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Original Research Article

MORPHOMETRIC STUDY OF PHARYNGEAL ORIFICE OF AUDITORY TUBE IN SOUTH INDIAN POPULATION

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ABSTRACT

Auditory tube extends from the anterior wall of middle ear to the lateral wall of the nasopharynx at the level of inferior turbinate. It plays an important role in maintaining the equilibrium of air. In the patients suffering from chronic otitis media, the auditory tube plays an very important landmark for the endoscopic evaluation and for transnasal approach to the infratemporal fossa. The present study was aimed to locate the pharyngeal orifice of the auditory tube in relation to the important anatomical landmarks. The study was carried out on 50 sagittal head and neck sections of formalin fixed cadavers. The pharyngeal opening of auditory tube was looked for its shape, size and position. The anatomical landmarks with reference to the pharyngeal opening of auditory tube taken were posterior end of inferior turbinate, perpendicular distance from the clivus, from the roof of nasopharynx, from the posterior end of hard palate and from the anterior arch of atlas. The distance from these anatomical landmarks to the pharyngeal orifice of auditory tube were measured using digital vernier calipers. The mean and standard deviations of the distances were calculated and tabulated. The measured distances were slightly higher on the right than the left side. These differences were not statistically significant. The present study is useful for otorhinolaryngologists to locate the position of pharyngeal opening of auditory tube endoscopically and evaluate patients with diseases of middle ear.

KEY WORDS: Auditory Tube, Nasopharynx, Hard Palate, Middle ear

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INTRODUCTION

The Auditory Tube (AT) is a mucous lined osseo-cartilaginous structure located in the head & neck region. It communicates the anterior wall of tympanic cavity with the lateral wall of nasopharynx. AT allows the passage of air and helps to maintain equilibrium on either sides of tympanic membrane. The AT is directed forwards, downwards & medially making an angle of 45^0 with sagittal plane & 30^0 with horizontal plane [1]. AT develops from the tubo-tympanic recess of the first endodermal pouch. Lateral dilated end of the the recess forms tympanic cavity while the medial tubular end of the

recess forms the auditory tube. The osseous portion of the AT is intra-temporal in position while the cartilaginous portion is lodged in the sulcus tubae at the base of the skull before it opens into the lateral wall of nasopharynx. Pharyngeal opening of the AT plays an important role in the endoscopic evaluation of the patients with various diseases of middle ear & nasopharynx. The following study is being undertaken to locate the pharyngeal opening of the AT in relation to the anatomical landmarks around nasopharynx.

MATERIALS AND METHODS

The study was carried out in the department of anatomy, K.S.Hegde medical academy, NITTE (Deemed To Be University) Mangalore, India. The study was performed on 50 formalin fixed sagittal section of human adult head and neck specimens, out of which 25 belong to left side and 25 belong to right side. The pharyngeal orifice of AT was observed for its shape, size and position. The anatomical landmarks pertaining to pharyngeal orifice of AT taken were distance from posterior end of Inferior Turbinate (IT), distance from the midpoint of clivus, distance from the roof of Nasopharynx (NP), distance from the posterior end of Hard Palate (HP), distance from upper border of C1 vertebrae. These landmarks were pinned and then the measurements were taken using digital vernier calipers. The data obtained was tabulated and statistically analyzed.

Fig. 1: Vertical and antero-posterior measurement of AT.

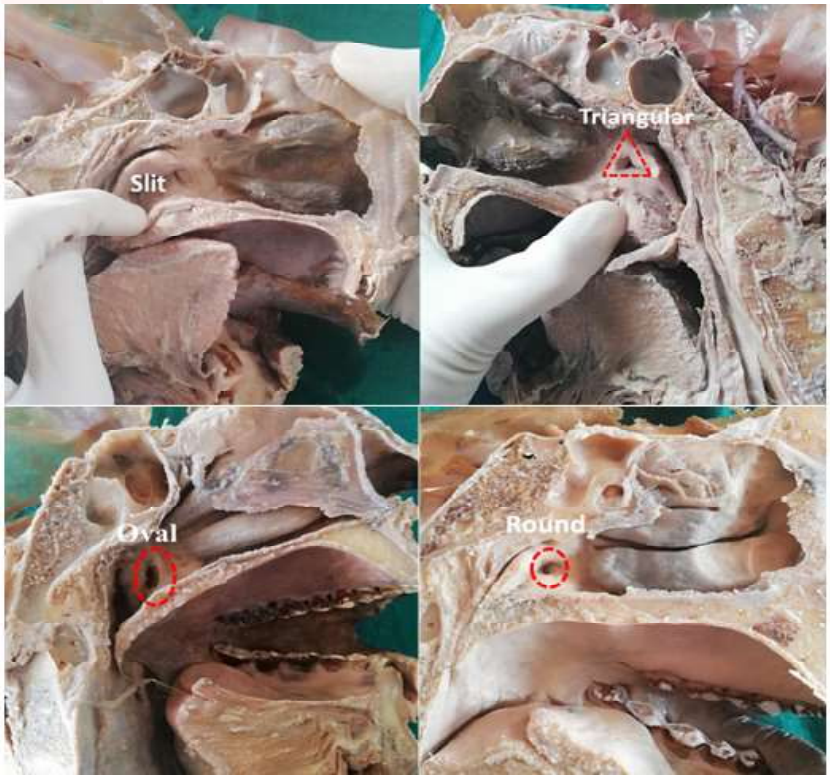

Fig. 2: Different shapes of AT.

RESULTS

The present study was carried out on 50 (25 of right side and 25 of left side) formalin fixed sagittal sections of adult head and neck section. The result obtained was tabulated. The mean and standard deviations of the distances were calculated and tabulated in Table 1, Table 2 and Table 3.

Table 1: Position and shape of pharyngeal orifice of Auditory Tube.

	Position/shape	Right (n=25)	Left (n=25)
Position of the opening	Below IT	6	6
	Behind IT	11	19
	Above IT	8	0
Shape of the opening	Oval	6	6
	Triangular	11	10
	Slit	6	3
	Round	2	6

Table 2: Morphometric measurements of pharyngeal orifice of AT.

Parameters	Vertical (cm)		AP (cm)		From posterior end of IT (cm)		Perpendicular distance from the clivus (cm)	
Number	Rt	Lt	Rt	Lt	Rt	Lt	Rt	Lt
	25	25	25	25	25	25	25	25
N mean	0.64	0.49	0.31	0.27	1.19	1.17	2.05	1.9
S.D	0.19	0.17	0.06	0.09	0.21	0.19	0.23	0.34
T value	3.061		1.649		0.317		2.139	
Test significant or not	yes		No		No		Yes	
P value	0.005		0.112		0.754		0.043	

Table 3: Morphometric measurements of pharyngeal orifice of AT.

Parameters	From the roof of nasopharynx (cm)		From posterior end of hard palate (cm)		From anterior arch of C1 (cm)	
Number	Rt	Lt	Rt	Lt	Rt	Lt
	25	25	25	25	25	25
N mean	0.9	0.86	1.82	1.86	2.76	2.63
S.D	0.12	0.15	0.38	0.33	0.24	0.35
T value	0.753		0.304		0.674	
Test significant or not	No		No		No	
P value	0.459		0.764		0.507	

DISCUSSION

The present study was carried out in 50 sagittal adult head and neck sections. The various shape and position of auditory tube was noted and tabulated in table 1.The mean and standard deviations of the distances were calculated and tabulated in table 2 and table 3. Triangular shape was more common on both right and left side.

Very few authors like Bluestone [2] have worked on pharyngeal opening but have taken only vertical length [3]. According to the study done by Mohite et al., the vertical height was recorded to be 0.92cm on right side and 0.81cm on left side. In the present study the vertical height was recorded to be 0.64 cm on right side and 0.49 cm on left side, these values were less than the values recorded by Mohite et al.

The AT plays a very important role in ventilation of middle ear [4]. To prevent injury to the carotid artery during AT dissection, the surgeon should identify the junction of the cartilaginous and bony AT as a landmark by following the AT lumen from the nasopharyngeal orifice to the junctional part [5].

Fossa of Rosenmuller is one of the site where nasopharyngeal carcinoma usually effects [6]. Clinical examination, including endoscopic examination of the nasopharynx can provide valuable information on mucosal involvement and local tumor extension [7].

Small blockages of AT which create negative pressure in the middle ear can take to secretion aspirations of rhinopharynx to the tympanic cavity. In children, for having the widest, more horizontal and shorter AT, the protection

function is less efficient [8,9].

Above the pharyngeal orifice there is tubal tonsil, which has aggregation of lymphoid tissue. The hypertrophy of this tonsil is observed and limited to the tubal ostium, Rosenmuller fossa and the posterior wall of the tubal orifice. Thehypertrophy of the lymphoid peritubal tissue can distort the normal morphology of the tubal orifice. It is difficult to distinguish tubal tonsil, the tubal ostium and the adjacent adenoid tissue [7]. We measured the distance of pharyngeal orifice of AT from various anatomical landmark, which is useful to locate the pharyngeal orifice of AT during endoscopic evaluation in the conditions like otitis media.

CONCLUSION

The present study is useful for otorhinolaryngologists to locate the position of pharyngeal opening of AT endoscopically and evaluate patients with diseases of middle ear.

Conflicts of Interests: None

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