ATELECTATIC EAR

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OTORHINOLARYNGOLOGY

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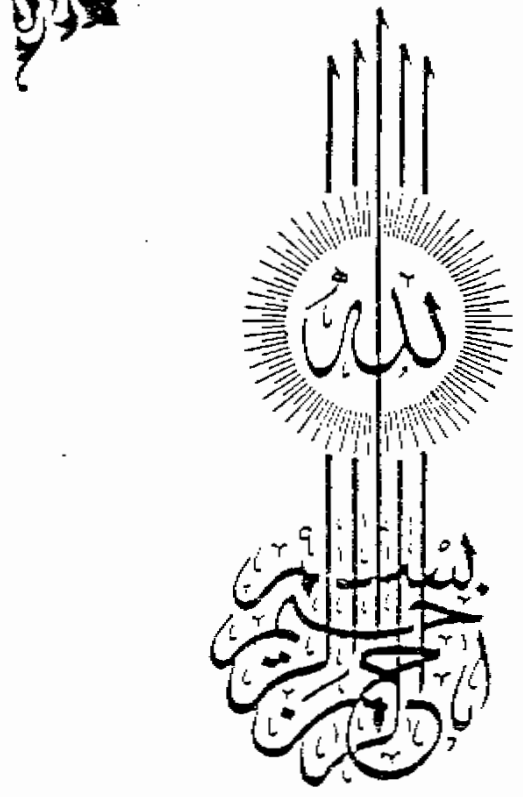

بسم الله الرحمن الرحيم

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا
عَلَّمْتَنَا إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ.

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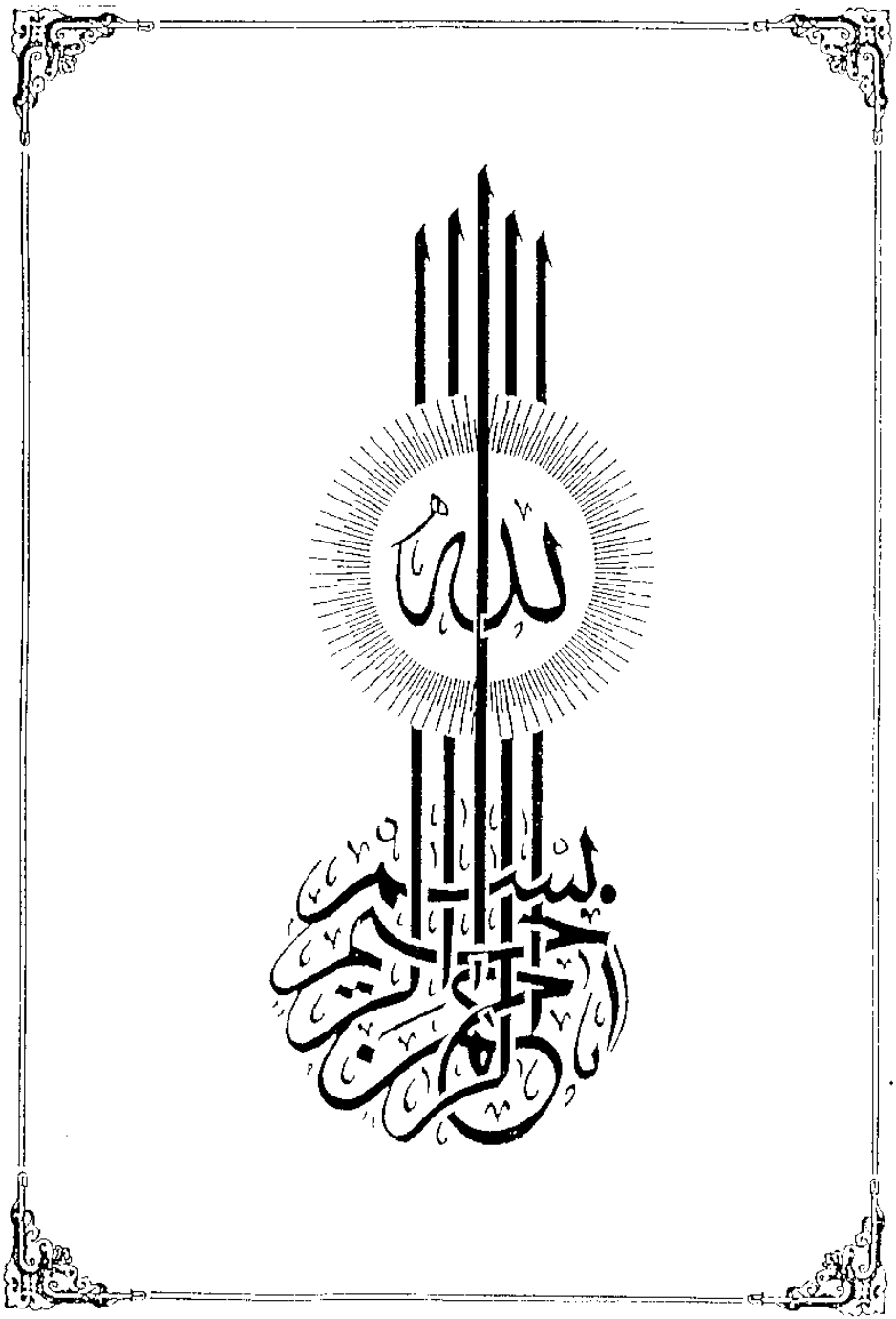

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CONTENTS

INTRODUCTION & AIM OF THE WORK

secondary cholesteatoma. In these ears a tympanoplasty may be benefit (Paparella and Jung, 1981).

AIM OF THE WORK:

To review of the literature dealing with atelectatic ear with purpose of emphasizing and clarifying the following points:-

* Anatomy and physiology of the middle ear especially the eustachian tube.
* Pathogenesis of atelectasis with various techniques of management (diagnosis/treatment).

ANATOMY OF THE MIDDLE EAR and EUSTACHIAN TUBE

ANATOMY OF THE MIDDLE EAR

The middle ear cleft consists of: eustachian tube, Tympanic cavity, mastoid air cell system. The whole cleft is lined by a continuous layer of epithelium. The membrane is respiratory in type (columnar epithelium ciliated in parts) in the eustachian tube and anteroinferior part of tympanic cavity. Else where the epithelium is flattened (cuboidal) (Ballantyne, 1979).

Auditory (Eustachian) tube

The eustachian (pharyngo-tympanic) tube connects the middle ear and the nasopharynx. It is about 3.75 cm long. Its direction is upwards, backwards and outwards from its lower opening in the lateral wall in the nasopharynx towards its upper opening in the anterior wall of the tympanic cavity, with a constriction at the junction of its lateral bony wall and medial cartilaginous portion (Donaldson and Miller, 1973; Ballantyne, 1979).

In adults the tube lies at an angle of 45 degrees with the horizontal plane (Proctor, 1973). Whereas in the infant this angle of inclination is only 10 degrees and the

eustachian tube is relatively wider, shorter and more horizontal in position, affording easier access for ascending infection from the pharyngeal ostium (Pulec and Horwitz, 1973).

It is generally accepted that the posterior third (11 to 14mm) of the adult tube is osseous and the anterior two thirds (20 to 25 mm)is composed of membrane and cartilage. Whereas in infants, the bony portion is relatively longer (Proctor, 1973).

The diameter of the tube is least at the isthmus, and there is gradual widening to the largest diameter at the tympanic orifice (Austin, 1985).

The bony portion lies within the temporal bone and is a prolongation of the anterior portion of the tympanic cavity (Proctor, 1973). Medially it is related to carotid canal and inferiorly it is separated from jugular fossa by a variable thickness of bone, sometimes containing air cells. Above it is divided from the tensor tympani muscle by a thin bony septum. The lateral wall of this portion of the tube is formed by the downturned portion of the tegmen tympani (petrous) (Mawson and Ludman, 1979).

The fibrocartilaginous portion makes an angle of about 160 degree with the bony portion. In cross section, the cartilaginous part looks somewhat like a shepherd's crook (Ballantyne, 1979). The cartilage is confined to the upper and medial parts, the remainder being formed of membrane (Deweese and Saunders, 1982). Superiorly the cartilaginous tube is in contact with the base of the skull, occupying a groove (Sulcus tubarius), from which it is suspended by the superior tubal ligament (Proctor, 1973).

The Gerlach's tubal tonsil near the pharyngeal end of the tube is in fact, a collection of lymphocytes rather than organized nodule. However, the fossa of Rosenmuller which lies behind the nasopharyngeal orifice, is normally packed with small but well-organized lymph nodules (Ballantyne, 1979).

The muscles concerned with the function of the eustachian tube are: Tensor veli palatini, levator veli palatini, superior pharyngeal constrictor, salpingo-pharyngeus and Tensor tympani (Proctor, 1973).

Usually the eustachian tube is closed, opening during such actions as swallowing, yawning or sneezing and thereby

permitting the equalization of middle ear and atmospheric pressures .

Most anatomic and physiologic evidences support active dilation induced by the tensor veli palatini muscle (Cantekin et al., 1979). Closure of the tube has been attributed to passive reapproximation of the tubal wall by extrinsic forces exerted by the surrounding deformed tissues and/or by recoil of elastic fibers within the tubal wall (Bluestone, 1991).

The tensor veli palatini muscle is composed of two bundles of muscle fibers divided by a layer of fibro-elastic tissue. The bundles lie lateral to the eustachian tube, in superficial-deep relationship to one another. The fibers of the superficial bundle run in an infero-superior direction from their attachment in the inferior margin of the sphenoid bone around the hamulus, to an attachment long the posterior border of the hard palate. The fibers of the deep bundle (Dilator tubae)run from an inferomedial attachment on the lateral membranous tubal wall forming an acute angle with the wall, while its tendinous portion passes around the hamulus and inserts along the posterior margin of the hard palate (Rood and Doyle, 1978).

The role of Tensor tympani in tubal opening is a relatively recent consideration. The muscle originates from the cartilaginous part of the tube, adjoining part of the sphenoid bone and the walls of its bony canal.

It is believed that both the tensor palati and the tensor tympani muscles, act synergistically in relation to their opening action on the auditory tube, being of the same embryological origin and having the same nerve supply from the mandibular division of the trigeminal nerve (Cantekin et al., 1979).

The levator palati takes origin from the under surface of the petrous bone, the lateral side of the upper end of the carotid sheath and from the inferior surface of the cartilaginous portion of the tube. The muscle is innervated by the looped pharyngeal branch of the vagus nerve (Proctor, 1973).

The salpingopharyngeus muscle arises from the medial and inferior border of the tubal cartilage via slips of muscular and tendinous fibers. The muscle then courses inferoposteriorly to blend with mass of the palatopharyngeus muscle. This muscle is also innervated by the looped pharyngeal branch of the vagus nerve (Proctor, 1973).

The superior pharyngeal constrictor arises from the posterior border of the medial pterygoid plate, the pterygoid hamulus, the pterygomandibular raphe, the posterior end of the mylohyoid line and by a few fibers from the side of the tongue. The fibers pass backwards between the pretubal (Tensor) and the retrotubal (Levator) muscles to insert into the median pharyngeal raphe and by an aponeurosis to the pharyngeal tubercle. The superior fibers curve below the levator veli palatini and the eustachian tube so that contraction of superior constrictor muscle also assists in elevation of the eustachian tube with swallowing (Proctor, 1973).

Tympanic cavity

It is an irregular, air filled space within the temporal bone, It contains the auditory ossicles and their attached muscles, the chorda tympani nerve and the tympanic plexus (Wright, 1987).

The walls of the Tympanic cavity

Roof

The anterior surface of the petrous portion of the temporal bone becomes thin where it joins the squamous portion forming the roof. The roof separates the cavity from the dura of middle cranial fossa (Mawson and Ladman, 1979).

Floor

It is a thin layer of cellular bone beneath which a thin convex plate separates the tympanic cavity from the superior bulb of the internal jugular vein. Anteromedial to the vein, the tympanic branch of the glossopharyngeal nerve pierces the floor on its way to the promontory (Mclay, 1982).

Anterior wall

It is vertical and angulated acutely with the floor and