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Bifurcation of Facial Nerve

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Abstract
Introduction: *Abnormal separation of CN7 much earlier in embryogenesis may be necessary for a bifurcation or trifurcation anomaly to result. Early division of the nerve at around 4-6 weeks may allow the displacement of one segment by the developing temporal bone structures.By the 8th week, the orientation of CN7 within the temporal bone has been established, with nerve's ultimate position and bony covering determined by development of stapes and membranous labyrinth. The basic configuration of the facial nerve is completed at around 8 weeks, whereas the mesenchymal tissue through which it passes and the structures it innervates are still poorly formed. The fibrous layers surrounding the facial nerve seem to be responsible for the final architecture of the facial canal.*
Aim*: Knowledge of the surgical anatomy of the facial nerve and facial canal is essential in middle ear surgery. The study in full term foetuses will help in applying the facts to new born, infants and young children up to the age of 2 years.*
Materials & Methods: *30 fetuses were used to expose 60 fetal temporal bones. In these the petrous part was dissected, decalcified and serial sections were taken.*
Observation: *Facial nerve bifurcation was seen in one temporal bone in its tympanic segment in the medial wall of middle ear.*
Discussion: *Bifurcation of its intratemporal portion is a rare malformation in which focal splitting of one or more facial nerve segments occurs (Christine et al, 2003).) In the present study bifurcation of the facial nerve was observed in the tympanic segment in the medial wall of middle ear.*
Keywords: *Bifurcation, Facial nerve, Tympanic segment*

I. Introduction

The embryologic origin of facial nerve bifurcation anomalies is uncertain, because CN7 never exists as separate bundles during its development. Formation of the nerve commences early in gestation with the facio-acoustic primordium (derived from the neural crest and otic vesicle) separating into facial and acoustic components at the end of the 4th week. By the end of the 5th gestational week, the chorda tympani has differentiated from the distal facial nerve. By the 8th week, the orientation of CN7 within the temporal bone has been established, with nerve's ultimate position and bony covering determined by development of stapes and membranous labyrinth. The basic configuration of the facial nerve is completed at around 8 weeks, whereas the mesenchymal tissue through which it passes and the structures it innervates are still poorly formed (Christine et al, 2003).

II. Aim

Knowledge of the surgical anatomy of the facial nerve and facial canal is essential in middle ear surgery. The study in full term foetuses will help in applying the facts to new born, infants and young children up to the age of 2 years.

III. Materials & Methods

30 fetuses were used to expose 60 fetal temporal bones. In these the petrous part was dissected, decalcified and serial sections were taken

The petrous part of the temporal bones was dissected in 30 fetuses, fixed in 10% formalin for 7 days and then decalcified. For decalcification the bony pieces were kept in 10% trichloro acetic acid for 2 weeks. After 2 weeks chemical test for calcium was performed in the following manner every day till calcium was removed fully.

5ml of decalcifying fluid is neutralized with N_2. Na OH, then 1 ml of 5% ammonium oxalate was added. Turbidity of the fluid indicates the presence of the calcium. Absence of turbidity after a delay of 5 minutes indicates that the decalcifying fluid is free of calcium.

The step takes 1 to 7 days by which the decalcification is complete.

After completion of decalcification, they were embedded in wax and serial sections were taken. The processing of the tissue for histology produces considerable amount of shrinkage to the tissue components. However the shrinkage factor is uniform for the entire tissue and therefore the morphometric data calculated for various tissue components are valid.

Observations were made on the facial nerve after staining the slides with Ehrlich's Haematoxylin & Eosin for routine study (Fig.1), and with Toluidine blue (Fig: 2).

IV. Observation

Facial nerve bifurcation was seen in one temporal bone in its tympanic segment in the medial wall of middle ear

V. Discussion

Bifurcation of its intratemporal portion is a rare malformation in which focal splitting of one or more facial nerve segments occurs (Christine et al, 2003).

Bifurcation and trifurcation anomalies of CN7 have been previously described in the otolaryngology literature. These have been reported to involve all portions of the nerve from the intracanalicular segment to the mastoid segment, with the most common anomalies occurring along the tympanic segment (Nager, 1993; Celin et al, 1991; Curtin et al, 1986; Kieff et al, 1998; Raine et al, 1995) In the present study bifurcation of the facial nerve was observed in the tympanic segment in the medial wall of middle ear.

Prior reports of bifurcation of the tympanic CN7 segment predominantly described focal bifurcation of the nerve proximal or anterior to the oval window with rejoining of the segments distal to the stapes or at the posterior genu. At surgery, stimulation of both branches has been reported to produce a strong facial response (Kieff et al, 1998). A bifid tympanic facial nerve has also been described where one segment passed through the stapedial arch (Marquet, 1981). Tympanic segment anomalies are associated with developmental anomalies of the vestibular fenestra and stapes.

VI. Conclusion

Middle ear being a vulnerable part in the course of the facial nerve, the position, the dimension and the integrity of the canal in which it lies were observed in the region of the middle ear. In the middle ear congenital abnormalities of the facial nerve such as dehiscence of the wall or, abnormal course of the facial nerve, the nerve is at danger in surgical procedures such as stapedectomy for otosclerosis, Myringotomy and removal of foreign bodies.

References

[1]. Celin SE, Wilberger JE, Chen DA. Facial nerve bifurcation within the internal auditory canal. Otolaryngol Head and Neck Surg 1991; 104: 389-393

[2]. Christine M, Glastonbury, Nancy J, Fischbein, H. Ric Harnsberger, William P. Dillon and Thomas R. Kertesz. Congenital Bifurcation of the Intratemporal Facial Nerve. AJNR Am J Neuroradiol 24:1334-1337, August 2003.

[3]. Curtin H, May M. Double internal auditory canal associated with progressive facial weakness. Am J Otol 1986; 7: 275-281

[4]. Durcan DJ, Shea JJ, Sleeckx JP. Bifurcation of the facial nerve. Arch Otolaryngol 1967; 86: 619-631.

[5]. Kieff DA, Curtin HD, Healy GB, Poe Ds. A duplicated tympanic facial nerve and congenital stapes fixation: an intraoperative and radiographic correlation. Am J Otolaryngol 1998: 19; 283-286

[6]. Marquet J. Congenital malformations and middle ear surgery. J R Soc Med 1981: 74:119-128.

[7]. Nager GT. Pathology of the ear & temporal bone. Philadelphia: Lippincott Williams & Wilkins; 1993: 147-164.

[8]. Raine CH, Hussain SS, Khan S, Setia RN. Anomaly of the facial nerve and cochlear implantation. Ann Otol Rhinol Laryngol Suppl 1995; 166:430-431.

[9].

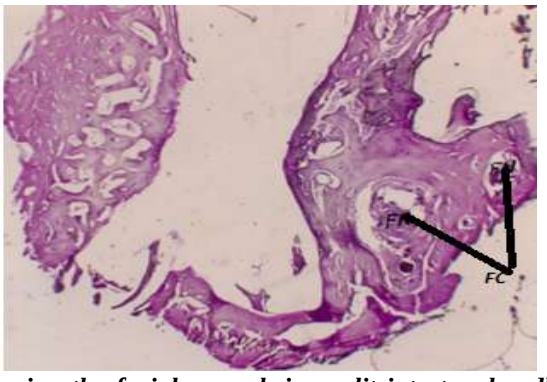

Fig: 1 - Photomicrograph showing the facial nerve being split into two bundles in the medial wall of the middle ear. 2.5X, H&E.: FN – Facial nerve

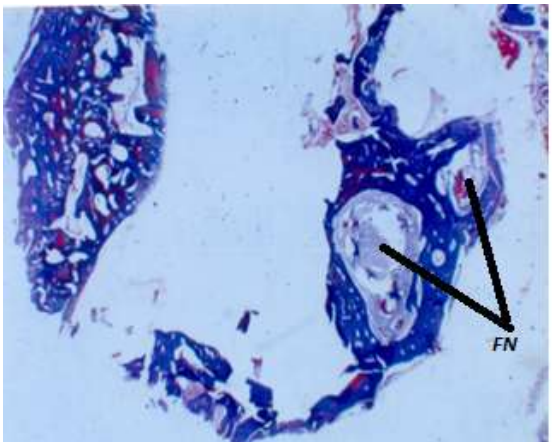

Fig: 2. Photomicrograph showing the facial nerve being split into two bundles in the medial wall of the middle ear. 2.5X, Toludine blue.: FN – Facial nerve