Congenital Auditory Meatal Atresia

Meta-Analysis Study

for the partial fulfillment of the master degree in Otorhinolaryngology

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٢٠٠٧

بسم الله الرحمن الرحيم

(قُلْ إِنَّ صَلَاتِي وَنُسُكِي
وَمَحْيَايَ وَمَمَاتِي لِلَّهِ رَبِّ
الْعَالَمِينَ، لَا شَرِيكَ لَهُ
وَبِذَلِكَ أُمِرْتُ وَأَنَا أَوَّلُ
الْمُسْلِمِينَ)

الأنعام (١٦٢-١٦٣)

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~~Review of literature……~~

~~Embriology of congenital auditory meatal atresia……..~~

~~Classification of congenital auditory meatal atresia……..~~

~~Management of congenital auditory meatal atresia……..~~

Congenital auditory meatal atresia (CAMA) is an uncommonly encountered congenital disorder, it occurs once in every ١٠،٠٠٠ births. Unilateral atresia is seven times more common than bilateral atresia ***(Jahrsdoerfer,*** ٢٠٠٣***)***.

CAMA was first described in western medicine by Paulus of Aegina in the seventh century AD.

Paulus recommended simple incision for opening the atresia. Later physicians used a hot iron probe to maintain canal patency after incising the atresia. The first operation to correct an atresia of the external auditory canal (EAC) was performed in ١٨٨٢ by Kiesselbach. In the early ٢٠th century

techniques for correction of the atretic external canal have involved opening the antrum and aditus of the ear and lining the cavities with a skin graft **(Milstein et al., ١٩٨١). .**

In these surgeries the atretic bony plate was untouched and the resulting hearing improvement was poor. In the past ٥٠ years improved radiologic and audiologic assessments coupled with the improvements in surgical technology such as the operating micro-scope and facial nerve monitoring have resulted in good surgical success rates for properly chosen patients with CAMA.

The future of medical and surgical intervention for patients with CAMA is exciting and includes such novel approaches as computer aided surgery as well as critical reviews of post surgical results with further attempts to increase success rates and minimize morbidity. Despite the presence of these surgical technological advances, some anomalies if present contraindicate surgery for CAMA ***(Milstein et al, ١٩٨١).***

Meta-analysis is a quantitative statistical procedure that synthesizes finding across many studies, overcoming the problems of small samples and diverse outcomes and programs. According to ***Tobler*** ***(***١٩٨٦***)*** the computation of the effect size is not dependent on statistically significant results. Instead of discounting the studies whose results do not reach statistical significance, as would be the case in a literature review, the quantitative results of each study are converted into a common metric (**effect size**). Thereby allowing comparison of results across studies.

Our study is a meta-analysis to know which of the surgical approaches for reconstruction of congenital auditory meatal atresia is better.

That will be done by the following steps:

١- Determination of the target disease……………………………….

٢- Identification and location of articles………………………………….

٣- Screening and evaluation of articles………………………………….

٤- Data collection……………………….

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٥- - Data analysis……………………………….

٦- -Reporting and interpretation (Results)

……………………………………………………….).

٧- -Discussion and conclusion…………….s.

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Congenital auditory meatal atresia

Embryology

The ossicles, except for the footplate of the stapes, are formed from the first and second branchial arches, and the external canal and tympanic membrane are derived from the first branchial cleft. Isolated branchial arch (ossicular) or branchial cleft (external canal) deformities are possible, but usually these malformations occur in combination.

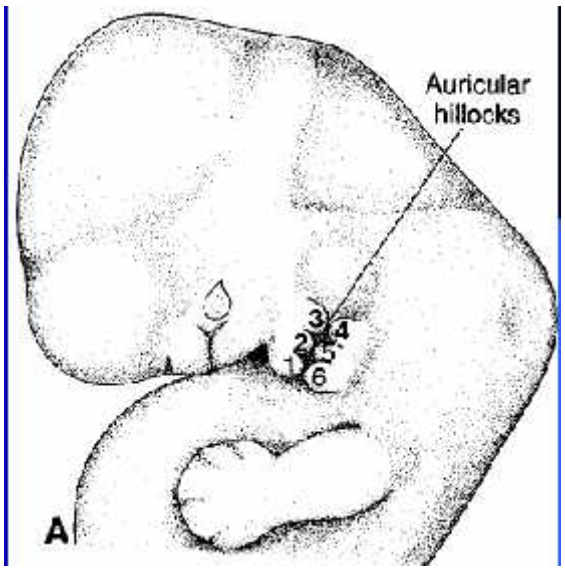

Figure ١: - auricle ٤th week of gestation . - ١st &٢nd branchial arches . -Hillocks of His . (after Gulya, ٢٠٠٣).

Other branchial arch defects may be present also, especially mandibular hypoplasia. Because the membranous labyrinth is derived from the ectodermal otocyst, sensorineural and vestibular function should be normal ***(Lambert,*** ١٩٨٨***)***.

The stapes footplate is formed in part from the otic capsule, and in most cases it is normally developed. Although, the superstructure is often deformed. This information is important, since the stapes often is partially obscured by the lateral ossicular mass or the facial nerve, and its normal mobility, may be difficult to determine, with certainty.

In congenital atresia, a bony fusion of the incudomalleal joint is present. Of the two ossicles, the malleus is the more deformed and usually smaller in size. The manubrium and/or head of the malleus are fixed to the atretic bone by a bony union ***(Lambert,*** ١٩٨٨***).***

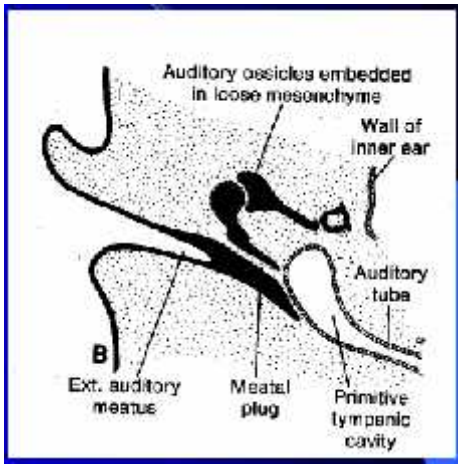

Figure ٢:

External auditory canal:

- ٨th week of gestation.

- ١st branchial groove .

-Medial migration of a solid core of epithelial cells .

(after Anson and Donaldson, ١٩٨١).

<u>The eustachian tube, middle ear, and mastoid air cells</u> are derived from the first pharyngeal pouch. There have been no anatomic or clinical studies showing impaired eustachian tube function in patients with aural atresia, but usually the middle ear cavity and mastoid air cells are smaller than normal. Pneumatization of the mastoid is a late embryologic event, starting at the seventh or eighth month and continuing in postnatal life.

A well-pneumatized mastoid, therefore, usually indicates good middle ear development, including size of the tympanum and ossicular formation. The relationship between middle ear development and degree of differentiation of the external ear is disputed.

The tympanic bone, which begins as a condensation of mesenchyme called the tympanic ring, forms the medial portion of the external canal. Beginning in the third embryonic month, the tympanic bone begins to ossify, eventually forming the tympanic ring and osseous ear canal; the latter structure continues its lateral growth during the first and second postnatal years.

Malformation of the tympanic bone produces atretic bone at the level of the tympanic membrane, and also results in atresia of the external canal. The mandibular condyle articulates with this rudimentary tympanic bone ***(Lambert,*** ١٩٨٨***)***.

The external canal is derived from the first branchial groove and initially is represented by a solid core of epithelial cells that extends down to the area of the tympanic ring and first pharyngeal pouch. The core of epithelial cells remains in place until the seventh month of fetal life, a time when almost all structures of the inner, middle, and outer ear are well differentiated. At this point, absorption of the epithelial cells begins, progressing in a medial-to-lateral direction. If this canalization process is arrested prematurely, it is possible to have a more normally developed tympanic membrane and bony external canal in association with an atretic membranous external canal ***(Lambert,*** ١٩٨٨***)***.

Abnormalities of ***the facial nerve*** frequently are associated with ear malformations. Bony dehiscence of the fallopian canal is common, and the facial nerve also may take an anomalous course. Typically the facial nerve makes an acute angle at the Second genu, crossing the middle ear in a more anterior and lateral direction to exit into the glenoid

fossa. In such cases, the facial nerve may lie just deep to the area of the tragus. A correlation between the degree of microtia and the extent of facial nerve abnormality has been noted ***(Lambert,*** ١٩٨٨***)***.

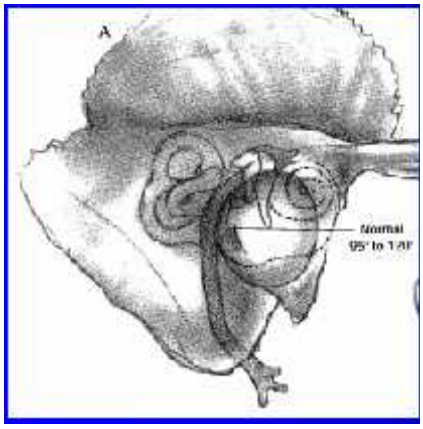

Figure ٣***: facial nerve*** ٤-٥ ***weeks of gestation (After Jahrsdoerfer,***١٩٩٨ ***).***