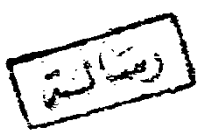
TEMPRO-MANDIBULAR JOINT

ESSAY

Submitted In Partial Fulfilment For
The Master Degree In
Oto-Rhino-Laryngology



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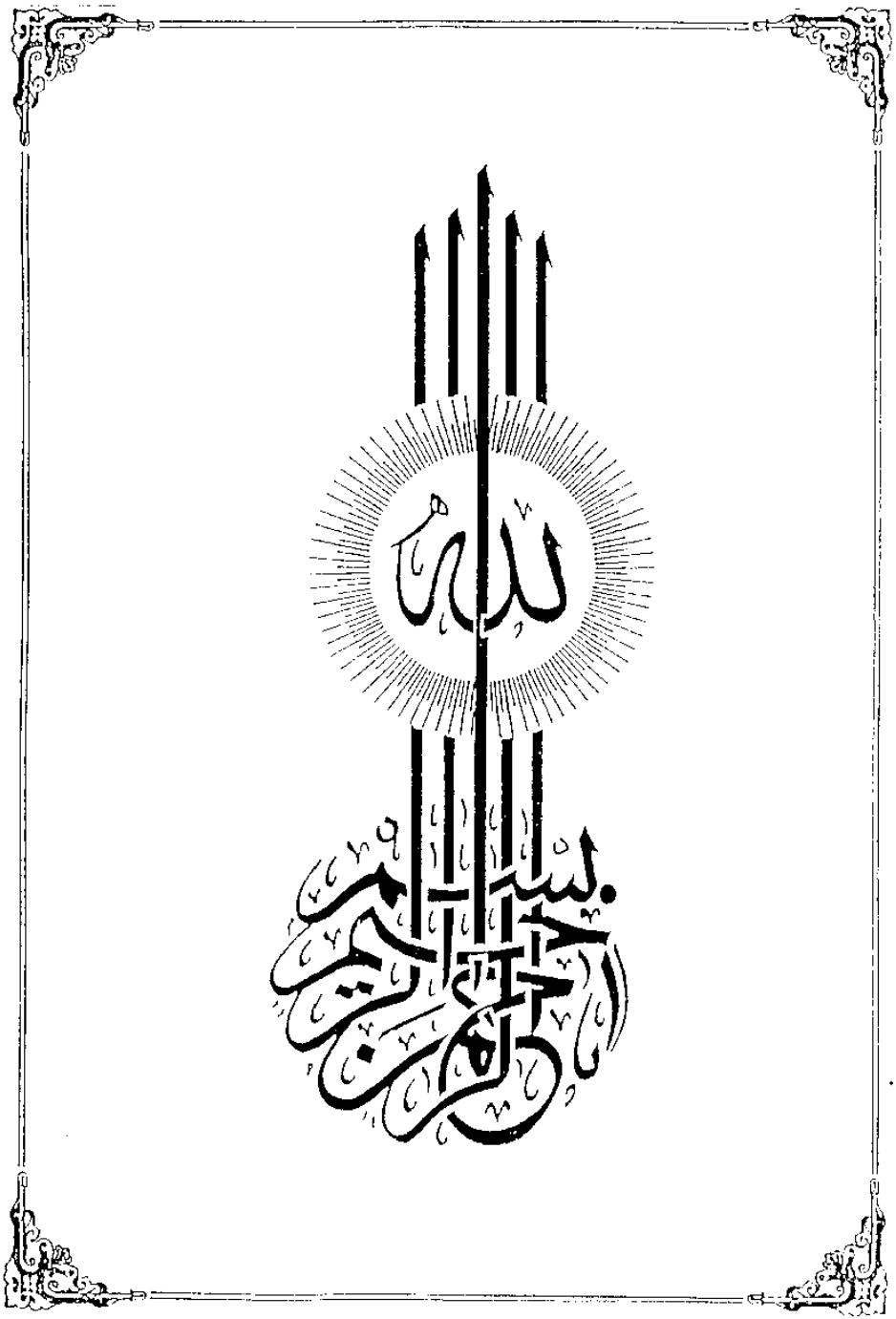
بسم الله الرحمن الرحيم

علم الإنسان ما لم يعلم

صدق الله العظيم



To
The Soul of My Father,

To
My Wife Who Suffers Lot During Production of this Work,

To
My Daughter
AMIRA

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CONTENTS

INTRODUCTION

Tempromandibular joint [T.M.J.] is one of the most important,yet one of the most poorly understood joint of the body.

Because of its unique anatomic position and association with other structures, the otolaryngologists considered it outside their reieam of responsibility. Recently, a closed anatomical and pathological relationships between the joint and the field of E.N.T. become evident and efforts try to clarify much of the mystery of the Joint. Although the pathological conditions that affect the joint are the same as those which affect other joints of the body, yet the special anatomic and functional characteristics of the joint and its surrounding structures often lead to unique clinical manifestation and growth disturbanas, not seen when these conditions occur in other areas.

In many disorders of T.M.J., the patient are unawar that their symptoms originate from their joint and complain of ear troubles. This confusion is not surprising when one consideres the anatomic and functional relationship of the joint to the ear.

The aim of the work is to keep the E.N.T. specialist aware of the importance of the T.M.J. and introduce the present-day knowledge about the joint, its various disorders and managment. The work is also aiming to scope a light on T.M.J. from surgical point of view, especially during skull base surgery.

PART (I)

ANATOMICAL AND PHYSIOLOGICAL CONSIDERATION OF T.M.J.

EMBERYOLOGY AND EVOLUTION OF T.M.J.

The structures of the T.M.J. have been found to originate from 2 different blastemas. They are situated at a relatively large distance from on another and grow at different rates. They are respectively, the condylar blastema and the temporal blastema.

The condylar blastema evolves to contribute to the formation of the condylar cartilage, the apponeurosis of the lateral pterygoid muscle, the disc and the capsular elements of the lower joint. The temporal blastema develops into the articular structures of the upper joint.

The condylar blastema forms at the distal and of the primordium of the mandible or the dentry which begins to ossify at about 7th week of the fetal life at approximately the 19 mm. stage. By the time of 22 mm. stage, a significant amount of bone has been laid down in a plate like form lateral to Meckel's cartilage which is the carlilagenous element of the first branchial arch. Meckel's cartilage extendes from the midline to the developing chin to the developing middle ear. The malleus and probably the incus develops as the posterior extension of Meckel's cartilage. The intermediate portion of Meckel's cartilage disappears, but its sheath remains to present in the formation of the anterior malleular ligament and the sphenomendibular ligament.

When the embryo reached the 24 m.m. stage the pterygoid and masseter muscles have differentiated. At the superior border of lateral pterygoid muscle and just medial to masseter muscle, there is a layer of mesenchyma which is the anlage of the articular disc. Superior joint cavity is developed from an area with few cells between the developing articular disc and the blastema of the zygomatic process.

At 25 mm. stage, the middle ear ossicles are fully formed in true cartilage, the malleus is continuous with Meckel's cartilage and the articular disc and the lateral pterygoid tendon are attached to it.

By the 11th week, the condylar cartilage becomes an evident structure located at the upper end of the posterior border of the developing mandible.

At 55 mm. stage, the condylar head produces an osseous head which matures into condylar cartilage at the 65 mm. stage.

At 13 weeks of development, the upper part of the joint cavity becomes a distinct entity. Full differentiation of all articular elements is arrived at the 190 mm. stage or the 4th fetal month. **(Donaled E. Doyle 1982).**

Bauma states that "Full differentiation of all articular elements by the 4th fetal month is in keeping with a general embryogenetic law that all vital organs are formed by this stage".

The nerve of the first branchial arch is the trigeminal nerve, it innervates the muscles of mastication, the myelohyoid muscle and the anterior belly of digastric muscle. The nerve supply of the medial pterygoid muscle (n. to medial pterygoid muscle) supplies also the tensor tympani muscle which is inserted onto the neck of the malleus, its contraction draw the tympanic membrane, thus the same blastema emerges as the medial pteygoid muscle as well as the tensor tympani muscle. The tensor tympani muscle is a remnant of that which moved the jaw at the reptilian stage and it continuous to maintain its identity with the basic nerve of the jaw apperatus. This suggests that, early

.n the emberyological oevelopment, neural patterns are establisned with the brain stem where jaw bone and ear bone movement are integrated. "This is the key relationship between jaw and ear dysfunction [Arlen H. 1977].

GROSS AND SURGICAL ANATOMY

The tempromandibular joint is formed by articulation of the condylar process of the mandible with the glenoid fossa and the articular eminence on the undersurface of the temporal squama.

It is a synovial ginglymcarthoidal joint, that functins as a hinge and moves freely but in one plane only; beckwards and forwards. It is a condylar joint i.e. one bone articulates with other by twc distenct articular surfaces. **(Gibilisco J.A. 1983).**

The term cranio-mandibular articulation is preferable to the customary designation tempromandibular joint, since the adult human mandible is a single bone with the same type of joint at each end. **(Dubrul E.L. 1980).**

THE OSSEOUS COMPONANTS OF T.M.J.

A. The Mandibular Condyle

The condyle is a date-stone-shaped structure, that is highly convex and oval. It measures 10 mm. anteroposteriorly and 20 mm. mediolaterally.

The lateral pole of the condyle is roughened and often blundly pointed. It projects only mediolaterally from the plane of the ramus. The medial pole is usually rounded and extendes strongly inwards from the plane of the ramus.

In lateral view, the condyle appears tilted forwards on the mandibular neck with its articular surface on the anteroposterior

aspect. The articular surface continuous medially down and around the rounded medial pole of the condyle. (Dubrul E.L. 1980).

The condyle is very convex in an anteroposterior direction, and slightly convex in mediolateral direction. The medio-lateral convexity is often irregular with medial and lateral slopes divided by a prominent anteroposterior ridge (Shore N.A. 1977).

B. The Articular Surface of the Temporal Bone:

The articular surface of the temporal bone or facies articularis is more complicated, it is situated on the inferior aspect of the temporal squama just anterior to the tympanic element of the temporal bone. It possesses the glenoid fossa and the articular eminence:

- **The glenoid fossa** is highly concave and covered by a paper like transparent layer of cortical bone at its right. **The roof** of the glenoid fossa is quiet thin, a light inside the cranium will shin through it. Alderman M.M (1977). **The posterior part** of the fossa is elevated to form a ridge, the posterior articular ridge or lip, which increases in right laterally to form a thickened cone-shaped prominence called the postglenoid process just anterior to the external acoustic meatus. **The lateral border** of the fossa is raised to form a narrow crest that joins the articular tubercle of the zygomatic process infront with the postglenoid process behind. **Medially the fossa** narrows and is bounded by a bony wall called the entoglenoid process that leans against the angular spine of the sphenoid bone. Sometimes the entoglenoid process is elevated to form a triangular process called the temporal spine. (Dubrul E.L. 1980)

Fig. 1 : T.M.J.; Articulating surfaces. (From **Ernshar** C.F. 1982, Anatomy and neuroanatomy. In **Morgan D.H. et al.,** Diseases of T.M.J. apparatus p. 9, London, C.V. Mosby Co.).

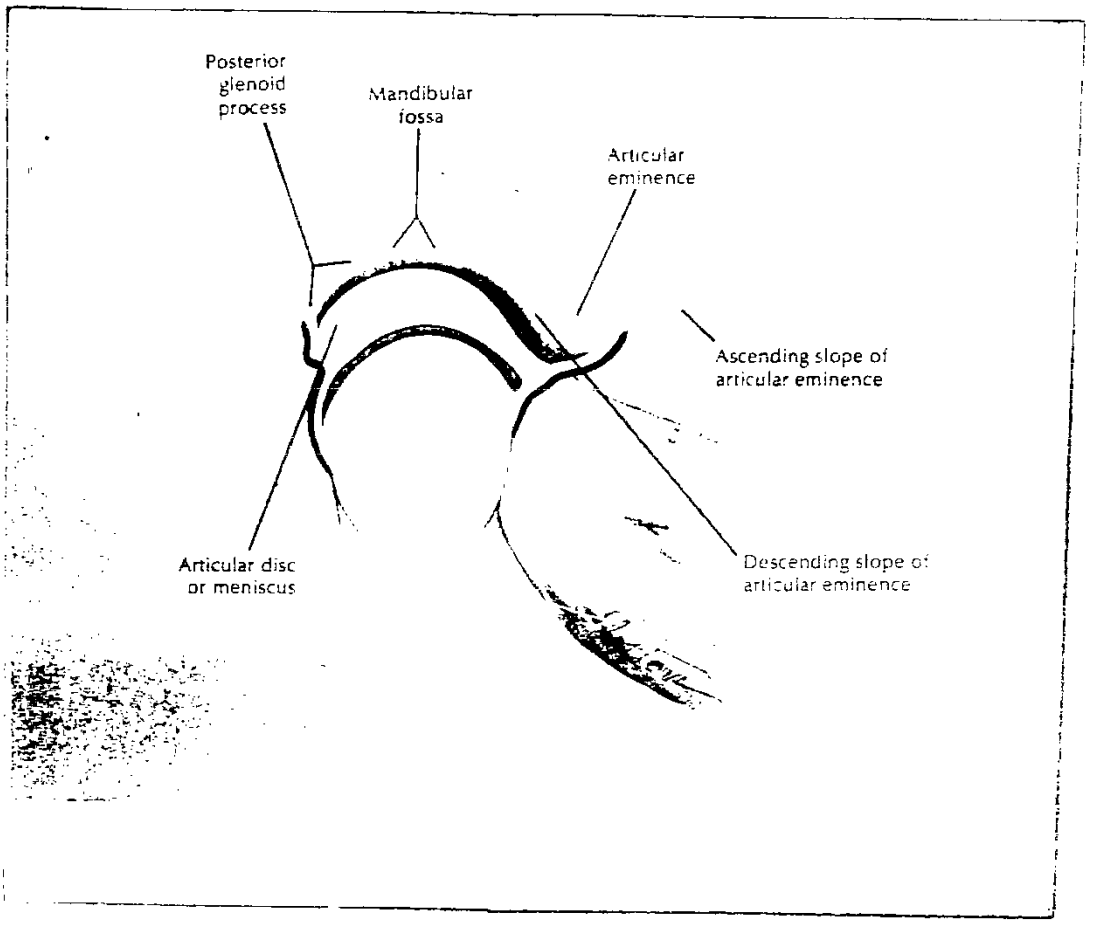

Fig. 2: Schematic representation of structures of T.M.J. (From **Ernshar C.P. 1982,** Anatomy and neuroanatomy. In **Morgan D.H. et al.,** Diseases of T.M.J. apparatus P. 9. London, C.V. Mosby Co.).