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Original Article

Canal wall window tympanomastoidectomy – A review of 84 cases

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Abstract:

Canal wall window (CWW) tympanomastoidectomy is a modified form of attico-antrostomy which can be a substituted for canal wall down procedure. A retrospective study of 84 cases of CWW tympanomastoidectomy were collected from department of otolaryngology and Head-neck surgery, BSMMU and ENT Foundation Hospital, Dhaka from June 2005 to July 2009.

In this study majority of the patients were 16 to 48 years 57(67.86%). Male female ratio was 3:1. Most of the patients were found cholesteatoma 27 (32.14%), granulation tissue 25(29.76%), retraction pocket 22(26.19%),

Postoperative hearing gain (mean three frequency pure tone air bone gap) assessed 3 months after primary surgery, most of the patients 34(40.48%) had gain 20dB+, 26 patients (30.95%) had gain 10dB+,18 patients (2143%) had gain 30dB+.

Materials used in tympano-ossiculoplasty were chonchal cartilage, sculptured incus, PORP and TORP. Most of the patients we used incus reposition 36(42.86%), cartilage ossiculoplasty 28(33.33%), PORP 12(14.29%) and TORP 8 (9.52%).

Post operative followup of the patient was done in 1 month, 3 month and 6 month intervals and condition of external auditory canal assessed. Dry ear were found 70 patients (83.33%), moist ear were found 8 patients (9.52%) and 6 patients (7.14%) were found purulent discharging ears and later canal wall down mastoidectomy done .

Key words: *Canal wall window, Tympanomastoidectomy.*

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Introduction:

The surgeon dealing with chronic ear diseases must make a number of intraoperative decisions. Major decision is whether to sculpt the canal wall intact or whether to drill away the canal wall[1,2]. Both the techniques present advantages and disadvantages. A simple and reversible third option that would allow the surgeon to capitalize on the structural integrity of an intact canal wall yet would facilitate disease removal beyond the blind medial end of the canal would combine advantages of both conventional techniques[3].

By creating a small whole through the intact canal wall as window, several desirable features are gained. Easy access to disease medial to the canal wall "bridge" area is achieved even with the incus present. The maneuver can be performed quickly. There is little peril for the patient because the drilling is far from the facial nerve and hearing should not be impaired, if ossicular discontinuity has been accomplished. Besides the necessary adjunctive exposures of a lateral epitympanotomy, the procedure can be combine with additional exposures, such as posterior tympanotomy. The window can be easily closed by chonchal cartilage. Bone dust collects to reconstruct the canal wall. The patient and surgeon must often can be spared removal of the canal wall without sacrificing the security of disease removal. The hearing results are better than expected because most patients have experienced a hearing gain, often to the normal range, after this type of cholesteatoma surgery, which is performed before considering the canal wall down technique[3].

Materials and Methods:

A total 84 mastoidectoimised patients were collected from Otolaryngology and Head-Neck Surgery Department, BSMMU, and ENT Foundation Hospital, Dhaka from June 2005 to July 2009 who was done canal wall window mastoidectomy. In this retrospective analysis 6 cases (7.14%) later required canal wall down procedure.

Technique of CWW mastoidectomy:

Under general anesthesia infiltration in the canal wall and post auricular region with 2% lignocaine with adrenaline. A transcanal and post aural incision was given. Tympanomeatal flap was elevated up to bony annulus. Enter the middle ear and follow the cholesteatoma, granulation tissue or infected polypoid mucosa in the attic or posterior superior quadrant of tympanic membrane. Then bony canal wall was widen by cutting burr up to outer attic wall i.e. scutum, scutum salve was created. A small whole was made in the scutum near attic and preserve the medial bony annulus i.e. bridge. The bone dust was collected and preserve in normal saline. The window was extended according the disease extended, i,e. interiorly or posteriorly. Bony drill was stopped when cholesteatoma sac was reached. Removed all cholesteatoma, granulation tissue, polypoid tissue in the anterior attic, aditus to antrum, sinus tympani and facial recess meticulously. Assessed the ossicular chain, if long process of incus eroded, removed it and prepared for ossiculoplasty, if stapes super structure was present /or absent incus was reshaped and placed over the stapes superstructure or footplate, absent of incus /stapes super structure, PROP/TROP was used. Chonchal cartilage was taken for closed the window, temporal fascia and bone dust was placed over the chonchal cartilage and make the canal in normal looking canal.

Results:

In the series of canal wall window tympanomastoidectomy, 14 patients (16.66%) were pediatric group, 57 patients (67.86%) were middle age group and 15 patients (17.86%) were older groups. The male patient was 54(64.29%) and female patients were 30(35.71%). Most of the patients were found cholesteatoma 27(32.14%), granulation tissue 25(29.76%), retraction pocket 22(26.19%), chronic discharging ears 10(11.90%).

Preoperative hearing status of the patients were assessed by 500,1000,1500Hz in the audiogram and taking mean three frequency pure tone air bone gap. Hearing level 0-20dB

were 16 patients (19.04%), 21-25dB were 14 patients (16.66%), 26-30dB were 15 patients (15.86%), 31-35dB were 12 patients (14.29%), 36-40dB were 14 patients (14.66%) and 41+dB were 13 patients (15.48%).

Postoperative hearing gain (mean three frequency pure tone air bone gap) assessed 3 months after primary surgery, most of the patients 34(40.48%) had gain 20dB+, 26 patients (30.95%) had gain 10dB+, 18 patients (2143%) had gain 30dB+, and 6 patients (7.14%) had gain 5dB+.

Materials used in tympano-ossiculoplasty were chonchal cartilage, sculptured incus, PORP and TORP. Most of the patients we used incus reposition 36(42.86%), cartilage ossiculoplasty 28(33.33%), PORP 12(14.29%) and TORP 8(9.52%).

Postoperative follow-up of the patient was done in 1 month, 3 month and 6 month intervals and condition of external auditory canal assessed. Dry ear were found70 patients (83.33%), moist ear were found 8 patients (9.52%) and 6 patients (7.14%) were found purulent discharging ears and later done canal wall down mastoidectomy.

Table-I

Distribution of age of patients (n=84)

Age in year	No. of CWW mastoidectomised patients	Percentage %
5-15	14	16.66
16-26	22	26.19
27-37	20	23.81
38-48	15	17.86
49+	13	15.48

Table-II

Distribution of sex of the patients (n=84)

Gender	No. of patients	Percentage
Male	54	64.29
Female	30	35.71

Table-III

Preoperative Otoscopic findings (n=84)

Findings	No. of patients	Percentage
Cholesteatoma	27	32.14
Granulation Tissue	25	29.76
Retraction pocket	22	26.19
Chronic discharging ear	10	11.90

Table-IV

Preoperative hearing status (mean three frequency pure tone air bone gap) (n=84)

Hearing level	No. of patient	Percentage
0-20dB	16	19.04
21-25dB	14	16.66
26-30dB	15	17.86
31-35dB	12	14.29
36-40dB	14	16.66
41+dB	13	15.48

Table-V

Postoperative hearing gain (mean three frequency pure tone air bone gap) (n=84)

Hearing gain	No. of patient	Percentage
+5dB	6	7.14
+10dB	26	30.95
+20dB	34	40.48
+30dB	18	21.43

Table-VI

Materials used in tympano-ossiculoplasty (n=84)

Materials	No. of patients	Percentage
Cartilage	28	33.33
Incus reposition	36	42.86
PORP	12	14.29
TORP	8	9.52

Table-VII

Postoperative condition of external auditory canal (n=84)

Condition of	No. of patients	Percentage the canal
Dry ear	70	83.33
Moist ear	8	9.52
Purulent discharging ear	6	7.14

Discussion:

The key to success in ontological surgery is not what technique one uses, but how well one uses it and one's own ability and judgment[4]. The major surgical style of Canal wall down and canal wall up have not changed substantially decades[5]. Creative attempts to modify the mastoid cavity or to create neo-canal wall by autologous cartilage[6,7,8,9]. The canal wall window tympanomastoidectomy is a novel technique in mastoid surgery. The surgeon can take advantage of an enhanced view but still maintain structural integrity. The procedure is rapid, safe, "low-tech" and inexpensive. The window slit can be used in combination with additional drilling maneuver to gain access to the epitympanum or facial recess. The canal integrity permits concurrent tympanoplasty or total drum replacement[3].

The window maneuver, if inadequate for removal of disease in a particular patient, slit can be converted into a canal wall down tympanomastoidectomy procedure at the initial or a subsequent procedure. The canal wall window technique is not intended to replace but to complement current techniques and has been effective as the step to taken before removal of the canal wall[3]. Prior to surgery it difficult to assess location of disease, extension of disease, nature of disease, that is, It is difficult to say either it is cholesteatoma or granulation tissue or infected polypoid mucosa. In classical canal wall down procedure integrity of ossicular chain could be difficult prior to surgery, do lot of unnecessary bony work, injury to dural plate and sinus plate, facial nerve palsy which causes unwanted complication.

The canal wall window technique has been most commonly applied to limited cholesteatoma in the attic or posterior mesotympanum with extension medial to canal wall "bridge" area. The view is compromised not only because of canal bone but also because the body of incus fills the small area, which further compromise the view and instrumentation access. The window slit provides direct access to such disease. In some cases the incus has been preserved if the biological behavior of the cholesteatoma has been favorable. In other cases, incus destruction can be better appreciated, reinforcing the impression that removal is preferable. Because canal wall integrity has been maintained, ossicular reconstruction can be performed at the initial or subsequent procedure[3].

The recurrence of cholesteatoma, usually as tiny pearls, was consistent with reported recurrence rates in pediatric patients in whom cholesteatoma seems to be a more formidable condition than in the adult [10-15]. No patient was in need of further operation, although 6 cases (7.14%) required second look surgery and converted to canal wall down

procedure. From the lager perspective, any surgical maneuver that intentionally would require a repeat-look procedure should be performed cautiously in patients in whom there is low capability for compliance[16].

The reconstruction maneuver with the chonchal cartilage should be performed so that the cartilage seats over the canal wall curvature to avoid later retraction pocket formation. In every case bone dust was placed over the reconstructed cartilage to maintain the canal wall integrity.

Hearing results were quite satisfactory considering that these patients otherwise would have undergone a canal wall down procedure. Most actually benefited with a hearing gain compared with preoperative hearing levels.

Conclusion:

A canal wall window technique with lateral epitympanotomy is rapid and safe and can be performed by an otolaryngologist comfortable with performing conventional mastoid surgery. The maneuver extends the capacity of the surgeon to handle pediatric cholesteatoma and has largely replaced the canal wall down tympanpmastoidectomy technique. The CWW technique is a viable hybrid alternative option to CWD surgery. The overall structural integrity of the wall is maintained, no meatotomy and meatoplasty is necessary. The postoperative result of a dry ear in the current series was 83%. Hearing results in the CWW patients were superior to the CWD groups.

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