



Cholesteatoma and Facial Canal Dehiscence: A Comparative Prospective Study

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Abstract

Dehiscence of the facial canal is a matter of great concern for an otologist as one of the most dreaded complications of mastoid surgery is injury to the facial nerve. Dehiscence can be congenital or acquired. Congenital fallopian canal dehiscence is a developmental defect of the bony covering of facial nerve which usually involves the tympanic segment of the canal in almost 60% of the cases. While as Acquired cases are most commonly associated with squamous chronic otitis media or cholesteatoma. The incidence of facial injury in cholesteatoma surgery is approximately as 1% to 2%.

Objectives: To find the true intraoperative incidence of Facial Canal Dehiscence (FCD) in squamous chronic otitis media and compare the results with homogenous control group. The second aim of the study is to determine the labyrinthine fistula in presence of FCD.

Methods: Total of 175 patients of chronic otitis media was enrolled in the study. The study group consisted of 100 cases of COM with cholesteatoma and control group consisted of 75 cases of Mucosal COM.

Results: Of total of 100 cases of cholesteatoma group 9% had FCD. While as in control group only 1.3% had FCD. Which was statistically significant ($p=0.03$). It was found that ears with both cholesteatoma & FCD had higher intraoperative incidence of labyrinthine fistulas (44%) compared to those where only cholesteatoma was seen. Which was highly statistical significant (p -value of 0.000001)?

Conclusion: There is a potential causal relationship between cholesteatoma & facial canal dehiscence. The presence of facial canal dehiscence markedly increases the chances of labyrinthine fistulas.

Keywords: Facial canal dehiscence; Cholesteatoma; Labyrinthine fistula; LSCC fistula

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Introduction

Any discontinuity in the bony limits of the facial canal resulting in a communication between the facial nerve and middle ear space or mastoid air cell system is called Facial Canal Dehiscence (FCD). Dehiscence of the facial canal is a matter of great concern for an otologist. It may result as an injury to the facial nerve. The facial nerve injury is one of the most dreaded complications of mastoid surgery with devastating consequences [1]. Although it can be observed in normal population [2]. Its origin has been found to be either congenital or acquired. Congenital facial canal dehiscence is a developmental defect of the bony covering of facial nerve which usually involves the tympanic segment of the canal in almost 60% of the cases [3]. The acquired type is most commonly associated with squamous Chronic Otitis Media (COM) or cholesteatoma [4].

Cholesteatoma is well known for its complications because of pressure necrosis and its osteoclastic activity [2]. The incidence of facial injury in cholesteatoma surgery is approximately 1% to 2% [5]. The risk of injury increases further with the presence of facial canal dehiscence. Reported risk of facial nerve palsy is between 0.6% to 3.6% and 4% to 10% in primary and revision surgeries, respectively [6,7]. Although the possibility of FCD in association with cholesteatoma cannot be ruled out in every situation, knowledge of its magnitude is the real concern for an operating otologist. The present study attempts to measure the true intraoperative incidence of facial canal dehiscence in squamous Chronic Otitis Media (COM with cholesteatoma) and compare the results with a homogenous control group (Figure 1). The second objective of the study is to analyze the risk of labyrinthine fistula in the presence of FCD. To the best of our knowledge, there has not been any published study in the literature concerning the estimation of risk of FCD in mucosal COM

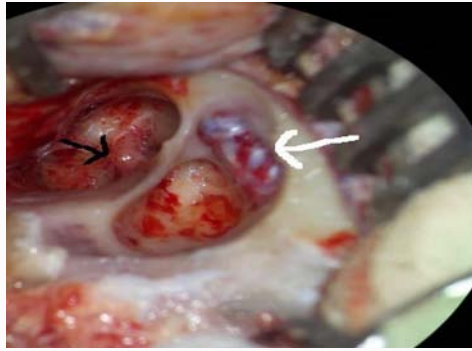


Figure 1: Microscopic intraoperative picture: Black arrow points to FCD, white arrow points dehiscent tegmen.

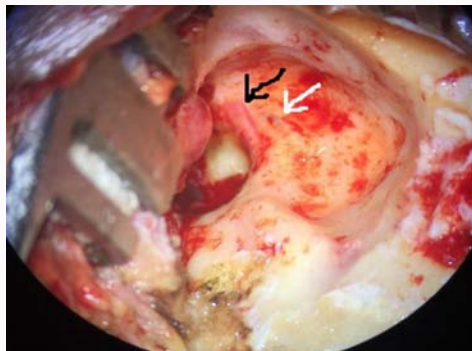


Figure 2: Microscopic Intraoperative picture showing FCD (black arrow) and Lateral SCC fistula (white arrow).

with cholesteatoma in comparison to a homogenous control group (mucosal COM without cholesteatoma) (Figure 2).

Methodology

The study was conducted in the department of Otorhinolaryngology (Head and Neck Surgery) in a tertiary care hospital for a period of 3 years between 2015 to 2018. Approval from the institutional ethical committee was obtained prior to the study*. A total of 175 patients of Chronic Otitis Media (COM) of both squamous and mucosal types of those needed surgical management (tympano-mastoid surgeries) were enrolled in the study. Patients that had squamous COM (COM with cholesteatoma) were grouped in group A (study group), while the patients with mucosal COM (COM without cholesteatoma) were designated as the group B (control group). All patients were informed regarding the study design and informed written consents were obtained from all of them. All patients were clinically examined preoperatively and relevant investigations were obtained (audiometry, tuning fork tests, microscopic examination, and a high-resolution CT of temporal bone). All patients were operated under general anesthesia using post aural approach. All intraoperative findings like the extension of disease, ossicular status, dehiscence of dural or sigmoid plates, facial canal dehiscence, and labyrinthine fistula, erosion of scutum, cortex or external auditory canal were recorded. Dehiscence of the facial canal was meticulously looked for under high microscopic magnification and was re-confirmed by probing the canal with a blunt hook. Statistical analysis of the data was carried out and the “p” value was calculated using a chi-square test. A p-value of less than 0.05 was considered to be statistically significant.

*Ethical committee clearance was given by the institutional

Table 1: The right ear was predominantly involved (n=53) compared to the left ear (n=26). Bilateral disease was seen in approximately 1/4th (n=22) of cases.

	Study Group	Control Group
Total no. of Patients	100	75
Males	52	39
Females	48	36
Unilateral Disease	52 Right Side 26 Left Side	40 Right Side 19 Left Side
Bilateral Disease	22	16
Average Disease Duration	6 Years	8 Years
Mean Age at Presentation	35 Years	33 Years

Table 2: Showing facial canal dehiscence significantly high in study group.

	Fcd +	fcd-	Total
Squamous Com (Study group)	9	91	100
Mucosal Com (control group)	1	74	75
Total	10	165	175

Chi square statistic of 4.675 with the ‘p’ value of 0.03 which is statistically significant

Table 3: Showing significantly high labyrinthine fistulas in study group with FCD.

	Labyrinthine fistula		Total
	+	-	
+	4	5	9
-	1	90	91
Total	5	95	100

The chi-square statistic with Yates correction is 23.9123. The p-value is 0.000001

clearance committee with approval number/ID. 23/ETH/HIMSR/ICMR.

Observation and Results

Out of 175 patients enrolled in the study, 100 patients constituted the study group having squamous COM and 75 belonged to control group of mucosal COM. In the study group the mean age was 35 years (range: 10 to 60 years). The male female ratio was 1:1. The right ear was predominantly involved (n=53) compared to the left ear (n=26). Bilateral disease was seen in approximately 1/4th (n=22) of cases. The Table 1 given below enlists these observations.

In the study group 9 cases (9%) were seen to have intraoperative FCD, while in the control group only 1 (1.3%) patient had FCD. The chi-square test employed for the calculations of incidence of intraoperative FCD between the two groups showed the p-value of 0.03 (chi-square statistic of 4.675) which was statistically significant as shown in Table 2. It was observed that the ears with both cholesteatoma and FCD (n=9) had a higher intraoperative incidence (44%, n=4) of labyrinthine fistulas (compared to those without FCD. All labyrinthine fistulas observed were limited to Lateral Semicircular Canal (LSCC) only. The observation was also seen to be statistically significant with the p-value of 0.000001 (chi-square statistic with Yates correction is 23.9123) (Table 3).

Discussion

The dehiscence of facial canal has been widely discussed in literature. The vast evidence range from histological studies to cadaveric to clinical studies. The current study observed that the intra operative incidence of FCD is 9% in COM with cholesteatoma, and

only 1.3% in the control group of otitis media without cholesteatoma. These results were similar to those observed by Kim et al. [8] in their study; they observed that 8.6% cases had associated FCD. Saha et al. [9] in their study Incidence of Facial Canal Dehiscence during Otologic Surgeries had similar results as that of our study, they reported 9 cases out of 100 (9%) had fallopian canal dehiscence although the cases were not homogenous as in our study. There are number of studies in the literature citing higher incidence of FCD in cholesteatoma compared to the current study. One such study is by Choi et al. [10] who studied 212 patients of tympanomastoidectomy retrospectively and found that the incidence of FCD as 64.0% in patients with cholesteatoma compared to 27.7% in patients without cholesteatoma. The disparity with our results could possibly be because of the non-comparable sample sizes and retrospective nature of their study.

Baxter et al. [11] in their study on Histologic examinations of temporal bones with evidence of chronic otitis media with or without cholesteatoma found that the incidence of facial nerve dehiscence was as high as 55% which was again high compared to current study. The other such study with higher rates of FCD was by Selesnick et al. [12] their study reported 33% of incidence of FCD in patients with cholesteatoma.

Results close to our observations were seen in a larger study by Sheehy et al. [13]. Who studied 1,024 cases of mastoid surgeries for cholesteatoma and found that 17% of the cases of cholesteatoma had FCD.

The second observation of our study is presence of higher incidence of intraoperative labyrinthine fistula in cholesteatoma cases with FCD. This was seen in 4 (44%) cases out of 9 who had both cholesteatoma and FCD. This observation was statistically significant (p value <0.05). Our observation matched with the observation of Arriaga et al. [14]. Their study also shows higher incidence of facial nerve dehiscence in fistula cases (27% to 55%).

In contrast to above findings, study by Trinidad et al. [15] shows low (4.67%) incidence of labyrinthine fistula in their study. Manolidis et al. [16] observed incidence of labyrinthine fistulas in different geographical areas and countries, ranging from 2.9% to 12.5%.

Interestingly, we didn't find any case of labyrinthine fistula in our control group. Although it was seen in insignificant proportion (1.09%) of cholesteatoma cases where facial canal was intact.

In the current study we found that all the cases of labyrinthine fistulas were limited to lateral semicircular canal (100%). Other Semicircular canals were never seen involved. These findings were similar to the studies of Faramarzi et al. [17] and Grewal et al. [18] who in their respective studies observed that lateral semicircular canal involvement was seen in 95.83% and 96% of cases compared to other sites.

Conclusion

The conclusion drawn from our study is that there is a potential causal relationship between cholesteatoma & facial canal dehiscence. The presence of facial canal dehiscence markedly increases the chances of labyrinthine fistulas. An otologist should anticipate the possibility of labyrinthine fistula in cholesteatoma cases where Facial

Canal Dehiscence in scene and take due precautions and appropriate steps to limit iatrogenic vestibular damage.

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