Atlas of Instruments in OTOLARYNGOLOGY HEAD & NECK SURGERY

Vikram Bhat K
Manjunath D

Foreword
A Mahadevaiah

JAYPEE

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Disclaimer

The field of medicine and the world of instruments is ever changing. The nomenclature of many instruments does not have a universal consensus and is controversial. As new research and clinical experience broaden our knowledge, devising new instruments may be necessary. The authors of the material given in this book have consulted sources believed to be reliable in their efforts to provide complete, up-to-date information with the standards accepted at the time of publication. The authors have also added their individual opinions in certain circumstances wherever required. However, in spite of all the efforts by the authors and publishers, some errors might have been left uncorrected. The authors, publishers and the printers do not accept any responsibility regarding the nomenclature, depiction, controversies or any other inadvertent errors in the book. The book is only for academic and research purposes and not for legal purpose.

Atlas of Instruments in
OTOLARYNGOLOGY
HEAD AND NECK SURGERY

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Dedicated to

Our teachers

and

parents

Foreword

It gives me great pleasure in writing the foreword to *Atlas of Instruments in Otolaryngology, Head and Neck Surgery* by Dr Vikram Bhat K and Dr Manjunath D.

With rapid advances in surgical techniques in Otolaryngology, Head and Neck surgery, development of suitable and sophisticated surgical instruments have revolutionized the investigation process to get exact diagnosis of disease conditions and surgical operations. And at the same time, the surgeon requires suitable instruments for proper performance of by operative procedures to his satisfaction.

Both the authors of this interesting book are well-experienced surgeons and they have been able to collect the information and photographs of most of the equipment and instruments that are being used in our specialty.

They have described in detail the names of instruments/ equipment and materials used in surgical procedures. And also highlighted the names of surgeons who invented or developed with their brief life history and contribution made in development of some of surgical steps of few procedures.

It is really fascinating to read about the history of development of ENT specialty and instruments used during the period between 14th and 18th Century, and how they struggled to invent/develop instruments without proper technological support.

In these days, we see a lot of instruments that were developed in those days have became obsolete and historical.

Most of the undergraduates and postgraduates books are lacking in sufficient information about the instruments, and this book gives most of the information required about instruments. I complement and congratulate the authors for their hard work and skills to compile this useful book which will be very good guide to the undergraduates, postgraduates and practitioners. I strongly recommend it for all medical college and hospital libraries.

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Preface

The world of instruments is as vast as the ocean. We spend a lot of time in the company of these tools of trade, but rarely spare a thought as to what they are called and how wonderfully a few instruments have been designed to suit the needs. No single medical institute can boast to have the collection of all these instruments and it has become very difficult for the postgraduate students to even get a glimpse of all of them before appearing for the final examination. There are many varieties and types of a few instruments and many names for several of them. The differences between the instruments are also not obvious many times. The nomenclature of many instruments lacks standardization and there is no universal consensus, hence this topic is shrouded in controversies. This makes the task of properly identifying and naming many instruments very difficult though a student is expected to know this quite well. Hence, we decided to make an attempt to identify these instruments and tried to arrive at a consensus.

The book does not contain each and every instrument that is present in the specialty of otorhinolaryngology. However, we have made a sincere attempt to include more than 350 instruments that can be considered important from the point of view of the postgraduate students and the practitioners. There are special tips for the students to remember the names of instruments in the form of tables and list of common scientists. The list of instrument sets is particularly useful to the junior practitioner and also the operation theater staff. Another special feature of this book is that the photographs of instruments have been presented with their tips wherever necessary, for proper identification and grasping. Brief relevant history of certain instruments is included for the benefit of exam-going postgraduate students. I hope, this book comes to your help the next time you pick-up an instrument, wonder what it is called and do not know where to look for the answer. There is ample scope to improve this book and suggestions for the same will be gracefully accepted. The suggestions may please be sent to us at *vikram.ent@gmail.com* and *drmanjud@gmail.com*.

Vikram Bhat K
Manjunath D

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We have sought the help of several institutions, instrument dealers and individuals without whom this book would not have been possible. Hence, we would like to whole-heartedly thank the staff of the Department of ENT of the following institutions for permitting us to photographs of the instruments:

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The following persons have generously helped us in clarifying various doubts and controversies. Hence, we would like to profusely thank them for the same:

1. Dr Shivakumar, Professor and Head, Department of ENT, SS Institute of Medical Sciences and Research, Davangere, Karnataka, India
2. Dr RN Patil, Professor, Department of ENT, JN Medical College, Belgaum, Karnataka, India
3. Dr Dipak Ranjan Nayak, Professor and Unit Chief, Department of ENT, Kasturba Medical College, Manipal, Karnataka, India
4. Dr Ravi Sachidananda, Head and Neck Surgeon, Department of ENT, Chandlers Ford, Eastleigh, United Kingdom.

We would also like to acknowledge, all the instruments Companies whose instruments' photographs have been of immense help in the preparation of the book. The chief nurse of our operation theater Mrs Gurudevi G Betgeri has kindly cooperated with us for many photographs of instruments. We would like to sincerely thank her and the other operation theater staff of Karnataka Institute of Medical Sciences (KIMS), Hubli, Karnataka, India.

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1 Instruments in Ear

GENERAL EAR INSTRUMENTS

1. Jobson-Horne ear probe with ring curette (Fig. 1.1)

It has two ends. One end has a serrated probe and the other end has a ring.

Uses:

a. Removal of wax
b. Removal of foreign body in the ear and nose
c. Removal of granulations in the ear
d. The probe end is used to probe polyp in the nose and ear
e. The probe end can act as a cotton swab carrier and can clean the ear or apply medication.

Fig. 1.1: Jobson-Horne probe with ring curette

Table 1.1: Comparison between ear pick, ear hook, ear probe

S. No.	Ear pick	Ear hook	Ear probe
1.	Sharp	Blunt	Blunt
2.	Straight or curved or right angled	Angled	Straight
3.	No serrations	No serrations	Serrated
4.	Used in clearing of disease in crevices and hidden areas, freshen the margins of perforation	To palpate delicate structures, spread graft, to remove foreign body	To carry cotton wool for application of drugs or cleaning

2. Ear vectis with cerumen spud (Fig. 1.2)

This instrument is used to remove wax and foreign bodies from the ear. One end of this instrument has a ring vectis while the other end has a blunt curette.

Fig. 1.2: Ear vectis and cerumen spud

Fig. 1.3: Hartmann aural forceps

3. Hartmann aural forceps (Fig. 1.3)

This resembles the Tilley aural forceps. However, the tip is wide and spade like. Hence, this is used to deliver dressings and medications into the ear. It can also be used to remove foreign bodies in the ear canal.

4. Troeltsch aural forceps (Wilde) (Fig. 1.4)

This is a forceps used both in the ear and nose. It can be used to pack and unpack spaces and cavities. It can also deliver medications in dressings.

Fig. 1.4: Troeltsch aural forceps (Wilde)

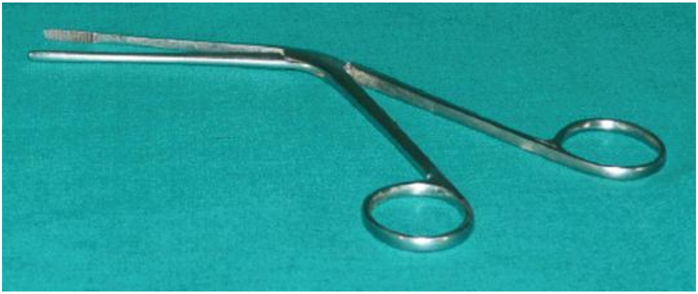


Fig. 1.5: Tilley aural forceps

5. Tilley aural forceps (Fig. 1.5)

This is an angled instrument with serrations only at the tip of the blades. It can also be used in the nose.

Uses:

a. For packing or unpacking the ear canal or mastoid cavity
b. For delivery of medicated dressings into the ear canal
c. For packing and unpacking the nose
d. For introduction of medicated pledgets for local anesthesia in the nasal cavity
e. Removal of foreign body/crusts/debris in the nose and ear.

6. Lucae curved aural forceps (Fig. 1.6)

This is a bayonet shaped instrument used to pack or unpack the ear. The bayonet shape ensures unobstructed view of the field while working.

John Shore *who invented the tuning fork in 1711 was a British musician.*

Heinrich Adolf Rinne *(1819–1868) and* **D Schwabach** *of Berlin in 1885 provided the information on the tuning fork tests. These tests provide one of the most valuable methods for differentiating between conductive and sensory neural deafness.*

Fig. 1.6: Lucae curved aural forceps

The Weber test is named after **Ernst Heinrich Weber** *(1795–1878) who was a German physician who along with his physicist brother Wilhelm published his studies in 1825. He was a professor of physiology and Anatomy. He is considered a founder of experimental psychology.*

Friedrich Bezold *(1842–1908) was the first to use terms "positive" and "negative" to describe the results of Rinne's test.*

The following are associated with him:

1. Bezold's abscess.
2. Bezold's mastoiditis: Mastoiditis with perforation into the digastric groove that creates a deep neck abscess.
3. Bezold's test: Method of testing deafness by use of a tuning fork.
4. Bezold's sign: Indication of descending mastoiditis.
5. Bezold's triad: Three symptomatic indications of otosclerosis.
   - I. Diminished aural perception of low frequency tones
   - II. Retarded bone conduction
   - III. Negative Rinne test

7. Tuning fork (Figs 1.7A and B)

Parts:

a. Two prongs
b. Shoulder

Fig. 1.7A: Hartmann tuning fork

Fig. 1.7B: Gardiner tuning fork

c. Stem
d. Base.

Common types:

a. Hartmann
b. Gardiner tuning fork.

The tuning fork is struck at the junction of upper one-third and lower two-third of the prongs. The vibrating tuning fork with the prongs in the acoustic axis is placed at a distance of 2.5 cm from the auricle for air conduction. The vibrating tuning fork is then placed with the base touching the mastoid process for bone conduction. It is available in various frequencies—128, 256, 512 and 1024. The 512 Hz tuning fork is commonly used for the following reasons.

a. It is present in the mid speech frequency range
b. Overtones are minimal
c. Sound is more auditory than tactile in nature
d. Tone decay is optimal.

Uses of the tuning fork:

a. To detect the type of hearing loss
b. To make an approximate estimate of the degree of hearing loss.

Fig. 1.8: Siegel pneumatic speculum with bulb

8. Siegel pneumatic speculum with bulb (Fig. 1.8)

Parts:

a. Rubber bulb
b. Rubber tube
c. Aural speculum
d. Eye piece with an oblique convex lens [Parallel to the tympanic membrane].

Uses:

a. Siegelization
b. Fistula test
c. Examination of external ear canal and tympanic membrane.
d. Instillation of medications.

9. Eustachian tube catheter (Fig. 1.9)

It is a metallic catheter with a curved proximal end and a ring at its base. The opening of its curved proximal end is at its tip. This instrument is usually 12 to 15 cm long. Ring on the proximal end indicates the direction of the tip of the catheter. This is not commonly used nowadays to test the patency of the Eustachian tube as there are other atraumatic equipments to do the same. It

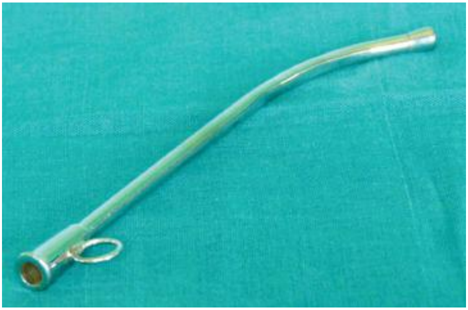


Fig. 1.9: Eustachian tube catheter

resembles the sinus douching cannula which is shorter and has an opening not at the tip but little proximal to it.

Uses:

a. To test the patency of Eustachian tube
b. To inflate the middle ear
c. To instill medications in the middle ear
d. To remove foreign bodies from the nose
e. As a suction cannula.

Other tests of Eustachian tube dysfunction:

a. Valsalva maneuver
b. Siegelization
c. Politzerization
d. Toynbee maneuver
e. Frenzel maneuver
f. Sonotubometry
g. Impedence audiometry
h. Radiological evaluation—X-ray, salphingography, CT scan, MRI.

Procedure of catheterization:

- Surface anesthesia of nose is achieved by spraying 4% lignocaine.
- The catheter is passed along the floor of the nose till it reaches the posterior wall of nasopharynx.

- The tip is now rotated 90 degrees medially and withdrawn anteriorly till the tip touches the posterior wall of the nasal septum.
- The catheter is now rotated 180 degrees laterally and the tip of the catheter is expected to be at the pharyngeal opening of the Eustachian tube.
- By gentle manipulation, the opening of the Eustachian tube is entered.
- Politzer bag is attached and the bag is squeezed.
- Sound heard on auscultation of the ear will give a clue to the status of the Eustachian tube.
- Inference—tubal block: no sound is heard, partial block: bubbling sound heard, stenosed: whistling sound heard, patent: air insufflation sound heard.

Complications of the procedure:

a. Severe pain
b. Epistaxis
c. Syncope
d. Damage to the pharyngeal end of the Eustachian tube.

Bartolomeus Eustachius *(1500–1574) an Italian Anatomist was one of the first to describe accurately the Eustachian tube and its relationship to the body. He wrote 'Epistola de Auditus Organis' that was the first book exclusively about ear. He also described tensor tympani muscle and stapes.*

Antonio Valsalva *(1665–1723): Antonio Valsalva (an Italian Anatomist) divided the ear into three parts, the outer, middle, and inner ear.*

- *Wrote 'De Aure Humana', describing anatomy as seen in over 1000 temporal bone dissections.*
- *He applied the term "labyrinth" to the entire inner ear.*
- *The parts of the cochlea were named as scala vestibuli and scala tympani.*
- *He described the muscles of the pinna.*
- *He named "Eustachian" for the pharyngotympanic tube in honor of Eustachius.*
- *He was the first to demonstrate the presence of ankylosis (abnormal immobility) of the stapes at postmortem.*

- *He suggested the use of the method of blowing out strongly while holding the mouth and nose closed, forcing air to pass into the middle ear by way of the Eustachian tube when it was blocked. This method is popularly called Valsalva maneuver.*

Jonathan Wathen, *in 1755, described the method of introduction of the Eustachian catheter by way of the nose to the Eustachian tube.*

Joseph Toynbee *(1815–1866) of England dissected more than 2000 temporal bones and formed the collection which became known as the Toynbee collection in the Museum of the Royal College of Surgeons. In 1860, his work "Disease of the Ear" was published. He noted that the Eustachian tube was not permanently open, but lightly closed, and that it opened only during such movements as swallowing or yawning. In one of his dissections, Toynbee recognized a fistula of the external semicircular canal and he pointed out that infection could extend to the brain by way of the labyrinth. Toynbee was one of the first to describe otosclerosis and he recognized it in 160 cases. While trying to treat his own tinnitus experimentally by inhaling chloroform and performing Valsalva maneuver, he died.*

10. Politzer apparatus (Fig. 1.10)

This is a test of Eustachian tube function.

Fig. 1.10: Politzer apparatus

Parts:

1. Rubber bulb
2. Nozzle
3. Rubber tube
4. Nose piece

The rubber tube is connected to the nozzle and the nosepiece is fixed inside the nasal cavity on the side of the Eustachian tube to be tested. The other nostril is closed to prevent air leak. The rubber bulb is now pressed and the patient is asked to swallow. By means of an auscultation tube connecting the patient's ear under test to the examiner's ear, a hissing sound is heard if the Eustachian tube is patent. This test can also be used to artificially ventilate the middle ear.

Adam Politzer *(1835–1913) was a prolific author and teacher. His name is associated with Politzer bag, cone of light, speculum and the test for unilateral deafness. He introduced one of the first mechanical audiometers. He correctly described otosclerosis as the disease of labyrinthine capsule, rather than being secondary to chronic middle ear catarrh as was thought. In 1896, he first published atlas of photos of tympanic membrane by illumination.*

11. Otoscope (Fig. 1.11)

It is a hand-held battery operated instrument used to visualize the external auditory canal, tympanic membrane and the middle

Fig. 1.11: Otoscope

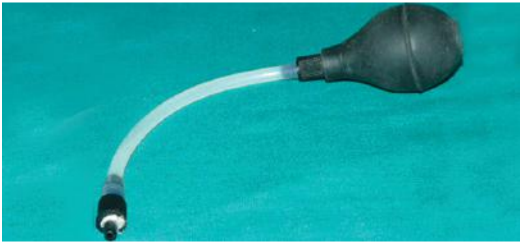


Fig. 1.12: Pneumatic attachment for otoscope

ear through the tympanic perforation. It has a convex lens which gives a magnification of two times. It has a fiberoptic light conveyance system for delivery of light to the aural speculum that is available in different sizes. Some of the otoscopes have a provision for attachment of pneumatic speculum for Seigelization.

Siegel, *in 1864, introduced pneumatic otoscope.*

12. Pneumatic attachment for otoscope (Fig. 1.12)

It has a bulb with a rubber tube attached to it and a nozzle at the tip of the tube for attachment to the otoscope. Used for checking the mobility of the tympanic membrane. Can also be used for fistula test.

13. Adult rigid otoendoscope (Fig. 1.13)

This is a short rigid telescope usually of 10 cm length and varying diameters—1.9, 2.7, 3.4 millimeters. It is available in 0, 30, 45, 70 degree angles. It has to be connected to a fiberoptic light source for illumination. Used to examine the external auditory canal, tympanic membrane and middle ear. The findings can be recorded through a camera.

14. Simpson aural syringe (Fig. 1.14)

It is a metallic syringe with a nostle piston inside a cylindrical body and a handle.

Fig. 1.13: Adult rigid otoendoscope

Fig. 1.14: Simpson aural syringe

Uses:

a. To remove softened wax
b. To remove nonhygroscopic foreign body and small hygroscopic foreign bodies.

Contraindications:

a. Perforated tympanic membrane
b. Otitis externa
c. CSF otorrhea
d. Large hygroscopic foreign body
e. Atrophic or thinned out tympanic membrane.

Complications:

a. Tympanic membrane rupture
b. Vasovagal attack
c. Injury to the external auditory canal
d. Vertigo due to stimulation of labyrinth.

15. Barany noise box (Fig. 1.15)

This is a device used to produce the noise and mask the non test ear during tuning fork test.

Robert Barany *(1876-1936) in 1906, invented the chair for use during vestibular testing. In 1914, he received Nobel prize for clarification of physiology and pathology of vestibular apparatus. He established caloric testing as diagnostic tool and also new criteria for diagnosis of labyrinthitis.*

Fig. 1.15: Barany noise box

16. Aural speculum (Figs 1.16A to E)

This is an instrument used to examine the external ear canal and the tympanic membrane. The speculum is gently inserted into the ear canal after pulling the pinna backwards, laterally and upwards in adults. In children, it is inserted in the canal by pulling the pinna backwards, laterally and downwards. This maneuver is essential to straighten the tortuous ear canal. The speculum is inserted up to the cartilaginous meatus without touching the bony canal as it is very sensitive and can be painful.

Fig. 1.16A: Holmgren self-retaining aural speculum

Fig. 1.16B: Hartmann aural speculum

Fig. 1.16C: Rosen aural speculum

Fig. 1.16D: Shea aural speculum

Fig. 1.16E: Tumarkin aural speculum

Uses:

a. Examination of the external ear canal and tympanic membrane
b. Removal of wax, foreign body, otomycosis or ear discharge
c. In operative procedures like myringotomy, myringoplasty, stapedotomy, stapedectomy
d. For transcanal injections.

There are several types of aural speculum.

a. Holmgren adjustable aural speculum
   This is a self-retaining adjustable aural speculum with a screw. Used for examination of ear and ear surgeries.
b. Hartmann aural speculum
   This is a funnel shaped speculum that has no slit on the body. The broader end is thickened for better grip.
c. Rosen aural speculum
   This is an aural speculum with an incomplete slit on its body. The slit is useful for injections on the external canal wall with the speculum in place.

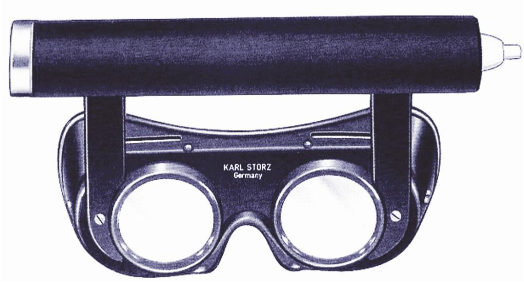


Fig. 1.17: Frenzel nystagmus spectacles with inbuilt battery handle

d. Shea aural speculum
   This aural speculum resembles Hartmann aural speculum. However, the narrow end of this speculum is beveled.
e. Tumarkin aural speculum
   This aural speculum has a complete split on its body to facilitate intra-aural injections into the external canal.

Other types of aural speculum:

f. Tonybee speculum
g. Farrier speculum
h. Politzer speculum
i. Heath speculum
j. Gruber speculum
k. Zollner speculum.

17. Frenzel nystagmus spectacles with inbuilt battery handle (Fig. 1.17)

This spectacle is used to detect the presence of nystagmus in a patient. The labyrinthine nystagmus is suppressed with visual fixation when worn by the patient. The power of this convex lens is 20 diopters and it prevents the visual fixation of the image. There is a battery pack and a bulb for illumination and detection of nystagmus.

HEARING DEVICES

18. Body level hearing aid (Fig. 1.18)

This is the largest of the hearing aids available and is inexpensive. The body of the hearing aid is kept in the pocket and connected to the receiver by wires. This model is available in the strong class and hence useful for the profoundly deaf.

19. Behind the ear hearing aid (Fig. 1.19)

This is a hearing aid worn behind the ear in which the microphone, amplifier, receiver and battery are present in one single unit. The amplified sound is delivered to the ear canal through a soft tube and an ear mould. It is suitable for all grades of hearing loss.

Fig. 1.18: Body level hearing aid

Fig. 1.19: Behind the ear hearing aid

20. In the ear hearing aid (Fig. 1.20)

This type of hearing aid is housed in an ear mould fitted into the concha of the ear. A small distal portion enters the ear canal. It is cosmetically more acceptable to the patient. This is suitable for patients with mild to moderate hearing loss.

Fig. 1.20: In the ear hearing aid

Fig. 1.21: Receiver in the canal hearing aid (RIC)

21. Receiver in the canal hearing aid (RIC) (Fig. 1.21)

This is also a behind the ear type hearing aid. However, the delivery system of the sound to the ear has receiver in the canal. Hence, this eliminates the need for an ear mould and can conveniently be removed and inserted by the patient.

22. In the canal hearing aid (Fig. 1.22)

This type of hearing aid is worn in the ear canal without projecting into the concha. This is suitable for patients with mild to moderate hearing loss.

Fig. 1.22: In the canal hearing aid

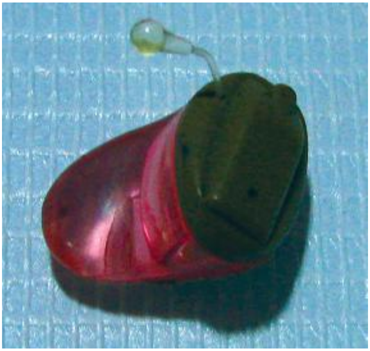


Fig. 1.23: Completely in the canal (CIC) hearing aid

23. Completely in the canal (CIC) hearing aid (Fig. 1.23)

Here, the main body of the hearing aid is completely inside the external auditory canal and there is an antenna sticking outside for easy removal.

24. Contralateral routing of signals (CROS) hearing aid (Fig. 1.24)

In this type of hearing aid, the microphone is fitted on the side of the deaf ear and the sound picked up from there is transmitted to the receiver placed in the better ear. Usually, it is available in

Fig. 1.24: Contralateral routing of signals hearing aid

Fig. 1.25: Bone anchored hearing aid

the spectacle model and is useful for severely hearing impaired persons in one ear only. This helps in better sound localization from the deaf side.

25. Bone anchored hearing aid (BAHA) (Fig. 1.25)

This is advancement over the bone conduction hearing aids and is an osseointegrated implant with a titanium abutment fixed to the skull.

Indications:

a. Absolute indication—bilateral canal atresia
b. Bilateral discharging ears
c. Congenital conductive impairment.

Parts:

a. Screw
b. Abutment (Titanium)
c. Ear level sound processor.

26. Middle ear implant (Vibrant sound bridge, Med-El, Austria) (Fig. 1.26)

This is a semi-implantable hearing device that resides beneath the skin without the visibility in the ear canal. It consists of an internal surgically implanted part—the vibrating ossicular

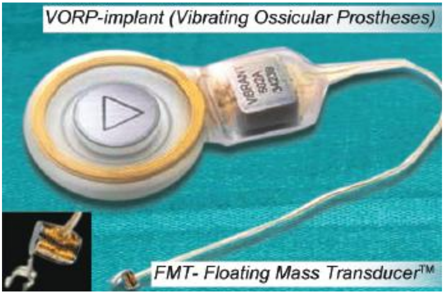


Fig. 1.26: Middle ear implant (Sound Bridge)

prosthesis (VORP) and an external audio processor. The VORP is made up of a receiving coil, conductor link and transducer. The transducer has a small electromagnetic coil and magnet to produce vibrations. This floating transducer is coupled to the long process of incus to transmit vibrations. This is meant for individuals who have serviceable hearing but are looking for improvements in sound quality, comfort and cosmesis.

27. Cochlear implant (Fig. 1.27)

It is an electronic device used in the profoundly deaf patients without any residual hearing for the direct electrical stimulation of the cochlear nerve through the inner ear. These are available as single channel and multichannel implants.

Parts:

a. External component: Present outside the body and consists of microphone, speech processor and transmitter.
b. Internal component: Fitted surgically on the head consisting of receiver stimulator and electrode array.

Models:

a. Nucleus 24
b. Clarion
c. MED – EL combi 40+.

Cochlear implants

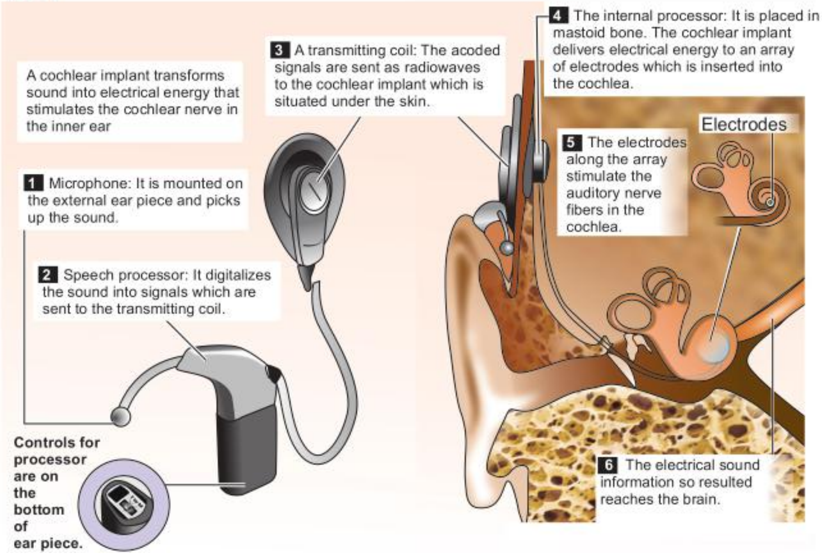


Fig. 1.27: Cochlear implant

William F. House *was a pioneer in reconciliation between neurosurgery and otology over acoustic neuromas which occurred in the late 1960s and 1970s. This was the birth of the field of skull base surgery. House had a tough time proving his credentials and persisted with his efforts in development of neurotology and finally succeeded in it. Glasscock noted that "had William F. House not had such a strong personality, had he not been so determined, then neurotology would not exist as we know it today". Starting in the 1960s, he researched on the idea of Cochlear implants. In 1984, House finally marketed the first cochlear implant.*

MYRINGOTOMY

28. Politzer myringotome (Fig. 1.28)

It is an instrument used to make an incision on the tympanic membrane for serous otitis media or unresolved acute otitis media. The incision may be in the anteroinferior quadrant for serous otitis media or posteroinferior quadrant for acute otitis media. The incision is radial for serous otitis media and circumferential for acute otitis media. Ventilation tube may be inserted on this incision if required in serous otitis media.

Lucae *in 1870 was the first to evaluate transmission of sounds through cranial bones.*

29. Lucae micro ear knife (Fig. 1.29)

This is a bayonet shaped myringotome available in various sizes for adults and children.

Fig. 1.28: Politzer myringotome

Fig. 1.29: Lucae micro ear knife (Myringotome)

30. Grommet (Figs 1.30A to H)

Materials used:

a. Fluoroplastic: It has non sticky surfaces that may reduce or preclude clogging or adhesions to the tube. It is a rigid material that is inexpensive, popularly used and facilitates easy tube insertions. It has proven biocompatibility.
b. Stainless steel: It is rigid for easy insertion and also biocompatible.
c. Silicone: It is a soft material that is easy to manipulate. It has proven biocompatibility. It can be compressed easily to aid insertion while it still retains its shape.
d. Titanium: These tubes have micro-polished lumens and flanges to discourage occlusion with blood or other fluids. It is about half the weight of stainless steel and hence easy for insertion. However, it is expensive.
e. Silver coated tubes: Here silver oxide is coated on silicone or fluoroplastic material. Silver has antimicrobial properties and has been clinically shown to reduce the incidence of postoperative otorrhea compared to other materials.

Fig. 1.30A: Sheehy type grommet

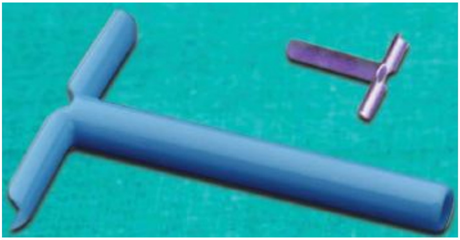


Fig. 1.30B: Goode 'T' tube

Mechanism of extrusion of ventilation tubes: The duration for which a ventilation tube is retained *in situ* after insertion depends on the structure of the grommet and the rate of migration of the tympanic epithelium. In general, tubes with collars ('Shoe-horn') or 'T' tubes are retained for much longer duration than the others. The centrifugal peripheral migration of the external tympanic epithelium pushes the tube towards the periphery of the tympanic membrane before final extrusion.

Types of ventilation tube:

a. Sheehy type grommet

   This is a fluoroplastic grommet with thin identical flanges. It has a classic collar button design with a large inner

Fig. 1.30C: Shepard large grommet

Fig. 1.30D: Shah large grommet

Fig. 1.30E: Baxter angled large grommet

Fig. 1.30F: Bobbin grommet

diameter that facilitates increased ventilation and reduced chances of blockage. This is a short-term grommet.

b. Goode 'T' tube

This is a long-term ventilation tube that is 'T' shaped. The horizontal limb of the 'T' has soft flanges. These flanges are folded to allow introduction through a small incision on the tympanic membrane. The soft flanges open up once introduced inside the middle ear. The flanges keep

Fig. 1.30G: Donaldson grommet

Fig. 1.30H: Armstrong beveled grommet

tube in position on the tympanic membrane while reducing chances of early extrusion. The soft flanges of the ventilation tube permit easy removal at any time.

c. Shepard grommet
This is also a fluoroplastic grommet where one flange is thicker than the other. The thicker flange has to lie on the outer lateral surface of the tympanic membrane. This is relatively easy for insertion and is a short-term grommet.

d. Shah type ventilation tube
This grommet has a 'shoehorn' type tab on its inner flange that facilitates insertion in small incisions and resists extrusion. The thicker flange lies on the outer surface of the tympanic membrane.

e. Baxter angled grommet
This is a fluoroplastic grommet that is funnel shaped. There is a thin flange on the medial end and beveling on the lateral end.

f. Bobbin grommet
This is also a fluoroplastic grommet. The lateral end is bell shaped while the medial end has a thin flange. The bell shape may improve ventilation and view through the lumen.

The lumen's straight section provides better balance on the tympanic membrane for improved retention.

g. Donaldson grommet
   This is a short-term fluoroplastic grommet that has unequal flanges. The inner flange is bigger and has a larger diameter. The outer flange is smaller.
h. Armstrong grommet
   The inner medial flange of this grommet is beveled and is consistent with tympanic membrane angle for easier insertion and removal. The lumen is parallel to ear canal for better visibility through the tube.

31. Grommet introducer (Fig. 1.31)

This instrument is used to anchor the grommet at its tip and then deliver and fix on the incision made on the tympanic membrane. The grommet is released from the tip when the finger grips are approximated.

Fig. 1.31: Grommet introducer

MASTOIDECTOMY AND TYMPANOPLASTY

32. Hanging motor drill (Fig. 1.32)

Parts:

a. Motor: This has a range of 12,000 to 20,000 rpm
b. Transmission cable
c. Foot switch.
   This motor is uncommonly used nowadays and has largely been replaced by the superior micromotor.

33. Handpiece for hanging motor drill (Fig. 1.33)

This is a more rugged and heavier handpiece than that of the micromotor. It requires a screw stud and a small spanner to insert and remove the bur tip every time.

Fig. 1.32: Hanging motor drill

Fig. 1.33: Handpiece for hanging motor drill

34. Micromotor unit for drilling (Fig. 1.34)

Parts:

1. Console: It consists of power supply to the micromotor. Using a switch the foot switch can be bypassed for continuous mode. Another switch is used to change the direction of rotation. An adjustable knob is used to increase or decrease the rotations per minute (Usually 30,000 to 40,000 rpm). The rotation speed may go upto 80,000 rpm.
2. Wire: Connects the console to the foot switch and console to the micromotor.

Fig. 1.34: Micromotor unit for drilling

3. Foot switch: Used to control the micromotor.
4. Micromotor.

Uses:

1. For drilling mastoid and ear canal
2. Can also be used to drill bone for choanal atresia, endoscopic dacryocystorhinostomy and Sistrunk operation
3. Ossicular sculpting
4. During stapedotomy to remove overhang
5. Dental and maxillofacial surgeries
6. Caldwell-Luc operation
7. Frontal sinus wall drilling
8. Mandibulectomy.

35. Micromotor drill handpiece (Fig. 1.35)

This is a detachable portion of the micromotor used to anchor the burs. The bur is inserted by unlocking the thread of the handpiece. The bur is pushed inside the handpiece and then locked to secure it. This handpiece is held like a pen during mastoid drilling.

36. Contrangle handpiece (Fig. 1.36)

This is a micromotor handpiece that is bent at an acute angle to facilitate unobstructed drilling of the middle ear and mastoid. It is held and used in the same way as a straight handpiece.

Fig. 1.35: Micromotor drill straight handpiece

Fig. 1.36: Contrangle handpiece

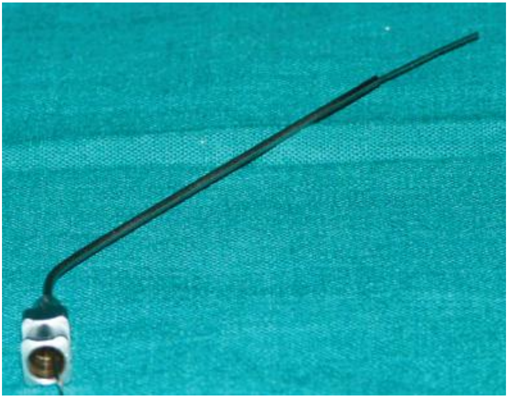


Fig. 1.37: Verhoeven ear microsuction tip

37. Verhoeven microsuction tip (Fig. 1.37)

This metallic suction tip is available in various sizes and is used for ear surgery under the operating microscope. Even though, it sucks out only a small quantity of fluid at a time, it is safe near vital structures.

38. Ear microsuction tip adapter (Fig. 1.38)

This is an instrument used to connect the rubber tube to the microsuction tip.

Fig. 1.38: Microsuction tip adapter

39. Farabeuf mastoid periosteal elevator (Fig. 1.39)

Parts: Handle, neck, thumb rest and broad tip.
Uses:

a. To elevate periosteum over mastoid bone in mastoidectomy
b. To elevate soft tissues and periosteum during Caldwell-Luc operation
c. Can also be used to elevate periosteum and soft tissues during maxillectomy, lateral rhinotomy and mandibulectomy.

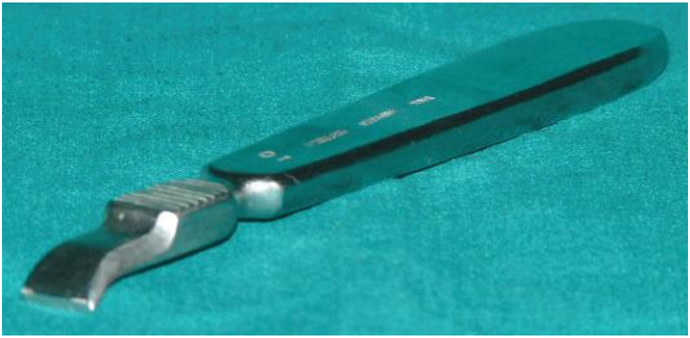


Fig. 1.39: Farabeuf mastoid periosteal elevator

Fig. 1.40: Mollison self-retaining 4×4 pronged mastoid retractor

40. Mollison self-retaining mastoid retractor (4×4 prongs) (Fig. 1.40)

This is a self-retaining mastoid retractor with four prongs on either blade. Besides retracting the tissue and fascia from the field of operation it can also secure hemostasis by compressing the vessels.

Uses:

1. Harvesting temporalis fascia
2. Mastoidectomy, tympanoplasty
3. In head and neck surgeries like tracheostomy and laryngofissure.

41. Plester self-retaining mastoid retractor 1 (3×3 prongs) (Fig. 1.41)

This is a mastoid retractor with 3×3 prongs of which one middle prong on one side is slighty longer. This longer prong is used to retract the external canal skin anteriorly for better visualization of external canal and middle ear. Hence, this retractor is separate for right and left sides.

Fig. 1.41: Plester 3×3 pronged (one long) mastoid retractor 1

42. Plester mastoid retractor 2 (2×2 prongs) (Fig. 1.42)

This is a self-retaining mastoid retractor with two prongs on either arm. All the prongs are identical. Used in mastoidectomy and tympanoplasty.

Fig. 1.42: Plester 2×2 pronged mastoid retractor 2

Fig. 1.43: Weitlaner 3×4 pronged mastoid retractor 1

Fig. 1.44: Weitlaner 2×3 pronged mastoid retractor 2

43. Weitlaner (3×4 prongs) mastoid retractor 1 (Fig. 1.43)

This is a self-retaining mastoid retractor with 3×4 prongs. All prongs are identical. Very much required for any mastoid surgery. Also used in head and neck surgeries like tracheostomy and thyroidectomy.

44. Weitlaner mastoid retractor 2 (2×3 prongs) (Fig. 1.44)

It is also a self-retaining mastoid retractor of smaller size. Hence, it is suitable for children.

Fig. 1.45: Jansen 3×3 pronged mastoid retractor

45. Jansen mastoid retractor (3×3 prongs) (Fig. 1.45)

This is a self-retaining mastoid retractor with three prongs on either arm. The arms are widened by turning a screw. Used in mastoid surgeries.

46. Wullstein self-retaining mastoid retractor (3×3 prongs) (Fig. 1.46)

This is a self-retaining mastoid retractor with three prongs on either arm. All the prongs on either arm are identical. Commonly used for mastoid surgeries.

Fig. 1.46: Wullstein 3×3 pronged mastoid retractor

Wullstein *performed first successful tympanoplasty inculcating basic principles, using free skin grafts. With* **Zollner** *he classified tympanoplasties into different types (I to VI).*

47. Mahadevaiah mastoid retractor (Fig. 1.47)

This is a self-retaining mastoid retractor with conical shaped blade like an ear speculum on either arm. The blade has pointed studs to anchor to the skin or soft tissue and prevents the retractor from slipping. Used in transcanal or endaural ear surgeries.

48. Lempert endaural mastoid retractor with third blade (Fig. 1.48)

This is a self-retaining mastoid retractor used mainly in the endaural ear surgeries. The speciality of this instrument is that it has an adjustable third blade that can retract the soft tissues entering the surgical field in a perpendicular direction.

Fig. 1.47: Mahadevaiah mastoid retractor

Fig. 1.48: Lempert endaural mastoid retractor with third blade

Julius Lempert *(1890–1968) is considered by some as the father of modern otology. He developed endaural approach to ear surgery and popularized the drill in otological surgery. According to Glasscock, his exposure of carotid artery during temporal bone surgery in 1938 was one of the significant events of skull base surgery.*

49. Perkin self-retaining mastoid retractor (1×3 prongs) (Fig. 1.49)

This is a self-retaining mastoid retractor that has three prongs of equal sizes on one blade and a single flat broad prong on the other blade. The flat prong is used to retract the canal skin during mastoid and middle ear surgeries.

50. Lempert endaural speculum (Fig. 1.50)

It is an aural speculum that is curved and used for making canal incisions and endaural surgeries.

51. Combined suction irrigation cannula (Fig. 1.51)

Here, the irrigation cannula and the suction cannula are present together. This eliminates the need for a surgical assistant to irrigate

Fig. 1.49: Perkin self-retaining 1×3 pronged mastoid retractor

Fig. 1.50: Lempert endaural speculum

Fig. 1.51: Combined suction irrigation cannula

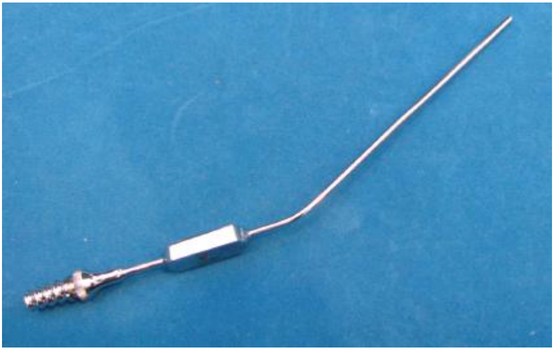


Fig. 1.52: Lempert mastoid suction tube

the drilling field with normal saline. This instrument is very useful in temporal bone dissection laboratory.

52. Lempert mastoid suction tube (Fig. 1.52)

This is a suction tip used in ear surgeries. It has a thumb rest with a vent to control the force of the suction. Available in various sizes.

53. Cutting bur (Fig. 1.53)

This is a bur tip with grooves and sipes on its body and is available in various sizes. Fewer the sipes, larger is the chunk of bone removed during drilling. Here, the cutting surface is not the tip

Fig. 1.53: Cutting bur

Fig. 1.54: Polishing diamond bur

of the bur but the side. The largest bur is used initially to perform mastoidectomy. The bur tip might be made up of steel, tungsten carbide or titanium. The diameter of the cutting bur and the diamond bur varies from 0.5 mm to 7 mm and the length varies from 45 mm to 70 mm.

54. Diamond bur (Fig. 1.54)

Made up of steel, tungsten carbide or titanium and is available in various sizes. There are two types of diamond burs. The one which has an irregular, coarse surface is a cutting or coarse diamond bur. The one with a regular, rough surface is a polishing fine diamond bur. Both of them do not have sipes or grooves on the surface. Hence, the polishing bur removes bone much more slowly and smoothly during drilling. Therefore, it is preferred for use on delicate structures like the facial nerve and sigmoid sinus. It is also used for polishing the surface of many structures in the middle ear and mastoid after drilling with a cutting bur during mastoidectomy. In this process of polishing it can stop bleeding from bony surfaces by clogging the vessels with bone dust.

55. Jenkin mastoid gouge (Fig. 1.55)

A gouge is an instrument with a curved rounded tip that has smooth beveling. Hence, it cuts bone in a circular pattern. It is held at an acute angle to the bone for cutting it and a hammer is

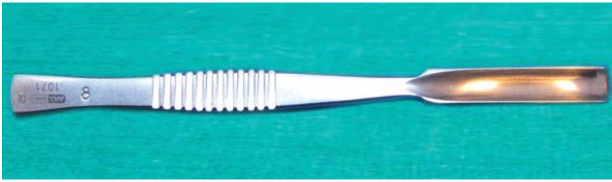


Fig. 1.55: Jenkin mastoid gouge

used for hitting on it. The gouge has been replaced by the electrical drill in the present day.

Uses:

a. Remove hard bone during mastoidectomy
b. Caldwell-Luc operation
c. Excision of exostosis in external auditory canal.

GJ Jenkins *(1874–1939) taught anatomy and then otology at King's College Hospital, London. He was a pioneer in the surgical treatment of meningitis. He attempted fenestration surgery for otosclerosis and opened horizontal canal.*

56. House graft press forceps (Fig. 1.56)

Used to press and shape harvested cartilage, vein graft or fascia before using for ossiculoplasty or stapedectomy.

Fig. 1.56: House graft press forceps

Fig. 1.57: Lempert mastoid curette

57. Lempert mastoid curette (Fig. 1.57)

Used to curette chunks of bone from mastoid and ear canal during ear surgeries like tympanoplasty, mastoid exploration or stapedotomy. Can also be used to remove granulation tissue and cholesteatoma.

58. MacEwen cell seeker and curette (Fig. 1.58)

This instrument has two ends. One end is a curved probe while the other end is a curette. The probe end is used to determine the direction of aditus ad antrum and other air cells. The curette is used to remove diseased air cells, bony overhangs and spicules.

Fig. 1.58: MacEwen curette and cell seeker

Fig. 1.59: Mastoid microgouge

Sir William MacEwen *(1848–1924) was born in Scottish island of Bute. He must be called the first skull base surgeon, versed equally well in surgeries of ear and brain. He pioneered the aseptic surgery of brain and temporal bone.*

59. Mastoid microgouge (Fig. 1.59)

To remove small chunks of bone from mastoid and external canal during mastoid exploration.

60. Micro ear ball probe (Shea) (Fig. 1.60)

This is an atrumatic instrument since it is ball tipped.
Uses:

a. This is used to explore and palpate various structures in the middle ear and mastoid

Fig. 1.60: Micro ear ball probe

b. It can also be used to position the graft and place gel foam during tympanoplasty
c. To locate the antrum
d. Can be used as a cell seeker.

61. Micro ear curved pick (Cawthorne) (Fig. 1.61)

This is a sharp curved instrument with a number of uses in all ear surgeries.

Uses:

a. To clear granulation tissue and tympanosclerotic plaques in the crevices of the mastoid and middle ear
b. To spread the graft during the tympanoplasty
c. To freshen the margins of tympanic perforation
d. Stapedotomy
e. Myringotomy with grommet insertion
f. Facial nerve decompression.

62. Paperella Duckbill micro ear elevator (Fig. 1.62)

It has a handle, shaft and a blunt broad spade like tip.

Uses:

a. To spread graft during tympanoplasty
b. To clear granulation tissue and cholesteatoma in middle ear and mastoid

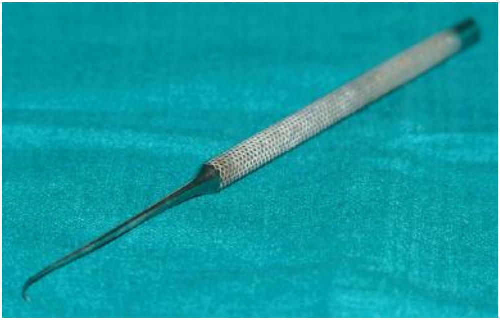


Fig. 1.61: Micro ear curved pick

Fig. 1.62: Paperella Duckbill micro ear elevator

c. To remove bone covering facial nerve in facial nerve decompression
d. To elevate the tympanomeatal flap in tympanoplasty and stapedotomy.

63. Micro ear right angled pick (Cawthorne) (Fig. 1.63)

It has a handle, shaft and a sharp pick at right angles to the shaft.
Uses:

a. To remove pieces of broken footplate during stapedectomy
b. To spread the graft during tympanoplasty
c. To freshen the margins of tympanic membrane perforation.

Fig. 1.63: Micro ear right angled pick

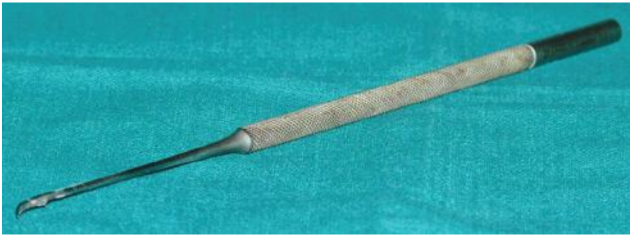


Fig. 1.64: Micro ear sickle knife

64. Micro ear sickle knife (Shea) (Fig. 1.64)

Uses:

a. To freshen the margins of tympanic membrane perforation
b. For myringotomy incision
c. Skeletonization of the handle of malleus
d. To break the middle ear adhesions
e. Dislocation of incudostapedial joint during stapedectomy and while drilling mastoid at the attic near ossicles.
f. To incise the facial nerve sheath in facial nerve decompression.

65. Micro ear straight pick (Cawthorne) (Fig. 1.65)

This is a sharp straight instrument.

Uses:

a. To clear granulation tissue and tympanosclerotic plaques in the mastoid and middle ear
b. To spread the graft during the tympanoplasty
c. To freshen the margins of tympanic perforation.

66. Plester flag knife (Fig. 1.66)

This is a micro ear instrument used mainly to make a horizontal incision on the external canal wall skin during elevation of tympanomeatal flap. It is also used to elevate tympanomeatal flap. Hence used in middle ear surgeries like myringoplasty, tympanoplasty and ossiculoplasty.

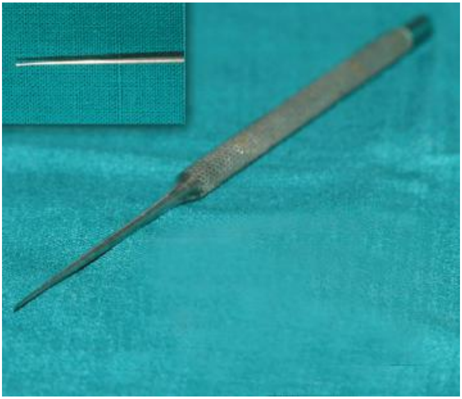


Fig. 1.65: Micro ear straight pick

Fig. 1.66: Plester flag knife

67. Rosen micro ear round knife (Fig. 1.67)

It is a microear instrument that has a sharp spade like rounded tip. The upper surface of the spaded tip might be serrated for roughening the undersurface of the remnant tympanic membrane. This spaded tip might also have small vents to permit suction. The tip is bent at an angle of 120° to the shaft.

Uses:

a. External canal skin tympanomeatal incision
b. Elevation of tympanomeatal flap during myringoplasty, tympanoplasty

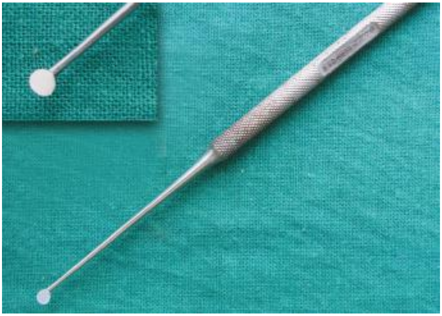


Fig. 1.67: Rosen micro ear round knife

c. Freshening the margins and undersurface of the perforation during myringoplasty and tympanoplasty
d. To break middle ear adhesions, especially between handle of malleus and promontory as in a case of atelectasis
e. To clear granulation tissue and cholesteaoma in certain hidden areas of the middle ear like facial recess and sinus tympani.

68. House ear microcurette (Fig. 1.68)

This instrument is used to remove small chunks of bone during mastoid exploration, stapedotomy, facial nerve decompression and tympanoplasty. It can remove overhang of bone and bony spicules near vital structures like facial nerve safely. Posterosuperior bony canal overhang is curetted in superior to inferior direction to avoid injury to the ossicular chain.

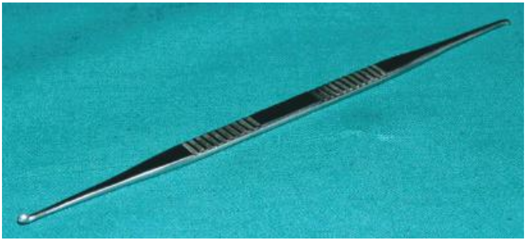


Fig. 1.68: House ear microcurette

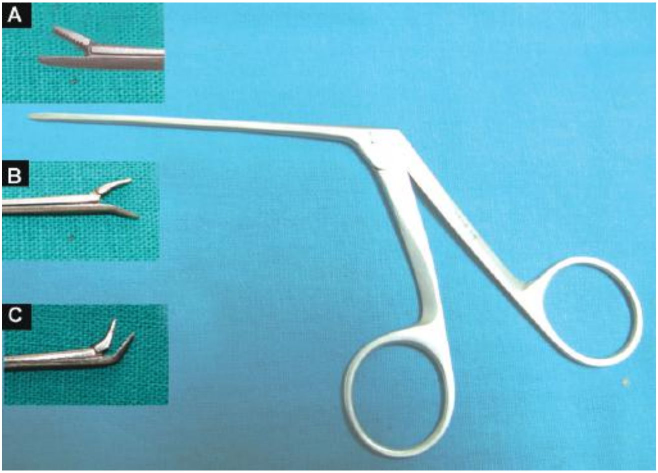


Fig. 1.69: Alligator forceps

69. Alligator forceps (Fig. 1.69)

This instrument is available as straight (A), downturned (B) or upturned (C) forceps. Also known as crocodile forceps.
Uses:

a. To hold graft materials like temporalis fascia and transfer it from one place to another
b. To hold and transfer gel foam and cotton pledgets
c. To hold and transfer ossicles, teflon piston, grommet or TORP/PORP
d. The upturned and downturned types are used to reach crevices and inaccessible areas in the middle ear and mastoid for the above purposes.

70. Wullstein cupped forceps (Fig. 1.70)

This single action instrument is available as straight (A), upturned (B), right turned (C) and left turned (D) cupped forceps.

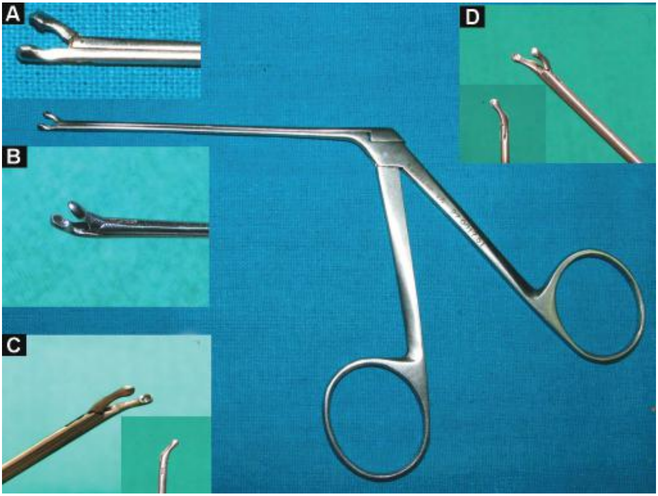


Fig. 1.70: Wullstein cupped forceps

Uses:

a. To remove granulation tissue, cholesteatoma, tympanosclerotic plaques from middle ear and mastoid cavity
b. To take a biopsy from middle ear and mastoid cavity
c. To hold and transfer ossicles in the middle ear
d. The curved varieties are useful to reach crevices and inaccessible areas of middle ear.

71. Wullstein toothed alligator forceps (Fig. 1.71)

This is a straight alligator forceps with two teeth in the lower jaw and one tooth in the upper jaw that makes the grasp of slippery materials better. Hence, it can grasp ossicles, grommets, stapes piston, etc.

72. Straight (A) and right angled (B) micro ear scissors (Fig. 1.72)

These are fine and delicate single action scissors.

Fig. 1.71: Wullstein toothed alligator forceps

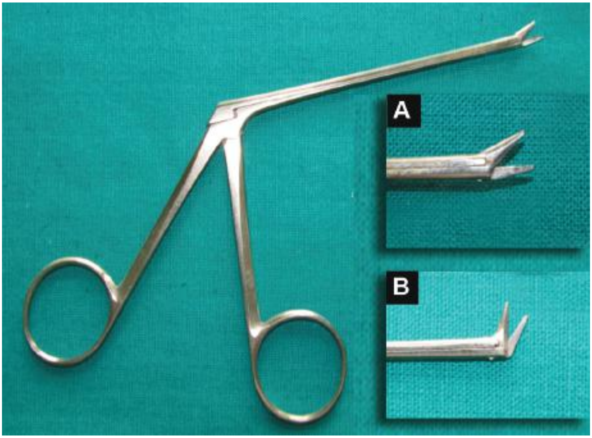


Fig. 1.72: Straight and right angled micro ear scissors

Uses :

a. To cut stapedius tendon, tensor tympani tendon
b. To cut middle ear adhesions
c. To cut the freshened margins of the tympanic perforation
d. To cut skin tags during transcanal incision
e. To cut the chorda tympani nerve when required.

Fig. 1.73: Derlecki ossicle holding forceps

Fig. 1.74: House Dieter malleus head nipper

73. Derlecki ossicle holding forceps (Fig. 1.73)

This instrument is used to hold and stabilize cartilage or ossicle for further sculpting before using for ossiculoplasty. It resembles a tissue forceps but the tip is grooved to hold the ossicle and the blades are tightened using a screw.

74. House Dieter malleus head nipper (Fig. 1.74)

To excise the head of malleus and parts of incus during clearance of middle ear disease and atticotomy.

75. Dewecker micro dissecting spring scissors curved (Fig. 1.75)

It is available in various sizes and can be used like a micro ear scissors. It is used in tympanoplasty for cutting the freshened margins of the tympanic perforation, to cut skin tags, etc.

Fig. 1.75: Dewecker micro dissecting spring scissors curved

76. Rosen curved microcurette (Fig. 1.76)

This is used to curette out small chunks of bone close to delicate and vital structures.

Uses:

a. Remove overhang of bone over facial nerve in stapedotomy
b. In facial nerve decompression
c. Canalplasty
d. Mastoidectomy.

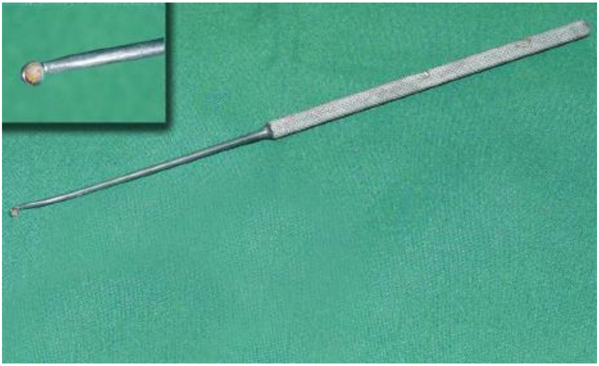


Fig. 1.76: Rosen curved microcurette

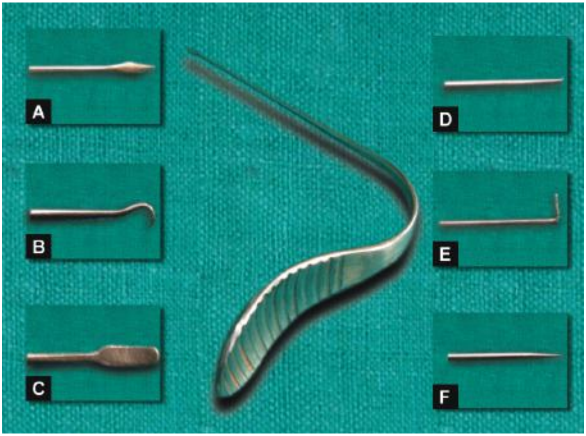


Fig. 1.77: Zollner set

77. Zollner micro ear instrument set (Fig. 1.77)

These are thumb held set of microear instruments and the set consists of the following:

A. Myringotome
B. Curved pick
C. Microelevator
D. Right angled pick
E. Right angled hook
F. Straight pick
G. Sickle knife.

Zollner *was the first to apply principles of middle ear transformer to surgical reconstruction of middle ear.*

78. Schuknecht roller knife (Fig. 1.78)

This has a handle at the tip of which is a rotating round knife. Hence, it can be used to make incisions in the ear canal for ear surgeries like tympanoplasty, stapedectomy, etc.

Fig. 1.78: Schuknecht roller knife

Fig. 1.79: Trautmann micro ear knife

79. Trautmann micro ear knife (Fig. 1.79)

This instrument resembles the myringotome. However, the shape of the knife at the tip is different. The knife is flat, blunt on one side while it is convex and sharp on the other side. Can be used for myringotomy and other middle ear surgeries.

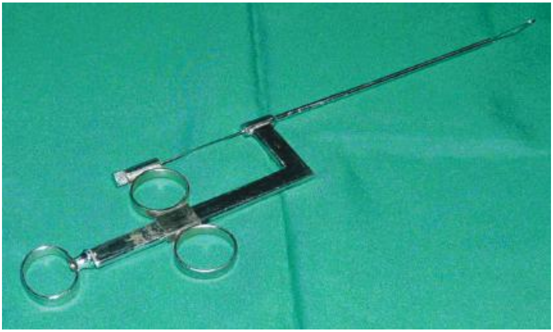


Fig. 1.80: Glegg aural snare

80. Glegg aural snare (Fig. 1.80)

This is a small snare that is used to remove aural polyp. Here, the snare wire is not in line with the handle of the instrument but is parallel to it; hence differs from Krause snare. This snare excises the polyp by crushing the pedicle with a blunt wire, thereby reducing the bleeding. This instrument is not used commonly nowadays.

81. Staecke guide and protector (Fig. 1.81)

This is a curved instrument used as a guide into the aditus, antrum and to protect the facial nerve, incus and horizontal semicircular canal while widening the aditus.

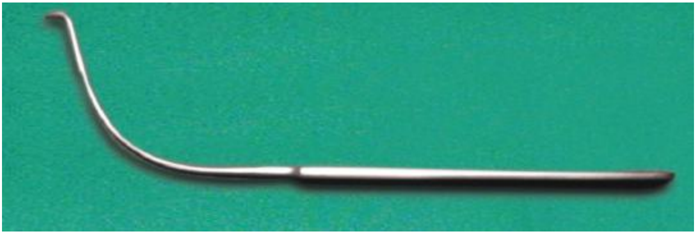


Fig. 1.81: Staecke guide and protector

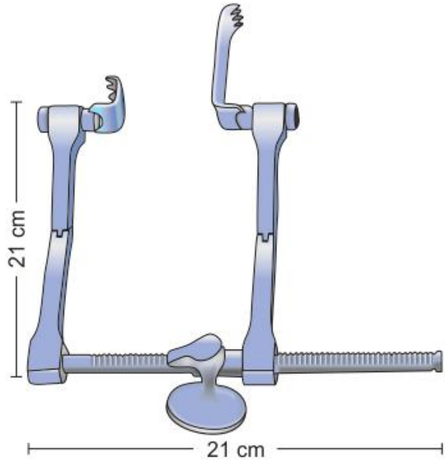


Fig. 1.82: Fisch glomus retractor

Staecke *in 1891, added meatal skin flap to cover the radical cavity. He and Zaufal made attic, tympanum and antrum into one cavity which is known as Staecke's operation. He was the first to approximate the severed facial nerve intratemporally.*

82. Fisch glomus retractor (Fig. 1.82)

Used to retract soft tissues in the mastoid and neck during excision of glomus tumors.

William Wilde *(1815–1876), was an Irish who studied in London, Berlin, and Vienna and then settled in Dublin where he was an ophthalmologist and an otologist. He wrote 'Practical observations on aural surgery, and the nature and treatment of diseases of the ear'. He recommended incision over the mastoid bone down through the periosteum in fluctuant mastoiditis. The incision popular even today is known as 'Wilde's incision'. For fostering the growth of otology as a speciality, he is known as "Father of modern otology". He invented angled shaft on aural instruments.*

OSSICULAR IMPLANTS

Ossicular reconstruction

Materials used for ossicular reconstruction

There are two types of materials

1. Natural—cartilage and bone (Auto and allografts)
2. Biomaterials used for TORP and PORP
   a. Hydroxyapatite: The dense variety (Ceramic calcium phosphate) resembles natural bone, resists degradation and provides good sound conduction. Besides it can be sculpted and shaped as per the requirement. It is one of the popular materials.
   b. Titanium: Light weight metal, biocompatible
   c. Platinum: It is non-corrosive, biocompatible, non-magnetic and malleable.
   d. Stainless steel: Good sound conduction, polished surfaces, resists adhesions
   e. Fluoroplastic [Teflon]: Excellent sound conduction, smooth, non sticky surface minimizes adhesions, proven biocompatibility.
   f. Gold: Malleable, biocompatible.

83. Total ossicular replacement prosthesis [TORP] (Fig. 1.83)

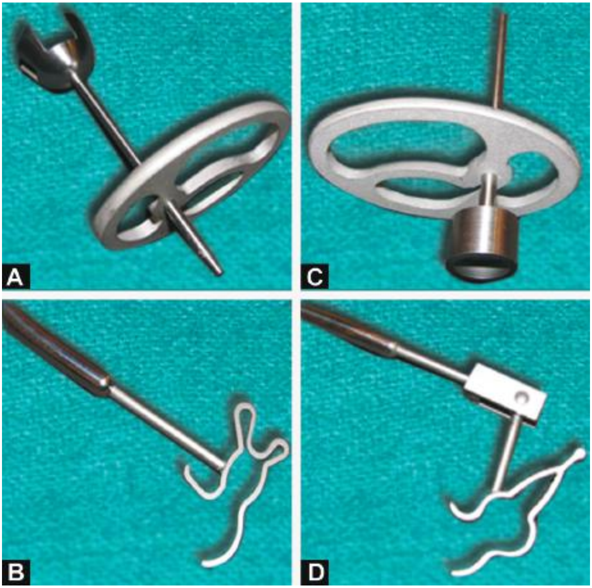
The prosthesis shown is made up of teflon and has a head and a thin shaft. The shaft is placed on the footplate of stapes. The graft is placed on the head of the prosthesis in the absence of malleus. In the presence of malleus, the graft may be placed over the handle of malleus.

84. Partial ossicular replacement prosthesis [PORP] (Fig. 1.84)

The prosthesis shown here is made up of teflon and has a head and a thick shaft. The shaft is placed on the head of the stapes. The graft may be placed on the head of the prosthesis.

Fig. 1.83: Total ossicular replacement prosthesis

Fig. 1.84: Partial ossicular replacement prosthesis



Figs 1.85A to D: Ossicular prosthesis—titanium

85. Models of ossicular replacement prosthesis—titanium (Figs 1.85A to D)

These prostheses are made up of titanium and the structure can be adjusted according to the needs.

A, B—PORP

C, D—TORP

STAPES INSTRUMENTS

86. Fisch titanium stapes piston (Fig. 1.86)

Available in various sizes and used during stapedotomy.

87. Causse teflon stapes piston (Fig. 1.87)

This is a loop piston made up of teflon available in various sizes ranging from 0.4 mm to 0.8 mm (diameter of piston shaft). The length of the shaft is adjusted using a measuring rod and a jig.

Fig. 1.86: Fisch titanium stapes piston

Fig. 1.87: Causse teflon stapes piston

88. McGee wire stapes prosthesis (Fig. 1.88)

It is wire prosthesis with a stainless steel or platinum wire and a flouroplastic handle used for stapedotomy. The wire portion is used to crimp on the long process of incus.

89. Piston holding forceps (Fig. 1.89)

This is a forceps resembling alligator forceps. However, there is a groove on both the blades to grasp the piston firmly without crushing it.

Fig. 1.88: McGee wire stapes prosthesis

Fig. 1.89: Piston holding forceps

90. Schuknecht wire bending die (Fig. 1.90)

This instrument is used to prepare the stainless steel wire prosthesis during stapedotomy. The die is used to produce the appropriate button hook shape for attachment to the incus. A millimeter scale is provided on the bending die for accurate measurement of the length of the prosthesis.

Fig. 1.90: Schuknecht wire bending die

Fig. 1.91: Stapedectomy piston measuring rod (Shea)

91. Shea stapedectomy piston measuring rod (Three markers) (Fig. 1.91)

This instrument is used to measure the length from the undersurface of stapes footplate to the midpoint of incus during stapedectomy. There are three spikes from the lowermost end at a distance of 3 ¼, 3 ½ and 3 ¾ mm. The length of the teflon piston to be inserted is decided by adding 0.25 mm to the length measured earlier.

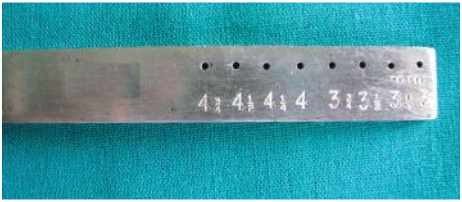


Fig. 1.92: Stapes piston measuring jig

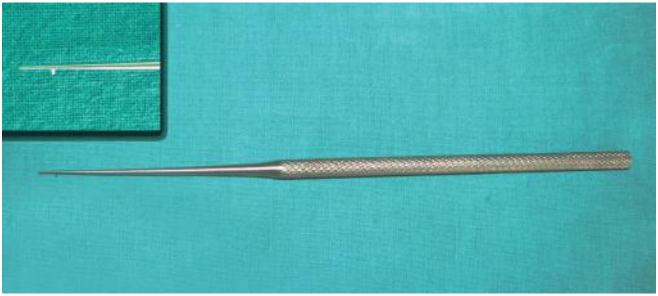


Fig. 1.93: House measuring rod

92. Stapes piston measuring jig (Fig. 1.92)

It is an instrument used to cut the exact length of stapes piston required during stapedotomy. This instrument has markings and perforations. The teflon piston is to be inserted in the perforation that corresponds to the distance from the long process of incus to the fenestra on the footplate. The excess length of the piston is then cut off with a blade.

93. House stapedectomy piston measuring rod (Fig. 1.93)

This is used to measure the distance between the footplate and the long process of incus. This instrument is available in various sizes with marker at different places from the tip, i.e. 3.5 mm, 4 mm, 4.5 mm and 5 mm.

Fig. 1.94: Stapedectomy perforator bur straight

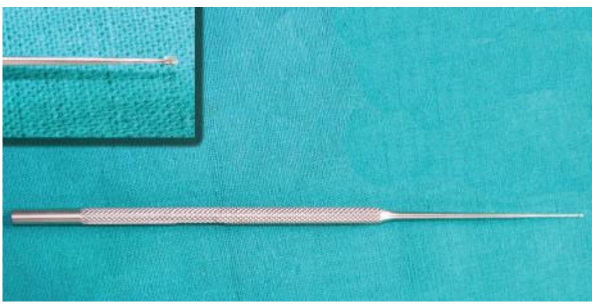


Fig. 1.95: Larkin hand perforator bur

94. Stapedotomy perforator bur straight (Fig. 1.94)

This instrument resembles the straight pick from a distance. However, a closer look shows that a guard is present a little distance away from its tip to avoid excessive penetration through the footplate. This instrument is available in various sizes and is used to make an accurate perforation on the footplate of stapes. This perforation has to be slightly larger than the diameter of the piston handle.

95. Larkin hand perforator bur (Fig. 1.95)

This is used to widen the fenestra made by a hand perforator before inserting the stapes piston during stapedotomy.

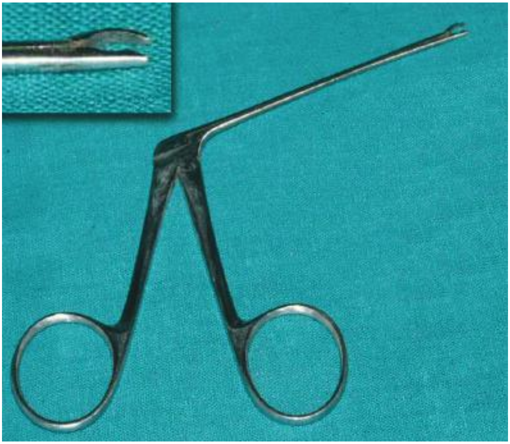


Fig. 1.96: McGee stapes piston crimper

96. McGee stapes piston crimper (Fig. 1.96)

It resembles the alligator forceps, however the upper jaw is longer than lower jaw and curved. It is used to crimp the ring head of the stapes piston and stabilize it on the long process of incus.

97. Fisch crurotomy scissors (Fig. 1.97)

This is a upturned microscissors where the blades are flattened sidewards. This is used to cut the stapes crura during stapedectomy/stapedotomy.

98. Crurotomy knife (Tip) (Fig. 1.98)

This is similar to the microear sickle knife. However serrations are present on the sharp end of the knife. This is used to cut the anterior and posterior crura during stapedotomy/stapedectomy.

Julius Lempert *in 1938, developed the fenestration operation. This led to renaissance of reconstructive surgery for conductive hearing loss. This helped to develop stapedotomy for the treatment of otosclerosis.*

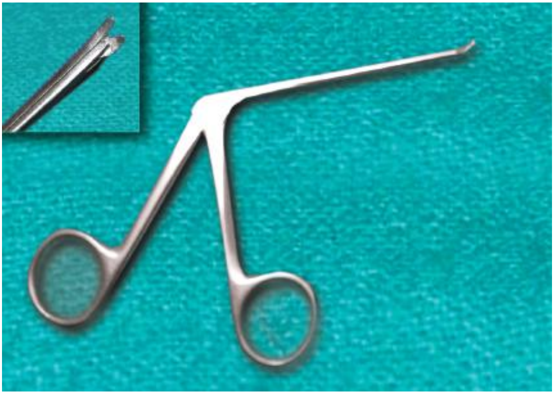


Fig. 1.97: Fisch crurotomy scissor

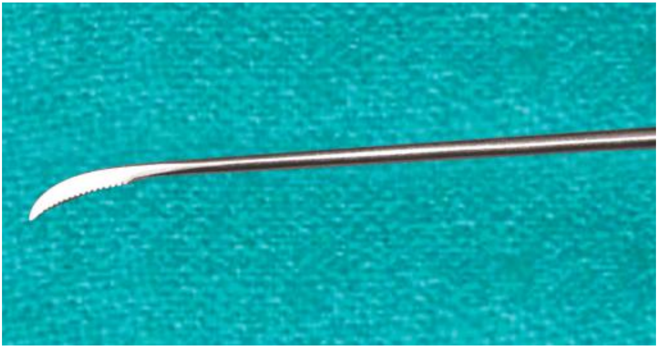


Fig. 1.98: Crurotomy knife tip

In 1952, **Samuel Rosen** *and again in 1955* **John Shea***, redefined Lempert's fenestration operation. Shea improved the procedure considerably and became popular for stapedectomy, in which the stapes was removed and replaced with a teflon prosthesis.*

INSTRUMENT SETS FOR EAR SURGERIES

1.1 Myringotomy set

1. Ear speculum of different sizes
2. Alligator forceps
3. Microear sickle knife
4. Politzer/Lucae myringotome
5. Curved pick
6. Microsuction tip with adapter
7. Grommet introducer
8. Ball probe
9. Grommet
10. Teleotoscope
11. Objective lens 200 to 250 mm for operating microscope

1.2 Mastoidectomy set

1. Bard Parker handle with blade
2. Halstead mosquito forceps
3. Hemostatic artery forceps curved
4. Septal mucoperiosteal elevator
5. Mollison self-retaining mastoid retractor (4×4 prongs)
6. Plester mastoid retractor (3×3 prongs) with one long prong (or 2×2 prongs)
7. Weitlaner mastoid retractor (3×4 or 2×3 prongs)
8. Jansen mastoid retractor (3×3 prongs)
9. Wullstein mastoid retractor (3×3 prongs)
10. Mahadevaiah mastoid retractor
11. Farabeuf periosteal elevator
12. Jenkin mastoid gouge
13. Heath mallet
14. Micromotor, handpiece
15. Diamond and cutting bur

16. Suction irrigation canula
17. Lempert mastoid curette
18. House microear curette
19. Adson toothed forceps
20. Macewan curette and cell seeker
21. Fine delicate gently curved scissors (Small)
22. Metzenbaum scissors
23. Lempert endaural retractor with third blade
24. Perkin self-retaining mastoid retractor (1×3 prongs)
25. Lempert endaural speculum
26. Mastoid microgouge
27. Rosen curved microcurette
28. Needle holder
29. Septal elevator
30. Objective lens 200 to 250 mm for operating microscope
31. Staecke guide and protector

1.3 Tympanoplasty/Ossiculoplasty set

1. Diamond and cutting bur
2. Derlecki ossicle holding forceps
3. House ear microcurette
4. Microsuction tip
5. Microsuction tip adapter
6. House graft press forceps
7. Lempert mastoid curette
8. House Dieter malleus head nipper
9. Microear ball point probe
10. Microear curved pick
11. Paperella duck bill microear elevator
12. Microear right angled pick
13. Microear sickle knife
14. Microear straight pick
15. Micromotor with handpiece

16. Plester flag knife
17. Rosen round knife
18. Alligator forceps
19. Wullstein cupped forceps straight, upturned, right and left turned
20. Microear scissors straight and right angled
21. Wullstein toothed alligator forceps
22. Deweker microspring scissors
23. Rosen curved microcurette
24. Schuknecht roller knife
25. Needle holder
26. Lucae curved aural forceps
27. Objective lens 200 to 250 mm for operating microscope
28. Adson toothed forceps

1.4 Stapedectomy set

1. House ear microcurette
2. Rosen round knife
3. Plester flag knife
4. Schuknecht roller knife
5. Lempert endaural speculum
6. Aural speculum
7. Stapes piston—Teflon/titanium
8. Stapes piston holding forceps
9. Shea piston measuring rod
10. Piston measuring jig
11. House piston measuring rod
12. Stapedotomy perforator
13. Larkin hand perforator bur
14. McGee stapes piston crimper
15. Fisch crurotomy scissors
16. Crurotomy knife
17. Microsuction tip

18. Microsuction tip adapter
19. Microear ball point probe
20. Microear curved pick
21. Microear right angled pick
22. Objective lens 200 to 250 mm for operating microscope
23. Paperella duck bill microear elevator

1.5 Facial nerve decompression set

1. Bard Parker handle with blade
2. Halsted mosquito forceps
3. Hemostatic artery forceps curved
4. Septal mucoperiosteal elevator
5. Mollison self-retaining mastoid retractor 4×4 prongs
6. Farabeuf periosteal elevator
7. Jenkin mastoid gouge
8. Heath mallet
9. Micromotor, handpiece
10. Diamond and cutting bur
11. Suction irrigation cannula
12. Lempert mastoid curette
13. House micro ear curette
14. Adson toothed forceps
15. Fine delicate gently curved scissors (Small)
16. Metzenbaum scissors
17. Perkin self-retaining mastoid retractor (1×3 prongs)
18. Lempert endaural speculum
19. Mastoid microgouge
20. Rosen curved microcurette
21. Needle holder
22. Septal elevator
23. Microsuction tip
24. Microsuction tip adapter
25. Micro ear ball point probe

26. Microear curved pick
27. Paperella duck bill microear elevator
28. Micro ear right angled pick
29. Micro ear sickle knife
30. Micro ear straight pick
31. Plester flag knife
32. Rosen round knife
33. Alligator forceps
34. Wullstein cupped forceps straight, upturned, right and left turned
35. Micro ear scissors straight and right angled
36. Wullstein toothed alligator forceps
37. Deweker microspring scissors
38. Schuknecht roller knife
39. Needle holder
40. Lucae curved aural forceps
41. Objective lens 200 to 250 mm for operating microscope

2 Instruments in Nose

GENERAL NOSE INSTRUMENTS

1. Thudicum nasal speculum (Fig. 2.1)

This is a self-retaining nasal speculum commonly used in the ENT outpatient clinic. It is held over the hooked index finger of the non-dominant hand. The blades are then closed by pressing between middle and ring finger.

Uses:

a. Diagnostic: Anterior rhinoscopy—nasal septum, Little's area, lateral wall of nose, nasal cavity
b. Therapeutic: Removal of foreign bodies, antral wash, nasal packing, surgical procedures inside the nose.

Fig. 2.1: Thudicum nasal speculum

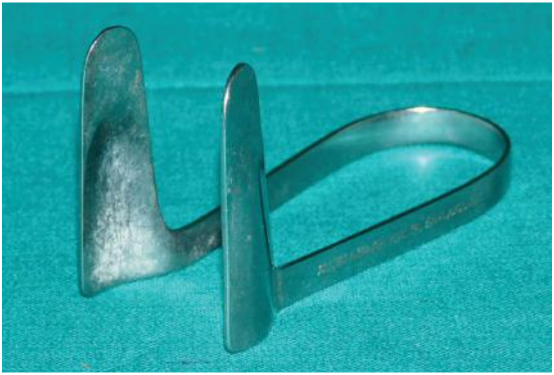


Fig. 2.2: St. Clair Thompson nasal speculum

2. St. Clair Thompson nasal speculum (Fig. 2.2)

This is a self-retaining nasal speculum similar to Thudicum nasal speculum except that the blades are longer here. The longer blades permit deeper visualization of the nasal cavity and its structures. Hence, this instrument is particularly used for nasal surgeries like:

a. Septoplasty/SMR
b. Polypectomy
c. Deep foreign bodies removal.

3. Killian short and long bladed nasal speculum (Fig. 2.3)

This is a self-retaining nasal speculum and is available with blades of different sizes. The distance between the blades can be adjusted and fixed with a screw.

Uses:

a. Diagnostic: Anterior rhinoscopy—nasal septum, Little's area, lateral wall of nose, nasal cavity
b. Therapeutic: Removal of foreign bodies, antral wash, nasal packing, surgical procedures inside the nose like polypectomy, SMR, septoplasty, etc.

Fig. 2.3: Killian short and long bladed nasal speculum

Fig. 2.4: Pilcher nasal speculum

4. Pilcher nasal speculum (Fig. 2.4)

This is a non self-retaining nasal speculum used for anterior rhinoscopic examination of children and adults.

5. St. Clair Thompson posterior rhinoscopy mirror (Fig. 2.5)

This instrument has a bayonet shaped handle (Hence differs from indirect laryngoscopy mirror) so that the examiner's hand

Fig. 2.5: St. Clair Thompson posterior rhinoscopy mirror

does not block his vision. The mirror is available in sizes of 0 to 5 and should be of an appropriate size so as to pass behind soft palate and reflect sufficient light for the image to be seen. This is a plain mirror and does not magnify the image. The throat is anesthetized locally either with lignocaine viscous gargle or lignocaine spray. The mirror surface is either heated or dipped in savlon in order to prevent fogging during the procedure. The tongue is depressed gently with a tongue depressor and this mirror is introduced inside like a pen with the mirror facing upwards. The patient is asked to breathe through the nose. The mirror is now introduced behind the soft palate without touching the posterior pharyngeal wall to reflect the light towards the nasopharynx. This instrument can also be used to examine the postnasal space after adenoidectomy to look for remnants if left any.

Fig. 2.6: Nasal foreign body hook

6. Nasal foreign body hook (Fig. 2.6)

Used to remove nasal foreign body by accessing the posterior part of the foreign body.

SEPTAL SURGERY INSTRUMENTS

7. Freer double-ended mucoperichondrial elevator (Fig. 2.7)

Uses:

a. To elevate mucoperichondrial and periosteal flap in septal surgeries
b. For displacement of inferior turbinate in antrostomy operation
c. For elevating canal skin and cartilage perichondrium in mastoid surgeries
d. For elevation of mucosa in Caldwell-Luc operation
e. To spread and tease temporalis fascia graft
f. To perform uncinectomy.

8. Septal aspirating elevator (Suction elevator) (Fig. 2.8)

This instrument has the advantage of suctioning blood while elevating the mucoperichondrium or mucoperiosteum during septoplasty.

Fig. 2.7: Freer double-ended mucoperichondrial elevator

Fig. 2.8: Septal aspirating elevator (Suction elevator)

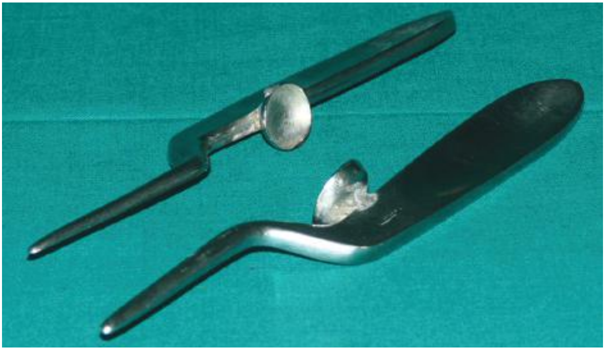


Fig. 2.9: Killian mucoperichondrial elevators (Left and right)

9. Killian mucoperichondrial elevators (Left and right) (Fig. 2.9)

This is a bayonet shaped instrument with a thumb rest. One side of the elevator is flat and the other side is convex. While the flat side faces the septum, the convex side faces the mucoperiosteal flap and the thumb rest faces upwards. Hence, this instrument is separate for right and left sides of the septum.

10. Ballenger swivel knife (Fig. 2.10)

This is a knife that can rotate 360 degrees within its two prongs. Hence, it can be positioned without rotating the instrument and the direction can be changed. This instrument is used in

Fig. 2.10: Ballenger swivel knife

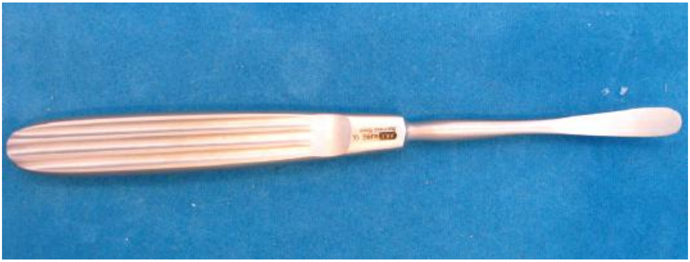


Fig. 2.11: Cottle nasal elevator

submucous resection of septum and also to harvest cartilage for rhinoplasty and tympanoplasty.

11. Cottle nasal elevator (Fig. 2.11)

Used to elevate mucoperichondrium of the nasal septum as well as other tissue planes during septorhinoplasty.

Fig. 2.12: Howarth nasal septal elevator

12. Howarth nasal septal elevator (Fig. 2.12)

This instrument has a blunt end and a sharp end for septal surgeries. While the blunt end is used for mucoperichondrial or mucoperiosteal elevation, the sharp spade type end is used to elevate the septum anteroinferiorly from the maxillary crest.

13. Joseph nasal mucoperichondrial elevator (Fig. 2.13)

Used to elevate the mucoperichondrium or mucoperiosteum in septal surgeries or rhinoplasty.

Fig. 2.13: Joseph nasal mucoperichondrial elevator

Fig. 2.14: Killian bayonet shaped nasal gouge

14. Killian bayonet shaped nasal gouge (Fig. 2.14)

This instrument is bayonet shaped to allow the adequate visualization of the nasal cavity during the procedures. The tip of the instrument has a rounded smooth bevelling for a better grip on the bone. It is always used with a mallet.

Uses:

a. Removal of maxillary crest and spur in septal surgeries.
b. Opening the bone of the canine fossa in Caldwell-Luc surgery.

15. Tilley nasal gouge (Fig. 2.15)

This is a bayonet shaped nasal gouge resembling Killian nasal gouge. However, the tip has a 'V' shaped slot for better anchorage of the maxillary crest.

Herbert Tilley *(1867–1941) was a pioneer in the surgery of the nasal sinuses. He also did work in the study of the pathology of nasal sinus disease.*

Fig. 2.15: Tilley nasal gouge

16. Heath mallet (Fig. 2.16)

This instrument appears like a hammer and is used along with a gouge, chisel or osteotome. The gouge is to be hit by a mallet with movement at the wrist during septal surgery.

17. Internal nasal septal splint (Fig. 2.17)

This nasal splint oval in shape and is made up of teflon. There are vents on the splint for anchorage to the septum with suture for the prevention and treatment of nasal synechia.

18. Septal internal nasal splint with airway (Fig. 2.18)

This splint is applied on either sides of the septum and sutured. The advantage of this splint is that it has an airway through which the patient can breathe.

Fig. 2.16: Heath mallet

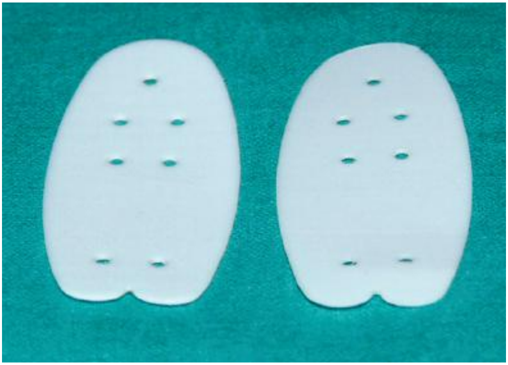


Fig. 2.17: Internal nasal septal splint

Fig. 2.18: Septal internal nasal splint with airway

19. Septal buttons with connector for septal perforation (Fig. 2.19)

These are circular nasal splints made up of teflon with a central hole for anchorage with a connector on either sides of the septal perforation.

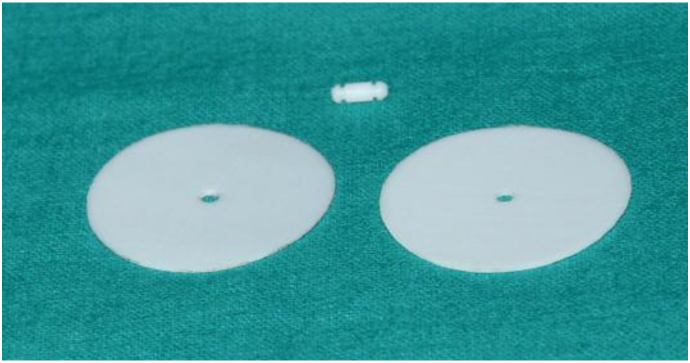


Fig. 2.19: Septal buttons with connector for septal perforation

ENDOSCOPIC SINUS SURGERY INSTRUMENTS

20. Nasal rigid endoscopes (Fig. 2.20)

Types:

a. Adult: Outer diameter is 4 mm
b. Pediatric: Outer diameter is 2.7 mm

Range: 0, 30, 45, 70, 90 and 120 degrees. Each is 18 cm long. Zero degree scope is the most commonly used of all as it has a direct forward looking orientation. The 30 degree scope is the endoscope of choice for diagnostic nasal endoscopy. It allows better visualisation of the structures in the lateral wall of nose. The 70 and 90 degree scopes are useful to visualise, work in the frontal recess and the maxillary antrum. They are also useful to visualise the laryngeal and hypopharyngeal inlet as an alternative to indirect laryngoscopy. The 120 degree scope is used to inspect the anterior wall of the maxillary sinus through the antrostomy opening.

Color code for endoscopes:

1. 0 degree : Green
2. 30 degree: Red
3. 45 degree: Black
4. 70 degree: Yellow

Fig. 2.20: Nasal rigid endoscopes (Adult and pediatric)

Fig. 2.21: Sinus trocar and cannula for endoscopy (4 mm)

Desmoreaux *(1853) is called the 'father of endoscopy'. He redesigned Bozzini's endoscope by attaching a gas light and condensers to project a beam of light down the tube.*

21. Sinus trocar and cannula for endoscopy (4 mm) (Fig. 2.21)

This instrument is used for antral puncture through the inferior meatal route and the canine fossa route. Besides allowing aspiration for culture sensitivity and biopsy, it also allows the passage of endoscope to examine the contents of the antrum.

22. Endoscopic nasal suction cautery tip (Fig. 2.22)

This instrument plays the dual role of suctioning a bleeding surface as well as cauterizing the mucosa simultaneously. It is commonly

Fig. 2.22: Endoscopic nasal suction cautery tip

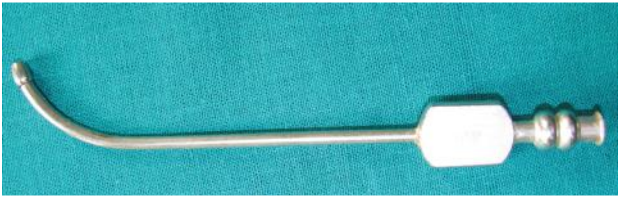


Fig. 2.23: Killian curved nasal suction tip for FESS

used for endoscopic endonasal dacrocystorhinostomy. It can also be used to cauterise bleeding vessels inside the nasal cavity.

23. Killian curved nasal suction tip for FESS (Fig. 2.23)

This curved suction tip is particularly useful for removing the secretions and fungal masses of the maxillary sinus through the middle meatus. Same way frontal recess can also be entered from below and drained.

24. Flexible nasopharyngoscope (Fig. 2.24)

Rhinofiberscopes are used to view the nasal cavity, the lateral wall, Eustachian tube opening and the nasopharynx. The tip is

Fig. 2.24: Flexible nasopharyngoscope

Fig. 2.25: Microdebrider console

movable distally and hence can enter the crevices and spaces inside the nasal cavity. These scopes can also be used to visualize the laryngeal inlet and hypopharynx also. The fiberscopes can be connected to a camera for magnification, better visualization and recording of the images.

25. Microdebrider [Hummer] console (Fig. 2.25)

This part consists of the power unit and the switch. The power unit harbors the facility to select the mode of the function required—microdebrider or micromotor. It can also adjust the speed of the blade, the amount of irrigation and oscillation. The footswitch is used for controlling blade direction and speed. Oscillation speed can go upto 30,000 rpm and rotation speed can go upto 70,000 rpm. It can be used in the rotatory or oscillatory modes.

26. Microdebrider handpiece (Fig. 2.26)

The handpiece consists of the rotating blade, irrigation channel and suction channel.

27. Microdebrider detachable blade and its tip (Fig. 2.27)

The blade is available as straight or curved tips.

Fig. 2.26: Microdebrider handpiece

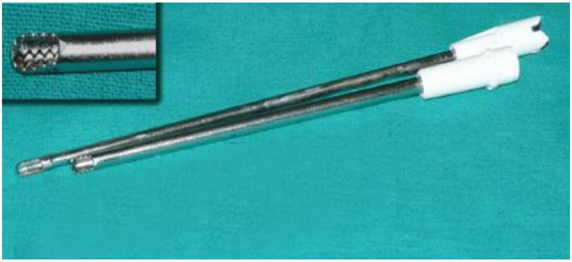


Fig. 2.27: Microdebrider detachable blade and its tip

28. Nasal endoscopic sickle knife (Fig. 2.28)

This is a knife that is used to make the initial incision in endoscopic sinus surgery. It is bigger and longer than its aural counterpart.
Uses:

a. Resection of uncinate process (Uncinectomy)
b. Opening a concha bullosa
c. For mucosal incision during endoscopic dacryocystorhinostomy (DCR).

Fig. 2.28: Nasal endoscopic sickle knife

29. Sinus ostium ballpoint probe 1 (Fig. 2.29)

This instrument is less curved compared to the next one.
Uses:

a. To locate the maxillary sinus ostium and sphenoid sinus ostium
b. To delineate and resect uncinate process
c. To identify the consistency of the mass in the nasal cavity.

Fig. 2.29: Sinus ostium ballpoint probe 1

Fig. 2.30: Sinus ostium ballpoint probe 2

30. Sinus ostium ballpoint probe 2 (Fig. 2.30)

Uses: Apart from the above uses it can be used to access the frontal recess.

31. Blakesley Weil straight cupped forceps (Fig. 2.31)

This is a single action forceps used to remove the bulla ethmoidalis and other ethmoidal air cells. This is also used to remove polyps and other nasal masses. All endoscopic forceps have a distal hinge and the blades open only at the tip of the instrument. This compromises the lever advantage and the strength of the instrument at the tip. It also limits the opening capacity of the instrument distally but makes it accessible at the narrow

Fig. 2.31: Blakesley Weil straight cupped forceps

Fig. 2.32: Blakesley through cut forceps

spaces of the nasal cavity. The advantage of a single action forceps is that it is more stable and stronger than a double action forceps. However, the disadvantage is that the space between the blades of the forceps is limited. It has an eye at the upper jaw to permit proper visualization of tissue unlike a Takahashi forceps that does not have an eye.

32. Blakesley through cut forceps (Fig. 2.32)

The upper jaw in a through cut forceps cuts cleanly through tissue to help avoid tearing. In a non-through cut forceps the tissue is captured between the blades and then cut. For obtaining tissue for the purpose of biopsies, the latter forceps is more suitable.

33. Blakesley Weil 45 degree upturned forceps (Fig. 2.33)

This forceps is more suitable to reach the structures that are higher up in the nasal cavity and the lateral wall of the nose.

Fig. 2.33: Blakesley Weil 45 degree upturned forceps

34. Blakesley Weil 90 degree upturned forceps (Fig. 2.34)

This instrument is used to access the structures in the roof of the nasal cavity that are not accessible with 45 degree forceps. By rotating this instrument 90 degrees, the tip faces the structures in the lateral wall linearly and hence it is possible to access them. In

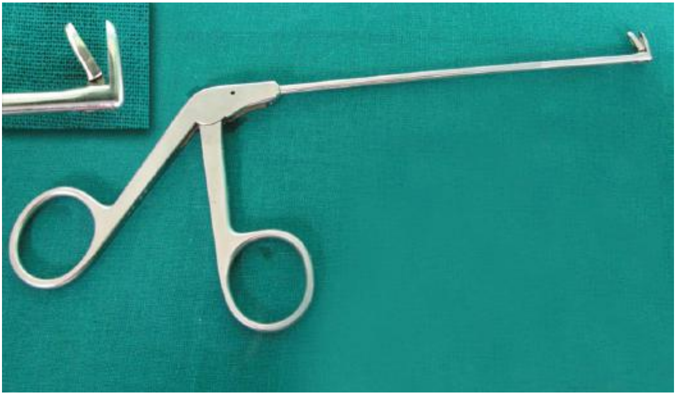


Fig. 2.34: Blakesley Weil 90 degree upturned forceps

Fig. 2.35: Pediatric Blakesley Weil 45 degree upturned forceps

the same way, it can also be used to remove the contents of the maxillary sinus through the ostium.

35. Pediatric Blakesley Weil 45 degree upturned forceps (Fig. 2.35)

This is a more gentle forceps that is smaller in size than its adult counterpart. However, the uses remain the same.

36. Flexible cupped forceps (Fig. 2.36)

This is a double action cupped malleable forceps that can be turned upward, downward or sideward. It can also be used to grasp bleeding vessels and tissues for cauterization.

37. Nasal endoscopic scissors (Fig. 2.37)

This is an endoscopic single action nasal scissors that opens only at the tip. It is available as straight, angled and serrated cutting edge types.

Uses:

a. To trim and resect inferior turbinate
b. Conchoplasty in concha bullosa
c. To resect any other soft tissue in the lateral wall of the nose.

Fig. 2.36: Flexible cupped forceps

Fig. 2.37: Nasal endoscopic scissors

38. Ostrum backbiting forceps (upward) (Fig. 2.38)

This is available as through cut upward and downward backbiting forceps.

Uses:

a. Uncinectomy
b. Widening the maxillary sinus ostium—care is taken not to widen the ostium anterior to the anterior end of middle

Fig. 2.38: Ostrum backbiting forceps (upward)

turbinate as it could result in the injury to the nasolacrimal duct.

39. Antrum punch rotating backbiter (Fig. 2.39)

This is a 360 degree rotating 'through cut forceps'. The tip of the instrument can be rotated upwards, downwards, right side or left side as per the requirement. The uses are similar to that of ostrum backbiting forceps.

Fig. 2.39: Antrum punch rotating backbiter

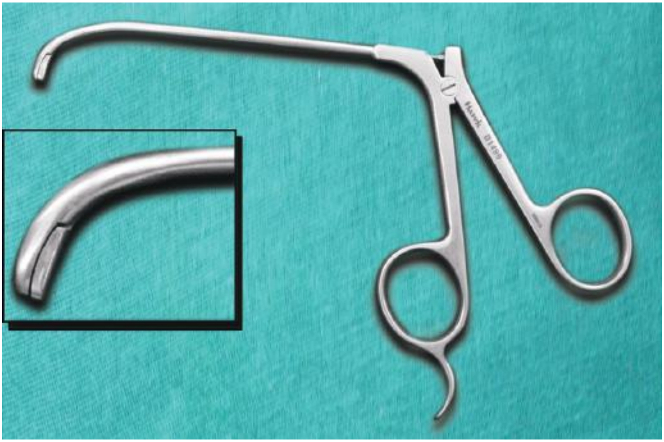


Fig. 2.40: Heuwieser antrum grasping forceps

40. Heuwieser antrum grasping forceps (Fig. 2.40)

Available as upward and downward grasping forceps.
Uses:

a. It is used for removal of tissue from maxillary sinus
b. Endonasal removal of cysts and polyps
c. Removal of foreign bodies from hypopharynx
d. Removal of ethmoidal air cells.

41. Stammberger sidebiting antrum punch (Fig. 2.41)

This is a through cut instrument that is separate for right and left sides and can cut downward and forward. It can be used to remove bone and soft tissues from the lateral wall of nose, inferior orbital floor in orbital decompression. Middle meatal antrostomy can be widened. Remnants of uncinate process can be removed. It can also punch a portion of turbinates when required.

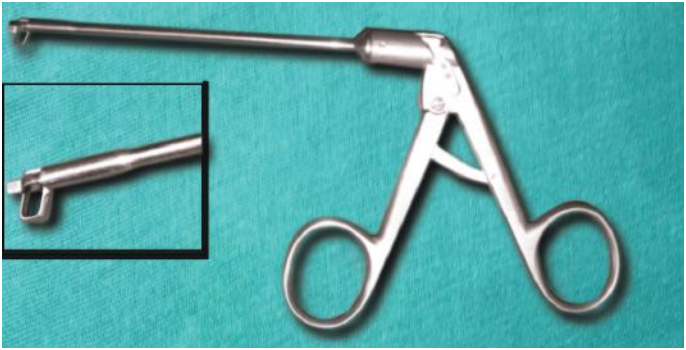


Fig. 2.41: Stammberger sidebiting antrum punch

42. Gruenwald clean bite upturned through cut forceps (Fig. 2.42)

This is an endoscopic sinus surgery instrument used to remove tissues and bony fragments from the lateral wall and the frontal recess. Also useful for biopsies.

Fig. 2.42: Gruenwald clean bite upturned through cut forceps

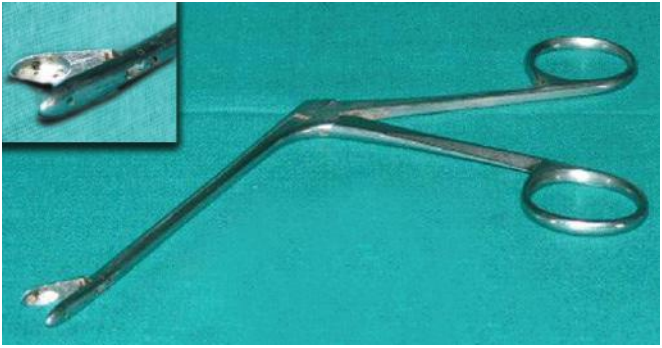


Fig. 2.43: Tilley Henckel forceps

43. Tilley Henckel forceps (Fig. 2.43)

This is a nasal forceps resembling Blakesley Weil forceps except that it has a larger tip and has markings on the upper surface to estimate the depth. This is an ethmoid punch forceps used to perform intranasal ethmoidectomy and frontoethmoidectomy. The upper surface has markings of each 1 cm apart which measure the distance from anterior nasal spine to the posterior ethmoid cells.

44. William Watson nasal polyps forceps (Fig. 2.44)

This is a forceps with serrated jaws for better grip of tissue. It is used to remove polyp and ethmoidal air cells during endoscopic sinus surgery.

45. Gruenwald through cutting nasal turbinate forceps (Fig. 2.45)

This through cutting forceps with narrow punch jaws is useful to cut and remove bone and tissue from the ethmoidal sinus or turbinate.

Fig. 2.44: William Watson nasal polyps forceps

Fig. 2.45: Gruenwald through cutting nasal turbinate forceps

Table 2.1: Comparison between through cut instrument and non-through cut instrument in endoscopic sinus surgery

S. No.	*Through cut instrument*	*Non through cut instrument*
1.	Cuts and removes the tissues. Hence, no tags are left behind	Removes the tissue by shearing forces. Tags can be left behind.
2.	Does not tear the cutting mucosa	Can tear or strip excess mucosa
3.	Shearing forces not involved. Hence, less chances of complications.	Due to shearing forces involved the chances of complications are more.
4.	Preferred for use near vital structures like lamina papyracea, sphenoid sinus and arteries	Not preferred over vital structures

L. Gruenwald *in his textbook on "Nasal Suppuration" in 1893 firmly established that nasal pus of the maxillary antrum was associated with the nose rather than the tooth as was believed that time.*

46. Stammberger mushroom punch (Fig. 2.46)

This instrument has a blunt head at the tip resembling a mushroom with a circular cutting mechanism. The blunt tip avoids mucosal injuries as the forceps is introduced inside. The tip is available in different angles.

Uses:

a. The straight forceps is used to remove the anterior wall of sphenoid sinus for sphenoidotomy and removal of ethmoidal septae.
b. The upward turned forceps is used for frontal recess surgery.

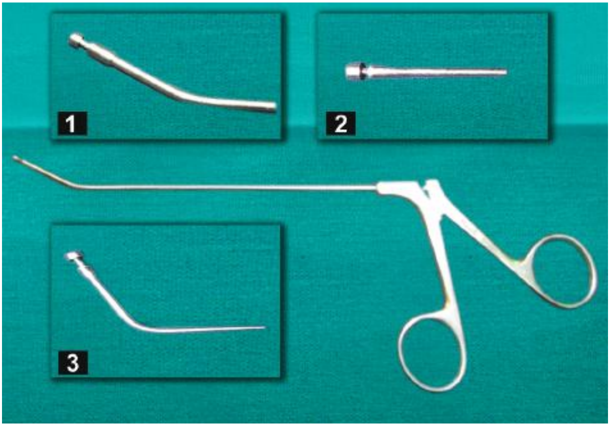


Fig. 2.46: Stammberger mushroom punch

Fig. 2.47: Antrum curved ring curette

47. Antrum curved ring curette (Fig. 2.47)

The uses are similar to that of the straight curette. However, the curvature helps to reach inaccessible areas of the antrum.

48. Antral forward cutting straight ring curette (Fig. 2.48)

This is a slightly curved ring curette available also as backward cutting type. It is used to curette the mucosa or remnants of

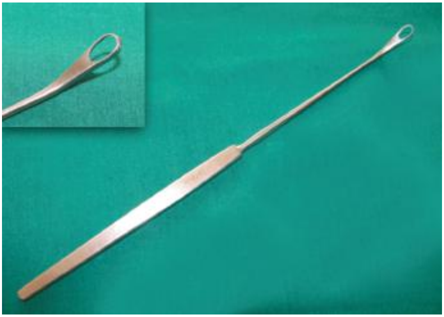


Fig. 2.48: Antral forward cutting straight ring curette

Fig. 2.49: Antrum straight cup curette

polyp tissue from the antrum. It is also used to curette ethmoidal air cells.

49. Antrum straight cup curette (Fig. 2.49)

This instrument is used to curette and capture the tissue within the antrum and ethmoidal air cells.

Fig. 2.50: Frontal sinus curette (J curette)

50. Frontal sinus curette (J curette) (Fig. 2.50)

This is a curette with a curved end useful to curette the air cells and the bone while approaching the frontal recess during endoscopic sinus surgery. This can also be used to curette the ethmoidal air cells. Frontal sinus curette is also available in 90 degree angle which can be inserted above roof of agger nasi cell. Once inserted, the curette is pulled anteriorly to break the posterior and superior agger nasi cell wall in order to approach the frontal recess.

51. Hartmann through cutting nasal forceps (Fig. 2.51)

This is a straight through cutting forceps used to precisely cut and remove soft tissue and delicate bone during endoscopic sinus surgery and turbinectomy.

52. Hildyard postnasal forceps (Fig. 2.52)

Used to take biopsy from the postnasal space through the nasal cavity. The mass in the nasopharynx is first visualized using an endoscope and then the biopsy is taken.

Fig. 2.51: Hartmann through cutting nasal forceps

Fig. 2.52: Hildyard postnasal forceps

Fig. 2.53: Biopsy and grasping forceps for FESS

53. Biopsy and grasping forceps for FESS (Fig. 2.53)

This is a double action forceps with a gentle small tip. Hence suitable for biopsies of structures in the nasal cavity.

54. Takahashi nasal surgery forceps (Fig. 2.54)

It is an endoscopic nasal surgery forceps used to remove soft tissue like polyps and ethmoidal aircells.

Fig. 2.54: Takahashi nasal surgery forceps

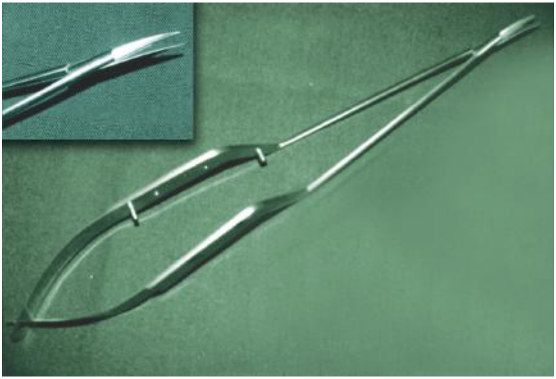


Fig. 2.55: Yasargil microscissors

55. Yasargil micro scissors (Fig. 2.55)

These are fine scissors of spring type, bayonet shaped with straight blades. Used for delicate cutting work inside the nasal cavity. Especially used to cut soft tissue inside the sphenoid sinus.

56. Kerrison rongeur (Fig. 2.56)

This instrument is available as upward biting and downward biting types.

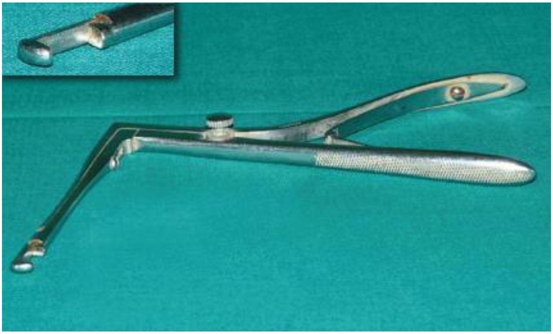


Fig. 2.56: Kerrison rongeur

Uses:

a. Removal of lacrimal bone in endoscopic dacryocystorhinostomy
b. Removal of anterior wall of sphenoid sinus
c. Removal of medial wall of maxilla
d. Caldwell-Luc operation

Table 2.2: Comparison between Kerrison rongeur and Citelli punch forceps

Kerrison rongeur	*Citelli punch forceps*
Non-through-cutting forceps	Through-cutting forceps
Cutting tip is available as upward biting and downward biting in angles of 90 and 40 degrees	Cutting tip is available as upward biting 90 degree

57. Kerrison-Costen rongeur (Fig. 2.57)

This is similar to Kerrison punch. The shaft is curved upwards or downwards and it may be upbiting or downbiting. This is used to open the sphenoid sinus and also useful in endonasal dacryocystorhinostomy to remove the bone covering the lacrimal sac.

Fig. 2.57: Kerrison-Costen rongeur

Fig. 2.58: Citelli punch forceps

58. Citelli punch forceps (Fig. 2.58)

It is used to remove bone in pieces while opening the sphenoid sinus and the antrostomy opening in Caldwell-Luc operation.

59. Hajek-Kofler sphenoid punch (Fig. 2.59)

Used to remove the anterior wall of sphenoid sinus in sphenoidotomy.

60. Kuhn-Bolger frontal recess giraffe forceps (Fig. 2.60)

This is a double action cupped forceps curved at 45 degree or 90 degree to reach the frontal recess. The jaw opens from side to side or front to back. This is also available as flexible type.

Fig. 2.59: Hajek-Kofler sphenoid punch

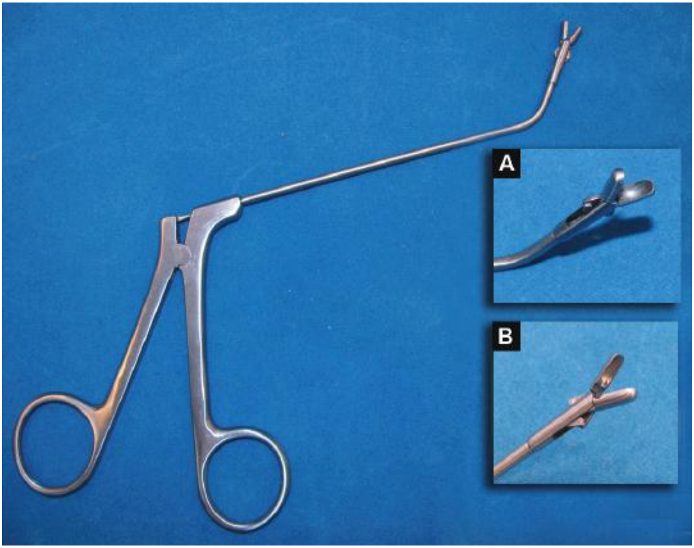


Fig. 2.60: Kuhn-Bolger frontal recess giraffe forceps

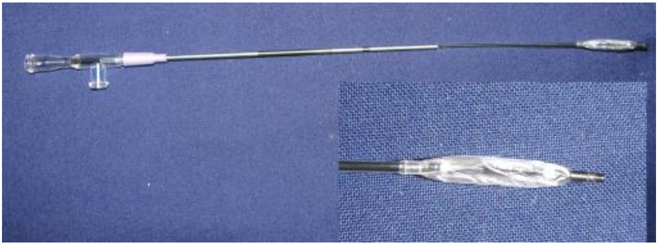


Fig. 2.61: Sinus balloon catheter for balloon sinuplasty

61. Sinus balloon catheter for balloon sinuplasty (Fig. 2.61)

This is the portion that is passed inside the guide and then dilated to widen the ostium of the sinus.

62. Sinus balloon inflation device for balloon sinuplasty (Fig. 2.62)

This device is used to inflate the catheter with the required pressure.

Fig. 2.62: Sinus balloon inflation device for balloon sinuplasty

Fig. 2.63: Sinus guide catheter for balloon sinuplasty

63. Sinus guide catheter for balloon sinuplasty (Fig. 2.63)

This acts as a guide for the introduction of the catheter into the required sinus. It is separate for different sinuses.

64. Flexible sinus guidewire for balloon sinuplasty (Fig. 2.64)

Used to guide the 'sinus guide catheter' inside the sinus for insertion.

65. Lacrimal punctum dilator (Fig. 2.65)

This is used to dilate the punctum of the lacrimal canaliculus in the upper or lower eyelid prior to the syringing of the lacrimal

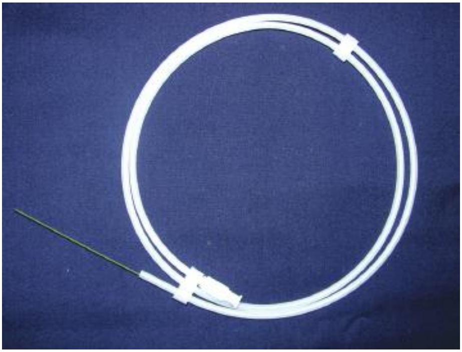


Fig. 2.64: Flexible sinus guidewire for balloon sinuplasty

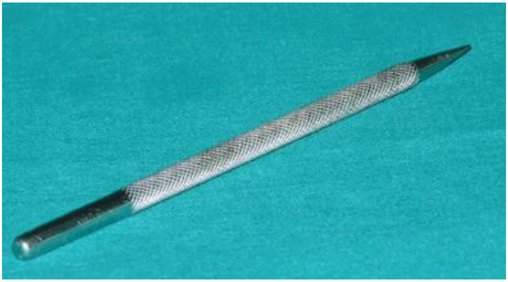


Fig. 2.65: Lacrimal punctum dilator

apparatus to confirm patency. The procedure may be performed during endoscopic dacryocystorhinostomy.

66. Bowman lacrimal probe (Fig. 2.66)

This probe is used to trace the path of the canaliculus through the punctum upto the lacrimal sac.

67. Lacrimal syringing needle (Fig. 2.67)

Used for syringing the lacrimal apparatus through the punctum to check its patency.

Fig. 2.66: Bowman lacrimal probe

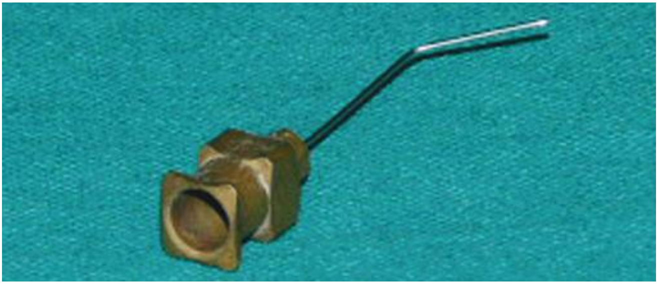


Fig. 2.67: Lacrimal syringing needle

NONENDOSCOPIC NOSE SURGERIES

68. Heymann turbinectomy scissors (Fig. 2.68)

This instrument is bent obtusely at the centre and has narrow blades with blunt tip and works in the vertical plane.
Uses:

a. Partial or total turbinectomy
b. Can be used to cut the cartilage in septal surgeries.

69. Tilley antral bur (Fig. 2.69)

This instrument is used to smoothen the margins of the intra-nasal antrostoma.

70. Double-ended antral scoop (Fig. 2.70)

A scoop is more cup-shaped and deep as compared to a curette. It is meant not only to remove the soft tissue inside a cavity but also capture it, for biopsy. It removes more tissue than a curette at a time. This double-ended scoop is mainly used to remove the soft tissue from the maxillary antrum during Caldwell- Luc operation.

Fig. 2.68: Heymann turbinectomy scissors

Fig. 2.69: Tilley antral bur

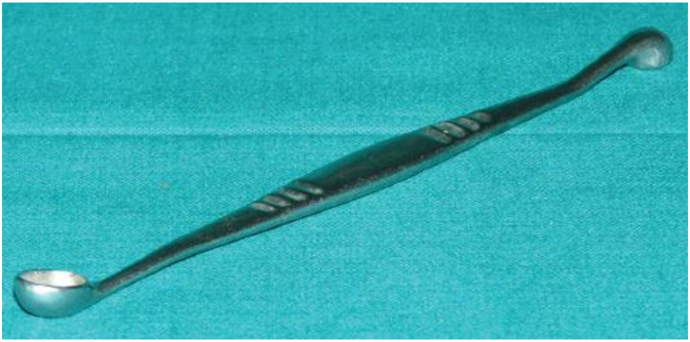


Fig. 2.70: Double-ended antral scoop

71. Higginson syringe (Fig. 2.71)

It has a bulb with red rubber tubing on either side. One end of the rubber tubing ends in a valve and the other ends in a nozzle. The valve allows only inflow of water into the bulb. The valve end is kept in water and the nozzle end is connected to the antral

Fig. 2.71: Higginson syringe

wash cannula. The capacity of the bulb is about 50 ml and the syringe is made up of red rubber material.

Uses:

a. Antral wash
b. Nasal douching in atrophic rhinitis.

72. Kerrison double action bone nibbling forceps (Fig. 2.72)

It is used to remove spicules of bone in surgeries like Caldwell-Luc operation, Lynch-Howarth operation, maxillectomy, etc.

Fig. 2.72: Kerrison double action bone nibbling forceps

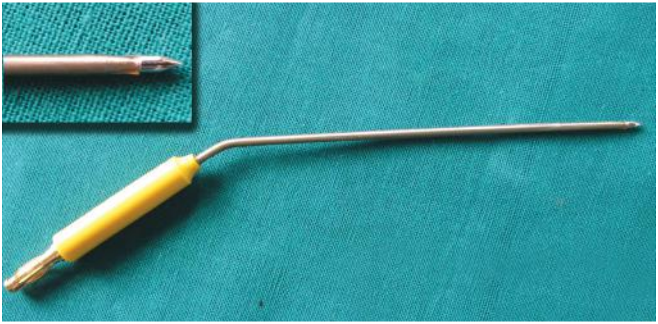


Fig. 2.73: Nasal probe for submucous diathermy

73. Nasal probe for submucous diathermy (Fig. 2.73)

Uses:

a. To shrink enlarged turbinates by submucous diathermy
b. To control bleeding during nasal surgeries
c. To burn the stalk of a mass of rhinosporidiosis
d. Excision of small benign tumors.

74. Jansen bone nibbler (Fig. 2.74)

It is used to nibble bone spicules and fragments during maxillectomy, lateral rhinotomy and Caldwell-Luc operation.

Fig. 2.74: Jansen bone nibbler

Fig. 2.75: Tilley antral harpoon

75. Tilley antral harpoon (Fig. 2.75)

It is an instrument used to make an opening in the medial wall of the maxillary antrum. The puncture is made just below the genu of the inferior turbinate where the bone is thinnest. It is held like a dagger in one hand and the index and thumb of the other hand are used for an adequate fulcrum. It has one antegrade pointing tip and three retrograde pointing tips. While the instrument is removed, a piece of bone could come out thereby enlarging the antrostome.

Uses:

1. Intranasal antrostomy for the drainage of chronic maxillary sinusitis
2. As an adjunct procedure during Caldwell-Luc surgery.

76. Walsham forceps (Fig. 2.76)

Used to reduce fractured nasal bones.

Table 2.3: Comparison between Asch and Walsham forceps	
Asch forceps (Fig. 2.87)	*Walsham forceps*
Angled blades	Straight blades
No rubber tube on the tip	Rubber tube on one tip to protect skin
Gap seen between prongs on approximation	No gap seen on approximation
Used to elevate and straighten the septum	Used to refracture and realign the nasal bones
Stout	Smaller in size

77. Optic nerve guide for evisceration (Fig. 2.77)

This instrument has a stalk with two wings at its tip. There is a slot in between two wings meant to anchor the optic nerve before being cut during orbital exenteration. This procedure may be accompanied with total maxillectomy.

78. Eye protector spoon (Fig. 2.78)

This is a spoon shaped instrument used to protect the orbital contents from injury during the osteotomy of the orbital floor and the lateral wall.

Fig. 2.76: Walsham forceps

Fig. 2.77: Optic nerve guide for evisceration

Fig. 2.78: Eye protector spoon

79. Knight nasal polyps forceps (Fig. 2.79)

This is an instrument used to remove polyps and cartilage during nasal surgeries.

Fig. 2.79: Knight nasal polyps forceps

80. Tilley Lichtwitz trocar and cannula (Fig. 2.80)

Parts—handle with long pointed end, cannula with connecting end for irrigation.

Fig. 2.80: Tilley Lichwitz trocar and cannula

Uses:

a. Diagnostic proof puncture: To obtain aspirate of the maxillary sinus for analysis
b. To drain pus in maxillary sinusitis
c. Instillation of medicine into maxillary antrum
d. Oro-antral fistula.

Procedure of antral puncture:

- The nasal cavity is anesthetized with a cotton pledget soaked in 4% lignocaine. The procedure is performed with the patient in the sitting position.
- The antral puncture is done in the inferior meatus 1 cm behind the anterior end of inferior turbinate.
- The trocar and cannula is directed towards the outer canthus of ipsilateral eye.
- The trocar is now withdrawn from the cannula.
- The valve end of the Higginson syringe is dipped in the warm water.
- The bulb is squeezed and the sinus is irrigated with water after connecting the syringe to the cannula.
- The patient is advised to breathe through the mouth.

Complications:

a. Laceration of the nasal mucosa
b. Soft tissue injury of the cheek
c. Orbital injury
d. Air embolism
e. Hemorrhage
f. Vasovagal attack
g. Injury to the pterygopalatine fossa through the posterior wall of maxillary sinus.

Contraindications:

a. Bleeding disorders
b. Age below 3 years
c. Acute maxillary sinusitis.

Fig. 2.81: Myle nasoantral perforator

81. Myle nasoantral perforator (Fig. 2.81)

This instrument has an antegrade and retrograde cutting edge. It is used to enlarge the antrostomy opening created by antral harpoon. Widening the opening posteriorly is to be avoided to prevent bleeding from sphenopalatine artery and its branches.

G. Caldwell *of America (1893) and* **Luc** *of France (1894) independently suggested making a wide opening in the canine fossa and establishing a permanent counter-opening in the nasal cavity for operating on the maxillary antrum. This procedure is known today as the Caldwell-Luc method.*

82. Irwin Moore nasal forceps (Fig. 2.82)

Resembles Luc forceps, but the tip is different. Used to grasp and remove soft tissue and bone.

83. Epistaxis catheter (Fig. 2.83)

This is a catheter made up of implant grade silicone that has an airway and can be used to control both anterior and posterior nasal bleeding. It has two separate bulbs that can be inflated with

Fig. 2.82: Irwin Moore nasal forceps

Fig. 2.83: Epistaxis catheter

saline for anterior and posterior bleeding. Can be used as an alternative to nasal packing and has the advantage of allowing the patient to breathe through the nose. It can also be used for nasal packing following nasal surgeries like septoplasty, rhinoplasty.

Fig. 2.84: Krause nasal snare

84. Krause nasal snare (Fig. 2.84)

This instrument can be used in the nose or the ear for excision of polyps. After the advent of endoscopic sinus surgery and the microdebrider, this instrument has lost its popularity.

Gabriel Fallopius *is an important person in the field of Rhinology as he invented the wire snare for the removal of nasal polyps.*

85. Hajek cheek retractor (Fig. 2.85)

This is a 'S' shaped instrument and confers to the architecture of face so that the assistant's hand does not obscure the view of the surgeon.

Uses:

a. Caldwell-Luc operation
b. Maxillectomy
c. Repair of oro-antral fistula
d. Vidian neurectomy
e. Transantral ligation of maxillary artery.

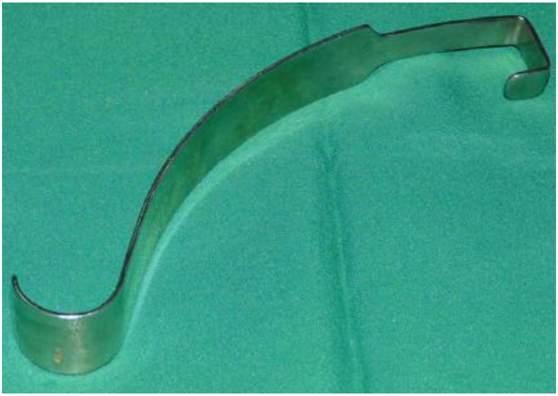


Fig. 2.85: Hajek cheek retractor

86. Jansen Middleton septum forceps (Fig. 2.86)

This is a curved stout instrument with three hinges and a high mechanical advantage. It can be used during septoplasty and rhinoplasty to remove cartilagenous and bony septum. It is preferred over Luc's forceps as the cutting is more precise. It is also available as a through cutting type forceps.

Fig. 2.86: Jansen Middleton septum forceps

Fig. 2.87: Asch septal forceps

87. Asch septal forceps (Fig. 2.87)

Used to reduce fractured nasal septum.

88. Merocel nasal dressing (Fig. 2.88)

This is a non stick material that facilitates easy atraumatic removal after packing. It also clears clots and debris during removal leaving a clean cavity. It is a safe biocompatible material. It is compressed for easy insertion and swells up subsequently after saline injection into it. It is used for packing nose following epistaxis and septal surgeries. It can be placed in the nasal cavity for more than 48 hours unlike a ribbon gauze (cotton).

Fig. 2.88: Merocel nasal dressing

RHINOPLASTY

89. Fomon alar retractor for rhinoplasty (Fig. 2.89)

This is an instrument used during rhinoplasty to retract the ala especially to make incision in the vestibule. The handle is thin and the prongs are less curved, blunt and more delicate as compared to a tracheal double hook.

90. Cottle alar retractor and protector (Fig. 2.90)

Apart from retracting the nasal ala during rhinoplasty, it can also be used to retract and protect various other soft tissue structures during the stages of rhinoplasty as it is atraumatic. It can also be used in vestibuloplasty and Young's operation for atrophic rhinitis.

Fig. 2.89: Fomon alar retractor for rhinoplasty

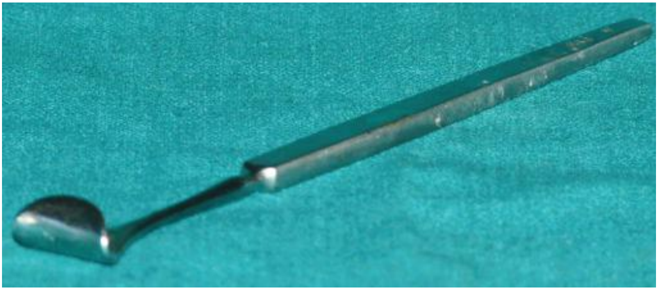


Fig. 2.90: Cottle alar retractor and protector

Fig. 2.91: Kilner alar retractor for rhinoplasty 1

91. Kilner alar retractor for rhinoplasty 1 (Fig. 2.91)

This double hooked retractor is used for better visualization of nasal vestibule during open and closed rhinoplasty.

92. Kilner retractor for rhinoplasty 2 (Fig. 2.92)

It has two ends. One with a single blunt hook and the other end with a catspaw retractor. It is used for nasal alar retraction during open and closed rhinoplasty.

93. Mcindoe nasal fine wound retractor (Fig. 2.93)

This is a fine retractor used during rhinoplasty to retract the vestibular skin after incision and obtain the proper tissue planes.

Fig. 2.92: Kilner retractor for rhinoplasty 2

Fig. 2.93: Mcindoe nasal fine wound retractor

94. Cottle four pronged alar retractor (Fig. 2.94)

This is a single sided nasal alar retractor used during rhinoplasty.

95. Aufricht nasal retractor for rhinoplasty (Fig. 2.95)

This is a nasal retractor with a long blade useful for both external and internal rhinoplasties. The long blade gives a deeper field of vision.

Fig. 2.94: Cottle four pronged alar retractor

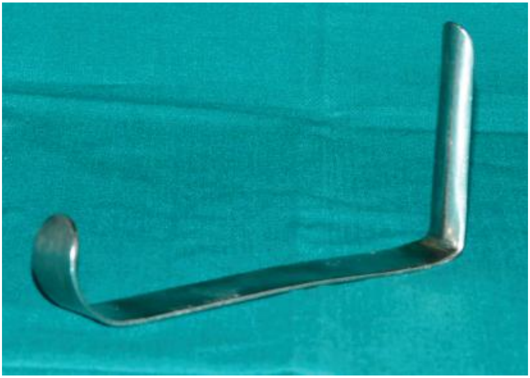


Fig. 2.95: Aufricht nasal retractor for rhinoplasty

96. Cottle columellar clamp (Fig. 2.96)

Used for stabilization of the nasal septum while making incision during rhinoplasty.

Fig. 2.96: Cottle columellar clamp

Fig. 2.97: Walter rhinoplasty scissors 1

97. Walter rhinoplasty scissors 1 (Fig. 2.97)

This is a pair of fine delicate angled scissors used to dissect the tissue planes anteroposteriorly during rhinoplasty.

98. Walter rhinoplasty scissors 2 (Fig. 2.98)

This is a fine delicate angled scissor used to dissect tissue planes sidewards in rhinoplasty. It is also used to deepen the marginal incision in the vestibular region. The angulation of the scissor gives better visualization.

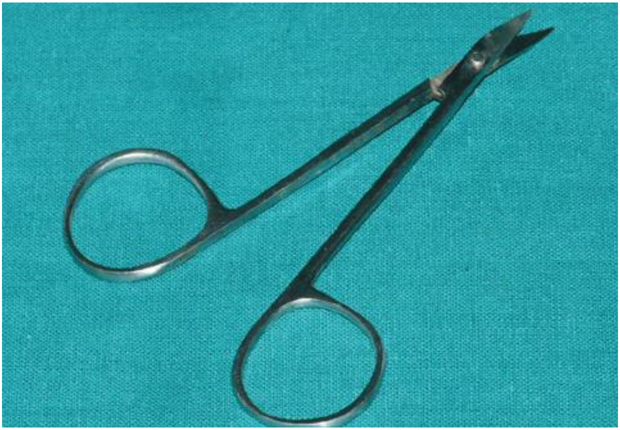


Fig. 2.98: Walter rhinoplasty scissors 2

99. Aufricht coarse rasp for rhinoplasty (Fig. 2.99)

It is usually made up of tungsten carbide. It is used to smoothen prominent bony spurs and protrusions and also minimal dorsal

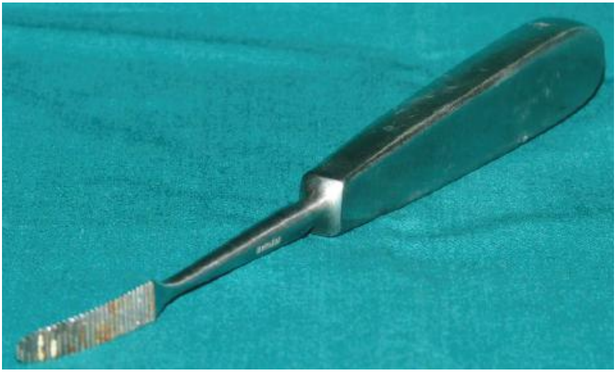


Fig. 2.99: Aufricht coarse rasp for rhinoplasty

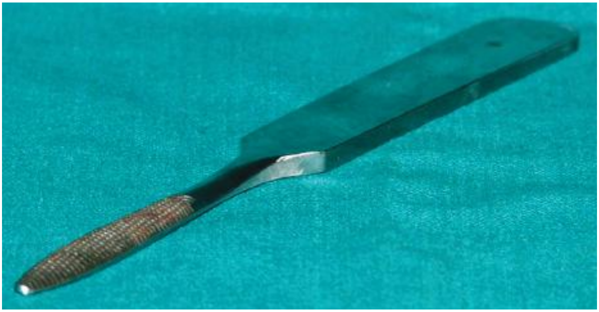


Fig. 2.100: Joseph fine rasp for rhinoplasty

hump reduction during rhinoplasty. This can also be used to rasp the glabella for defining the nasofrontal angle.

100. Joseph fine rasp for rhinoplasty (Fig. 2.100)

A fine rasp is used to further smoothen the coarse bony surface after using a coarse nasal rasp.

101. Masing chisel for osteotomy (Fig. 2.101)

This chisel is separate for right and left sides. While placing a chisel on a bone, the beveled surface should lie against the bony surface. Masing chisel is used for internal lateral osteotomy during

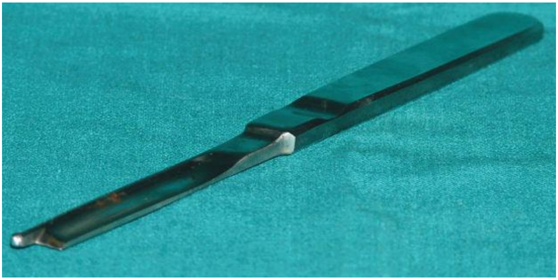


Fig. 2.101: Masing chisel for osteotomy

rhinoplasty. It has a guard at its lateral end tip in order to protect the eye.

102. Nasal chisel (Fig. 2.102)

Used to make bony cuts during lateral rhinotomy, maxillectomy, mandibulotomy, etc.

Table 2.4: Comparison between a chisel and an osteotome

S. No	*Chisel*	*Osteotome*
1.	Beveling only on one side	Beveling on both sides
2.	Used for chiselling pieces of bone	Used for dividing bone
3.	Cannot cut deep into a bone	Can cut deep into a bone

103. Straight chisels (Fig. 2.103)

Used mainly for making osteotomy cuts during maxillectomy and mandibulotomy.

104. Freer chisel (Fig. 2.104)

This chisel has a flat broad tip. It is used for cutting bone in craniofacial surgeries like maxillectomy, mandibulotomy and also for osteotomy in rhinoplasty.

Fig. 2.102: Nasal chisel

Fig. 2.103: Straight chisels

Fig. 2.104: Freer chisel

105. Jansen chisel (Fig. 2.105)

Used for median osteotomy in rhinoplasty.

106. Osteotome (Fig. 2.106)

This is an instrument that is beveled on both the sides and cuts the bone deep and straight.

Fig. 2.105: Jansen chisel

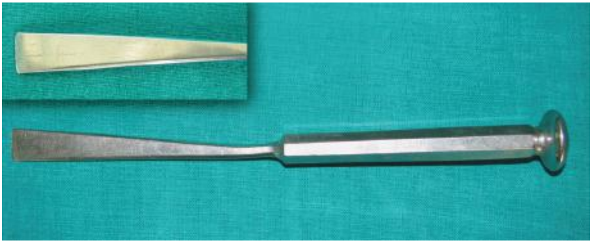


Fig. 2.106: Osteotome

Uses:

a. For external osteotomy in rhinoplasty
b. For osteotomy cuts in maxillectomy, mandibulectomy, etc.

107. Castroviejo rhinoplasty measuring caliper (Fig. 2.107)

It is used to measure various parameters of the nose during rhinoplasty. Also used to measure the thickness of cartilage harvest before grafting in augmentation rhinoplasty. It has a range of 0 to 15 mm. It can also be used in thyroplasty surgeries.

108. Curved raspatory for rhinoplasty (Fig. 2.108)

Used to elevate cartilage and mucoperichondrium during rhinoplasty.

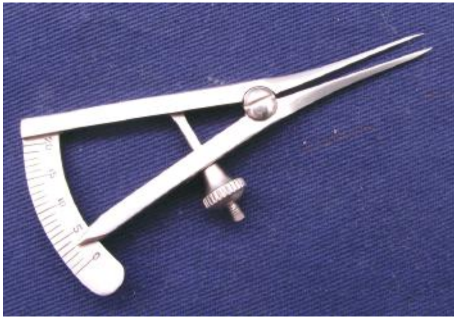


Fig. 2.107: Castroviejo rhinoplasty measuring caliper

Fig. 2.108: Curved raspatory for rhinoplasty

109. William Watson curved coarse rasp (Fig. 2.109)

Used to rasp undersurface and sides of nasal bones and septum. Also used to rasp frontal sinus.

110. Joseph nasal saw (Fig. 2.110)

It is used for cutting bone for internal lateral osteotomy and dorsal hump reduction in rhinoplasty.

111. Cartilage crusher (Fig. 2.111)

Used to modify the shape or morselize harvested cartilage pieces for augmentation rhinoplasty.

Fig. 2.109: William Watson curved coarse rasp

Fig. 2.110: Joseph nasal saw

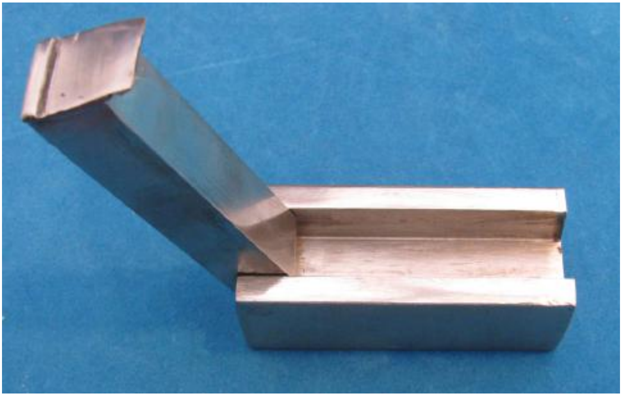


Fig. 2.111: Cartilage crusher

Fig. 2.112: Joseph curved rhinoplasty knife

112. Joseph curved rhinoplasty knife (Fig. 2.112)

Used for rhinoplasty incisions on the skin and also to elevate the tissue planes. It is useful in making transfixion incision.

113. Joseph double edged nasal knife (Fig. 2.113)

This is an arrow shaped double edged pointed knife with a sharp tip and a guard. Used for skin and cartilage incisions in rhinoplasty. Also useful to elevate tissues of nasal skeleton on the dorsum of the nose.

114. External nasal splint (Fig. 2.114)

This malleable nasal splint is used for application on the dorsum of the nose after reduction of fracture nasal bones or rhinoplasty.

Fig. 2.113: Joseph double edged nasal knife

Fig. 2.114: External nasal splint

INSTRUMENT SETS FOR NOSE SURGERIES

2.1 Septal surgery set

1. Ballenger swivel knife
2. Freer mucoperichondrial elevator
3. Killian nasal gouge
4. Heath mallet
5. Joseph nasal elevator
6. Internal nasal splint
7. Cottle nasal elevator
8. Septal aspirating elevator
9. Howarth nasal septal elevator
10. Tilley nasal gouge
11. Nasal suction tip
12. Killian nasal speculum
13. Thudicum nasal speculum
14. Nasal packing forceps
15. Jansen Middleton nasal forceps
16. Luc forceps
17. Irwin Moore forceps
18. Needle holder
19. Lac tongue depressor
20. Short sharp scissors gently curved
21. Yankauer pharyngeal suction
22. Aspirating dissector

2.2 Intranasal antrostomy set

1. Suction tip
2. Killian nasal speculum
3. Nasal packing forceps
4. Tilley antral bur
5. Tilley antral harpoon

6. Myle nasoantral perforator
7. Lac tongue depressor
8. Yankauer pharyngeal suction

2.3 Antral wash set

1. Suction tip
2. Killian nasal speculum
3. Nasal packing forceps
4. Higginson syringe
5. Tilley Lichtwitz trocar and cannula
6. Lac tongue depressor

2.4 Caldwell-Luc set

1. Freer mucoperichondrial elevator
2. Farabeuf periosteal elevator
3. Killian nasal gouge
4. Heath mallet
5. Nasal suction tip
6. Killian nasal speculum
7. Nasal packing forceps
8. Double-ended antral scoop
9. Kerrison double action bone nibbling forceps
10. Jansen bone nibbler
11. Tilley antral harpoon, bur
12. Myle nasoantral perforator
13. Hajek cheek retractor
14. Needle holder
15. Langenbeck retractor
16. Non-toothed forceps
17. Lac tongue depressor
18. Yankauer pharyngeal suction

2.5 Turbinectomy set

1. Heymann turbinectomy scissors
2. Nasal septal internal splint
3. Nasal suction tip
4. Killian nasal speculum
5. Nasal packing forceps
6. Nasal probe for submucosal diathermy
7. Luc forceps
8. Irwin Moore forceps
9. Needle holder
10. Adson toothed forceps
11. Lac tongue depressor
12. Yankauer pharyngeal suction

2.6 Endonasal dacryocystorhinostomy set

1. Freer mucoperichondrial elevator
2. Nasal suction tip
3. Nasal packing forceps
4. Rigid nasal endoscope
5. Killian curved nasal suction tip
6. Blakesley Weil straight, 45° upturned, 90° upturned forceps
7. Nasal endoscopic sickle knife
8. Endoscopic nasal suction cautery
9. Kerrison rongeur
10. Lacrimal punctum dilator
11. Bowman lacrimal probe
12. Lacrimal syringing needle
13. Lac tongue depressor
14. Killian nasal speculum
15. Yankauer pharyngeal suction

2.7 Nasal polypectomy set

1. Killian nasal speculum
2. Nasal suction tip
3. Luc forceps
4. Nasal packing forceps
5. Knight nasal polyp forceps
6. Irwin Moore forceps
7. Krause nasal snare
8. Lac tongue depressor
9. Yankauer pharyngeal suction
10. Rigid nasal endoscope
11. Heuwieser antrum grasping forceps
12. Microdebrider and its accessories

2.8 Lateral rhinotomy set

1. Freer mucoperichondrial elevator
2. Osteotome
3. Heath mallet
4. Nasal packing forceps
5. Metzenbaum scissors
6. Jansen bone nibbler
7. Allis forceps
8. Gille skin hook
9. Babcock forceps
10. Mayo scissors
11. Adson toothed forceps
12. Luc forceps
13. Mosquito forceps
14. Hemostatic forceps
15. Langenbeck retractor
16. Non-toothed forceps
17. Yankauer pharyngeal suction
18. Lac tongue depressor
19. Killian nasal speculum

2.9 Endoscopic sinus surgery basic set

1. Freer mucoperichondrial elevator
2. Nasal suction tip
3. Nasal packing forceps
4. Heymann turbinectomy scissors
5. Rigid nasal endoscope
6. Killian curved nasal suction tip
7. Sinus trocar and cannula
8. Blakesley Weil cupped forceps straight, 45° upturned, 90° upturned
9. Nasal endoscopic sickle knife
10. Endoscopic nasal suction cautery
11. Kerrison Costen rongeur
12. Sinus ostium ballpoint probe
13. Nasal endoscopic scissors
14. Ostrum backbiting forceps
15. Tilley Henkel forceps
16. William Watson nasal forceps
17. Antrum curved ring curette
18. Gruenwald through cutting nasal forceps
19. Heuwieser antrum grasping forceps
20. Stammberger side biting antrum punch
21. Biopsy and grasping forceps
22. Rotating antrum punch backbiter
23. Stammberger mushroom punch
24. Antrum forward cutting straight ring curette
25. Kuhn-Bolger frontal recess giraffe forceps
26. Takahashi nasal surgery forceps
27. Antrum straight cupped curette
28. Gruenwald clean bite upturned through cut forceps
29. Microdebrider and its accessories
30. Yasargil microscissors
31. Citelli punch forceps
32. Blakesley through cut forceps

33. Hajek Kofler sphenoid punch
34. Hartmann through cutting nasal punch forceps
35. Lac tongue depressor
36. Killian nasal speculum

2.10 Rhinoplasty set

1. Freer mucoperichondrial elevator
2. Masing chisel (internal osteotomy)
3. Osteotome (external osteotomy)
4. External nasal splint
5. Nasal packing forceps
6. Aufricht nasal retractor
7. Kilner alar retractor
8. Aufricht coarse rasp
9. Cottle alar retractor and protector
10. Joseph fine rasp
11. Nasal chisel straight
12. Walter rhinoplasty scissors
13. Fomon alar retractor
14. Joseph nasal saw
15. Mcindoe nasal fine wound retractor
16. Cottle columellar clamp
17. Cartilage crusher
18. Castroviejo rhinoplasty measuring calliper
19. Cottle four pronged alar retractor
20. Rhinoplasty curved raspatory
21. Joseph curved rhinoplasty knife
22. Joseph double edged nasal knife
23. Freer chisel
24. Jansen nasal chisel
25. William Watson coarse rasp
26. Nasal suction tip
27. Needle holder

28. Adson toothed forceps
29. Halsted mosquito forceps
30. Gille skin hook
31. Lac tongue depressor
32. Killian nasal speculum
33. Heath mallet
34. Walsham forceps
35. Jansen Middleton septum forceps

2.11 Maxillectomy set

1. Farabeuf periosteal elevator
2. Killian nasal gouge
3. Heath mallet
4. Osteotome
5. Nasal suction tip
6. Yankauer pharyngeal suction tip
7. Nasal packing forceps
8. Kerrison double action bone nibbling forceps
9. Jansen bone nibbler
10. Optic nerve guide
11. Eye protector spoon
12. Hajek cheek retractor
13. Gigli saw
14. Needle holder
15. Adson's toothed forceps
16. Allis forceps
17. Babcock forceps
18. Mayo scissors
19. Metzenbaum scissors
20. Gille skin hook
21. Luc forceps
22. Humby skin knife holder
23. Halsted mosquito forceps

24. Hemostatic forceps
25. Langenbeck retractor
26. Non-toothed forceps
27. Yankauer pharyngeal suction tube
28. Lac tongue depressor
29. Killian nasal speculum

2.12 Fracture nasal bone reduction set

1. Freer mucoperichondrial elevator
2. External nasal splint
3. Nasal packing forceps
4. Walsham forceps
5. Asch forceps
6. Lac tongue depressor
7. Killian nasal speculum.

3 Instruments in Throat

ADENOTONSILLECTOMY INSTRUMENTS

1. Boyle Davis mouth gag with tongue blade (Fig. 3.1)

It has two components: Boyle blade and Davis gag that are used simultaneously. It helps to keep the mouth open and push the tongue up and away from the operation site. Upper tooth plate has small holes to which a rubber tube is sutured to prevent trauma to the incisor tooth. The mouth gag is introduced in the closed position after opening the mouth with the head extended. The mouth gag is gradually opened and the ratchet lock makes it self-retaining. The whole assembly can be lifted up and maintained in that position using Draffin bipods.

Indications:

a. Tonsillectomy
b. Adenoidectomy
c. Surgeries of palate and nasopharynx
d. Excision of choanal polyp.

2. Doughty tongue blade (Fig. 3.2)

It has a slit and groove in the middle to accommodate the endotracheal tube. This prevents the tube from blocking the tonsillar dissection.

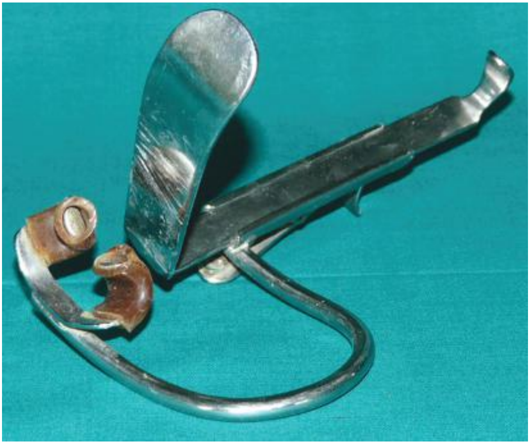


Fig. 3.1: Boyle Davis mouth gag with tongue blade

Fig. 3.2: Doughty tongue blade

Fig. 3.3: Russel Davis tongue blade

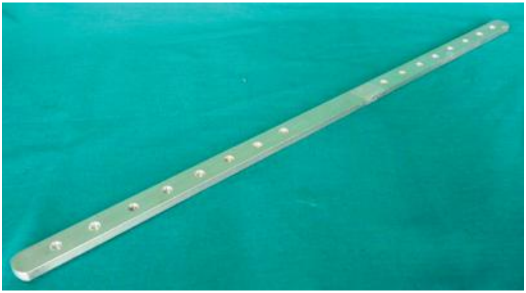


Fig. 3.4: Magauren plate

3. Russel Davis tongue blade (Fig. 3.3)

This tongue blade has a groove in the middle to hold the endotracheal tube and protect it from moving, kinking or closure by teeth. This blade can be used with other frames like Davis mouth gag.

4. Magauren plate (Fig. 3.4)

Used to stabilize the Draffin bipod stand on the patient table.

5. Draffin bipods (Fig. 3.5)

It consists of two rods with multiple rings in a row. Used to anchor and fix the Boyle Davis mouth gag for numerous oropharyngeal surgeries including adenotonsillectomy.

Fig. 3.5: Draffin bipods

Fig. 3.6: St. Clair Thompson adenoid curette with cage

6. St. Clair Thompson adenoid curette with cage (Fig. 3.6)

This instrument is used to curette the adenoids by a blind technique. The curette is introduced behind the soft palate with the blade facing down. It is held like a dagger and the adenoid is curetted from the nasopharyngeal wall in the midline by sweeping movement. The cage is used to prevent slipping of the excised tissue into the throat. During the procedure, the neck of the patient should not be in too much extension as it might injure the atlanto-occipital joint.

Hans Wilhelm Meyer *(1824–1895) of Copenhagen, in 1868 first described adenoids and its signs and symptoms.*

Fig. 3.7: Beckmann adenoid curette without cage

7. Beckmann adenoid curette without cage (Fig. 3.7)

This is particularly used to remove remnants of adenoid tissue after adenoidectomy. This is also used to remove tubal tonsils without damaging the eustachian tubal opening. Without the cage, the instrument is relatively atraumatic.

8. Adenoid through cutting forceps (Fig. 3.8)

This instrument is used to remove remnant adenoid tissue after performing adenoidectomy. The remnant tissue is confirmed by palpation of postnasal space after surgery.

Fig. 3.8: Adenoid through cut forceps

Fig. 3.9: Laforce adenotome

9. Laforce adenotome (Fig. 3.9)

This instrument comes in various lengths with blades of different sizes. It is used to trap the adenoid tissue in the nasopharynx to cut and capture it in the cage. The mechanism of this instrument is similar to the tonsillar guillotine.

10. St. Clair Thompson adenoid tag forceps (Fig. 3.10)

This is a non-through cutting forceps used to remove adenoid tags in the postnasal space after adenoidectomy. It can also be used to remove postnasal packs.

11. Dennis Browne tonsil holding forceps (Fig. 3.11)

It is used to hold the tonsil and pull it medially during the process of dissection. This instrument resembles Luc forceps but differs from it in the following:

a. The edges of the jaw are blunt and do not cut tissue.
b. The upper jaw is smaller than the lower jaw.
c. The tip has a box mechanism.

Fig. 3.10: St. Clair Thompson adenoid tag forceps

Fig. 3.11: Dennis Browne tonsil holding forceps

12. Muck forceps (Fig. 3.12)

This is used to grasp the tonsil and pull it medially during tonsillectomy. It is particularly useful in grasping small and fibrotic tonsils.

Fig. 3.12: Muck forceps

13. Colver tonsillar vulsellum forceps (Fig. 3.13)

This instrument is also used to hold the tonsil to pull it medially prior to dissection. It is especially useful where the tonsil is friable and the grip cannot be changed repeatedly.

14. Gwynne Evan tonsillar dissector (Fig. 3.14)

It has a blunt end and a serrated end. Blunt end is used for the initial dissection of tonsil to obtain the proper plane. The ser-

Fig. 3.13: Colver tonsillar vulsellum forceps

Fig. 3.14: Gwynne Evan tonsillar dissector

rated end is used to cut the tissues from the upper pole, pillars and the tonsillar bed till the lower pole is reached.

15. Mollison tonsillar dissector and pillar retractor (Fig. 3.15)

It has a blunt end used for initial atraumatic dissection of the tonsil. The retracting end is used to retract the anterior pillar to look for bleeding points and tags of tonsillar tissue left behind.

Fig. 3.15: Mollison tonsillar dissector and pillar retractor

Fig. 3.16: Eve tonsillar snare

16. Eve tonsillar snare (Fig. 3.16)

The snare has a stainless steel wire which is usually 3 inches long with a thickness of 28 gauge. It is used to snare the lower pole of the tonsil after dissection. The lower pole is crushed on snaring and thromboplastin is released which is a powerful vasoconstrictor.

17. Birkett straight first artery forceps (Fig. 3.17)

This is used to catch bleeding points in the tonsillar fossa after tonsillectomy. It is replaced by Negus second artery forceps underneath the first artery forceps before ligation.

Fig. 3.17: Birkett straight first artery forceps

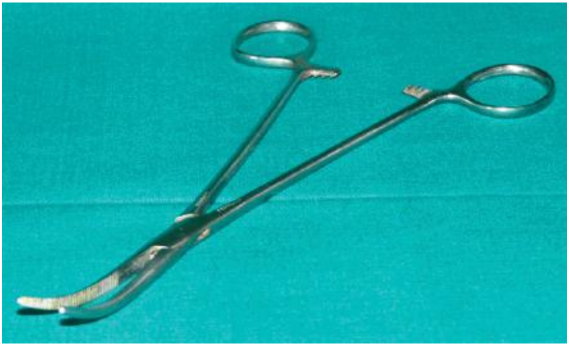


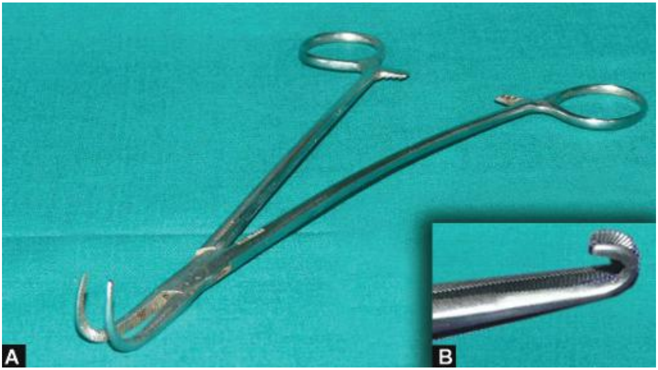
Fig. 3.18: Birkett gently curved first artery forceps

18. Birkett gently curved first artery forceps (Fig. 3.18)

The use of this instrument is same as that of the straight first artery forceps.

19. Negus second artery forceps (Figs 3.19A and B)

It has a curved tip and is used after the first artery forceps for ligating blood vessels in a deep site. The curve may be 't' shaped or 'J' shaped as given in Figs 3.19A and B types.



Figs 3.19A and B: Negus second artery forceps

Fig. 3.20: Wilson artery forceps

20. Wilson artery forceps (Fig. 3.20)

This is a long curved artery forceps with angulation in the middle. The use of this instrument is similar to the Negus artery forceps.

21. Negus knot tier and ligature pusher (Fig. 3.21)

It is used to push the ligature loop on the Negus second artery forceps to ligate the bleeding point.

Fig. 3.21: Negus knot tier and ligature pusher

Fig. 3.22: Waugh tenaculum forceps

22. Waugh tenaculum forceps (Fig. 3.22)

It is used in tonsillectomy. The single tooth of the forceps is used to incise the anterior pillar. It can also be used for the dissection of tonsil from its bed and also as a swab holder. There is a stud in one of the arms that can be felt through a vent in the opposite arm. This is useful to note the pressure exerted at the tip.

23. Yorke hemostatic tonsillar clamp (Fig. 3.23)

It has a circular platform on one blade and a concave rod on the other. The former is used to press the tonsillar fossa covered with a gauze piece while the latter fits on the neck outside. It is

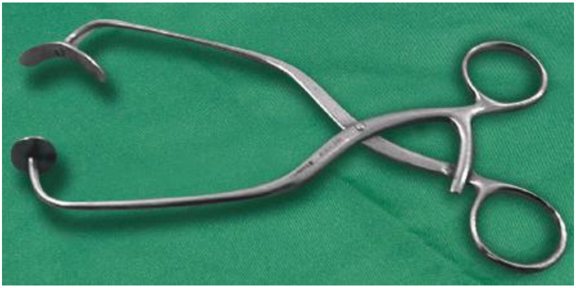


Fig. 3.23: Yorke hemostatic tonsillar clamp

Fig. 3.24: Yankauer suction tube

used mainly in reactionary and secondary hemorrhage for about 15 to 20 minutes.

24. Yankauer suction tube (Fig. 3.24)

It is a long bent instrument with a stout handle. The tip of the tube has a rounded blunt cap with small holes. This prevents trauma to the dissection field. The bent tube enables the surgeon to visualize the dissection field better. The multiple openings in the tip of suction tube will facilitate suction even if the main opening is blocked. This instrument is used for all oral and oropharyngeal surgeries including adenotonsillectomy besides maxillectomy, laryngectomy and other neck surgeries.

25. Irwin Moore tonsillar pillar suturing needle (Fig. 3.25)

This ligature needle is used after tonsillectomy dissection to suture the anterior and posterior pillars. This procedure is performed when the bleeding is more and cannot be controlled by the routine tie.

Fig. 3.25: Irwin Moore tonsillar pillar suturing needle

26. Ballenger guillotine (Fig. 3.26)

This is an instrument used to engage and excise the tonsils. However, it has become unpopular because of the excess bleeding, especially in untrained hands, leaving behind tonsillar remnants and unnecessary damage to surrounding structures. Also with this instrument it is difficult to engage and remove fibrotic tonsils. The only advantage of this procedure over the conventional dissection and snare method is that it is faster. Some studies have revealed that guillotine tonsillectomy causes less pain postoperatively.

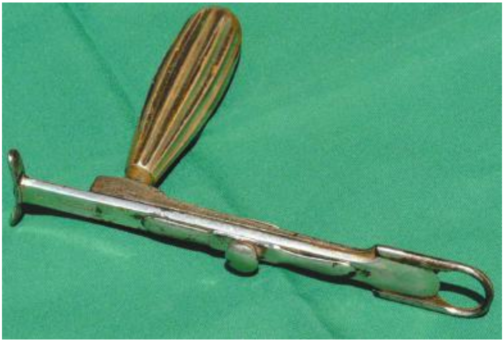


Fig. 3.26: Ballenger guillotine

Fig. 3.27: Jenning mouth gag

27. Jenning mouth gag (Fig. 3.27)

It is a self-retaining mouth gag which can be used in edentulous patients as the blades rest on the alveolar margins. It is used in adenotonsillectomy and other oropharyngeal surgeries.

28. Kilner mouth gag (Fig. 3.28)

This instrument is similar to Boyle Davis mouth gag. However, here the levers for hooking on the teeth are adjustable. A slotted tongue blade is used.

Fig. 3.28: Kilner mouth gag

HISTORY OF TONSILLECTOMY

Aulus Cornelius Celsus *in 30 AD was the first to describe early tonsillectomy. He believed that the hardened tonsils resulted from inflammation and to remove the tonsils they needed to be separated all around with a finger-nail and torn out. If not possible them to grasp the tonsils with a hook and to remove them with a knife.*

Guillotine: **Philip Syng Physick** *(1768–1837) of Philadelphia in 1828 modified an instrument which was earlier designed by Benjamin Bell for uvulotomy and later used for tonsillectomy. It is the predecessor of all tonsil guillotines. Physick's tonsillectomy had two plates, with a knife sliding between them. Physick's method was modified by William B. Fahnestock who introduced a guillotine with a prong or fork to catch the tonsil. This later came to be known as Malhieu's guillotine. This was later modified by Morell Mackenzie. However, the instrument was popularized by Greenfield Sluder of St Louis who after further improvisation of the instrument used to perform hundreds of surgeries and demonstrated the safety of his equipment. Guillotine tonsillectomy was hence known as Sluder tonsillectomy in his honor.*

Morell Mackenzie *(1837–1892) is considered as the true founder of the modern tonsil operation. His guillotine was a modification of the one devised by Physick. In 1887, Mackenzie and Norris Wolfenden, founded the journal named "Journal of Laryngology", which added "otology", making it exclusively related with the otolaryngology speciality. He published a book called 'The hygiene of vocal cords' which went into many editions.*

MISCELLANEOUS INSTRUMENTS

29. Lac tongue depressor (Fig. 3.29)

It has a flat end and a slightly curved end. The flat end is placed over the anterior two-third of the tongue to depress it. The posterior one-third should not be touched in order to prevent gag reflex. The following are its uses:

a. Examination of oral cavity and oropharynx
b. To retract lips and cheek
c. To express pus out of the tonsil—septic squeeze test
d. To test gag reflex
e. For cold spatula test to check patency of nasal passage
f. For posterior rhinoscopy
g. For oral cavity procedures like injection of steroids, biopsy, excision of cysts, etc.

30. St. Clair Thompson quinsy forceps (Fig. 3.30)

It is bayonet shaped instrument with a sharp trocar tip. It has a guard at some distance from tip to prevent deep entry. For draining quinsy sharp tip is pierced with the forceps closed. The instrument is then opened like a sinus forceps to drain the abscess.

Fig. 3.29: Lac tongue depressor

Fig. 3.30: St. Clair Thompson quinsy forceps

31. Indirect laryngoscopy mirror (Fig. 3.31)

This mirror was originally invented by Manoel Garcia of Spain in 1855. This instrument has a handle, shaft and a plain mirror at an angle. The focal length of this mirror is at infinity. The mirror is available in various sizes ranging from 8 mm to 30 mm.

Method of indirect laryngoscopy:

The throat is sprayed with 4 percent lignocaine solution. Fogging on the mirror is prevented either by heating the glass surface or dipping the mirror in savlon. The patient is asked to open the mouth and protrude the tongue. The tongue is held with a dry gauze piece with the left hand. The handle of the mirror is held like a pen and gently introduced into the oral cavity and finally placed against the soft palate and uvula without touching the posterior pharyngeal wall (to prevent gagging). The patient is asked to breathe through the mouth. The patient is asked to phonate 'eee' for observing vocal cord adduction and is asked to breathe gently for observing vocal cord abduction.

Uses:

a. For examination of tongue base, valleculae, glossoepiglottic fold, pharyngoepiglottic fold, arytenoids, aryepiglottic folds, ventricular bands, vocal cords, interarytenoid region, pyriform fossae and posterior pharyngeal wall. These regions

Fig. 3.31: Indirect laryngoscopy mirror

can be examined for any foreign body, inflammatory, non-inflammatory, traumatic or neoplastic lesions.

b. To remove small foreign bodies like fish bone.
c. To remove tissue for histopathological examination.

Structures not seen in this procedure:

a. Postcricoid region
b. Apex of pyriform fossa
c. Ventricles
d. Undersurface of vocal cords and adjoining subglottic region
e. Laryngeal surface of epiglottis.

Pitfalls of indirect laryngoscopic examination:

a. There is anterior and posterior reversal of structures in the mirror image
b. Overhanging of epiglottis may obscure vision
c. The anterior commissure is poorly visualized
d. Depth perception is poor
e. The procedure is difficult in children
f. The tongue may rise on phonation and may obscure the view of larynx
g. The procedure is difficult in a person with short neck
h. The vocal cords appear short and flat in the mirror
i. The vocal cords appear white due to the reflection of a greater amount of light to the mirror from the vocal cords than the rest of the larynx.

In 1840, **Manoel Garcia** *(1805-1906), a singing teacher was interested in the physiology of the human voice. The idea hit him when he saw sunlight reflected from a window. He made a long handled mirror to observe the interior of the larynx during singing. He described the action of the vocal cords during inspiration, expiration, and vocalization. He recorded his observations of the production of sound in the larynx. Garcia is recognized as the first successful laryngoscopist because of his accurate, detailed recording of these observations. He is considered to be the "Father of Laryngology". However, Czermak developed the technique of indirect laryngoscopy.*

Garcia's 100th birthday was organized by **Felix Semon** *on March 17th, 1905 at Old Royal Medical and Chirurgical Society in Hanover Square, London. He was appreciated by delegates from all over the world for his invention of mirror leading to the field of laryngology; however Garcia was so humble that he wondered what was all the fuss about as he had never meant to become the founder of a new medical speciality and he protested that the mirror had cost him only 6 francs!*

32. Collin tongue holding forceps (Fig. 3.32)

This is an instrument used to hold the tongue firmly without injuring it. It has a ratchet to lock and works like an artery forceps. It is used in surgeries on the tongue like hemiglossectomy, tongue tie release, excision of lingual thyroid, etc.

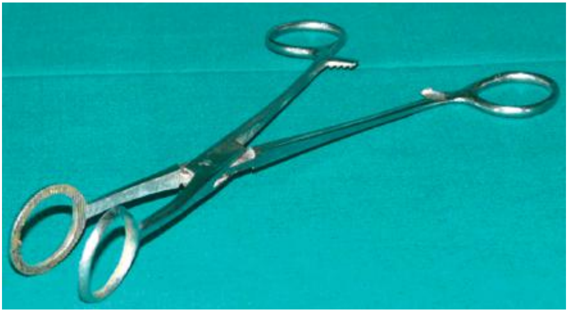


Fig. 3.32: Collin tongue holding forceps

Fig. 3.33: Guiding probe

33. Guiding probe (Fig. 3.33)

It is placed under the tongue to engage the frenulum before cutting it.

34. Yankauer nasopharyngoscope (Fig. 3.34)

This is an instrument used to examine the nasopharynx with the patient in the supine position and the head extended. The instrument is inserted under the soft palate and can be used to examine the nasopharynx as well as to take biopsies from the region.

Fig. 3.34: Yankauer nasopharyngoscope

Fig. 3.35: Ferguson Ackland mouth gag

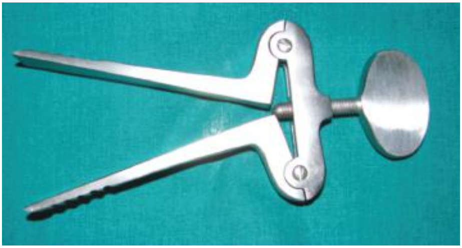


Fig. 3.36: Heister mouth gag

35. Ferguson Ackland mouth gag (Fig. 3.35)

This is a self-retaining mouth gag similar to Doyen mouth gag. However, the mechanism by which this gag remains open is different.

36. Heister mouth gag (Fig. 3.36)

This is a self-retaining mouth gag with two prongs that have grooves and ridges to anchor on the teeth. It can be used in the treatment of trismus. Other uses are similar to that of Doyen mouth gag.

37. Dingmann mouth gag (Fig. 3.37)

This instrument has a tongue depressor, cheek retractors and wire springs which help to fix palatal flaps.

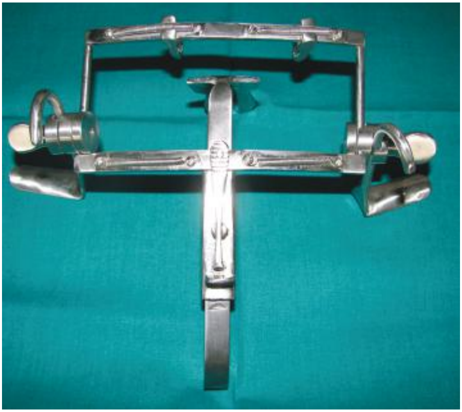


Fig. 3.37: Dingmann mouth gag

Uses:

a. Cleft palate.
b. Uvulopalatopharyngoplasty.
c. Pharyngoplasty.
d. Operations on the nasopharynx.
e. Surgery for choanal atresia.
f. Transpalatal approach to juvenile nasopharyngeal angiofibroma.
g. Sphenoidotomy.
h. Hypophysectomy.
i. Vidian neurectomy.

38. Doyen mouth gag (Fig. 3.38)

It is a self-retaining mouth gag used to open the mouth by anchoring on the teeth for the following:

a. Glossectomy
b. Soft palate and floor of the mouth surgery
c. Tongue tie release
d. Dental surgery

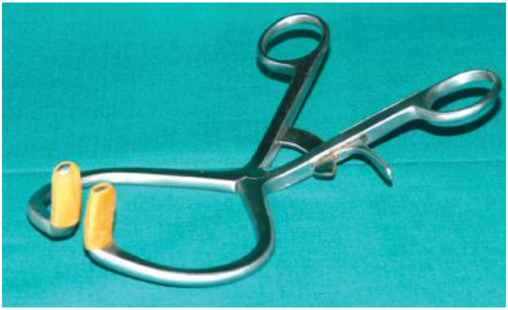


Fig. 3.38: Doyen mouth gag

e. Excision of ranula, benign tumors, cysts and calculus
f. In unconscious patients to open the mouth and prevent airway obstruction
g. Caldwell Luc operation.

39. Wire cutting scissors (Fig. 3.39)

Short and stout scissors used to cut snare wire for insertion into the snare.

40. Cleft palate elevator (Fig. 3.40)

It is a curved mucoperiosteal elevator separate for the right and left sides. It is used mainly for cleft palate reconstruction.

Fig. 3.39: Wire cutting scissors

Fig. 3.40: Cleft palate curved mucoperiosteal elevator

INSTRUMENT SETS FOR THROAT SURGERIES

3.1 Adenoidectomy set

1. Boyle Davis mouth gag with tongue blade
2. Doughty tongue blade/Russel Davis tongue blade
3. Draffin bipods
4. Magauren plate
5. St. Clair Thompson adenoid curette with cage
6. Beckmann adenoid curette without cage
7. Adenoid through cut forceps
8. Laforce adenotome (uncommonly used)
9. Adenoid tag forceps
10. Yankauer nasopharyngoscope (uncommonly used)
11. Yankauer pharyngeal suction tube
12. St. Clair Thompson postnasal mirror

3.2 Tonsillectomy set

1. Boyle Davis mouth gag with tongue blade
2. Doughty tongue blade/Russel Davis tongue blade
3. Draffin bipods
4. Magauren plate
5. Dennis Browne tonsil holding forceps
6. Gwynne Evan tonsillar dissector
7. Mollison tonsillar dissector and pillar retractor
8. Eve tonsillar snare
9. Birkett first artery forceps
10. Birkett gently curved first artery forceps
11. Yorke hemostatic tonsillar clamp
12. Negus knot tier and ligature pusher
13. Negus second artery forceps
14. Irwin Moore tonsillar pillar suturing needle
15. Colver tonsillar vulsellum forceps

16. Waugh tenaculum forceps
17. Yankauer pharyngeal suction tube
18. Muck forceps
19. Ballenger guillotine
20. Wilson artery forceps

4

Instruments in Larynx, Trachea and Esophagus

BRONCHOSCOPY

1. Rigid bronchoscope (Figs 4.1A to H)

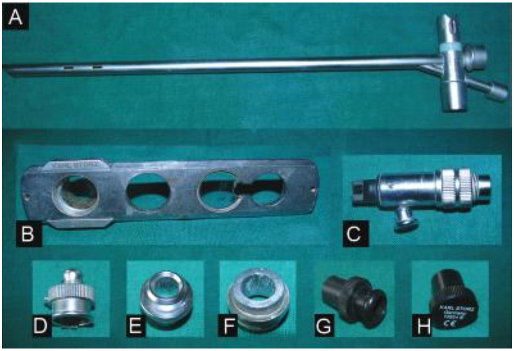
This is a hollow rigid tube with a beveled end. The adult bronchoscope is about 40 to 45 cm long. It has vents on the side for ventilation of the other bronchus when they remain above the level of carina when inserted into the major bronchus and hence differs from esophagoscope.

Parts:

a. Handle
b. Shaft or body
c. Distal beveled end with vents
d. Prismatic light deflector: No loss of lumen space due to light carrier
e. Fluvog adapter for attachment to the proximal end.
f. Tube guide
g. Rubber sealing cap
h. Glass window plug.

Sizes:

A. Adult—6.5, 7.5, 8.5
B. Pediatric—as given in the Table 4.1



Figs 4.1A to H: Bronchoscope and accessories: A. Main rigid pediatric bronchoscope; B. Fluvog adapter; C. Prismatic light deflector; D. Instrument guide for suction catheter; E. Sealing plug for respiration connector; F. Adapter for respirator; G. Glass window plug; H. Sealing cap

Uses:

Diagnostic:

a. For examination of tracheobronchial tree for pathology—growth, ulcer, stricture, etc.
b. Biopsy from a suspicious growth or ulcer
c. Bronchial lavage from secretions
d. Bronchography
e. Autofluorescence and photodynamic diagnosis.

Therapeutic:

a. Foreign body removal
b. Tracheobronchial stenting
c. Aspiration of secretions
d. Removal of tumors.

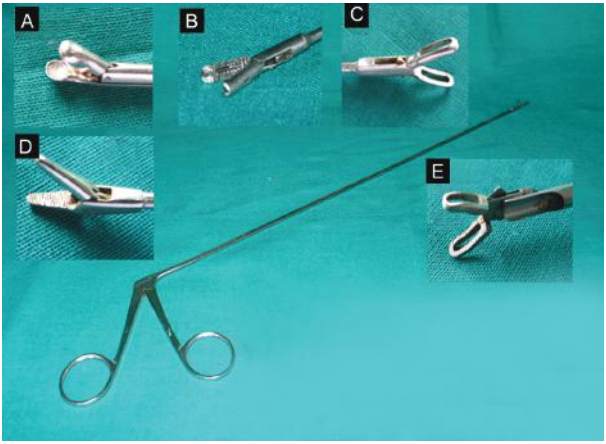
Gustav Killian *(1860-1921), was a German laryngologist, born in Mainz. He made revolutionary advances in the diagnosis and treatment of intralaryngeal passages, especially the removal of foreign bodies from the bronchial tubes, by means of his art of bronchoscopic control. He used 'Bronchoscope', a some-*

Table 4.1: Sizes of pediatric bronchoscopes for various ages

Bronchoscope number	Outer diameter (mm)	Inner diameter (mm)	Length (cm)
	Neonatal		
2.5	4.2	3.5	20
3.0	5.0	4.3	20
3.5	5.7	5.0	20
	Infant		
3.0	5.0	4.3	26
3.5	5.7	5.0	26
3.7	6.4	5.7	26
4.0	6.7	6.0	26
	Child		
3.5	5.7	5.0	30
3.7	6.4	5.7	30
4.0	6.7	6.0	30
4.5	7.3	6.6	30
5.0	7.8	7.1	30
6.0	8.2	7.5	30
	Adolescent		
6.0	8.2	7.5	40

what modified esophagoscope of Rosenheim for visualization of tracheobronchi. Hence he is regarded as the 'Father of bronchoscopy'. He also introduced suspension laryngoscopy. His coworker Seiffert improved the method of suspension laryngoscopy by using a chest rest, which was later perfected by Kleinsasser.

Chevalier Jackson *(1865-1958), was born in Pittsburg, Pennsylvania. He invented the modern science of endoscopy of the upper airway and esophagus, using hollow tubes with illumination (Bronchoscopes and esophagoscopes). He developed methods for removing foreign bodies from the esophagus and the airway with great safety. His works also reduced risks involved in a tracheotomy. Jackson campaigned to put labels on all poisonous or corrosive substances to prevent ingestion accidents due to which congress passed an Act in 1927, which saved countless children from serious injuries and death.*



Figs 4.2A to E: Bronchoscopy forceps with tips: A. Round cupped jaw forceps for biopsy; B. Toothed serrated alligator forceps for slippery foreign bodies; C. Curved fenestrated alligator double action forceps for peanuts and soft foreign bodies; D. Straight single action alligator forceps for hard foreign bodies; E. Curved fenestrated double action optical alligator forceps

2. Bronchoscope forceps (Figs 4.2A to E)

It comprises of the following instruments.

A. Cupped forceps: Used for tracheal and bronchial biopsy.
B. Toothed alligator forceps: Very useful to grasp and remove slippery foreign bodies like custard apple seed.
C. Fenestrated curved forceps: This is a double action forceps with wide jaws capable of holding relatively bigger foreign bodies especially useful for peanuts and soft foreign bodies.
D. Alligator forceps: This single action grasping forceps is used to remove hard foreign bodies.
E. Double action optical forceps: This fenestrated curved grasping forceps is for use along with an endoscope. It is used for accurate removal of foreign bodies. Does not pass through the smallest pediatric bronchoscope.

3. A. Suction tip for bronchoscope (Figs 4.3A and B)

This is a long suction tip with a vent at the proximal end for regulation of the suction.

Figs 4.3A and B: A. Suction tip for bronchoscope; B. Suction trap for bronchoscope

Fig. 4.4: Hopkins optical telescope for bronchoscope forceps

B. Suction trap for bronchoscope

This has a test tube trap attached to a suction tip to collect bronchial lavage and secretion for analysis.

4. Hopkins optical telescope for bronchoscope forceps (Fig. 4.4)

This is a rigid straightforward telescope 0 degree, diameter 4 mm, length 30 cm. For use along with optical bronchoscope forceps.

5. Injection cannula for bronchoscope jet ventilation (Fig. 4.5)

This is an attachment for the pediatric rigid bronchoscope proximal end. It is used for positive pressure assisted ventilation system.

6. Hopkins optical forceps for bronchoscope (Fig. 4.6)

The jaws of the forceps are wide and the regions of biopsy and foreign body are well visualized during the procedure. The spring action of the handle prevents excess pressure being applied to the foreign body. The depth perception during foreign body removal and biopsy is excellent.

Fig. 4.5: Injection cannula for bronchoscope jet ventilation

Fig. 4.6: Hopkins optical forceps for bronchoscope

Fig. 4.7: Flexible fiberoptic bronchoscope

7. Flexible fiberoptic bronchoscope (Fig. 4.7)

Types: Pediatric and adult
Dimension:
Adult—6.4 mm, 5 mm, 5.6 mm diameter and 54 cm length
Pediatric—3.7 and 2.8 mm diameter and 54 cm length
Parts:

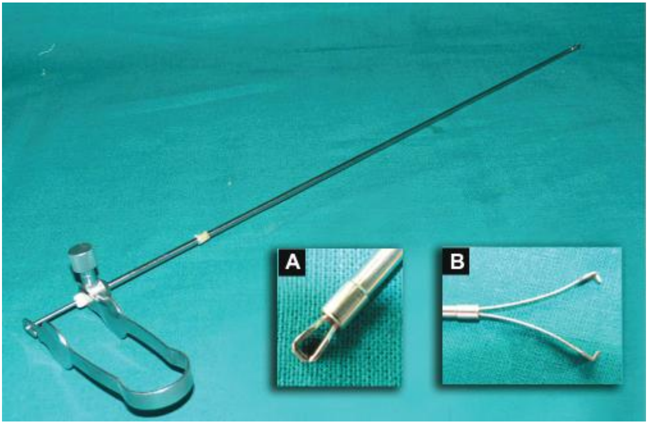
a. Focus ring
b. Eyepiece
c. Suction valve
d. Working channel
e. Control lever
f. Distal end with four openings—fiberoptic light cable, suction channel, irrigation channel and biopsy channel.

Uses:

a. For diagnostic bronchoscopy
b. Treatment of acute respiratory problems in ICU
c. Aspiration of secretions under visual control
d. Unresolved long standing chest infections
e. For tracheobronchial, lung biopsy
f. Bronchoscopic intubation
g. Selective bronchiography
h. Autofluorescence and photodynamic diagnosis
i. Secretions.

8. Sponge holder with spring handle for tracheobronchial smears (Figs 4.8A and B)

This is used to take smears from the tracheobronchial tree for analysis.



Figs 4.8A and B: Sponge holder with spring handle for tracheobronchial smear

ESOPHAGOSCOPY

9. Adult rigid esophagoscope (Fig. 4.9)

It is a long rigid hollow tube of 40 to 45 cm length and 16 to 20 mm diameter. It is available as Negus and Jackson type. The Negus type generally has double proximal illumination, tapers distally and has markings on it. The Jackson type has single distal illumination and has no markings and does not taper distally. In distal illumination, the light can get fogged due to its proximity to the distal end.

Parts:

a. Handle
b. Eyepiece (Proximal end)
c. Body or shaft
d. Light carrier
e. Distal opening.

Fig. 4.9: Adult esophagoscope

Uses:

Diagnostic

a. Malignancy
b. Foreign body examination
c. Cardiospasm
d. Tracheoesophageal fistula
e. Stricture.

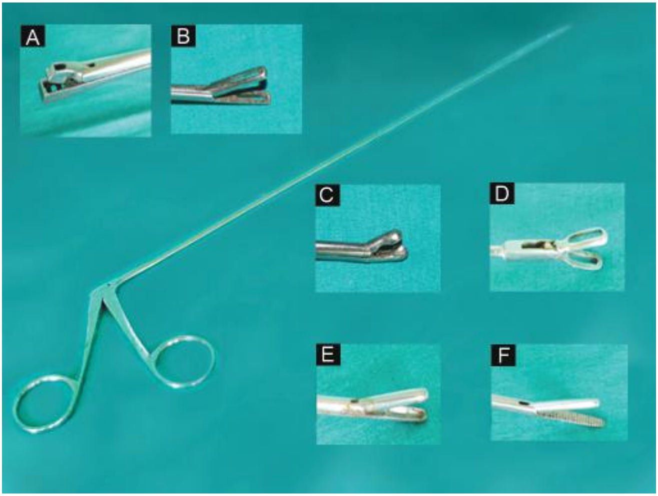
Therapeutic

a. Removal of foreign body
b. To guide bougies through esophageal strictures
c. Esophageal stenting
d. Sclerosing agent injection into esophageal varices.

10. Rigid esophagoscope forceps (Figs 4.10A to F)

Insets:

A. Through cut biopsy forceps: Used for esophageal biopsy.



Figs 4.10A to F: Esophagoscope forceps

B. Foreign body forceps 1: Used to grasp and remove foreign body.
C. Cupped forceps: Used for small biopsies.
D. Foreign body forceps 2: This is a double action forceps with wide jaws and convenient to hold foreign body.
E. Biopsy forceps: This has long jaws with depression inside to grasp and cut tissue. Hence used for biopsy.
F. Alligator forceps: This has long jaws with serrations on the inner aspect in both of them. Hence used to grasp and remove foreign body.

11. Fiberoptic light carrier for esophagoscope (Fig. 4.11)

This light carrier for Jackson type of esophagoscope, is long and reaches upto the distal opening of the esophagoscope. Hence, it can easily get fogged and needs to be cleaned frequently.

12. Hypopharyngoscope (upper end esophagoscope, esophageal speculum) (Fig. 4.12)

This instrument is similar to an esophagoscope but it is shorter in length (about 29 cm). Also the distal end of the scope is not narrower than its proximal end like in a typical esophagoscope.

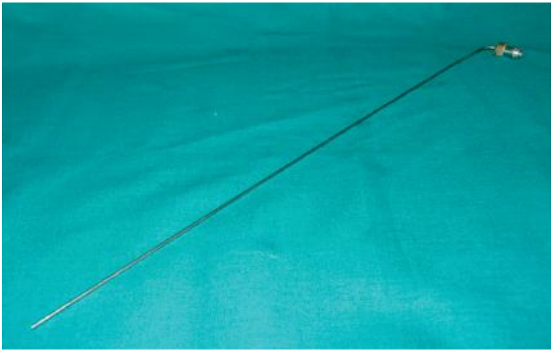


Fig. 4.11: Fiberoptic light carrier for esophagoscope

Fig. 4.12: Hypopharyngoscope with light deflector

Uses:

a. To remove foreign bodies from the hypopharynx or cricopharynx
b. To take biopsy from the above regions
c. For cricopharyngeal dilatation
d. Excision of cricopharyngeal webs.

13. Esophageal denture shearing forceps (Fig. 4.13)

This is a pair of stout scissors that is used to cut dentures and other large foreign bodies in the esophagus to make their removal easier.

14. Esophageal gum elastic bougie (Fig. 4.14)

This bougie is made up of gum elastic and is available in various sizes. It is used in the dilatation of esophageal strictures and stenosis.

Fig. 4.13: Esophageal denture shearing forceps

Fig. 4.14: Esophageal gum elastic bougie

15. Montgomery esophageal tube (Fig. 4.15)

This tube is used to bridge the gap between the pharyngostome and esophagostome after laryngoesophagectomy during first stage reconstruction of cervical esophagus. This tube has a funnel shaped superior end to conform to the hypopharynx and two firm oval bands to ensure proper positioning and prevent leakage of saliva after surgery. It is made up of implant grade silicone.

Uses:

a. To eliminate the problem of salivary leak through the pharyngostome.

b. To maintain a wide patent pharyngostome and esopharyngostome
c. To create a trough between pharyngostome and esopharyngostome to facilitate second stage procedure.

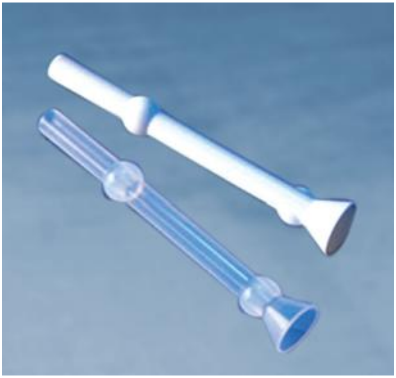


Fig. 4.15: Montgomery esophageal tube

LARYNX

16. Direct laryngoscope (Fig. 4.16)

This is a 'U' shaped instrument made up of German silver. It uses a rigid fiberoptic light carrier for illumination. The position of the structures is not changed unlike indirect laryngoscopy and there is no magnification. Based on the type of illumination there are two types—Jackson and Negus.

Table 4.2: Comparison between Jackson and Negus types of instruments

S.No	*Feature*	*Jackson*	*Negus*
1.	Site of illumination	Distal	Proximal
2.	Number of illuminations	Single	Double
3.	Brightness	Less bright	More bright
4.	Fogging of light carrier	Possible	Unlikely
5.	Proximal size	Narrower	Broader

Uses:

a. For examination of larynx, hypopharynx, cricopharynx and upper esophagus

Fig. 4.16: Direct laryngoscope

b. Removal of foreign bodies from the above regions
c. For biopsy from tumors
d. For excision of tumors or nodules from the glottis or supraglottis
e. To assess the extent of laryngeal growth before laryngectomy.

It took 40 years after the invention of indirect laryngoscopy for the invention of direct laryngoscopy and was by **Kirstein**. *Lack of an appropriate light source was the reason why it took such a long time.*

17. Direct laryngoscope with detachable blade (Fig. 4.17)

This direct laryngoscope has a sliding part that can be detached and removed. Hence, it allows the visualization of posterior structures and also permits to introduce a bronchoscope especially for difficult cases.

18. Holinger anterior commissure laryngoscope (Fig. 4.18)

The adult scope has a length of 17 cm and has a long fiberoptic light carrier, hence of Jackson type. The horizontal limb of the

Fig. 4.17: Direct laryngoscope with detachable blade

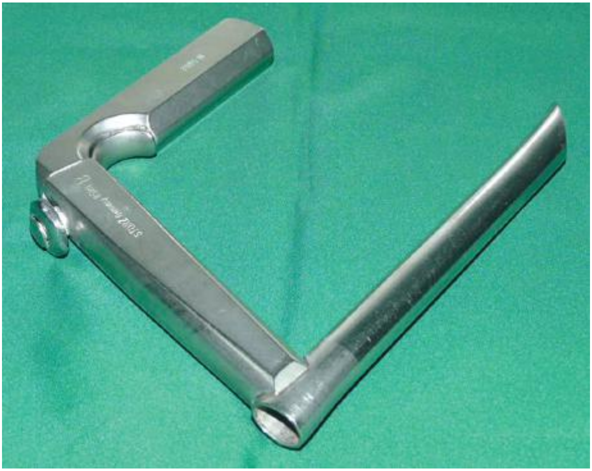


Fig. 4.18: Holinger anterior commissure scope

handle is detachable and hence can also be used as a suspension laryngoscope. It is very useful in examination of larynx in difficult situations. The anterior commissure, subglottis and the posterior commissure can be properly visualized.

19. Fiberoptic light carrier for direct laryngoscope (Fig. 4.19)

This is a rigid fiberoptic light carrier used for rigid direct laryngoscope. It is available in various lengths and sizes. The Negus type of laryngoscope has two short light carriers that don't reach the distal end. The Jackson type of laryngoscope has a single long light carrier that reaches the distal end of the laryngoscope.

20. Macintosh laryngoscope (Fig. 4.20)

Parts:

a. Handle: It has a rough surface for proper grip. It contains batteries inside for illumination of the blade tip.

Fig. 4.19: Fiberoptic light carrier for direct laryngoscope

Fig. 4.20: Macintosh laryngoscope

b. Mouth: This has a pin that accepts blades of various sizes. When properly fitted and closed, the electrical circuit is completed and the bulb is switched on.
c. Blade: The blade may be straight or curved and has a bulb at its tip for illumination.

Uses:

a. For endotracheal intubation
b. For inserting bronchoscope
c. To take biopsy from the base of tongue or pharynx or larynx

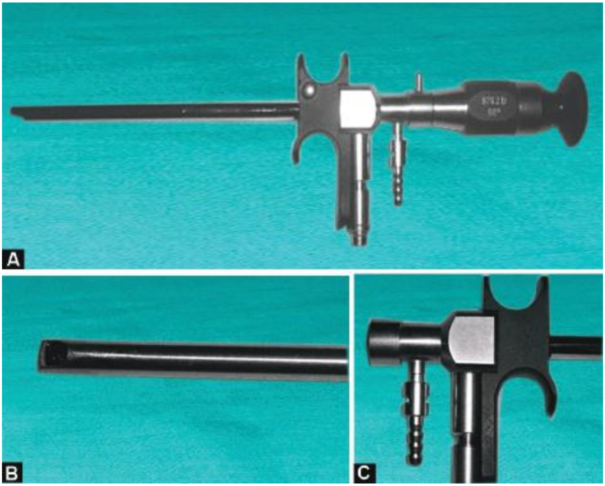


Fig. 4.21: Rigid telelaryngopharyngoscope

d. Removal of foreign bodies in the oropharynx and hypopharynx
e. For insertion of Ryle's tube in difficult cases.

21. Rigid telelaryngopharyngoscope (Fig. 4.21)

This is a rigid endoscope with integrated lateral telescope 90 degree, diameter 10 mm, length 15 cm, autoclavable, 4X magnification and has fiberoptic light transmission. It has a built-in suction channel.

22. Mackenzie laryngeal forceps (Fig. 4.22)

This is a curved laryngeal forceps meant to reach the larynx without a direct laryngoscope. It can be used to take biopsy from supraglottis or the pyriform fossa. It can also be used to remove foreign bodies in the same region. The procedure is done with the patient in sitting position under local anesthesia. This is an obsolete instrument and not commonly used nowadays.

Fig. 4.22: Mackenzie laryngeal forceps

23. Halogen portable light source (Fig. 4.23)

This is a portable light source used for direct laryngoscopy, bronchoscopy, esophagoscopy, hypopharyngoscopy, nasal endoscopy, flexible nasopharyngoscopy and bronchoscopy. It has a special bulb of 150 W that requires a fan to cool it regularly.

24. Fiberoptic flexible light cable (Fig. 4.24)

This cable contains flexible optical fibers that transmit light by total internal reflection. This is used to transmit light from the light source to the endoscope or the light carrier.

Fig. 4.23: Halogen portable light source

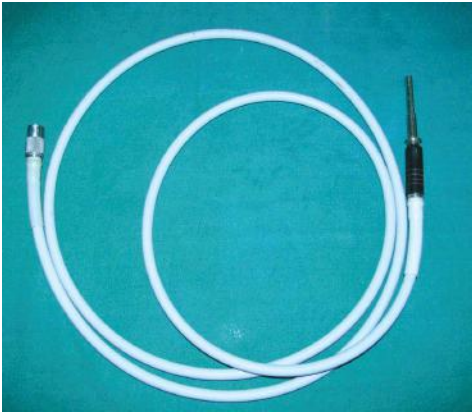


Fig. 4.24: Fiberoptic flexible light cable

25. Rotatable laryngeal biopsy forceps with cupped jaws (Fig. 4.25)

This is a curved biopsy forceps that has a rotatable tip. It is meant for laryngeal biopsy and excision of small nodules, cysts or papilloma without the direct laryngoscope. The procedure is done in the sitting position.

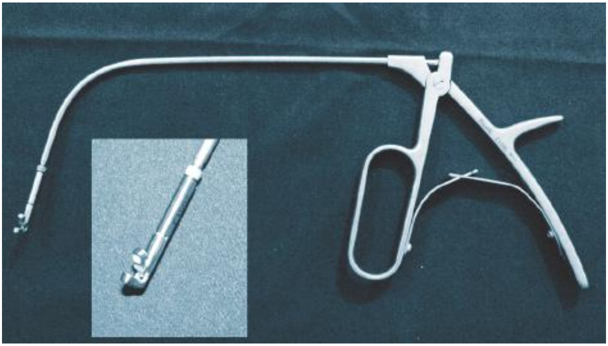


Fig. 4.25: Rotatable laryngeal biopsy forceps with cupped jaws

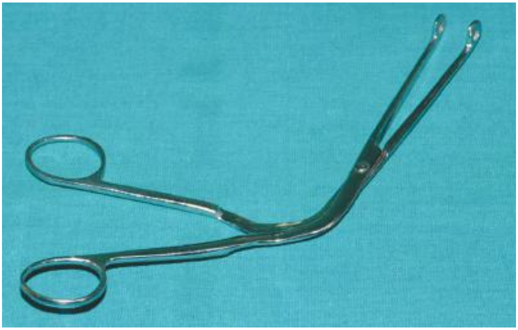


Fig. 4.26: Magill forceps

26. Magill forceps (Fig. 4.26)

This is an angulated forceps commonly used to orient and guide the endotracheal tube into the larynx. This angulation is done in order to prevent the obstruction to the view of the surgeon.

Parts:

a. Grip rings
b. Stalk
c. Fenestrated blades

Uses:

a. To pass endotracheal tube
b. For difficult cases of Ryle's tube insertion
c. To remove foreign body from pharynx
d. For throat packing.

27. Montgomery laryngeal keel (Fig. 4.27)

This is used in the prevention and treatment of adhesion formation, subsequent restenosis and web formation in the larynx. The keel has application following hemilaryngectomy to prevent stenosis and migration of granulation tissue into the larynx. It is also used when a sharp anterior commissure is formed after laryngeal stent removal. Can be used in the anterior commissure

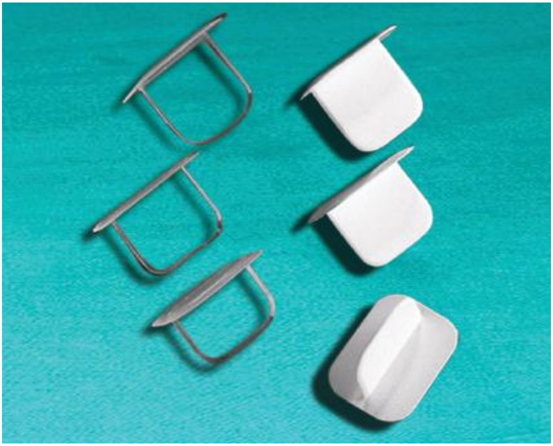


Fig. 4.27: Montgomery laryngeal keel

in an anterior web. There are many different designs and sizes in various materials like teflon and silicone. The intralaryngeal extension of the keel is thinner than the extralaryngeal portion. The extralaryngeal portion when secured to thyroid laminae with a figure of eight suture covers the thyrotomy repair with its umbrella. The posterior wing should not touch the posterior commissure. These materials can be placed in the larynx either by endoscopy or through a mini cricothyroidotomy and held in place with sutures through the cricothyroid membrane. These materials are removed endoscopically under general anesthesia after 2 to 4 weeks.

28. Montgomery laryngeal stent (Fig. 4.28)

This is a molded silicone prosthesis designed to conform to the normal endolaryngeal surface. This is used as a support for endolaryngeal mucosa and cartilage framework. The stent includes two silicone suture buttons to support the stent externally. Usually

Fig. 4.28: Montgomery laryngeal stent

these laryngeal stents are kept for less than 6 weeks. Many types of laryngeal stent are available. Firm stents are used if splinting is required, solid stent is used if aspiration is a problem and a soft hollow stent is used if phonation is required.

Uses:

a. For separation of mucosal surfaces during healing following laryngeal trauma
b. Repair of web formation or atresia
c. Excision of laryngeal lesion.

29. Aboulker laryngeal stent (Fig. 4.29)

This is a hollow long laryngeal stent available in various sizes ranging from 3 mm to 15 mm diameter. These are coated with teflon. The uses are same as that of Montgomery laryngeal stent.

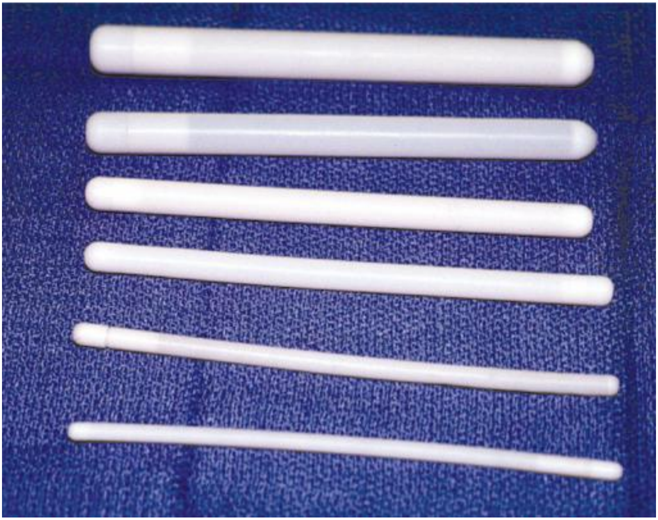


Fig. 4.29: Aboulker laryngeal stent

MICROLARYNGOSCOPY

30. Kleinsasser suspension laryngoscope for microlaryngeal surgery (MLS) (Fig. 4.30)

This resembles a direct laryngoscope except that the horizontal portion of the handle is replaced by a curved hook. The chest piece is attached to the vertical portion of the handle and this makes the instrument self-retaining and hands free. The proximal aperture of this instrument is wider than the distal end that is narrower. The posterior surface of this scope is flat and this provides good stability to the instrument. The inner surface of this instrument is coated black or given a matt finish in order to prevent glare and reflection from the light of microscope. Microlaryngoscopy is performed with the help of a microscope that has a 400 mm lens at its objective.

Uses:

a. Microlaryngeal surgical procedures like excision of mass, cordectomy, stripping, etc.
b. Biopsy from the vocal cords.

Bruning *of Germany was probably responsible for the invention of microlaryngoscopy. He improvised the direct laryngoscopy and realized*

Fig. 4.30: Kleinsasser suspension laryngoscope for MLS

that pressure on the thyroid cartilage was necessary to reveal the anterior commissure. He also introduced monocular magnification. He produced a device with a pressure applicator on the larynx. Originally laryngoscopy was performed with patient sitting with examiner standing behind. Killian in 1911, developed suspension laryngoscopy for direct laryngoscopy. This was modified further by Lynch of New Orleans, and is still used as the "Boston" suspension laryngoscope.

Kleinsasser *of Germany published a book in 1968 which revolutionized the operative laryngoscopy. The use of stereoscopic microscope and microear instruments were modified for use in larynx. Kleinsasser is aptly called 'the father of modern microlaryngeal surgery'.*

31. Kleinsasser anterior commissure operating laryngoscope (Fig. 4.31)

This is a suspension laryngoscope which has a beak at the ventral surface of the distal end that pushes the epiglottis anteriorly and gives a clear view of the anterior commissure.

Fig. 4.31: Kleinsasser anterior commissure operating laryngoscope

Fig. 4.32: Distending operating laryngoscope

32. Distending operating laryngoscope (Fig. 4.32)

In this instrument, the posterior blade can be expanded using a screw. It has a black finish and is laser compatible.

33. Riecker chest piece and Jack for MLS (Fig. 4.33)

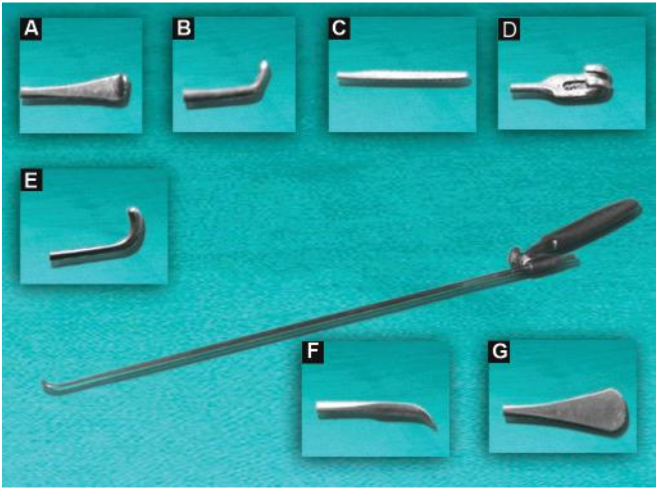
The Jack is fixed into the handle of the microlaryngoscope and the chest piece rod is inserted into the Jack. The chest piece has a pressure plate covered with rubber foam that is placed under the chest holder. The screw is tightened on the Jack to make the entire assembly self-retaining.

34. Detachable microlaryngeal instruments (Figs 4.34A to G)

These are straight instruments with a shaft and a working tip. The shaft is inserted into a handle and the length of the shaft can be adjusted as required. The following are the instruments.

A. Laryngeal right angled knife: To incise the medial margin of the vocal cords in Reinke's edema and sulcus vocalis.

Fig. 4.33: Riecker chest piece and jack for MLS



Figs 4.34A to G: Microlaryngeal instrument tips with handle: A. Laryngeal right angled knife; B. Laryngeal angled sharp hook; C. Laryngeal straight probe; D. Laryngeal blunt double hook retractor; E. Laryngeal angled blunt hook; F. Laryngeal sickle knife; G. Laryngeal peeling knife

B. Laryngeal angled sharp hook: Used to separate the layers of the vocal cord.
C. Laryngeal straight probe (cotton carrier): Used to deliver medications through a cotton swab into the larynx.
D. Laryngeal blunt double hook retractor: This is used to retract the false cords and examine the ventricles. Also used to retract the true cords to examine the subglottic region.
E. Laryngeal angled blunt hook: This is used to retract and examine the crevices and hidden areas of the larynx.
F. Laryngeal sickle knife: Used to incise polyps, nodules, cysts and other structures in the larynx.
G. Laryngeal peeling knife: Used for peeling the vocal cords as in sulcus vocalis.

35. Laryngeal straight cupped forceps for MLS (Fig. 4.35)

This is a single action basic instrument of MLS used in almost all microlaryngeal surgeries for removal of papilloma, nodules, polyp, cyst, tumor, tags, etc. This is also available as upturned cupped forceps and side turned forceps.

36. Laryngeal scissors for MLS (Fig. 4.36)

This is a single action scissors used in MLS for cutting nodules, polyps, papillomas and other structures.

Fig. 4.35: Laryngeal cupped forceps

Fig. 4.36: Laryngeal straight scissors for MLS

37. Lindholm vocal cord and false cord retractor (Fig. 4.37)

This is an atraumatic self-retaining retractor with ratchet. The distal end has blunt curved blades for retraction of the true cords or the false cords. Hence, the subglottic region and trachea can be visualized during microlaryngeal surgery.

Fig. 4.37: Lindholm vocal cord and false cord retractor

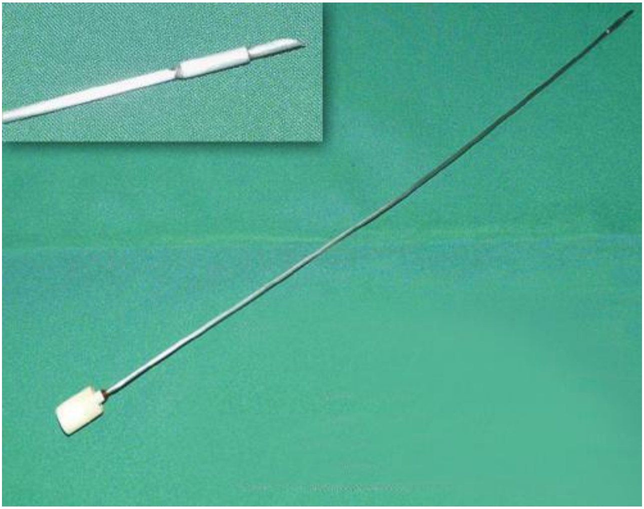


Fig. 4.38: Laryngeal needle

38. Laryngeal needle for injection (Fig. 4.38)

This is a thick needle that is attached to a stout syringe in order to inject teflon paste or fat for the medialization of vocal cord. The size used is usually 18 to 20 G.

39. A. Bruning laryngeal syringe (Figs 4.39A and B)

This syringe is used to inject teflon paste or liquefied fat for the medialization or lateralization of vocal cord. This is used along with the laryngeal needle.

B. High pressure handle

This is used along with the syringe and the injection needle to obtain sufficient pressure for the injection.

Fig. 4.39A: Bruning laryngeal syringe

Fig. 4.39B: High pressure handle

THYROPLASTY

40. Laryngeal calipers for thyroplasty (Fig. 4.40)

Used to mark the position of the proposed laryngeal window from the upper border of thyroid cartilage and from the midline of thyroid cartilage.

41. Male laryngeal window marker (Fig. 4.41)

This is a larger window marker used in thyroplasty type 1. It measures 5 to 6 mm breadth and 12 mm length. The marking is done on the cartilage using a thermal cautery.

42. Female laryngeal window marker (Fig. 4.42)

This is a smaller window marker than the male type. The ideal dimensions would be 4 to 5 mm breadth and 10 mm length. Used to mark these dimensions on the thyroid cartilage prior to making a window as well as make the measurements on the silicone block

Fig. 4.40: Laryngeal calipers

Fig. 4.41: Laryngeal window marker—Male

Fig. 4.42: Laryngeal window marker—Female

before cutting it. The marking is done on the cartilage using a thermal cautery.

Fig. 4.43: Thyroplasty rounded perichondrial elevator

43. Round mucoperichondrial elevator for thyroplasty (Fig. 4.43)

This is a small blunt circular mucoperichondrial elevator used in thyroplasty. It has a flat surface that should face the cartilage and a convex surface that should face the mucoperichondrium. Care should be taken not to breach the inner perichondrium of the thyroid cartilage.

44. Thyroplasty mucoperichondrial elevator sharp (Fig. 4.44)

This is a sharp mucoperichondrial elevator used to elevate difficult cases of adherent mucoperichondrium. It has a higher risk of perforating the inner perichondrium.

Fig. 4.44: Thyroplasty mucoperichondrial elevator sharp

45. Silicone block for thyroplasty (Fig. 4.45)

This is a polymer of silicon which is bioinert and friendly. Blocks of various sizes can be cut and shaped as per the needs for medialization thyroplasty.

46. Montgomery thyroplasty implant (Fig. 4.46)

This is a readymade thyroplasty implant for medialization in unilateral vocal cord paralysis. It is available in various sizes. There is

Fig. 4.45: Silicone block for thyroplasty

a sizer to determine the required size of implant. There is no need to hand fashion the implant. It has a self-retaining design and no suturing is necessary. This procedure is reversible later if necessary.

Fig. 4.46: Montgomery thyroplasty implant

TRACHEOSTOMY

47. Blunt tracheal hook (Isthmus single hook) (Fig. 4.47)

This is used to retract the isthmus of the thyroid and other soft tissues during tracheostomy. The sharp tracheal hook is used to retract the cricoid cartilage superiorly and stabilize the trachea prior to the tracheal incision during tracheotomy.

48. Down cricoid hook double (Fig. 4.48)

It is a blunt instrument that has two hooks. This instrument is used to retract soft tissue or strap muscles in the neck during tracheostomy.

49. Trousseau tracheal dilator (Fig. 4.49)

It is an instrument used to dilate the tracheostoma during or after the tracheostomy to insert the tracheostomy tube. It allows easier introduction of the tracheostomy tube and prevents formation of a false passage.

Table 4.3: Comparison between tracheal dilator and artery forceps

Feature	*Tracheal dilator*	*Artery forceps*
Pressing the handle of the instrument	Opens the prongs	Closes the prongs
Ratchet	Absent	Present
Inner aspect serrations	Absent	Present

50. Laborde tracheal dilator (Fig. 4.50)

This is a tracheal dilator with three prongs to dilate the trachea. Hence, it is more efficient in opening the tracheostoma and guiding the tube in its natural course.

Fig. 4.47: Isthmus single hook

Fig. 4.48: Down cricoid hook double

Fig. 4.49: Trousseau tracheal dilator

Fig. 4.50: Laborde tracheal dilator

Fig. 4.51: Fuller bivalved tracheostomy tube

51. Fuller bivalved tracheostomy tube (Fig. 4.51)

Parts:

a. Biflanged outer tube: Collar present to tie ropes
b. Inner tube: Has two circular rings to grasp, remove and insert the tube.

This is a metallic tracheostomy tube and has an inner tube that is longer than the biflanged outer tube. This prevents the outer tube from getting blocked by secretions. The inner tube can easily be removed for cleaning. Also the posterior wall of the inner tube has an opening that permits the patient to breathe through the nose and phonate. The two flanges of the outer tube can be compressed for initial introduction into the trachea. Hence a pilot is not necessary for introduction. The compressed flanges of the outer tube hold the inner tube in place and prevent it from getting coughed out. Hence a lock system is not required in this tube.

Disadvantages:

a. The tip of the flanges can injure the tracheal wall
b. Flanges can break after long use and present as foreign bodies
c. There is a risk of granulation tissue formation.

Table 4.4: Comparison between Fuller and Jackson tracheostomy tubes

Feature	*Fuller tracheostomy tube*	*Jackson tracheostomy tube*
Outer tube	Biflanged	No flanges
Lock for inner tube	Absent	Present
Vent for breathing and phonation on inner tube	Present	Absent
Pilot for introduction	Absent	Present

52. Jackson tracheostomy tube (Fig. 4.52)

Parts:

a. Inner tube
b. Outer tube: Contains a collar and a locking mechanism
c. Pilot obturator

This consists of a longer inner tube and an outer tube. The inner tube is locked at the opening of the tube so that it is not coughed out. This is due to the pressure being built up as it does not have an inner tube opening. Also there are no flanges to hold the

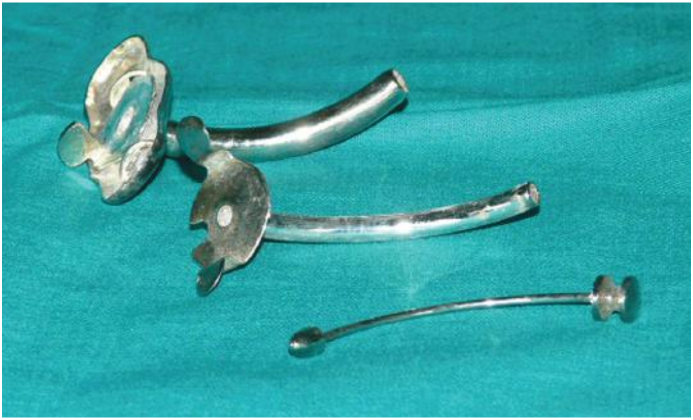


Fig. 4.52: Jackson tracheostomy tube

inner tube in place. There is a pilot for introducing the tube into the trachea so that injury is not caused to the posterior wall.

Disadvantages:

a. Phonation is not possible
b. The patency of the natural air passage cannot be checked by blocking the tube
c. There is a risk of granulation tissue formation.

The French gauge (FG or FR) is three times the outer diameter (millimeters) of the tube. This FG system is commonly followed for identifying the number of metal tracheostomy tube.

53. Non-metallic: Portex tracheostomy tube (Fig. 4.53)

Parts:

a. Single tube with collar
b. Cuff
c. Balloon with valve for air
d. Pilot obturator.

Fig. 4.53: Portex tracheostomy tube with attachment

Advantages:

a. Made up of soft material, hence less damaging to the tracheal wall
b. Since it has a cuff it is particularly useful for intensive care unit patients
c. It is useful during radiotherapy
d. It has a blue radiopaque line all along the tube for radiological detection of the site of the tube.

Disadvantages:

a. Cleaning the tube is more difficult—requires removal
b. Phonation not possible usually
c. Checking the patency of natural air passage is not possible
d. Cuff might injure the tracheal wall (tracheal necrosis) if overinflated and left for a longer period of time. Pressure should be preferably less than 30 mm of Hg.

The inner diameter in millimeters corresponds to the designated size of the tracheostomy tube.

Table 4.5: Comparison between metallic and non-metallic tracheostomy tube

S. No.	*Feature*	*Metallic tracheostomy tube*	*Non metallic tracheostomy tube*
1.	Inner tube and outer tube	Present	Only one tube
2.	Cuff	Absent	Absent or present
3.	Positive pressure ventilation	Not possible	Possible if cuffed
4.	Prevention of aspiration	Not possible	Possible if cuffed
5.	Radiotherapy	Incompatible	Compatible
6.	Phonation	Possible in Fuller type	Not possible usually
7.	Cleaning the tube	Simpler and easier	Requires removal of the entire tube

Table 4.6: Non-metallic tracheostomy tube sizes according to age and tracheal transverse diameter

Age	*Trachea transverse diameter (mm)*	*Inner diameter tracheostomy tube (mm)*
Pre-term–1 month	5	2.5–3.0
1–6 months	5–6	3.5
6–18 months	6–7	4.0
18 months–3 years	7–8	4.5
3–6 years	8–9	5.0
6–9 years	9–10	5.5
9–12 years	10–13	6.0
12–14 years	13	7.0

54. Montgomery tracheostomy speaking valve (Fig. 4.54)

This is a tracheostomy speaking valve designed to allow tracheostomy patients to speak without the need for finger occlusion. This valve facilitates airflow in one way using a thin silicone diaphragm

Fig. 4.54: Montgomery tracheostomy speaking valve

and opens on inspiration and closes on expiration. It has a unique cough release mechanism that prevents the tube from dislodgement as a result of coughing or excessive airway pressure. It is used on a non-metallic tracheostomy tube with a vent on it for phonation.

The earliest reference to tracheotomy was for relief of suffocation was made by **Aretaeus** *between 80 AD and 160 AD. However, the first successful tracheotomy is attributed to* **Antonio Musa Brasavola** *who published the procedure in 1546. This tracheotomy was performed on a patient who was on the verge of death from an abcess in the windpipe.* **Fabricius** *is credited with having introduced the concept of inserting a tube into the tracheotomy to maintain the airway. The concept of using an inner canula was initially presented by* **Martin** *in 1730.* **Trousseau** *contributed to the development of an inner canula. The term tracheotomy was coined by Heister in 1718.*

55. Singer laryngectomy tube (Fig. 4.55)

This is a short tube that is used after a total laryngectomy for insertion into the stoma. It is a flexible silicon tube available in various sizes. It prevents the stoma from narrowing and also facilitates easy cleaning of the secretions.

Fig. 4.55: Singer laryngectomy tube

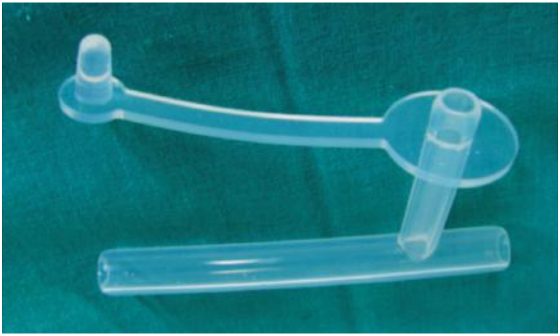


Fig. 4.56: Montgomery ‘T’ tube

56. Montgomery ‘T’ tube (Fig. 4.56)

This is a molded laryngotracheal stent made up of silicone. It is firm enough to support a damaged tracheal wall and soft enough to prevent injury to soft tissues. This stent may be used for tracheal stenosis, malacia, laryngotracheal injury, segmental resection and anastomosis of trachea and also for subglottic stenosis. It is also used to maintain a cervical trachea that cannot be repaired. Usually the short limb of the 'T' has to go upwards into the subglottic region below the true vocal cords. The long limb of the 'T' has to go downwards well above the carina. The extraluminal limb of the 'T' tube which is at an angle of 75 or 90 degree is open outside and can be closed with a cap. This opening can be used either for cleaning the tube or for breathing when the proximal limb is blocked. This limb is also useful to remove the tube after a period of 6 to 12 months or more.

Advantages:

a. Patient can phonate with the tube *in situ*.
b. The tube can be closed with a snugly fitting cap.
c. There is no need to remove the tube for cleaning frequently.
d. The material used is implant grade silicone that is either radiolucent or radiopaque.
e. Crusting and drying up of secretions is very less when the cap of the 'T' tube is closed compared to a tracheostomy tube.

Disadvantages:

a. Cannot prevent aspiration
b. As there is no cuff, positive pressure ventilation cannot be administered.

VOICE REHABILITATION

57. Trocar and cannula for secondary tracheoesophageal puncture (TEP) (Fig. 4.57)

This is used to make an opening in the tracheoesophageal wall following total laryngectomy prior to insertion of voice prosthesis. A pharyngeal protector is used to prevent undue damage to the wall.

58. Pharynx protector for secondary tracheoesophageal puncture (Fig. 4.58)

This is a hollow tube with a handle used to protect the pharyngeal mucosa from tearing when a tracheoesophageal puncture is made with a trocar in secondary TEP.

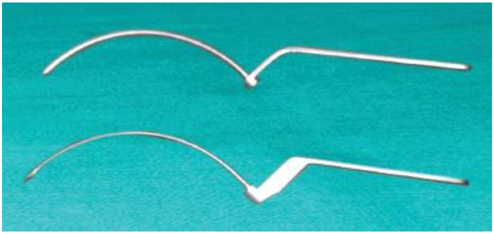


Fig. 4.57: Trocar and cannula for secondary TEP

Fig. 4.58: Pharynx protector for secondary TEP

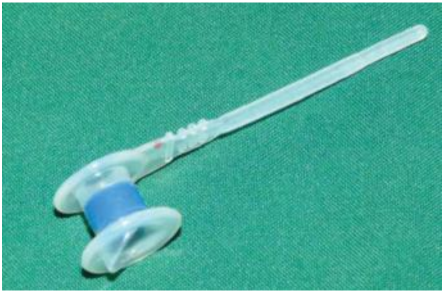


Fig. 4.59: Provox voice prosthesis

59. Provox voice prosthesis (Fig. 4.59)

Available as Provox 1 and Provox 2

Parts:

a. Tracheal flange
b. Esophageal flange
c. Valve
d. Safety strap
e. Blue ring on body

Table 4.7: Comparison between Bloom Singer and Provox prosthesis

S. No.	*Feature*	*Bloom Singer prosthesis*	*Provox prosthesis*
1.	Mode of insertion	Antegrade (From front)	May be antegrade or retrograde
2.	Opening of esophageal flange after insertion	Delayed	Immediate
3.	Diameter	Smaller (3.5 mm)	Larger (5 mm)
4.	Valve	Glued to the body	Molded to the body
5.	Suitability	For secondary TEP	For both primary and secondary TEP

Table 4.8: Comparison between Provox 1 and Provox 2 prosthesis

S. No.	*Feature*	*Provox 1*	*Provox 2*
1.	Suitability	Primary TEP	Primary or secondary TEP
2.	Mode of insertion	Retrograde	Retrograde/Ante-grade
3.	Flanges	Slightly harder	Soft
4.	Method of insertion	Using guide wire	Using inserter

60. Provox prosthesis inserter (Fig. 4.60)

It is used to insert the voice prosthesis.

61. Bloom singer prosthesis (Fig. 4.61)

This is a voice prosthesis used mainly for secondary TEP (Antegrade insertion).

62. Groningen prosthesis (Fig. 4.62)

It was developed in Netherlands at the department of otorhinolaryngology, University Hospital Groningen. It is a low pressure indwelling voice prosthesis consisting of a tracheal and esophageal

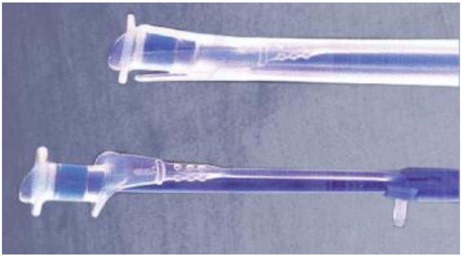


Fig. 4.60: Provox prosthesis inserter

flange with a shaft of variable length (5–13 mm). This makes it possible to adjust the device to the thickness of tracheoesophageal wall. This prosthesis has a standard 7 mm or an optional 8 mm shaft diameter. There is a semicircular slit centrally through the esophageal flange which acts as a valve.

Fig. 4.61: Bloom singer prosthesis

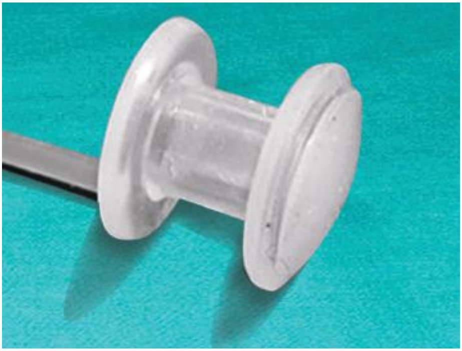


Fig. 4.62: Groningen prosthesis

INSTRUMENT SETS IN LARYNX, TRACHEA AND ESOPHAGUS

4.1 Rigid bronchoscopy set

1. Rigid ventilating bronchoscope and its accessories
2. Bronchoscope forceps of different kinds
3. Suction tip for bronchoscope
4. Suction trap for bronchoscope
5. Optical telescope for bronchoscope forceps
6. Injection cannula for bronchoscope jet ventilation
7. Hopkins optical forceps
8. Sponge holder with spring handle for tracheobronchial smears
9. Portable light source
10. Flexible fiberoptic light cable
11. Camera attachment with CCTV for Hopkins telescope (For demonstration)
12. Macintosh laryngoscope
13. Teeth protector

4.2 Rigid esophagoscopy/hypopharyngoscopy set

1. Rigid esophagoscope/hypopharyngoscope with accessories
2. Esophagoscope forceps
3. Rigid fiberoptic light carrier/prismatic light deflector
4. Suction tip for esophagoscope
5. Portable light source
6. Flexible fiberoptic light cable
7. Teeth protector

4.3 Direct laryngoscopy set

1. Rigid direct laryngoscope with accessories
2. Portable light source

3. Flexible fiberoptic light cable
4. Rigid fiberoptic light carrier
5. Laryngeal cupped biopsy forceps
6. Suction tip for laryngoscope
7. Holinger anterior commissure scope
8. Teeth protector

4.4 Microlaryngeal surgery set

1. Kleinsasser suspension laryngoscope
2. Distending operating laryngoscope
3. Microlaryngeal instrument tips with handle
4. Laryngeal straight, upturned, sideturned forceps
5. Laryngeal straight scissors
6. Riecker chest piece and Jack
7. Lindholm vocal cord and false cord retractor
8. Rigid fiberoptic light carrier
9. Portable light source
10. Flexible fiberoptic light cable
11. Objective lens 400 mm for microscope
12. Laryngeal suction tip
13. Teeth protector
14. Coagulating electrode for thermal cautery
15. Laryngeal needle
16. Bruning syringe

4.5 Medialization thyroplasty set

1. Gille skin hook
2. Halsted mosquito forceps
3. Fine dissection forceps
4. Freer mucoperichondrial elevator
5. Metzenbaum scissors
6. Laryngeal callipers
7. Hemostatic artery forceps

8. Allis forceps
9. Langenbeck retractor
10. Suction tip
11. Laryngeal window marker—male/female
12. Thyroplasty rounded perichondrial elevator
13. Silicone block
14. Needle holder
15. Rigid/flexible endoscope
16. Adson toothed forceps

4.6 Tracheostomy set

1. Halsted mosquito artery forceps
2. Hemostatic artery forceps
3. Down cricoid double hook
4. Isthmus single hook
5. Trousseau tracheal dilator
6. Laborde tracheal dilator
7. Fuller/Jackson/Portex tracheostomy tube
8. Allis forceps
9. No: 11 blade for tracheal incision
10. Metzenbaum dissecting scissors
11. Short fine gently curved scissors
12. Langenbeck retractors
13. Needle holder
14. Adson toothed forceps
15. Suction tip
16. Non-toothed forceps
17. Mollison mastoid retractor.

5 General Instruments

HEAD AND NECK INSTRUMENTS

1. Bulldog clamp (Fig. 5.1)

This is an atraumatic type of hemostat used mainly for temporary ligation of major vessels in the neck during head and neck surgery.

2. Allis forceps (Fig. 5.2)

Parts:

1. Ring shaped finger grips—two
2. Ratchet
3. Both the tips are flattened and curved inwards with serrated ends—hence traumatic.

Uses:

a. To hold subcutaneous tissue and widen the field of dissection
b. To hold or lift fascia during dissection in the neck
c. To hold swellings during dissections to obtain proper cleavage.

Fig. 5.1: Bulldog clamp

Fig. 5.2: Allis forceps

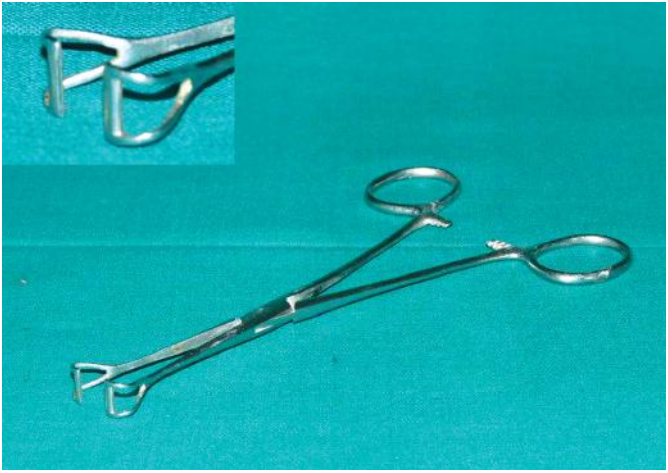


Fig. 5.3: Babcock forceps

3. Babcock forceps (Fig. 5.3)

It is an atraumatic instrument with two finger grips, ratchet, fenestrated and serrated curved blades. There are no teeth at the tip. Hence used to hold and lift delicate structures like mucosa, cysts, gland, etc.

Fig. 5.4: Kocher artery forceps

4. Kocher artery forceps (Fig. 5.4)

This is an artery forceps that has got teeth at its tip. The blades have transverse serrations and can be tightened by a ratchet. It is used to pick up retracting soft tissue and blood vessels in the periosteum and fibrous tissue.

5. Lane tissue forceps (Fig. 5.5)

This forceps has two finger grips, a ratchet on the handles and teeth at the tip. The blades are fenestrated and curved so as to hold bulk of tissues within it. They are used to hold tissues during dissection without crushing or injuring them. The forceps can also hold tumors during dissection.

6. Mayo scissors (Fig. 5.6)

This scissors may be straight or curved and is available in various sizes. Tip is tapered but not sharp. Hence used for blunt dissection and safer than scalpel.

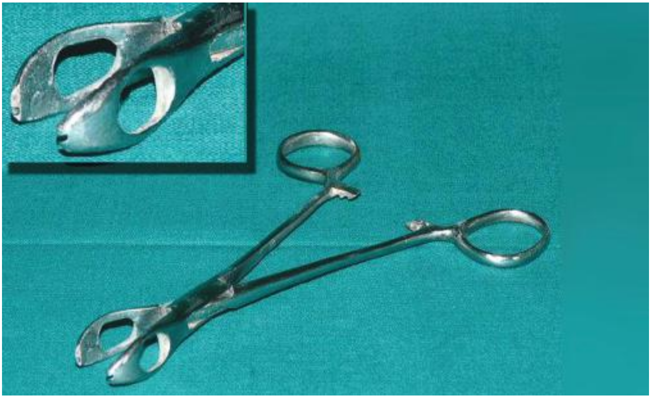


Fig. 5.5: Lane tissue forceps

Fig. 5.6: Mayo scissors

7. Metzenbaum dissection scissors (Fig. 5.7)

It is a gently curved scissors with a blunt tip available in various sizes. Used for sharp and blunt dissection in head and neck surgeries.

8. Gille skin hook (Fig. 5.8)

Used to retract skin flaps after incising the skin.

Fig. 5.7: Metzenbaum dissection scissors

Fig. 5.8: Gillie skin hook

9. Mixter forceps (Fig. 5.9)

This forceps resembles the tonsillar second artery Negus forceps. However, the tip of this instrument is at sharp right angles to the body and the tip is smaller in size compared to the Negus forceps. It is used to tie ligatures or feeders around blood vessels in head and neck dissections.

Fig. 5.9: Mixter dissecting forceps

10. Gigli saw wire with handle (Fig. 5.10)

Parts:

1. Two 'T' shaped handles each with a stout hook for attachment of wire on the vertical limb.
2. Wire saw—thin and long to cut bone when moved to and fro.

Use:

For cutting bone in maxillectomy, mandibulectomy and skull bones during reflection of osteoplastic flaps.

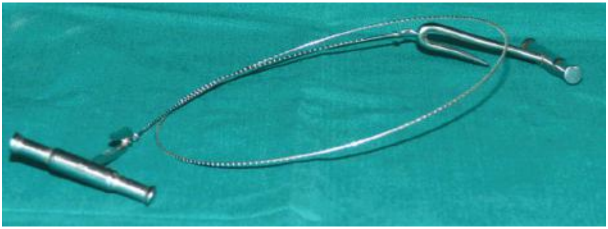


Fig. 5.10: Gigli saw wire with handle

Advantages:

1. Bone is cut from within outwards. Hence deeper structures are not injured.
2. The wire can be easily negotiated from a small opening and hence can be inserted through a small wound to cut deeply situated bone.

Nowadays the oscillating saw has largely taken over the job of Gigli saw.

11. Joll thyroid-retractor (Fig. 5.11)

This is a self-retaining retractor with two pairs of blade and ratchet at one end and a semicircular handle at the other end. The blades hold the skin flaps and retract the flaps when the instrument is opened with a screw within the handle. This is used to retract skin, superficial fascia and platysma during surgery on the thyroid and parathyroid glands.

12. Kocher thyroid dissector (Fig. 5.12)

Used in the dissection of thyroid especially the upper pole.

13. Surgical stapler (Fig. 5.13)

It is used to staple skin incisions in the head and neck instead of sutures. It is fast and saves time.

Patrick Heron Watson *(1832–1907), a surgeon from Edinburgh England, performed the first laryngectomy in 1866 on a patient with syphilis of the larynx. The patient died of pneumonia.*

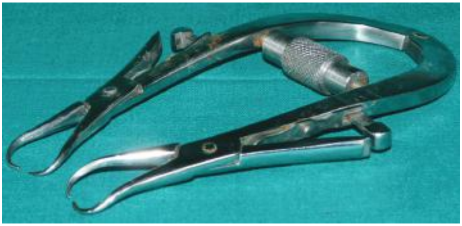


Fig. 5.11: Joll thyroid retractor

Christian Theodor Billroth *(1829–94), Professor of Surgery at Vienna, was the first to perform laryngectomy for malignancy in 1873, but recurrence and death took place within a month.*

Fig. 5.12: Kocher thyroid dissector

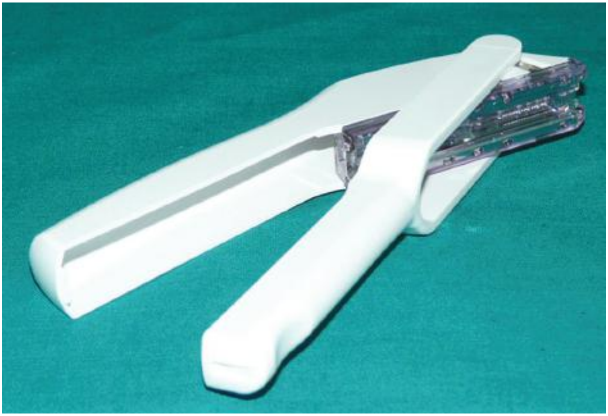


Fig. 5.13: Surgical stapler

MISCELLANEOUS GENERAL INSTRUMENTS

14. Operating microscope (Fig. 5.14)

The operating microscope is used routinely for all ear surgeries as well as microlaryngeal surgeries.

Parts of a basic model:

a. Optical system: Consists of three parts and controls the distance between lens and object. The parts are binocular assembly, magnification changer and objective lens.

   Binocular assembly: This consists of two eyepieces that are available in different magnifications like 10 X, 12.5 X, 16 X and 20 X of which 12.5 X is commonly used. The power of these eyepieces varies from –5 to +5D and can be adjusted as per the requirements of the dissector. The interpupillary distance is adjusted to get a single image through the binoculars.

   Magnification changer: This is a rotating device between the object and binocular assembly. Using this device, the magnification can be changed from 6 to 40 X. However for routine ear work, a magnification of 10 X is preferred. The manual turret drum assembly has magnification factors of 0.4, 0.6, 1, 1.6 and 2.5. As the magnification becomes higher, the field of vision becomes narrower and the depth of field decreases rapidly. There is a fine focus control for fine focusing of the object.

   Objective lens: This lens is fitted at the bottom of the head which can be screwed and unscrewed easily. For ear surgery usually a 200 mm lens is used. For nose a 300 mm lens is used and for the larynx 400 mm lens is used.

b. Illumination: Can be provided by a bulb (6 V, 50 W) or a halogen light source or a xenon light source.

c. Stand: The microscope is made mobile by the stand and can be moved from place to place. It can be fixed on the stand tightly with the knobs provided. The arms are so arranged

Fig. 5.14: Operating microscope

on the stand that the head of the microscope can be tilted in any direction and fixed at the required level by the operator.

Accessories: A beam splitter is used to split the light rays and reflect it towards the co-observation tube, still camera or CCTV camera. All these accessories are used for teaching.

a. Co-observation tube: This may be of two types—monocular tube or binocular tube.
b. Still camera: A special camera adapter of 35 mm is required.
c. CCTV: This requires the aid of adapter rings for camera attachment. The images are processed through a single chip, two chip or three chip camera and then connected to a monitor.

Carl Olof Nylen *(1892–1978), an otolaryngologist at the University clinic of Stockholm in 1921, invented monocular microscope, instead of a loupe, during a surgery in a patient with chronic otitis media with labyrinthine fistulas. It did not provide depth perception and absence of* *a light source in early designs resulted in dimness of image with increased magnification.*

In 1922, **Gunnar Holmgren** *(1875–1954), Head of University Clinic of Stockholm (Where Nylen practiced) invented binocular microscope and attached a light source to microscope to overcome the lack of depth perception and the magnification was 6-10.*

In 1952, **Hans Littmann** *(1907–1991), invented a microscope capable of changing magnification without changing focal length. His design, the Zeiss-opton, provided 200 mm working distance and magnifications of 4, 6, 10, 16, 25, 40 and 63 selectable through a rotary Galilean system.*

Horst L Wullstein*, an otolaryngologist from Gottingen, Germany, was not satisfied with the mechanical flexibility of the microscope he used and built a microscope mounted on stand equipped with a rotating arm. In 1953, Littmann benefitted from Wullstein's ideas and experience and manufactured the "Zeiss OPMI-1" (Zeiss operating microscope 1). This was more stable, easily operable with superior coaxial lighting and had 10–40.5 cm working distance. The magnification was 2.5 and 50.*

15. Head mirror (Fig. 5.15)

It consists of a plastic headband to which is attached an adjustable concave mirror with a central hole. The diameter of the mirror

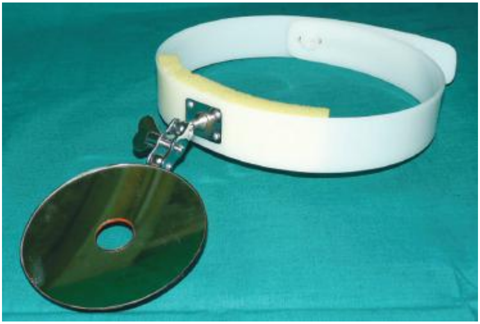


Fig. 5.15: Head mirror

is 9 cm while that of the central aperture is 2 cm and the focal length of the mirror is approximately 18 cm. When parallel rays of light from the Bull's lamp impinge on the concave mirror, the light rays converge at the focal point of the mirror. The advantage of wearing this head mirror is that it keeps both hands free for procedures. However, the head has to be kept fixed and cannot be moved to any position like the headlight.

Hofmann *in 1841 designed the first otologic head mirror.*

16. Clar headlight (Fig. 5.16)

Used to focus light, keeping the hands free for surgeries of nose, throat, ear. It has a concave mirror that reflects light and focuses the beam at the focal point of the mirror that can be adjusted by the surgeon. A voltage of 6 to 12 is supplied to a bulb through the transformer.

17. Bull lamp (Fig. 5.17)

This consists of a metal box with vents within which is kept a 100 W bulb. The light rays come out through a central opening

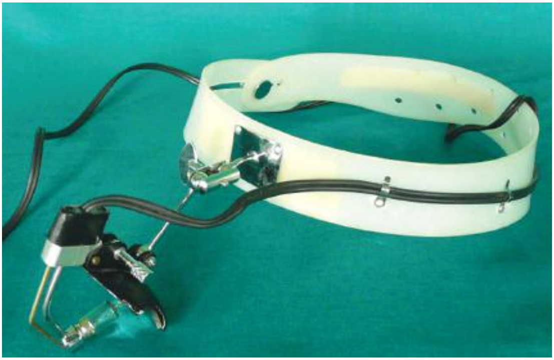


Fig. 5.16: Clar headlight

Fig. 5.17: Bull lamp

in the box. This opening has a biconvex lens of appoximately 30 to 40 cm focal length. The lamp is placed 30 cm behind the left ear of the patient. The lamp can be adjusted to focus the rays on the head mirror.

18. Atomizer (Ohm) (Fig. 5.18)

Parts:

1. Rubber bulb
2. Rubber tube
3. Glass bottle containing local anesthetic
4. Spray shaft

Uses:

a. To spray local anesthetic like 4% lignocaine on the posterior pharyngeal wall before examination.
b. To spray local anesthetic in the nose before diagnostic nasal endoscopy.

Fig. 5.18: Ohm atomizer

Fig. 5.19: Fiberoptic headlight

c. Before biopsy of ulcers/swellings in the oral cavity or oropharynx.

19. Fiberoptic headlight (Fig. 5.19)

This consists of a headband, a fiberoptic light cable and a concave mirror. The light cable is connected to a suitable light source of 150 to 250 watts. This light is transmitted through the light cable by total internal reflection to a concave mirror. The reflected light converges at the focal point of the mirror.

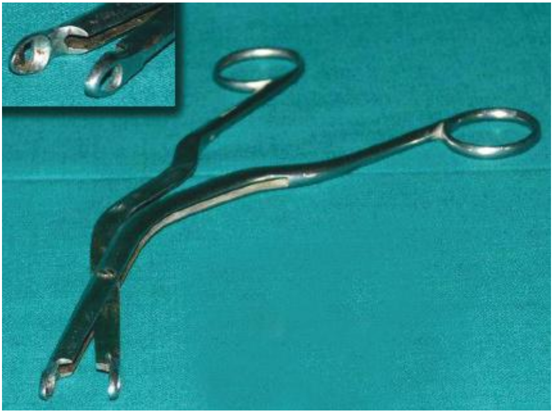


Fig. 5.20: Luc forceps

20. Luc forceps (Fig. 5.20)

This forceps has a screw joint and has a fenestrated tip with sharp blades that grasp the tissue and cut it. Hence, this forceps is suitable for biopsy of various soft tissues and delicate bone.
Uses:

a. SMR or septoplasty for removal of cartilage and bone
b. Polypectomy and Caldwell-Luc operation
c. Edge biopsy from oral cavity and oropharynx
d. Turbinectomy.

21. Non-toothed forceps (Fig. 5.21)

This is a plain forceps that has serrations on its inner surface for better grip. This is an atraumatic forceps and does not damage the structures it catches. When the limbs of the forceps are pressed, the tips approximate against each other.
Uses:

a. For holding delicate structures like nerves, blood vessels, mucosa, etc.
b. For wound packing.

Fig. 5.21: Non-toothed forceps

Fig. 5.22: Adson toothed forceps

22. Adson toothed forceps (Fig. 5.22)

Uses:

a. For holding tough structures like skin, fascia, sheath, etc.
b. To hold the needle while suturing
c. Dissection in depth

Cannot be used to hold delicate structures like nerves, blood vessels, mucosa, etc.

23. Bard Parker handle (Fig. 5.23)

Used to attach blades of various numbers for surgical procedures.

Fig. 5.23: Bard Parker handle

24. Langenbeck retractor 1 and 2 (Figs 5.24A and B)

This instrument has a handle, shaft and a flat right angled retracting end that may be broad or narrow. This is used for deep retraction in head and neck surgeries.

25. Sharp short gently curved dissecting scissors (Fig. 5.25)

This is a pair of fine scissors with multipurpose use for dissection and cutting in ear, nose, and throat surgery.

Fig. 5.24A: Langenbeck retractor 1

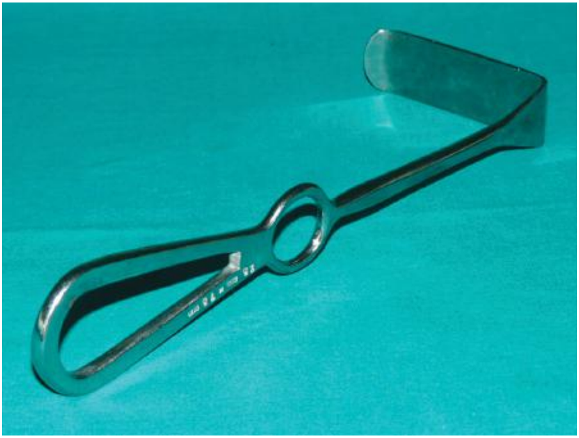


Fig. 5.24B: Langenbeck retractor 2

Fig. 5.25: Sharp short gently curved dissecting scissors

26. Heath suture cutting scissors (Fig. 5.26)

This is a curved scissors that has a fine delicate tip to release and cut sutures. Hence used for removal of sutures in the mastoid, face, head and neck.

Fig. 5.26: Heath suture cutting scissors

Fig. 5.27: Suction tip

27. Suction tip (Fig. 5.27)

This is a metallic rigid suction tip with a thumb grip vent to control the power of suction used in nasal and ear surgeries. This suction tip is to be attached to a rubber tube before use.

28. Needle holder (Fig. 5.28)

It has two blades and a long handle with finger grip and a ratchet. The ratio of length of handle to blade is 4:1. The blade has serrations on the inner aspect to grip the needle.

Fig. 5.28: Needle holder

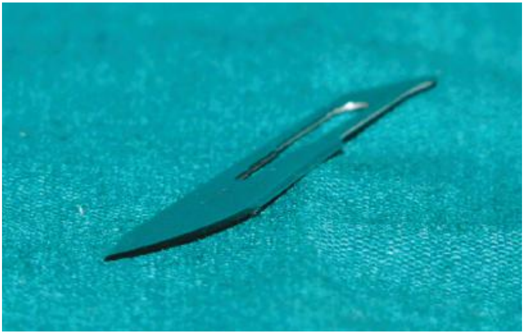


Fig. 5.29: No 10 blade

29. No 10 blade (Fig. 5.29)

Used for skin incisions after attaching to the Bard Parker handle.

30. No 11 blade (Fig. 5.30)

Uses:

a. To make stab incision on an abscess
b. To make an incision on trachea during tracheostomy
c. To make an initial cut on concha bullosa
d. May be used to make an incision on the lacrimal sac in endoscopic dacryocystorhinostomy.

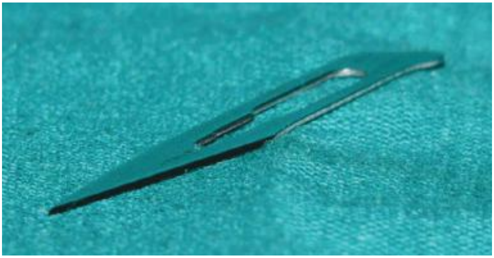


Fig. 5.30: No 11 blade

Fig. 5.31: No 15 blade

31. No 15 blade (Fig. 5.31)

This blade is used to cut soft tissues and obtain dissection planes in head and neck surgeries. Also used to make incisions for septal surgeries.

32. No 12 blade (Fig. 5.32)

Used to make an incision on the anterior pillar during tonsillectomy.

33. Humby knife (skin graft blade holder with handle) (Fig. 5.33)

This is an instrument used for harvesting superficial layers of skin (split thickness graft) for grafting. It has two screws for

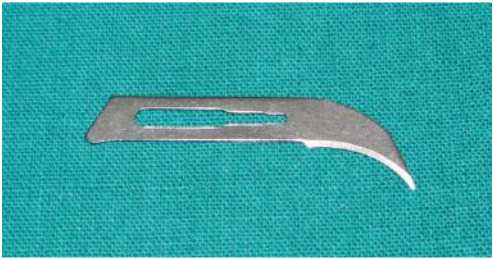


Fig. 5.32: No 12 blade

Fig. 5.33: Humby skin graft blade holder

adjusting the knife for adequate skin thickness. Another screw is used for locking the knife. There are four or five key hole shaped slots for holding the disposable blade on the knife firmly. Electrical skin graft knife has taken over the job of this instrument in many places today.

34. Down blade for skin grafting (Fig. 5.34)

This is a detachable blade that is to be inserted into a holder and used for skin grafting.

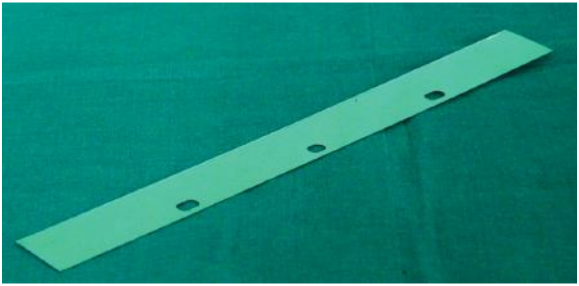


Fig. 5.34: Down blade for skin grafting

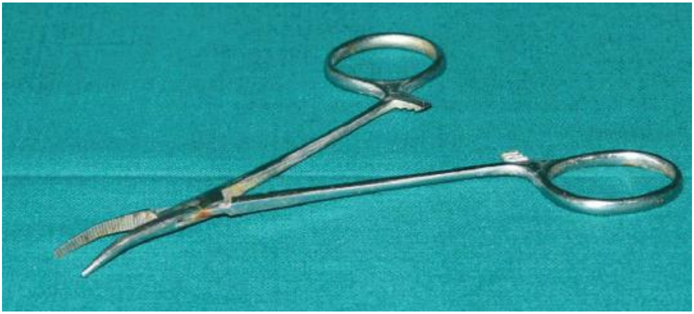


Fig. 5.35: Halsted mosquito forceps

35. Halsted mosquito forceps (Fig 5.35)

This is a smaller variant of the larger artery forceps and has got narrow and pointed blades. It also has two finger grips and a ratchet. There are transverse serrations on the inner aspects of the blades. If the forceps is large and the transverse serrations are present throughout the extent of the blades then it becomes a muscle or a pedicle clamp. However, the hemostat and the mosquito forceps have transverse serrations only at the tip. Mosquito forceps is used to catch small bleeding vessels before ligation. It is also used to hold ends of sutures.

36. Lister sinus forceps (Fig. 5.36)

It is a forceps resembling artery forceps but has no ratchet. The inner surfaces of the blades are serrated and the tip is blunt. It is mainly used for draining an abscess by breaking the loculi inside after making an incision.

37. Hemostatic artery forceps (Fig. 5.37)

This forceps is available in various sizes and may be straight or gently curved. The inner surface of the tip is serrated for better grip. There is also a ratchet for locking.

Fig. 5.36: Lister sinus forceps

Fig. 5.37: Hemostatic artery forceps

Uses:

a. For catching the ends of blood vessels
b. To hold gauze peanut and stay sutures
c. To step on a knot
d. To clamp drainage tubes and catheters

Fig. 5.38: Mayo towel clip

e. To hold fascia, sheath, muscle, etc.
f. To introduce and remove drain from a wound.

38. Mayo towel clip (Fig. 5.38)

This is a self-retaining instrument that is used to hold drapes in place. It can also hold suction tubes, wires and cables to the towel.

39. Rampley sponge holding forceps (Fig. 5.39)

It is a long straight instrument with broad fenestrated tips that have transverse serrations in the inner aspect. It has a ratchet

Fig. 5.39: Rampley sponge holding forceps

lock that allows a secure grip. Used to hold swabs, sponges or gauze pieces for painting the surgical field before the actual procedure. The adequate length of the instrument ensures that the antiseptics are applied to the part from a distance.

40. Cheatle forceps (Fig. 5.40)

This is a large forceps with flat and angled blades. This instrument does not have a ratchet. The blades have large serrations for firm grip.

Uses:

a. To pick and transfer sterile instruments and linen from one place to another
b. To pick up hot instruments and materials after sterilization.

Fig. 5.40: Cheatle forceps

GENERAL INSTRUMENT SETS

5.1 Laryngectomy/Neck dissection set

1. Halsted mosquito forceps
2. Hemostatic artery forceps
3. Kocher artery forceps
4. Allis forceps
5. Babcock forceps
6. Surgical stapler
7. Suction tip
8. Mayo scissors
9. Metzenbaum scissors
10. Needle holder
11. Gille skin hook
12. Mixter dissecting forceps
13. Adson toothed forceps
14. Non-toothed forceps
15. Freer mucoperichondrial elevator
16. Langenbeck retractors
17. Bulldog clamp
18. Yankauer pharyngeal suction tube
19. Lac tongue depressor

5.2 Other head and neck surgeries set

1. Joll thyroid retractor
2. Kocher thyroid dissector
3. Lane tissue forceps
4. Gigli saw wire
5. Halsted mosquito forceps
6. Hemostatic artery forceps
7. Kocher artery forceps
8. Allis forceps

9. Babcock forceps
10. Surgical stapler
11. Suction tip
12. Mayo scissors
13. Metzenbaum scissors
14. Needle holder
15. Gille skin hook
16. Mixter dissecting forceps
17. Adson toothed forceps
18. Non-toothed forceps
19. Freer mucoperichondrial elevator
20. Langenbeck retractors
21. Bulldog clamp.

Appendix

INSTRUMENTS WITH COMMON SCIENTIST NAMES IN EAR

1. House

a. Ear microcurette
b. Graft press forceps
c. Malleus head nipper [With Dieter]
d. Stapedectomy piston measuring rod [Single marker]

2. Fisch

a. Titanium stapes piston
b. Crurotomy scissors
c. Glomus retractor
d. Middle fossa dural retractor

3. Shea

a. Stapedectomy piston measuring rod [Three markers]
b. Micro ear ball probe
c. Micro ear sickle knife
d. Bevelled aural speculum

4. Lempert

a. Endaural retractor with third blade
b. Endaural speculum
c. Mastoid curette

d. Mastoid suction tube
e. Straight ear rongeur

5. Cawthorne

a. Micro ear curved pick
b. Micro ear right angled pick
c. Micro ear straight pick

6. Plester

a. Micro ear flag knife
b. Self-retaining mastoid retractor [3×3 prongs]

7. Rosen

a. Micro ear round knife
b. Aural speculum [Incomplete split]
c. Curved microcurette

8. Schuknecht

a. Wire bending die
b. Micro ear roller knife

9. McGee

a. Wire stapes prosthesis
b. Stapes piston crimper

10. Wullstein

a. Micro-ear cupped forceps
b. Toothed alligator forceps
c. Mastoid retractor [3×3 prongs]

11. Lucae

a. Micro ear knife [Myringotome]
b. Curved aural forceps

12. Weitlaner

a. Mastoid retractor [3×4 prongs]
b. Mastoid retractor [2×3 prongs]

13. Politzer

a. Myringotome
b. Apparatus for eustachian tube function
c. Aural speculum

14. Hartmann

a. Through cutting nasal forceps
b. Tuning fork
c. Aural speculum
d. Aural forceps

15. Zollner [Thumb instruments set]

a. Myringotome
b. Curved pick
c. Microelevator
d. Right angled pick
e. Right angled hook
f. Straight pick
g. Sickle knife

16. Mollison

a. Mastoid retractor (4×4 prongs)
b. Anterior pillar and tonsillar dissector

INSTRUMENTS WITH COMMON SCIENTIST NAMES IN NOSE

17. Killian

a. Curved nasal suction tip
b. Bayonet shaped nasal gouge
c. Mucoperichondrial elevator
d. Short and long bladed nasal speculum

18. Tilley

a. Antral bur
b. Nasal gouge
c. Antral harpoon
d. Nasal forceps [With Henkel]
e. Trocar and canula [With Lichtwitz]
f. Aural forceps

19. Freer

a. Double ended mucoperichondrial elevator
b. Chisel

20. Joseph

a. Fine rasp for rhinoplasty
b. Nasal mucoperichondrial elevator
c. Nasal saw
d. Curved rhinoplasty knife
e. Double edged nasal knife

21. Blakesley Weil

a. Upturned 45 degree forceps
b. Upturned 90 degree forceps

c. Straight cupped forceps
d. Pediatric cupped straight and upturned forceps

22. St. Clair Thompson

a. Nasal speculum
b. Posterior rhinoscopy mirror
c. Adenoid curette with cage
d. Quinsy forceps
e. Adenoid tag forceps

23. Cottle

a. Columellar clamp
b. Four pronged alar retractor
c. Nasal elevator
d. Nasal alar retractor and protector

24. Kerrison

a. Double action bone nibbling forceps
b. Rongeur
c. Rongeur for sphenoid sinus [With Costen]

25. William Watson

a. Curved coarse rasp
b. Nasal polyps forceps

26. Stammberger

a. Side biting antrum punch forceps
b. Mushroom punch

27. Jansen

a. Chisel
b. Bone nibbler

c. Mastoid retractor
d. Septum forceps [with Middleton]

28. Gruenwald

a. Clean bite upturned through cut forceps
b. Through cutting nasal turbinate forceps

29. Hajek

a. Cheek retractor
b. Sphenoid punch [With Kofler]

30. Kilner

a. Alar retractor for rhinoplasty
b. Mouth gag

INSTRUMENTS WITH COMMON SCIENTIST NAMES IN THROAT

31. Negus

a. Second artery forceps for tonsillectomy ligation
b. Knot tier and ligature slipper

32. Yankauer

a. Nasopharyngoscope
b. Throat suction tube

33. Ballenger

a. Swivel knife for submucoperichondrial resection of nasal septum
b. Guillotine for tonsillectomy

INSTRUMENTS WITH COMMON SCIENTIST NAMES IN LARYNX, BRONCHUS AND ESOPHAGUS

34. Montgomery

a. 'T' tube
b. Esophageal tube
c. Thyroplasty implant
d. Laryngeal keel
e. Laryngeal stent

35. Kleinsasser [Microlaryngeal surgery set]

a. Suspension laryngoscope
b. Laryngeal right angled knife
c. Laryngeal angled sharp hook
d. Laryngeal straight probe
e. Laryngeal blunt double hook retractor
f. Laryngeal angled blunt hook
g. Laryngeal sickle knife
h. Laryngeal peeling knife

GENERAL INSTRUMENTS WITH COMMON SCIENTIST NAMES

36. Heath

a. Mallet
b. Suture cutting scissors

37. Down

a. Blade for skin grafting
b. Double cricoid hook

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