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Short Communication

Impact of temporal bone dissection on the understanding anatomy of the ear among medical students

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ABSTRACT

The aim was to study the impact of temporal bone dissection demonstrations on understanding anatomy of the ear among medical students. During a period of six months from October 2017 to March 2018, 10 cadaveric temporal bones dissections were demonstrated using ZEISS microscope and in the presence of medical students headed by a Consultant Otolaryngologist in the department of ENT, Sri Devaraj URS Medical College and Research Centre, Kolar. Anatomy of the middle ear and inner ear and various operative procedures were demonstrated. The students were divided into 2 groups. Group I comprised students who attended the temporal bone dissection and Group II included those who didn't attend dissection. After the session both the groups were assessed by the consultant. Scores were given to the group individuals based on the ability to answer the questions. 10 Temporal bone dissections were demonstrated in 6 months period to medical students who were divided into 2 groups based on their attendance of the demonstration. The students of both groups were assessed. Scores were given by Likert scale-5point scale question. The results of our study proved that those students who attended the temporal bone dissection (Group-I) had better understanding of the anatomy and operative procedures of the ear as compared to students in group II. Demonstration of temporal bone dissection to the medical students had a good impact on their understanding of the three dimensional anatomy of the ear.

Keywords: Temporal bone, Dissection, Students, Anatomy of ear

INTRODUCTION

Temporal bone anatomy is complex and difficult to understand. A thorough understanding of the anatomy is essential to be able to identify the etiology of diseases of the ear and for their safe and effective treatment.[1] The temporal bone consists of four embryologically distinct components: the squamous, mastoid, petrous, and tympanic parts and it articulates with the sphenoid, parietal, occipital, and zygomatic bones.[1]

The tympanic part of the temporal bone forms the anterior wall and floor and part of the posterior wall and roof of the bony external auditory canal (EAC) and the anterior wall and floor of the middle ear.[1]

The facial nerve traverses the temporal bone within a bony canal known as the fallopian canal, which begins at the fundus of the internal auditory canal (IAC) and terminates at the stylomastoid foramen. Within the IAC, the nerve lacks fibrous sheath or endoneurium and is

surrounded by a thin layer of arachnoid matter. The labyrinthine segment is the first, shortest, and narrowest segment of the fallopian canal. It travels superior to the cochlea and opens into the geniculate fossa located just beneath the Superior temporal recess. [1] The mastoid part of the temporal bone is a bulbous bony structure shaped by the expansion of air-filled spaces. [1]

Demonstration of temporal bone dissection plays an important role in educating the undergraduate and postgraduate medical students about the anatomy and surgical procedures of the ear. Hours of study is required for the three dimensional conceptualization.[2]

Temporal bone dissection on cadavers with the help of an operating microscope has been advocated by many authors for better understanding of anatomy of ear and for improvement of surgical skills.[3]

Dissection of temporal bone is required to develop different surgical techniques in the middle ear and mastoid, and to perform trans-mastoid approaches to clear intracranial lesions or to develop an approach to Cerebello-pontine angle.[4-6] Cadavers remain an armament for teachers of human anatomy.[7]

Dissection in otologic simulator cannot replace the actual dissection of temporal bones in cadavers.[8] It is universally accepted that repeated dissection of temporal bone is essential to understand the core anatomy of temporal bone and to develop safe otological skills.[9-10]

METHODS

This study was done in department of ENT, R L Jalappa Hospital, Tamaka, Kolar during period of October 2017 to March 2018. Temporal bone dissection was conducted over period of 6 months. A total of 10 wet formalin preserved temporal bones were used for the dissection. Undergraduate medical students who were posted in the department of ENT, and post graduates working in the department headed by a consultant otolaryngologist carried out dissections on the temporal bone. Anatomy of middle ear, inner ear, and various operative procedures of ear were demonstrated using different sized burs and instruments. Various anatomical structures and their relations to surrounding structures were shown and various landmarks and their importance in each procedure were explained.

The students were divided into 2 groups, students who attended temporal bone dissection and students who did not attend the dissection. At the end of session both the group students were assessed by the consultant. Scores were given to the 2 set of students based on the ability to answer the questions and their understanding of the anatomy. Scores were given by Likert scale-5 point scale question.

Dissection performed

10 temporal bones were dissected under ZEISS microscope after fixing the temporal bone with a bone holder, using burr tips of different sizes. Out of the 10 bones, in one mastoidectomy was performed already. Brief anatomy was explained including the side, the structures present to the medical students. The techniques demonstrated include: Conchotomy, harvesting graft from the conchal cartilages for different other techniques, grommet insertion, epitympanotomy, cortical mastoidectomy, canal wall down mastoidectomy, facial nerve decompression, labyrinthectomy, demonstration of cochlea, insertion of cochlear implant electrodes, endolymphatic sac decompression, orientation of stapedius muscle, semicircular canals, stapedotomy.

Anatomy of the ear including external ear, middle and inner ear was discussed in detail in each step and was demonstrated for the students.

RESULTS

10 temporal bone dissections was done in 6 months period in the presence of medical students and assessment of 2 different group of students proved that the students who attended the temporal bone dissection had better understanding of anatomy and operative procedures than the other group. Scores were given by Likert scale-5 point scale question.

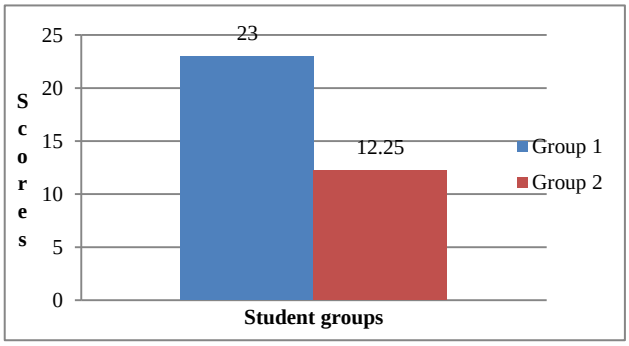

Figure 1: Comparison of average scores obtained by student groups.

Figure 2: Temporal bone dissection demonstration classes 1.

Figure 3: Temporal bone dissection demonstration classes 2.

Figure 4: Temporal bone dissection demonstration classes 3.

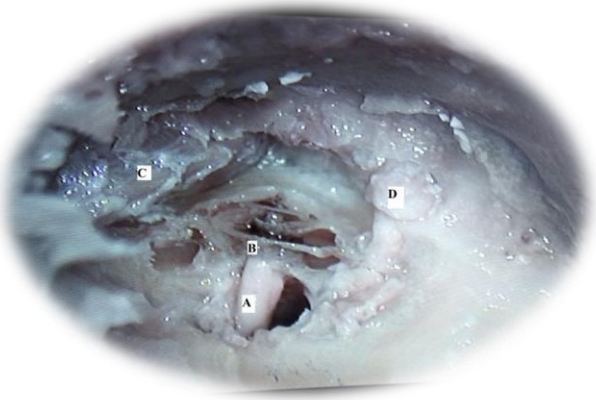

Figure 5: Demonstration of (A): cochlear nerve, (B): cochlea, (C): internal carotid artery, (D): facial nerve genu.

DISCUSSION

Temporal bone dissection with help of operating microscope has been advocated by many authors for better understanding of anatomy of ear and for improvement of surgical skill. Many otologists committed that they take advantage of microscopic temporal bone dissection on cadaver to improve their surgery. The practice of dissection on cadaver improves hand control on micro-drill, surgical instruments and adjusting microscopic vision during surgery.[2]

The bones which we dissected were received from department of anatomy and forensic medicine. The temporal bone is dissected with help of various burrs, micro motor, suction and irrigation and microsurgical instruments.

Several researchers have developed 3-dimensional models and computer aided software for temporal bone dissections but nothing replaces the original temporal bone dissection and demonstration.[4] Many of researchers opine Cadaveric dissection including temporal bone remain an important tool for teaching.[7] Most of the normal anatomic features such as suprameatal crest, dural plate, aditus to mastoid antrum, lateral or horizontal semicircular canal, facial nerve (Fallopian) canal are demonstrated. And these types of dissection and demonstration cannot replace other types of teaching.[8] It is universally accepted that repeated dissection of temporal bone is essential to understand the core anatomy of temporal bone and to develop safe otological skills.[9,10] Dissection of temporal bone is required to develop different surgical techniques in the middle ear and mastoid, and to perform trans-mastoid approaches to clear intracranial lesions or to develop an approach to cerebello-pontine angle.[4-6]

The students are given option that whoever is interested can attend temporal bone dissection.

Different surgical procedures are demonstrated to one set of students (Group -I) like tympanotomy, atticotomy, grommet insertion, tympanoplasty and various types of cortical mastoidectomy, endolymphatic sac decompression, facial nerve decompression were demonstrated to the students. During the process of dissection part of the theory such as indication and complication behind each exercise is also discussed.

The other group (Group-II) students that did not attend temporal bone dissection were asked to study the same concepts related to temporal bone exercise.

Both the groups are assessed in theory and surgical related exercise and questions related to three-dimensional anatomy.

The step by step dissection of structure and magnified view on the monitor helps the student to understand the

critical relations of different structures, anatomy to the best and to understand concepts of basic and advanced surgical procedures of ear.

CONCLUSION

Demonstration of Microscopic dissection of temporal bone was very useful in visualization of 3 dimensional views of ear structures and makes anatomy and surgical procedures easy to understand. It hikes the quality of surgical skills and develops new innovative techniques.

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