SHEEP TEMPORAL BONE

Kesavan Bhaskaran[1], Gudepu Parasuram[2], Aditya Kanchumurthy[3], Venkateshwararao[4]

[1]Assistant Professor, Department of ENT & Head & Neck Surgery, Andhra Medical College.
[2]Associate Professor, Department of ENT & Head & Neck Surgery, Andhra Medical College.
[3]Senior Resident, Department of ENT & Head & Neck Surgery, Andhra Medical College.
[4]Junior Resident, Department of ENT & Head & Neck Surgery, Andhra Medical College.

ABSTRACT

INTRODUCTION

Human temporal bones are difficult to procure now a days due to various ethical issues. Sheep temporal bone is a good alternative due to morphological similarities, easy to procure and less cost. Many middle ear exercises can be done easily and handling of instruments is done in the procedures like myringoplasty, tympanoplasty, stapedotomy, facial nerve dissection and some middle ear implants. This is useful for resident training programme.

KEYWORDS

Human temporal bone, Sheep temporal bone, Middle ear anatomy, Otological surgical procedures, Resident training.

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INTRODUCTION:

Anatomical Features: The external auditory canal of the sheep is highly curved and projects over the pars flaccida which is triangular and smaller than the circular pars tensa.[1] This leaves part of the lateral bulla under the bony shelf of the ventral EAC. Similarly, the inferolateral bulla extends laterally under the tympanic bone and annulus.[2] As such, the hypotympanum is particularly large. The pars tensa is proportionally large compared with other animals. The sheep middle ear is morphologically equivalent to the human middle ear,[3] although the size is about two thirds smaller.[2]

The long process of the incus is shorter, thicker, and closer to the body of the malleus.[2] As with humans, the ossicular system is freely mobile, being suspended by collagenous fibers or mucosal folds carrying blood vessels and nerves. The malleus head articular surface forms a diarthrosis with the incus body, whereas the ISJ is similar to the enarthrosis seen in humans. Human and sheep round windows are similar, but sheep have no mastoid antrum and the mastoid cells are filled by adipose.[1]

The lamb's mastoid is not pneumatized. Training mastoidectomies on lambs cannot be recommended for beginners due to the varied anatomy and a difficult preparation. Dissectional training for experienced learners is imaginable.

Disadvantages: Mastoid surgery can't be done as in human temporal bone as mastoid air cells are not well developed.

MATERIALS AND METHODS: Sheep temporal bone procured and fixed in the temporal bone lab with facilities for temporal bone dissection.

Procedures: Myringoplasty: It is done as in humans. Postauricular incision is given, pinna retracted forward, incision given at 12 and 6 o'clock, tympanomeatal flap elevated, a small graft material kept.

Tympanoplasty: Malleus of sheep resembles human malleus, it is removed and graft directly kept on incus. In another procedure, incus also removed and graft kept on stapes head.

Stapedotomy: Fenestration is done on the foot plate of stapes and prosthesis is inserted and fixed on to incus (long process of incus is not well developed.

Facial Nerve Dissection: The facial nerve and its anatomical relation to the lateral semicircular canal is similar to human anatomy.

DISCUSSION: Temporal bones of the sheep have an external ear canal, chain and inner ear structures similar to humans. Unfortunately some scales differ when compared to humans. Most sizes are smaller, which is a challenge for trainees. As a lot of morphology is similar, these bones might be used for teaching anatomy and surgical techniques.[1] These surgical skills can be improved by using animal biologics. Digital trainers are also not applicable for work on the ossicular chain, as the insertion of prostheses is impossible. This disadvantage does not exist in animals. Reconstructive steps can be taught ideally. Until today, virtual models have not offered colour information like animal biologics. They are more appropriate than animal models for teaching especially the mastoid anatomy, but they are not useful for teaching the coordination of drill, suction and other microsurgical tools. Because of the biological similarity to human temporal bone, the sheep's temporal bone is ideal for residents' experimental surgery.[4,5]

Compared to humans, sheep temporal bone structure such as pars flaccida is small. Incus is also small, so prosthesis insertion onto the incus long process is difficult.

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Corresponding Author:
Dr. Aditya Kanchumurthy,
Flat No. 301, Swethawahan Residency,
MIG 28, MVP Sector I, Visakhapatnam-530017.
E-mail: aditya.kanchumurthy@gmail.com
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Mastoidectomy cannot be done because it is not well developed.

As mastoid is not well developed in sheep temporal bone, mastoidectomy is the only exercise which cannot be done properly.

Surgical procedures like myringoplasty, ossiculoplasties, stapedotomy, middle ear implants and facial nerve dissection can be done on sheep temporal bone.

CONCLUSION: Sheep temporal bone is next alternative to human temporal bone in middle ear procedures, but it has some limitations. It gives good experience with drill, suction and instrument co-ordination with coloured structures. It is superior to virtual models.

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