Anatomy

FACIAL NERVE IDENTIFICATION – COMPARISON OF TWO LANDMARKS: A CADAVER STUDY

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ABSTRACT Preservation of the facial nerve during parotid gland surgery depends upon its exposure which may require the guidance of certain landmarks. In this study 20 cadaver heads were dissected to find which of the two landmarks ie; tympanomastoid suture and tragal pointer is closer to the facial nerve. The average distance between the tympanomastoid suture and the facial nerve was 4.1mm.The tympanomastoid suture was nearest to the main trunk and therefore was considered the most reliable landmark.

KEYWORDS :

INTRODUCTION
The facial nerve or cranial nerve (CN) VII is the nerve of facial expression. The pathways of the facial nerve are variable, and knowledge of the key intratemporal and extratemporal landmarks is essential for accurate physical diagnosis and effective surgical intervention in the head and neck region. During parotid gland surgery the preservation of the facial nerve depends upon its exposure and on the surgeon being able to find it without damaging it. A surgeon has to be familiar with a range of techniques because variations in pathology may make any given approach difficult. It would thus be very helpful to develop a precise and unduly acceptable procedure that uses invariable anatomical landmarks to quickly identify the facial nerve.

The first surgeon to describe the exposure of the main trunk at its origin was James in 1940[1]. Since then various authors have advocated several surgical landmarks to facilitate the identification of the facial nerve trunk. The upper border of the posterior belly of the digastric muscle and its attachment to the mastoid process has frequently been used to identify the trunk of the facial nerve.[1] The nerve is found approximately 1.5 cm intracranial to this point. It lies approximately 1.0cm deep to the attachment of posterior belly of the digastric muscle.[1] The tragal pointer, a portion of the tragal cartilage which points in the direction of the nerve is used as a landmark. The nerve lies approximately [1-2] cm deep and slightly anterior and inferior to the tip of the pointer[1,2] .Superiorly it lies near the sharp, finger like bony ridge at the anteroinferior margin of the external auditory meatus of the skull and inferiorly it was found near the broad blunt anterior margin of the mastoid process of the temporal bone. There is a v-shaped sulcus called the Tympanomastoid suture (Sqamotympanic fissure)[1,2].

This anatomical study is an attempt to determine as objectively as possible which among the landmarks the tragal pointer and the tympanomastoid suture is more reliable.

MATERIALS AND METHODS
An anatomical study was conducted in the department of maxillofacial surgery, Bangalore Institute of Dental Sciences, Bangalore from Dec 2015 to Dec 2016. A total of 20 halves of cadaver heads stored in formalin were dissected.

The heads were to the lateral side to expose the preauricular region for dissection .A preauricular incision extending from 10mm superior to tragal cartilage to a point 20mm

inferior to the angle of mandible was made. The skin flaps were raised and discarded to prevent obscured vision .The subcutaneous tissue was dissected away. Dissection was done in the region of tragal cartilage and the tragal pointer was identified .Dissection was done in the

mastoid and tympanic region to palpate the squamotympanic fissure. Facial nerve trunk was identified by retrograde dissection i.e either the buccal or the zygomatic branch was identified and the trunk was traced. The main trunk was exposed without displacing the course or position of the nerve. The next step was to clear of any soft tissue from the landmarks. The specific points on the landmarks that were used were the most inferior tip of the tragal pointer and the most central point of the sqamotympanic fissure. This specific location is necessary as both these landmarks are not points and therefore the reference point on this landmark was specifically defined. The shortest distance from squamotympanic fissure and tragal pointer to the facial nerve were measured using calipers and noted. The mean of two measurements was calculated.

These distances were compared to see which of these is closer to the facial nerve trunk. Statistical analysis was performed to determine the significance of these distances. Student t-test was used for the comparison.

RESULTS
A comparative study with 20 cadavers was undertaken to find which of the two landmarks ie tympanomastoid suture and tragal pointer is closer to the facial nerve.

The table below shows the Minimum, Maximum, Median, Mean, SD and 95%CI of distances (mm)

Distance (mm)	Min-Max	5th percentile	Median	Mean	95th percentile	SD	95% CI
Distance between Facial nerve and tympanomastoid suture(mm)	2-6	2.5	4.0	4.1	10.0	1.07	3.59-4.60
Distance between Facial nerve and tragal pointer(mm)	10-14	6.0	12.5	12.25	14.0	1.48	11.56-12.94

The tympanomastoid suture in 12 (60%) of the cadavers was 3-4 mm from the facial nerve .In 7(35%) the distance was 5-6 mm and in 1 (5%) it was 2mm .The average distance between the tympanomastoid suture and the facial nerve was 4.1mm.

The tragal pointer in 10 (50%) cadavers was between 10-12.In the other 10 (50%) it was between 13-14mm.The average distance between the tragal pointer and the facial nerve was 12.2mm.

Distance of Facial nerve and tympanomastoid suture (mm) and Facial nerve and tragal pointer(mm) is significant(t=18.400; P<0.001**) with smaller distance with tympanomastoid suture(mm) of 4.1± 1.07 and is significantly less when compared to distance of tragal pointer(mm) from facial nerve
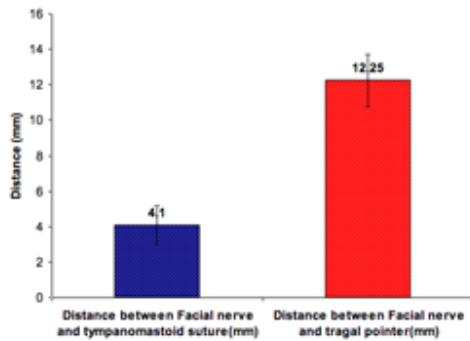
Comparison Of Distance From Stf And Tragal Pointer

DISCUSSION

During parotid gland surgery, the preservation of the facial nerve depends upon its exposure and on the surgeon being able to find it without damaging it. Various landmarks like the upper border of the posterior belly of the digastric muscle and its attachment to the mastoid process[1], mastoid process[3], TMS[1,2,4], TP[1,4], external auditory canal[5], styloid process[6], transverse process of the Axis , angle of the mandible, the cervical vertebra, the pinna[6] , the auricularis inferior muscleand the retromandibular vein have frequently been used to identify the trunk of the facial nerve[5,6,9].

Various studies have shown that sqamotympanic fissure is the most efficient landmark in comparison with other landmarks allowing the identification of the nerve with precision within 3mm range[1]. Robert L Witt[7] (2005) proved that the tympanomastoid suture (TMS) is a significantly closer and less variable anatomic landmark to the facial nerve than the posterior-superior margin of the posterior belly of the digastric muscle (PBD), in the parotid surgery. The mean closest distances from the TMS and PDS to the facial nerve were 1.8(range 1-4) mm and 12.4(range7-17) mm respectively.

This study aims at comparing the ease and accuracy of using Squamotympanic fissure (Tympanomastoid suture) and the tragal pointer as landmarks in facial nerve identification. At the end of the study we found that the tympanomastoid suture in 12 (60%) of the cadavers was 3-4 mm from the facial nerve. In 7(35%) the distance was 5-6 mm and in 1(5%) it was 2mm. The average distance between the tympanomastoid suture and the facial nerve was 4.1mm.

The tragal pointer in 10 (50%) cadavers was between 10-12(mm). In the other 10 (50%) it was between 13-14mm.The average distance between the tragal pointer and the facial nerve was 12.2mm. These values clearly indicate that the TMS is closer to the facial nerve trunk than the Tragal pointer. Statistical analysis showed that this difference in distance was significant with p value being < 0.0001.

However with all these advantages identification and palpation of STF requires surgeon's expertise. Even though many surgeons regard it as the most useful landmark, it is often difficult to find the right drop-off point of the suture[8]. It also requires elevation of the periosteum around the ear canal which may be a complex surgical intervension[9].

Limitations of this study include the following. The sample size can be regarded as small and a larger sample may provide more information. The sample was not evenly distributed between both genders ,no consideration was given to age and side (right or left) .These factors may have an effect on the position of facial nerve trunk .This study was done on cadavers stored in formalin .There may be variations in the distances from the landmarks to the nerve trunk in a living person.

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