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Research Paper

Dehiscence of Facial Canal

Medical Science

KEYWORDS : Facial nerve, Middle ear, tympanic part, dehiscence.

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ABSTRACT

Introduction: Physiological presence of fetal dehiscence of the facial canal has been observed. As early as 1949, Guild (1949) regarded such natural absence as a "not uncommon anomaly". Henner & Buckingham (1956) listed dehiscence among the severe abnormalities encountered in otological surgery. Excellent descriptions usually with a report on evidence have been provided by Derlacki (1957), Shambaugh (1980); Kodres and Buckingham (1957) and Cawthorne (1969).

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: In 6 specimens the wall of the facial canal was found to be deficient in the medial wall of the middle ear. The deficiency was varying from a minimal area to a wider area.

If there is dehiscence of the facial canal in the middle ear there can be unexpected post operative facial nerve complications. The nerve will be involved in middle ear infections.

Introduction:

Congenital bony dehiscence is the most common abnormality of the facial nerve canal that occurs in up to 50% of otherwise normal temporal bones predominantly involved in tympanic portion (91%) (Baxter 1971). With this high prevalence is more accurately described as variation in normal anatomy (Jahrsdoerfer 1981; Nager 1993)

Facial nerve has got a motor root and a sensory root. Both the roots of the facial nerve run in the internal acoustic meatus and then run laterally to the geniculum of the facial canal, at which point the two roots fuse. At the geniculum the nerve makes a sharp bend posteriorly and runs in the medial wall of the tympanic cavity producing an arciform prominence below the eminence of lateral semicircular canal and above the promontory. Finally the nerve turns downwards through the bone in the posterior wall of the middle ear cavity to the mastoid air cells to its point of exit at the stylomastoid foramen. The nerve passes through a vulnerable part of the tympanic cavity. Congenital absence of part of the bony wall of the facial canal has assumed a place of growing importance keeping pace with the degree of technical improvements made in the middle ear reconstructive surgery, with the consequent increase in the number of otosurgical cases.

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 canal and its dimensions after staining the slides with Ehrlich's Haematoxylin & Eosin for routine study (Fig: 13), Mallory's Trichome to study the different tissue components such as connective tissue, blood vessels, etc (Fig: 14)., Glees Modification of Bielschowsky's silver stain to study the nerve fibres (Fig: 15) and Toluidine blue to study nerve cells (Fig: 16).

Observations:

Dehiscence of wall of the Facial Canal:

In 6 specimens the wall of the facial canal was found to be deficient in the medial wall of the middle ear (Fig 35 to 40). The deficiency was varying from a minimal area to a wider area. In 3 other specimens the facial nerve was split into fascicles within the canal (Fig 41 & 42). The facial nerve was having a definitive sheath and lying within the sheath were the vessels supplying it (Fig 43).

Discussion:

According to **Wright (1966)**, dehiscences are certainly present in 4% of cases. This is somewhat less than what is cited by **Kettel (1965)** who found 57% dehiscences out of 211 cases. **Kaplan et al (1960, 1984)** have suggested the persistence of the aperture for the stapedial artery as a possible cause for dehiscence, which itself disappears at the 10th week. **Abing et al (1987)** have stressed the possibility of middle ear infections in early infancy as a cause of dehiscence. The regions of the facial canal which are covered by intramembranous bone are the most susceptible areas of dehiscence. The dehiscence of the facial canal plays an important part in the development of facial nerve palsy from acute otitis media **(Henderson, 1989)**.

Baxter's (1971) observation revealed in incidence of dehiscence in 55%. 91% of dehiscence was located in the tympanic segment & 9% in the mastoid portion. He defined dehiscence as a gap in the canal wall measuring 0.4mm or more. The majority of the gaps were found in the oval window region. A gap in the continuity of the osseous wall may be observed in any portion of the facial canal, the majority however is observed along the tympanic part. The regions of the facial canal which are covered by intramembranous bone are the most susceptible area of dehiscence.

The highest incidence of exposed facial nerve has been reported to be 30-35% during surgery for middle ear Cholesteatoma (Lin et al 2004; Selesnick et al 2001; Ozbek et al 2009). Majority of those were found to be in revised cases and at the tympanic seg-

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ments since it was in the way of extension of the Cholesteatoma (Moody et al 2007; Magliulo et al 2011; Kim et al 2008; Bayazit et al 2002).

In the present study dehiscence was observed in 5% . and all were observed in the tympanic segment of the Facial canal (100%)

Conclusion:

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 body (chorda tympani nerve also may be involved).

If there is dehiscence of the facial canal in the middle ear there can be unexpected, post operative facial nerve complications. The nerve is also involved in the middle ear infections. 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.

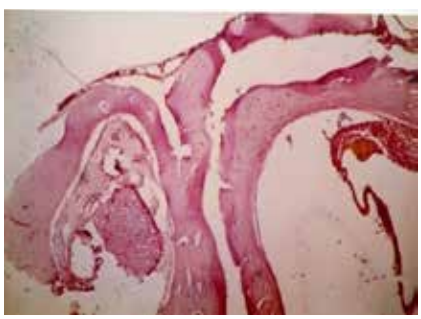

Fig: 35 Photomicrograph showing the dehiscence of the wall of the facial canal in the medial wall of the middle ear in fetus no. 1- 2.5X, H&E.

D- Dehiscent part of the wall.

Fig: 36 Photomicrograph showing the dehiscence of the wall of the facial canal in the medial wall of the middle ear in fetus no. 2 - 2.5X, H&E.
D- Dehiscent part of the wall.

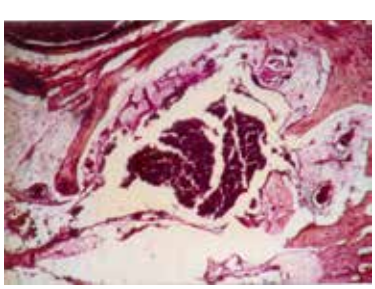

Fig: 37 Photomicrograph showing the dehiscence of the wall of the facial canal in the medial wall of the middle ear in fetus no. 3- 2.5X, H&E.
D- Dehiscent part of the wall.

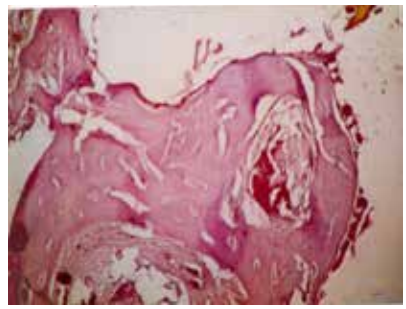

Fig: 38 Photomicrograph showing the dehiscence of the wall of the facial canal in the medial wall of the middle ear in fetus no. 4 - 2.5X, H&E.
D- Dehiscent part of the wall.

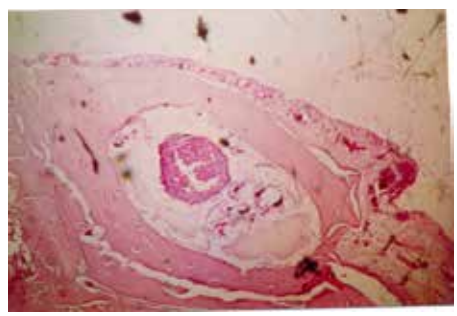

Fig: 39 Photomicrograph showing the dehiscence of the wall of the facial canal in the medial wall of the middle ear in fetus no. 5 - 2.5X, H&E.
D- Dehiscent part of the wall.

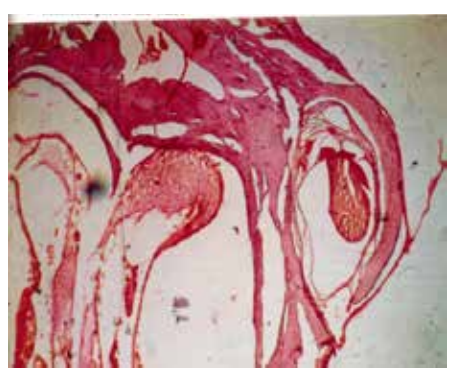

Fig: 40 Photomicrograph showing the dehiscence of the wall of the facial canal in the medial wall of the middle ear in fetus no. 6 - 2.5X, H&E.
D- Dehiscent part of the wall.

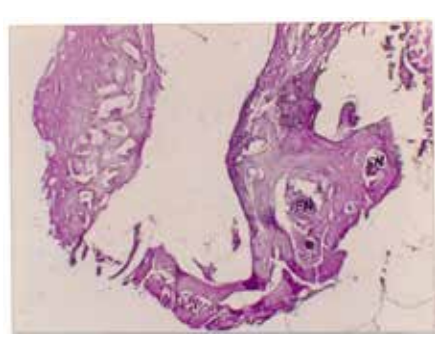

Fig: 41. Photomicrograph showing the facial nerve being split into two bundles in the medial wall of the middle ear. 2.5X, H&E.
FN – Facial nerve

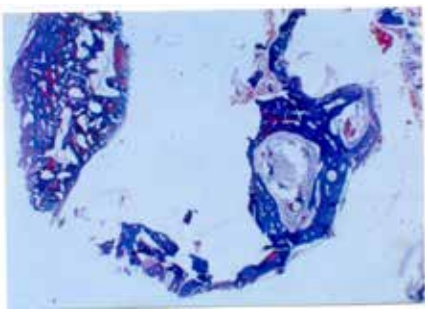

Fig: 42. Photomicrograph showing the facial nerve being split into two bundles in the medial wall of the middle ear. 2.5X, Toludine blue.
FN – Facial nerve

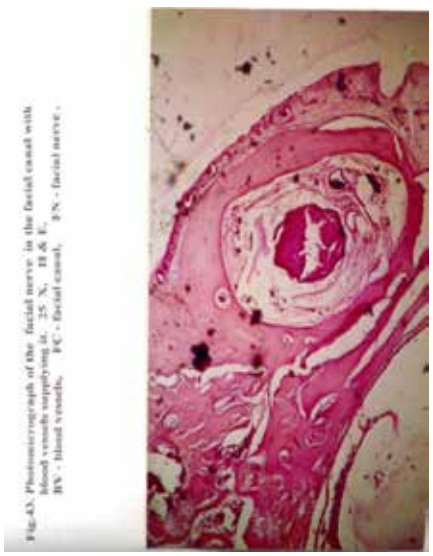

Fig: 43. Photomicrograph showing the facial nerve in the facial canal with blood vessels supplying it. . 25X, H&E.

BV – Blood vessels; FC – Facial canal; FN – Facial nerve

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