WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 9, Issue 2, 1055-1064. Research Article ISSN 2277– 7105

APPLICATION OF *YOGYA VIDHI* IN OTORHINOLARYNGOLOGY W.S.R. TO TEMPORAL BONE DISSECTION

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Article Received on
07 Dec. 2019,

Revised on 27 Dec. 2019,
Accepted on 16 Jan. 2020,

DOI: 10.20959/wjpr20202-16714

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ABSTRACT

Acharya Sushruta describes the ancient tradition of surgery in India, he compiled a surgical compendium including other branches of medicinal science is known as '*Sushruta Samhita*'. This treatise contains detailed descriptions of way of teaching, practice of surgery & other related surgical and medical branches. He has contributed a special chapter for new learners to extend short hand surgical training is named as '*Yogyasutriya Adhyaya*'. The human cadaveric temporal bone is ideal simulator for training in otology. In this article an attempt has been made to highlight the ancient surgical concepts of Sushruta Samhita, which are being practiced even today with some basic principles but after modifications and amendments.

KEYWORDS: Yogya vidhi, Surgical skills, Temporal bone dissection, Hands on training.

INTRODUCTION

In Ayurveda, *Acharya Sushruta* school has been recognized as a surgical branch. *Acharya* Sushruta was the first person who learnt and practiced various surgical procedures in approximately 4th century B.C. A complete review of *Sushruta Samhita* reveals the concepts and contributions of *Acharya Sushruta* in the field of surgery.

For a successful surgical maneuver, the surgeon should have courage, quickness in action, should be non-shaking, non-sweating (self confident & self command), should have sharp instruments.

The qualities are alike as Lion's Heart, Eagle's Eyes, Ladies Fingers, etc. as mentioned in modern era. For acquiring theses qualities practical training is very essential & for this purpose a number of models were created to learn the procedures before applying them on humans.

Acharya Sushruta mentions it in "*Yogyasutriya Adhyaya.*"

rÉÉåarÉÉxÉqrÉMçü MüqÉÉïprÉÉxÉ: |[1] - QûsWûhÉ xÉÑ. xÉÔ. 9/1

AÍkÉaÉiÉxÉuÉïzÉÉx§ÉÉjÉïqÉÌmÉ ÍzÉwrÉÇ rÉÉåarÉÉÇ MüÉUrÉåiÉç |

xlÉåWûÉÌSwÉÑ Nåû±ÉÌSwÉÑ cÉ MüqÉïmÉjÉqÉÑmÉÌSzÉåiÉç |

xÉÑoÉWÒû´ÉÑiÉÉåÅmrÉM×üiÉrÉÉåarÉ: MüqÉïxuÉrÉÉåarÉÉå pÉuÉÌiÉ ||[2] - xÉÑ. xÉÔ. 9/3

iÉŠ zÉx§ÉMüqÉÉïÅ¹ÌuÉkÉqÉç | iÉ±jÉÉ - Nåû±Ç, pÉå±Ç, sÉåZrÉÇ, uÉåkrÉqÉç, LwrÉqÉç, AÉWûÉrÉïÇ, ÌuÉxÉëÉurÉÇ, xÉÏurÉÍqÉÌiÉ ||[3]

- xÉÑ. xÉÔ. 5/5

In it he introduces to the students the primary techniques in surgical practice. All operative maneuver involves one or more of the eight varieties of *Ashtavidha Shastra Karma* (surgical interventions). These are *Chedana* (Excision), *Bhedana* (Incision), *Lekhana* (Scraping), *Vyadhana* (Puncturing), *Eshna* (Probing), *Aharana* (Extraction), *Visravan* (Draining) & *Seevana* (Suturing).

mÉëirÉ¤ÉiÉÉå ÌWû rÉSèSØ¹Ç zÉÉx§ÉSØ¹Ç cÉ rÉ°uÉåiÉç |

xÉqÉÉxÉiÉxiÉSÒpÉrÉÇ pÉÔrÉÉå ¥ÉÉlÉÌuÉuÉkÉïlÉqÉç ||[4] - xÉÑ. zÉÉ. 5/48

iÉ§É

mÉÑwmÉTüsÉÉsÉÉoÉÔMüÉÍsÉlSMümÉÑxÉæ(xÉÉå)uÉÉïÃMüMüMüÉïÂMümÉëp

ÉÑÌiÉwÉÑ Nåû±ÌuÉzÉåwÉiÉÉlÉç SzÉïrÉåiÉç, EiMüiÉïlÉmÉËUMüiÉïlÉÉÌlÉ

cÉÉåmÉÌSzÉåiÉç;

SØÌiÉoÉÎxiÉmÉëxÉåuÉMümÉëpÉ×ÌiÉwÉÔSMümÉƒ¡ûmÉÔhÉåïwÉÑ

pÉå±rÉÉåarÉÉqÉç; xÉUÉåÎqhÉ cÉqÉïhrÉÉiÉsÉå sÉåZrÉxrÉ;

qÉ×iÉmÉzÉÑÍxÉUÉxÉÔimÉsÉlÉÉsÉåwÉÑ uÉ uÉåkrÉxrÉ:,

bÉÑhÉÉåmÉWûiÉMüÉ¸uÉåhÉÑlÉsÉlÉÉsÉÏzÉÑwMüÉsÉÉoÉÔqÉÑZÉåwuÉåwrÉxrÉ

; mÉlÉxÉÌoÉÎqoÉTüsÉqÉ‹qÉ×iÉmÉzÉÑSliÉåwuÉÉWûÉrÉïxrÉ;

qÉkÉÔÎcNû¹ÉåmÉÍsÉmiÉå zÉÉsqÉsÉÏTüsÉMåü ÌuÉxÉëÉurÉxrÉ;

xÉÔ¤qÉbÉlÉuÉx§ÉÉliÉrÉÉåqÉ×SÒcÉqÉÉïliÉrÉÉå¶É xÉÏurÉxrÉ;
mÉÑxiÉqÉrÉmÉÑÂwÉÉ…¡ûÌuÉzÉåwÉåwÉÑ oÉlkÉlÉrÉÉåarÉÉÇ; qÉ×SÒwÉÑ
qÉÉÇxÉZÉhQåûwuÉÎalÉ¤ÉÉUrÉÉåarÉÉqÉç;
qÉ×SÒcÉqÉïqÉÉÇxÉmÉåzÉÏwÉÔimÉsÉlÉÉsÉåwÉÑ cÉ
MühÉïxÉÎlkÉoÉlkÉrÉÉåarÉÉqÉç;
ESMümÉÔhÉïbÉOûmÉÉµÉïxÉëÉåiÉxrÉsÉÉoÉÔqÉÑZÉÉÌSwÉÑ cÉ
lÉå§ÉmÉëÍhÉkÉÉlÉoÉÎxiÉmÉÏQûlÉrÉÉåarÉÉÍqÉÌiÉ ||[5] - xÉÑ. xÉÔ. 9/4

To obtain proficiency, skill and speed in various surgical procedures, *Acharya Sushruta* devised various experimental modules. For example, *Bhedana* (Incision) & *Chedana* (Excision) are to be practiced on vegetables & leather bags filled with mud of different densities.

Lekhana (Scraping) on hairy skin of animals, *Vedhana* (Puncturing) on the vein of dead animals & lotus stalks *Eshana* (Probing) on moth eaten wood or bamboo. Scarification on wooden planks smeared with bees wax etc.

In present era, access to 'Wet lab' facilities give trainees the chance to develop their skills before being exposed to real patients, and the development of teaching attachments for operating microscopes allows the trainer & the trainee to see exactly what each one is doing. This permits efficient, low-risk training, which is good for everyone i.e. the surgeons & especially patients. It also has a 'fast-to-fail' advantage in that early exposure to the demands of various techniques enables trainees who lack the required dexterity to change career early on.

Temporal bone dissection plays an important role in the education, research, training of residents & young surgeons in Otorhinolaryngology.

Deliberate practice on human cadaveric temporal bones only, will confer both mastery in anatomy & surgical techniques. The human cadaveric temporal bone is ideal simulator for training in Otology. For mastery in surgical technique otologic surgeon must have their hands-on training session.

The dissection of temporal bone is essential to develop innovative surgical techniques in middle ear, mastoid & perform trans-mastoid approach to clear intracranial lesions or develop an approach to cerebello-pontine angle lesions.

This study aims at highlighting steps involved in acquiring necessary skills & understanding anatomy before performing on live otologic surgeries.

As temporal bone anatomy is complex, hours of study are required for three-dimensional conceptualization, for mastery in surgical technique otologic surgeon must have their repeated hands on training session.

AIM

To study the impact of temporal bone dissection demonstrations on understanding anatomy of the ear.

OBJECTIVE

1) To explain the anatomy of the ear with the help of *Yogya vidhi*.
2) To explain the dissection of temporal bone with the help of *Yogya vidhi.*

MATERIALS AND METHODS

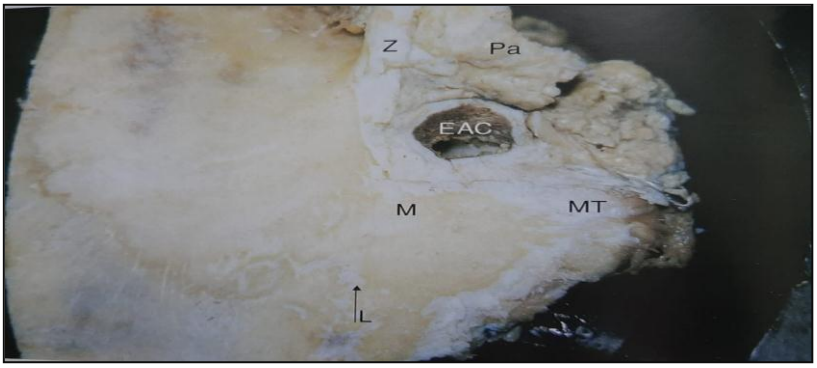
1) We obtain the institutional permission for carried out this project.
2) We dissected four consecutive temporal bones and preserved it in 10% formalin solution.

Surface Anatomy of Temporal Bone

The following Landmarks are identified on the lateral surface

1) Linea Temporalis
2) Spine of Henle
3) External acoustic canal
4) Base of zygoma
5) Glenoid fossa
6) Mastoid tip
7) The specimen is examined for the presence of Dura, cranial nerves, internal carotid artery and internal jugular vein.

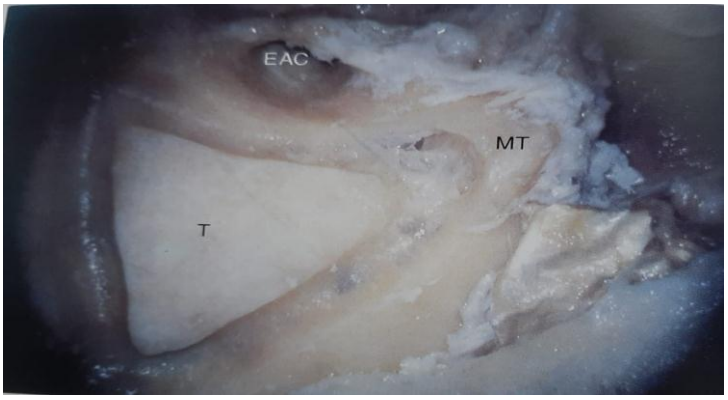
Figure: Surface Anatomy of Temporal Bone[6]



(Z = Base of zygoma, Pa = Parotid, EAC = External Auditory Canal, M = Mastoid, MT = Mastoid Tip, L = Linea temporalis).

Cortical Mastoidectomy

Figure: Triangle of Attack.[7]

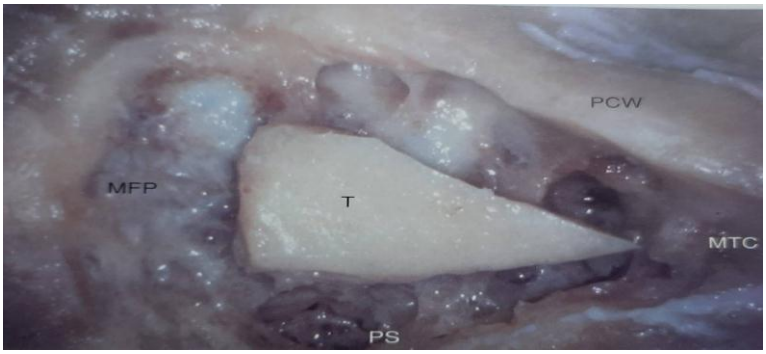


(EAC = External Auditory Canal, MT = Mastoid Tip, T = Triangle of Attack)

- The dissection is started with cortical mastoidectomy.
- The surface of temporal bone is irrigated with the largest suction irrigation cannula.
- Using the largest cutting burr the first horizontal cut is made along the Linea temporalis starting at the base of zygoma.
- Another cut is made posterior to the posterior canal wall vertically downwards towards the mastoid tip.
- The third cut joins the posterior limit of the first cut to the mastoid tip, thus forming a bony triangle.
- This has been described as “Triangle of Attack”.
- This is the safest bone to start drilling as the vital structures is in depth.

Boundaries of Triangle of Attack

Figure[8]



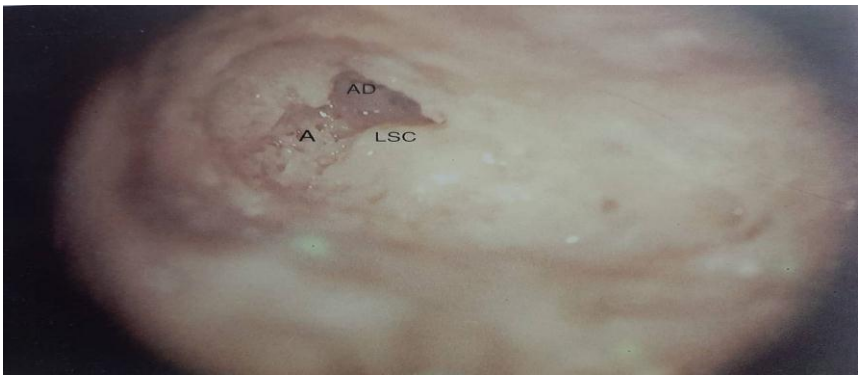
(PCW = Posterior Canal Wall, T = Triangle of Attack, MFP = Middle Fossa Plate, MTC = Mastoid Tip Cells, PS = Perisinus Cells.)

The boundaries of this triangle are saucerised preserving the following structures.

- Superiorly – Middle fossa plate
- Posteriorly – Sigmoid sinus plate
- Anteriorly – posterior canal wall
- Inferior angle – Mastoid tip

Antrotomy

Figure[9]



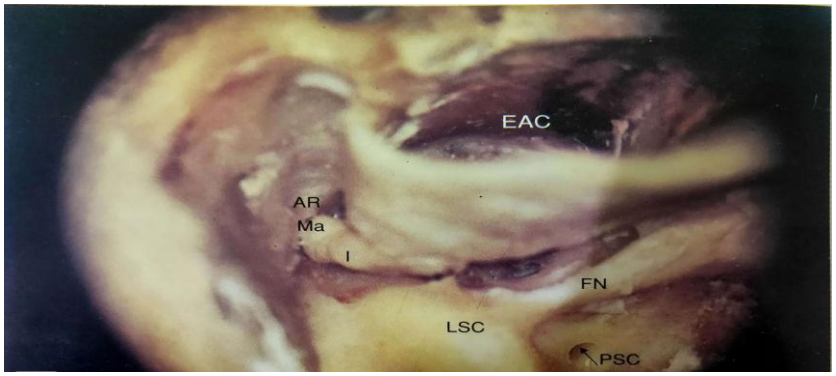
(A = Antrum, AD = Aditus, LSC = Dome of Lateral Semicircular Canal)

- The drilling is continued widening the antrum and the aditus is visualized.
- **Incus shadow**: In the process of widening the aditus, the shadow of incus is visualized in the irrigation fluid.
- This shadow appears before the incus is seen.
- This helps in avoiding blind probing and the possibility of dislodging the incus.
- The sino-dural angle is opened in the whole length till the dural plate meets the sinus plate.
- The posterior canal wall is thinned.

- Then the mastoid air cells are removed systematically.

Landmarks to identify the mastoid segment of the facial nerve

Figure[10]

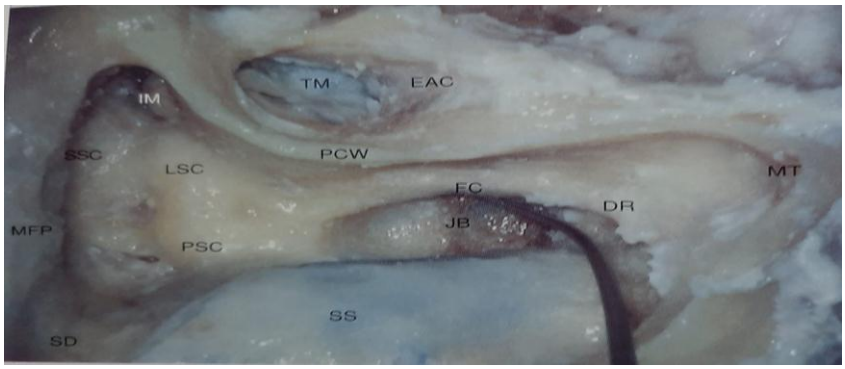


(EAC = External Auditory Canal, AR = Anterior Recess, Ma = Malleus, I = Incus, LSC = Lateral Semicircular Canal, FN = Facial Nerve, PSC = Ampullary end of Posterior Semicircular Canal (open).)

- The facial nerve at the second genu is always medial to the short process of incus.
- The facial nerve is always medial and anterior to the lateral semicircular canal.
- It is 1-2 mm anterior to ampullary end of the post-semicircular canal.
- The digastric ridge points to the facial nerve at it's exit from the stylomastoid foramen.

End points of cortical mastoidectomy

Figure[11]

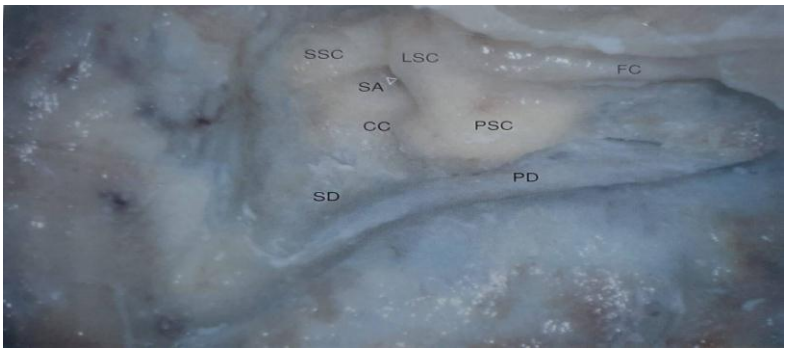


(EAC = External Auditory Canal, TM = Tympanic Membrane, IM = Incudo Malleolar Joint, PCW = Posterior Canal Wall, MFP = Middle Fossa Plate, SD = Sino-dural angle, SS = Sigmoid Sinus, MT = Mastoid Tip, DR = Digastric Ridge, FC = Facial Canal, JB = Jugular Bulb, PSC = Posterior Semicircular Canal, LSC = Lateral Semicircular Canal, SSC = Superior Semicircular Canal.)

- Thin dural and sinus plates through which dura and sigmoid sinus can be visualized.
- Sino-dural angle widely opened showing the junction of dural and sinus plates.
- Mastoid tip with complete exenteration of air cells.
- Well-delineated digastric ridge along with it's relation to the facial canal.
- Thin posterior canal wall.
- The origin of chorda tympani should be visible inferiorly.
- Skeletonized vertical segment of the facial canal.
- Widely opened mastoid antrum and aditus showing the dome of the lateral semicircular canal and short process of incus.
- Incudo-malleolar joint and superior malleolar ligament may be visualized.

Skeletonization of semicircular canals

Figure[12]



LSC = Lateral Semicircular Canal, SCC = Superior Semicircular Canal, PSC = Posterior Semicircular Canal, SA = Sub-arcuate Artery, CC = Crus Commune, FC = Facial Canal, PD = Presigmoid Dura, SD = Sino-dural Angle.

- The dome of lateral semicircular canal is visualized when the mastoid antrum is opened.
- The posterior semicircular canal lies posterior and perpendicular to the lateral canal.
- While removing the air cells posterior to the lateral canal, the solid white bone of the posterior canal is identified.
- The ampullary end of the posterior canal is just 1-2 mm from the vertical segment of the facial canal.
- Care is taken to prevent damage to the facial nerve while removing the peri labyrinthine air cells in this area.
- The ampullary end of the superior semicircular canal is identified medial to the body of incus, where it is adjacent to the ampulla of lateral semicircular canal.

- Non-ampullary ends of the superior and posterior canals joins to form the crus commune, which is identified by drilling the air cells / bone between the canals and sino-dural angle (Trautman's triangle).
- Care is taken, as the dura lies very close to the ampulla and dome of superior semicircular canal.
- The bone of the semicircular canals is dense and ivory white.
- The sub-arcuate artery can be visualized in the centre of superior semicircular canal.

Equipment

- Microscope
- Micromotor
- Handpiece
- Burr points
- Suction irrigators
- Temporal bone holder
- Micro instruments: blade with handle, periosteal elevator-mastoid, stout scissors, TM elevator, sickle knife, circular knife, straight pick, hook, cup forceps, crocodile forceps, micro scissors, house curette, house adapter, needle suctions, suction tube, irrigation tube, gloves, gowns, napkins, mops.

CONCLUSION

Temporal bone dissection provides the avenue in understanding complex anatomic features in three-dimensional view, which was very easy for deep conceptualization. It is also useful for increasing the success rate of skillful surgery.

RESULT

The 4 Temporal bones were dissected, 2 of male and 2 of female. The supramental crest, dural plate, aditus & antrum were all present in 4 Temporal bone dissected. In each has highly pneumatized mastoid and incus were seen. Each Tympanic membrane remnant and stapes were seen.

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