



Insight To Boundaries Of Medial Mastoid Tip Cells And Its Clinical Significance In Well Pneumatized Temporal Bone – Descriptive Observational Study

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Abstract:

Objective: To delineate the boundaries of medial mastoid tip cells in extensively pneumatized mastoid.

Study Design: Retrospective descriptive observational study.

Materials And Methods: Temporal bone dissection done on 36 temporal bones out of which 24 were well pneumatized, 8 were diploic and 4 were sclerotic mastoid. Complete mastoidectomy was done exposing the mastoid tip cells and its boundaries were delineated.

Keywords: Mastoid tip, Medial mastoid tip cells, Complete Mastoidectomy, digastric ridge

Introduction:

The word mastoid is derived from a greek word “mastos” meaning breast, correlating to the shape of the bone.^[1] The anterolateral portion of the mastoid bone arises from the squamous part of the temporal bone and its posteromedial portion including the mastoid tip develops from the petrous bone. Pneumatization usually begins in late fetal life and progresses during infancy and childhood.^[2] The factors which determine the extent of pneumatization are not clearly established. The growth pattern may be controlled by several factors like mucous membrane condition, congenital factors, developing growth centers in the bone, Eustachian tube function and recurring upper respiratory tract infections.^[3]

the mastoid process was completely pneumatized in only 36 per cent, partially diploic and partially pneumatic in 43 per cent and sclerotic in 20 per cent.^[4]

The sternocleidomastoid muscle inserts to the outer surface of the mastoid tip. The posterior belly of digastric muscle inserts on the digastric groove situated on the mastoid tip. The digastric groove is a landmark for the facial nerve. Stylomastoid foramen is situated at the anterior end of the digastrics groove from where the facial nerve exits the temporal bone. The mastoid process has a thicker outer surface where the muscles attached and is weaker medially.^[5]

In a well pneumaatized mastoid tip cells there is high chances for erosion due to its thin wall causing cholesteatoma extension or complications like Bezold’s abscess and citelli’s abscess.^[6]

In many studies conducted on post operative cases of chronic otitis media who underwent revision mastoidectomy showed that one of the causes for recurrence is Incomplete excision of cholesteatoma from the medial mastoid tip cells.^[7] As medial mastoid tip cells have many important structures surrounding it and also very difficult to access and

drill in a narrow space it is very important for the budding surgeons to identify the structures surrounding it.^[8] Hence this study aims to delineate the boundaries of medial mastoid tip cells in extensively pneumatized mastoid.

Materials And Methods:

This is a retrospective descriptive observational study, conducted in our department from period of 2016 to 2020 . Institutional ethical committee clearance was taken. All the dissections were microscope assisted. The drilling of the mastoid was done using micro drill . The temporal bones were fixed using a fixator and cortical mastoidectomy along with all possible exercises were done as mentioned in textbooks .The boundaries of the medial mastoid tip cells were delineated , findings

were recorded and images were taken during dissection process

Stastical Analysisanalysis:

Data collected is entered into Microsoft excel data sheet and is analyzed using SPSS 22 version software. Categorical data is represented in the form of Frequencies and proportions. Chi-square test is used as a test of significance for qualitative data. Graphical representation of data is done using MS Excel and MS word . MS Excel, SPSS version 22 IBM SPSS Statistics, Somers NY, USA is used to analyze data

Results:

36 wet temporal bones were dissected , out of which 19 (52.7%) were right sided bones and 17 (47.2%) were left sided temporal bones.

TABLE I: Table depicting distribution of temporal bones based on pneumatization of mastoid

TYPE OF PNEUMATISATION	NUMBER OF BONES	TOTAL PERCENTAGE
Well pneumatized	24	66.66%
Diploic	8	22.22%
Sclerotic	4	11.11%

Figure I: Graph showing Distribution of subjects according to Posterior semicircular canal delineation and pneumatization of mastoid.

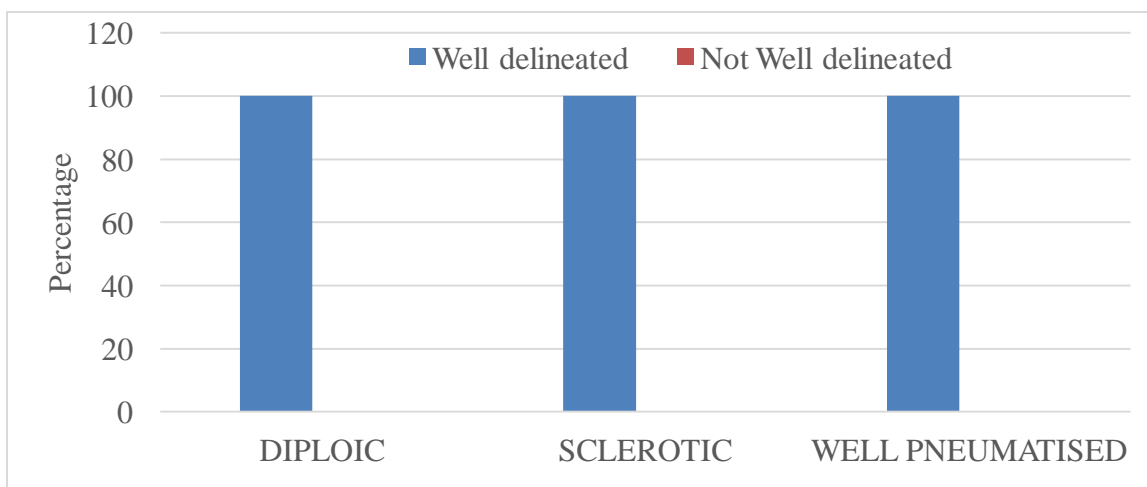


Table II: Table depicting distribution of subjects according to Sigmoid sinus location and pneumatisation of mastoid

	Sigmoid sinus	
	Anteriorly placed	Well delineated
DIPLOIC	5	3
	62.5%	37.5%
SCLEROTIC	4	0
	100.0%	.0%
WELL PNEUMATISED	0	24
	.0%	100.0%
Total	9	27
	25.0%	75.0%

P Value <0.001, there was statistically significant between to Sigmoid sinus and pneumatisation of mastoid.

Figure II: Graph depicting Digastric ridge delineation and pneumatisation of mastoid

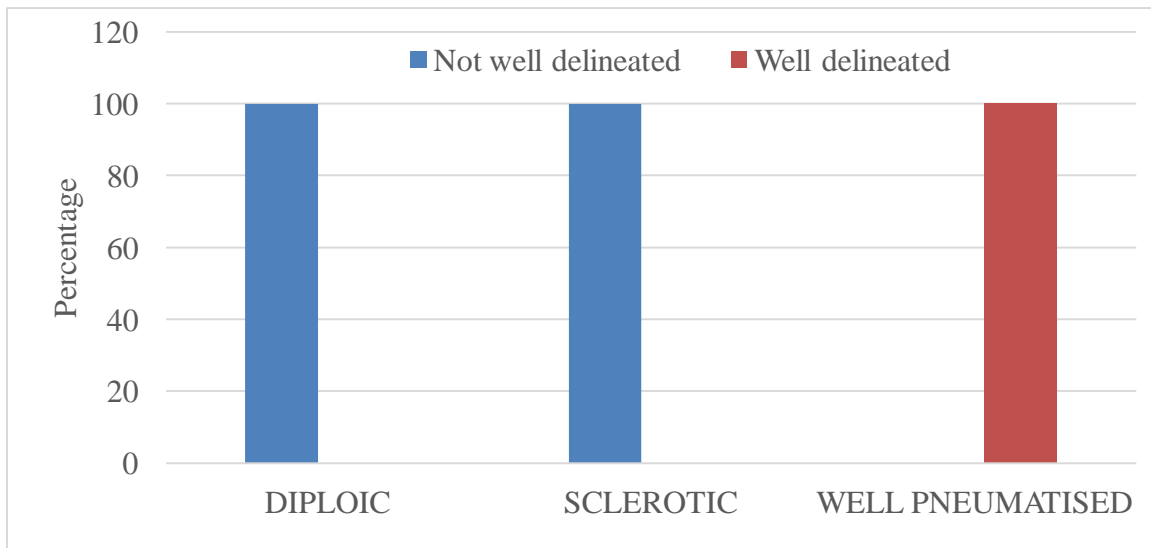


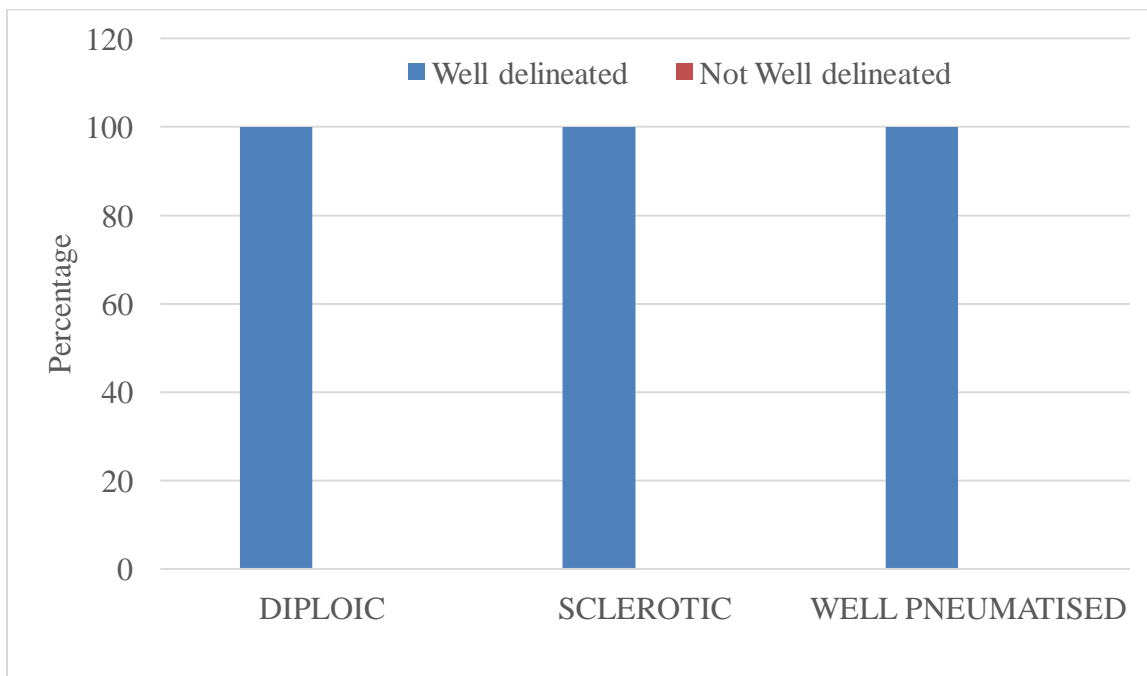
Table III: Table depicting presence of High jugular bulb and pneumatisation of mastoid

	Jugular bulb	
	High jugular bulb	Well delineated
DIPLOIC	1	7
	12.5%	87.5%
SCLEROTIC	2	2

	50.0%	50.0%
WELL PNEUMATISED	1	23
	4.2%	95.8%
Total	4	32
	11.1%	88.9%

P value < 0.026, there was statistically significant between presence of High Jugular bulb and pneumatisation of mastoid.

Figure III: Graph depicting delineation of facial nerve and pneumatisation of mastoid



Discussion:

Mastoid tip cells can be classified into medial and lateral with respect to the digastric ridge. Digastric ridge situated in the mastoid tip, runs from posterolateral to anteromedial direction in sagittal plane. It could be well delineated only in well pneumatised bones. The air cells situated medial to digastric groove are medial mastoid tip cells and one situated lateral to digastric groove are Lateral mastoid tip cells. There are no important structures related to mastoid tip cells, especially lateral mastoid tip cells. However when it comes to medial mastoid tip cells there are important structures around it. Sometimes,

there are a tract of small air cells covering the larger Medial tip cells. In all the 36 temporal bones we have dissected in our study after completely exposing the medial mastoid tip cells the surrounding structures were delineated. The Medial mastoid tip cells are limited medially by jugular bulb, laterally by digastric ridge, superiorly by dome of posterior semicircular canal and endolymphatic sac, posteriolaterally by lower 1/3rd of sigmoid sinus and anterolaterally by lower 1/3rd of vertical portion of facial nerve and stylomastoid foramen.

Conclusion:

The importance of medial mastoid tip cells lies in the fact that any inflammation, granulation or cholesteatoma involving these cells, care is to be taken to avoid injury to surrounding vital structures during clearance of the disease. In case if a surgeon

identifies any structure projecting into the medial tip cells care to be taken while excision

Conflict Of Interest:

The authors declare no conflict of interest or commercial affiliation related to this study

References:

1. Mansour S, Magnan J, Ahmad HH, Nicolas K, Louryan S. Comprehensive and clinical anatomy of the middle ear. Springer International Publishing; 2019 Jul 4.
2. McKenzie D. The aqueduct of Fallopius and facial paralysis. The Journal of Laryngology & Otology. 1920 Jul;35(7):201-10.
3. Diamant M. Otitis and pneumatisation of the mastoid bone. Acta otolaryngol (Stochh). 1940;41:1-49.
4. Zuckerkandl E. Zur Anatomie des Warzenfortsatzes. Monatsschrift für Ohrenheilkunde. 1879 Apr;13:49-54.
5. Al-Baharna H, Al-Mubaireek H, Arora V. Bezold's abscess: A case report and review of cases over 14 years. Indian J Otol 2016;22:148-51.
6. Li L, Ren J. Aural cholesteatoma with upper neck extension. Auris Nasus Larynx. 2012 Oct 1;39(5):534-6.
7. Bhatia S, Karmarkar S, DeDonato G, Mutlu C, Taibah A, Russo A, Sanna M. Canal wall down mastoidectomy: causes of failure, pitfalls and their management. The Journal of Laryngology & Otology. 1995 Jul;109(7):583-9.
8. Irugu DV, Singh A, Kumar R. Morphometry of the Digastric Ridge and Its Significance for Mastoid Surgeries—A Cadaveric Study. Ear, Nose & Throat Journal. 2021 Jul;100(6):NP296-8.

Fig : 1

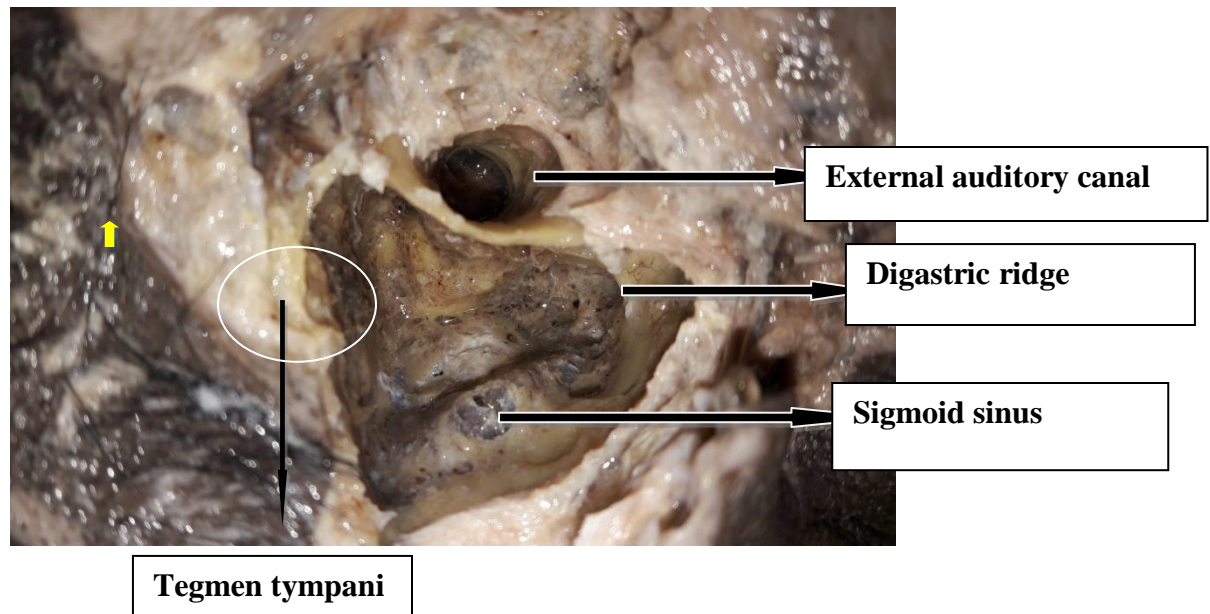


Fig 2

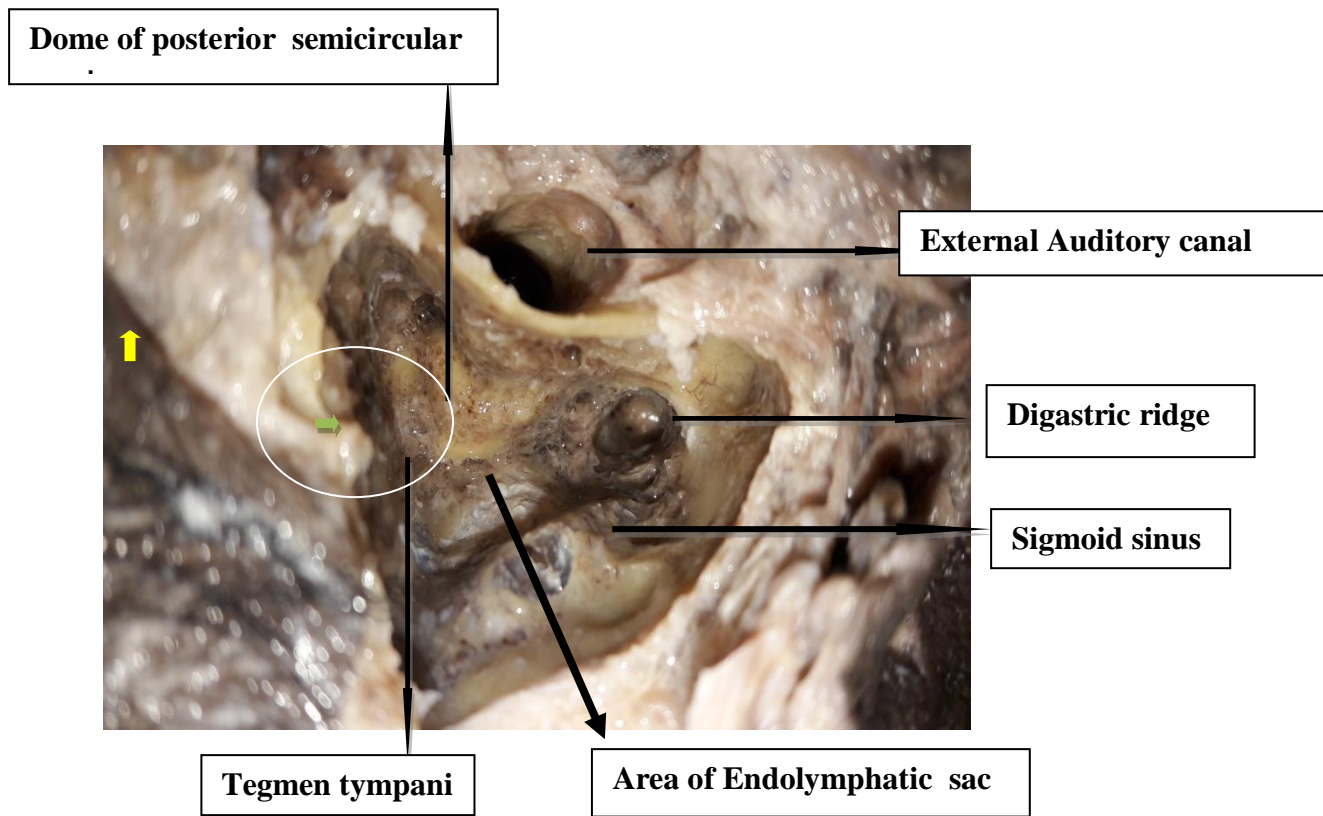
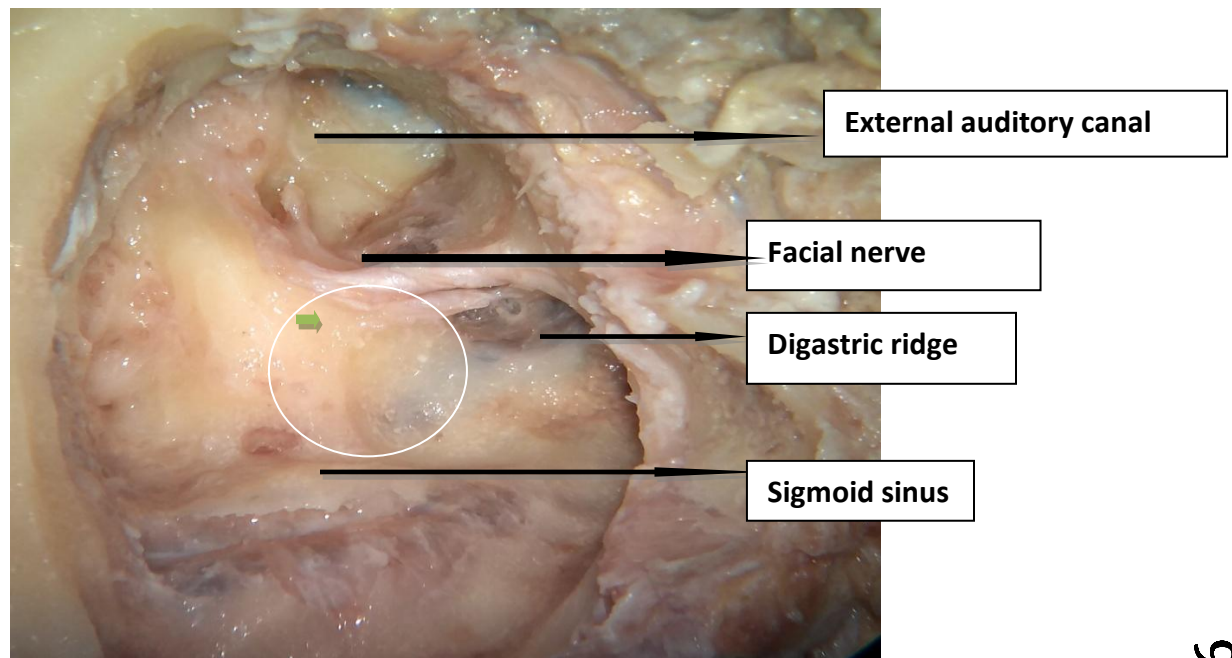


Fig 3



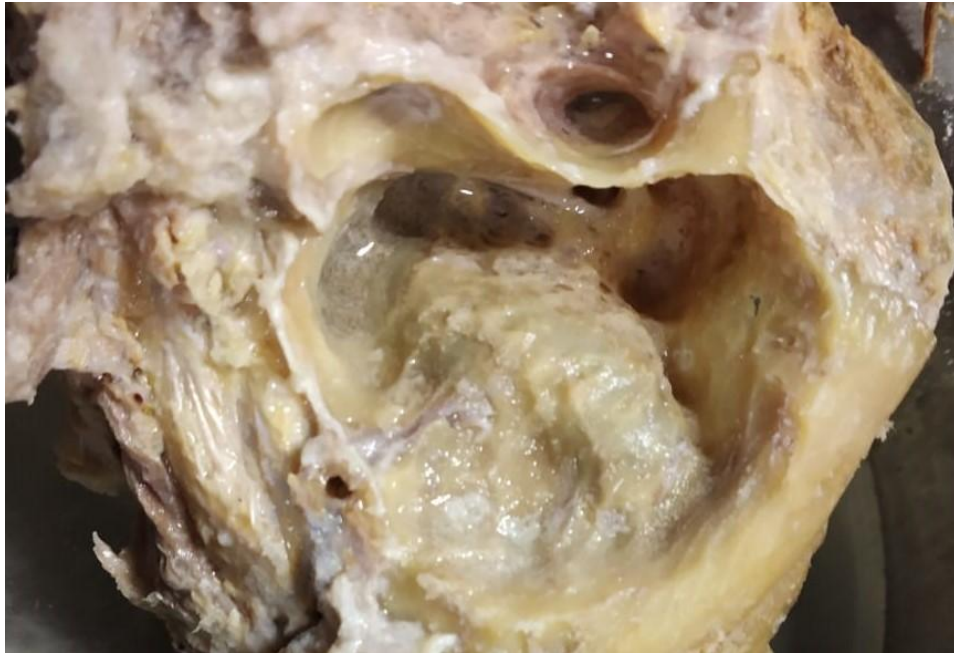
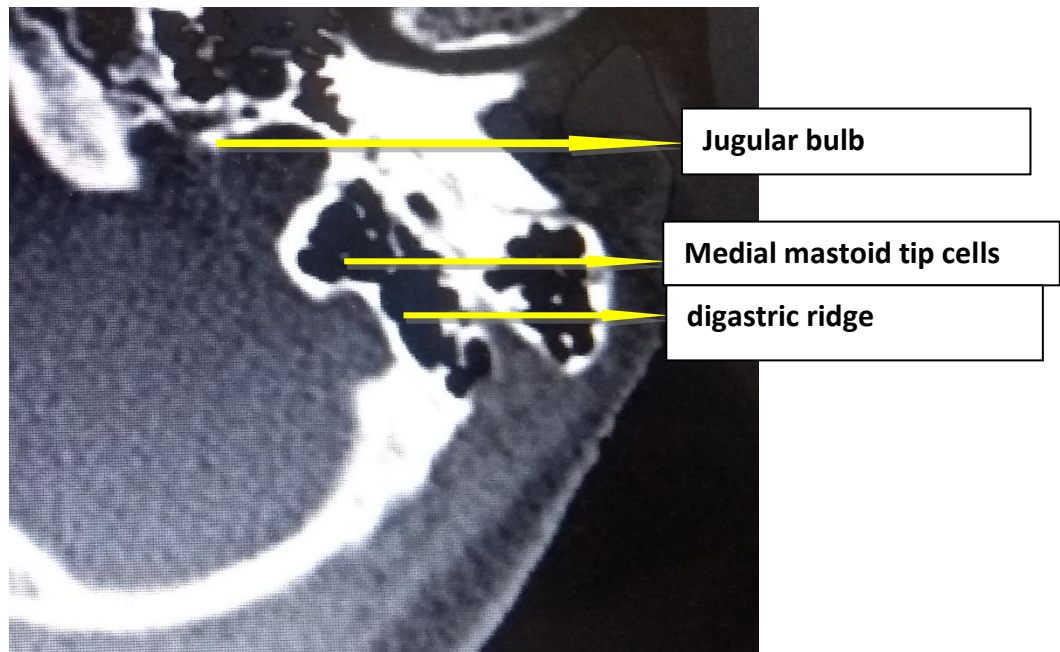


Fig 4



Legends To Figures

Fig 1: following complete mastoidectomy, mastoid cavity exposed showing the medial tip cell medial to digastrics ridge which are not completely exposed

Fig 2: Medial mastoid tip cells exposed jugular bulb visualised which is forming the medial wall, limited by digastrics ridge laterally, superiorly limited by dome of posterior semicircular canal and endolymphatic sac, posterolaterally limited by lower 1/3rd of sigmoid sinus and anterolaterally limited by lower 1/3rd of vertical portion of facial nerve.

Fig 3 : Mastoid tip cells exposed in a diploic mastoid following canal wall down mastoidectomy

Fig 4 :CT scan showing medial mastoid tip cells and its relation with jugular bulb and digastric ridge.