

Computerized Tomographic Study of Pneumatisation of Mastoid

Dr Vidya C. S^{*}, Dr N.M. Shamasundar^{**}, Dr Saraswathi G^{***}

^{*} Assistant Professor, JSS Medical College, Mysore-15, Karnataka, India

^{**} Professor and Head, JSS Medical College, Mysore-15, Karnataka, India

^{***} Professor, Department of Anatomy JSS Medical College, Mysore-15, Karnataka, India

Abstract- Introduction and objective: The mastoid air cell system represents a more or less extensive system of interconnecting air filled cavities arising from the mastoid and walls of middle ear. Based on the density of mastoid air cells it has been described as sclerotic (absence of pneumatisation), diploic type (partially pneumatised), pneumatic (totally pneumatised). The pneumatised type were further described as squamomastoid, perilabyrinthine, petromastoid and accessory (occipital). The knowledge regarding the status of pneumatisation of mastoid process is very essential for otologists while performing surgeries like cochlear implant, drainage of mastoid abscess, middle ear surgeries

Materials and method: In the present study 50 dried skulls of south Indian origin (males =28, females = 22) of age more than 50 yrs were studied in detail by computerized tomography. Hence details regarding pneumatisation were observed in 100 mastoid processes. The extent and type of pneumatisation were recorded and analysed.

Results: observations revealed incidence of squamomastoid type was seen in 74 cases, petromastoid type in 12 cases, perilabyrinthine in 12 cases, sclerous type in 2 cases and accessory nil.

Conclusion: Mastoid process is frequently approached by otologists to perform mastoidectomy, cochlear implant placement in neural deafness and in some of the middle ear surgeries.

Index Terms- mastoid process, pneumatisation, cochlear implant

I. INTRODUCTION

The mastoid air cell system has been recognized as an important contributor to the patho physiology of inflammatory diseases.¹ The pneumatisation has been linked to hereditary and genetic factors. Ventilation of middle ear as an essential predictor of the functional results following middle ear reconstruction. Based on the density of mastoid air cells it has been described as sclerotic (absence of pneumatisation), diploic type (partially pneumatised), pneumatic (totally pneumatised). The pneumatised type were further described as squamomastoid, perilabyrinthine, petromastoid and accessory.² The parts containing attic, aditus, antrum and labyrinth constitutes periantral triangular zone. It covers the spaces which represent the centre of activity in initiation and promulgation of pneumatisation.³ The present study aim in studying pneumatisation of mastoid process which is frequently

approached by otologists to perform mastoidectomy, cochlear implant placement in neural deafness. Hence a pre-operative CT scan assists the otologists for planning and for surgical interventions.

II. MATERIALS AND METHOD

In the present study 50 dried skulls of south Indian origin (males =28, females = 22) of age more than 50 yrs were studied in detail by computerized tomography. Initially all the skulls were scanned at vikram hospital with 3D axial multislider CT scan axial and coronal images were obtained and details regarding pneumatisation were observed in 100 mastoid processes. The extent and type of pneumatisation were recorded and analysed.

III. RESULTS

Table1: Study of mastoid process by CT scan in 50 dry skulls (M=28, F = 22)

Type	Right		Left	
	Male	Female	Male	Female
Petromastoid	5	3	3	1
Squamomastoid	20	15	20	19
Perilabyrinthine	3	3	5	1
sclerous	-NIL	1	NIL	1
Accessory	-	-	---	---



Image 1: squamo-mastoid type



Image2 : petrous type

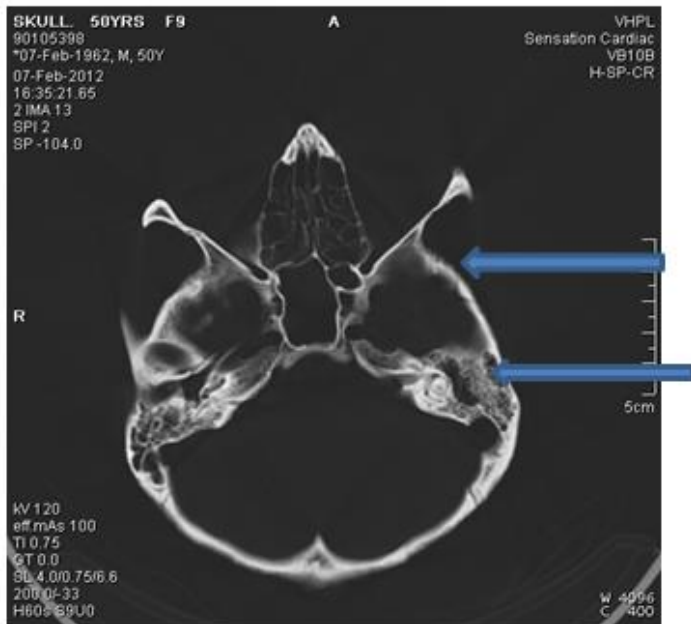


Image 3 : perilabyrinthine type

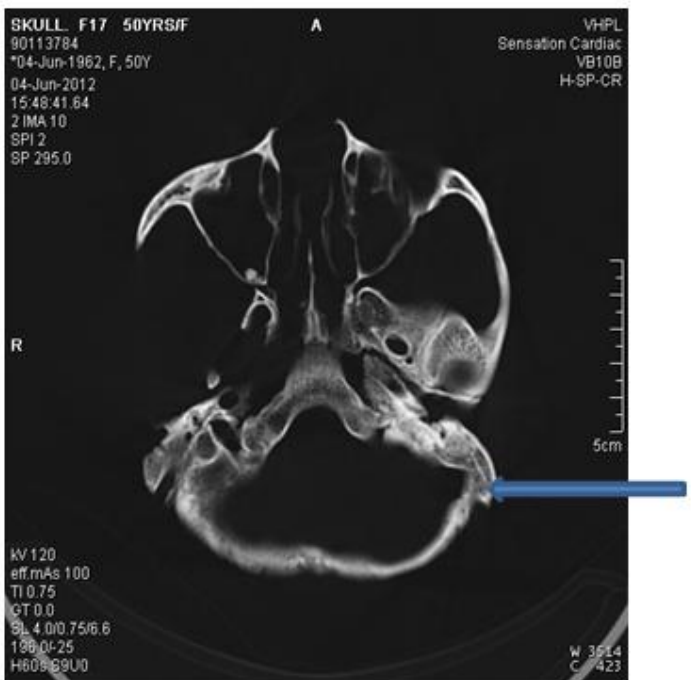


Image 4 : Sclerous Type

IV. DISCUSSION

In the present study **Petromastoid** type 8 in males(5 Right ,3 left) and 4 in females (3 Right ,1 left) , **Squamomastoid** type is prominent, 40 in males(20 in right , 20 in left)and 34 in females (15 in right and 19 in females, **Perilabyrinthine** type 8 in males(3 Right ,5 left) and 4 in females (3 Right ,1 left) ,**Sclerous** type 2 in female (1right ,1left) **Accessory** not observed in any skull.

Kim J and others studied volumes of the mastoid air cells (right and left) using 3D reconstruction of C T scan of PNS . Their study revealed volumes of male subjects were larger than those of females. There was a positive correlation between the pneumatisation of mastoid air cells and that of sphenoid sinus. ⁴ Koji Yamashita et al studied the size of mastoid air cells and tympanic cavity using high resolution CT. 100 temporal bones of 50 patients with cholesteatoma and 50 control subjects were included. Both the volume and cross –sectional area of cavities of combined mastoid air cells and tympanic cavity in the affected side of the patients with cholesteatoma were significantly smaller than those in unaffected side($p < 0.001$) . both the volume and cross-sectional area of the cavities of combined mastoid air cells and tympanic cavity of both affected and unaffected sides of patients with cholesteatoma were significantly smaller than contralateral affected side.⁵

Samuel A and others studied temporal bone dissection in 10 cadavers. The landmark of importance for the dissection was the McEwens triangle. Anatomic features encountered during the dissection were noted and recorded. Cribiformae and wide marrow mastoid cavity were noted in 17 temporal bones, highly pneumatisation mastoid air cells and incus were seen in 14 each , tympanic remnant was seen in 13 and stapes in 6. Temporal bone dissection provides an avenue in understanding the anatomic features and the variation that may pose a challenge in cochlear implant and other otologic surgeries.⁶

Mastoidectomy is one of the *key steps* in placing a cochlear implant. Here a mastoidectomy allows access to the surgeon to the middle ear through the facial recess. **Open mastoidoepitympanectomy** involves complete exenteration of the mastoid air cell and is indicated in poorly pneumatized and ventilated ears with limited access and exposure .⁷

V. CONCLUSION

Well aerated mastoid cavity indicates easier surgical intervention across the facial nerve recess. CT mastoid is useful to indicate a low lying dura or an anteposed sigmoid sinus when operation is being contemplated on a sclerotic mastoid. Both CT and MRI should be used, as they delineate in different manners of cochlear and middle ear anatomy, look for labyrinthine ossification and malformations. The knowledge regarding the status of pneumatisation of mastoid process is very essential for otologists while performing surgeries like cochlear implant , drainage of mastoid abscess, middle ear surgeries.

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AUTHORS

First Author – Dr Vidya C. S., Assistant Professor, Department of Anatomy JSS Medical College, Mysore-15, Karnataka, India

Second Author – Dr N.M. Shamasundar Professor and Head, Department of Anatomy JSS Medical College, Mysore-15, Karnataka, India

Third Author – Dr Saraswathi G. Professor , Department of Anatomy JSS Medical College, Mysore-15, Karnataka, India