

RETRACTION POCKETS IN CHRONIC SUPPURATIVE OTITIS MEDIA- OUR EXPERIENCE

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ABSTRACT : *Retractions of the tympanic membrane constitute a large proportion of ear diseases causing concern to the otologist. The clinical features in a case of retraction pocket are varied and range from a completely symptomless entity to a complicated retraction pocket with the presence of a cholesteatoma. Also, that a retraction pocket in the posterosuperior region and pars flaccida is a precursor of cholesteatoma is now well recognized. We have studied 60 cases of retraction pockets during a period of 5 years and have attempted to find out the etiology as well as the most effective treatment in such cases. Though over the years along with a dysfunctional eustachian tube, a sclerotic mastoid has been implicated as one of the causes of Retraction Pockets, we in our study have seen a large sized mastoid antrum (beyond 2 mm of Lateral Semicircular Canal) as a consistent feature in most of our cases. This was subjectively assessed as a surgical finding in tympanomastoidectomy and objectively assessed by a high Resolution Computed Tomography of the temporal bone. We have found that a canal wall down mastoidectomy was the most effective in preventing the recurrence of retraction pockets. In a country like India, canal wall down mastoidectomy offers an acceptable solution to the problem of retraction pocket as not only is the follow up of patients poor but also the "Second-Look" procedure is not always possible. The use of 1-0 chromic catgut in the middle ear instead of the more conventionally used silastic in preventing recurrent retractions can be considered as an effective single-staged procedure.*

Key Words : *Retraction Pocket ; Large Antrum ; Canal Wall Down.*

INTRODUCTION

Retraction of the tympanic membrane is the medial displacement of tympanic membrane, thus reducing the middle ear space. A localized pocket formed by the retracted tympanic membrane is called a "Retraction Pocket". Retraction of the tympanic membrane is known by various names such as atelectatic otitis, adhesive otitis, marginal retraction pocket, myringomalacia and middle ear epidermatisation. The most commonly used term atelectasis comes from the Greek word "Ateles" i.e. incomplete and "Etasis" i.e. extension or ballooning a term also commonly used for "An airless collapsed lung". Though a dysfunctional eustachian tube may be the cause of the retraction pocket, once it is formed, it can be considered as a separate entity and persists even after the disappearance of the causal eustachian tube dysfunction (Bennet, 1970).

A retraction pocket may present as a symptomless entity, which may be an incidental finding, or with ear discharge and hearing loss. Hence clinical examination with an operating microscope and pneumatic otoscopy along with investigations like audiometry and radiological investigations become mandatory to reach an accurate

clinical diagnosis and subsequently provide the best possible treatment. Treatment options depend upon the grade of retraction, the presentation of the patient and presence or absence of cholesteatoma. Various treatment modalities that can be offered to the patient range from a conservative medical treatment and regular follow up to Grommet insertion to simple excision of retraction pocket with



Fig. 1 : A HRCT Temporal bone showing a large sized mastoid antrum.

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Table-I : Sex distribution of the cases

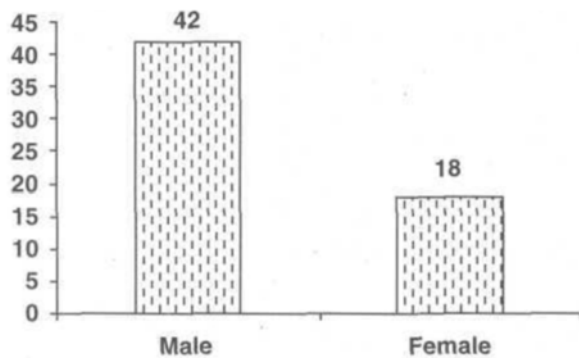


Table -II : Age Distribution of the cases

Age Dist.	1 to 10	11 to 20	21 to 30	31 to 40	41to 50	51to 60	61to 70
No. of Cases	6	20	14	10	6	2	2
No. of Cases %	10%	34%	23%	17%	10%	3%	3%



Fig. II : Intraoperative photograph showing a large sized antrum extending beyond the cholesteatoma sac.

cartilage grafting in early cases and Intact canal wall or Canal wall down tympanomastoidectomy in late cases.

Also, in this age of Computed Tomography, the application of HRCT temporal bone in retraction pockets not only helps in planning surgical treatment but also acts as an important academic tool in finding out the cause of retraction pocket.

In our study of 60 retraction pockets spanning over a period of 5 years, we have attempted to elucidate their cause, their

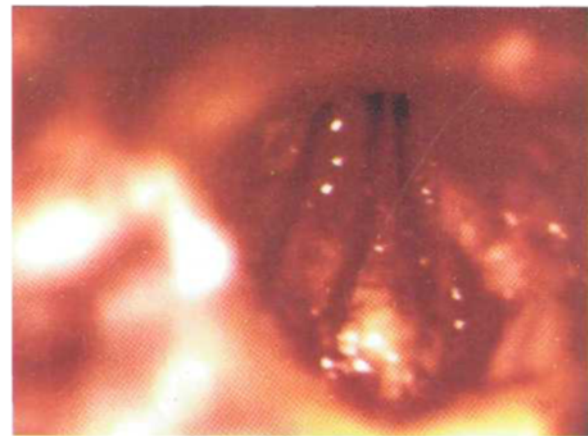
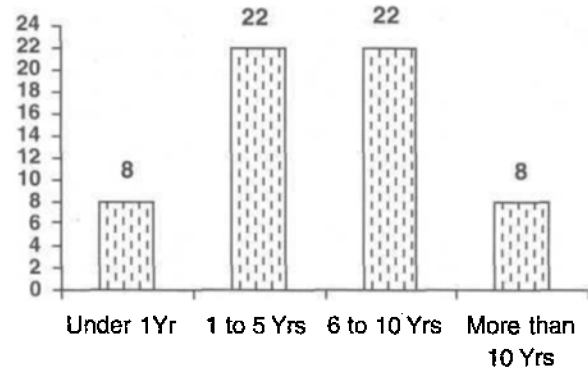


Fig. III : Intraoperative photograph showing three pieces of 1-0 catgut in the middle ear to prevent the reformation of adhesions. The pieces are laid between the eustachian tube opening and the sinus tympanicus.

Table- III : Duration of Otorrhea



clinical presentation and the best possible surgical modality in our setup. Also, the application of HRCT temporal bone has helped us in reaching conclusive evidence that a large sized mastoid antrum is present in cases of retraction pockets and should be tackled surgically to prevent the recurrence of retraction pockets.

MATERIALS AND METHODS

Our study of retraction pockets of the tympanic membrane spanned over a period of 5 years, 60 patients were selected from the Out-Patient Department of our institution. All patients had either retraction of pars tensa or pars flaccida or both of varying degrees. Patients of either sex with no other systemic illness were selected for the study. Before subjecting the patients for surgical management, a requisite anesthetic clearance was obtained from the Department of Anesthesia and it was ensured that the patients did not have

Table - IV : Findings on Otomicroscopy

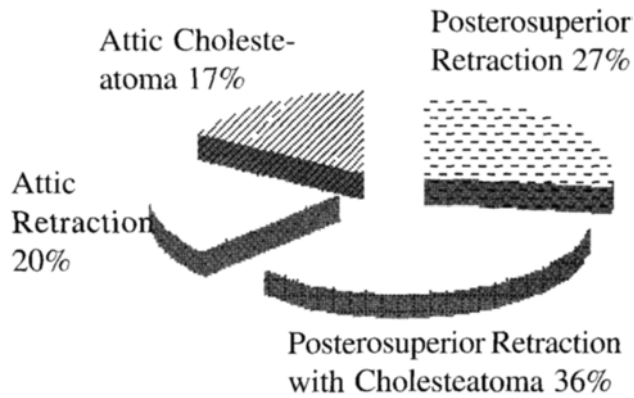


Table- V : Hearing Status (Pure tone audiometry average)

No. of Cases	Mild Cond.	Mod Cond.	Mild Mixed	Mod Mixed	Profound SN
No. of cases	26	24	2	6	2
No. of cases%	44%	40%	3%	10%	3%

Table-VI : Antrum size assessment by HRCT temporal bone

Size of the Antrum on CT	Large	Small
No. of Cases	18	4
No. of Cases %	82%	18%

any active infection of nose or throat. The follow up period was atleast 1 year. Present or past history of intracranial complications formed a criterion for exclusion.

60 patients of retraction pockets, thus selected were thoroughly examined following a proper history taking. The history included chief complaints and their onset, duration and progress, and any associated factors. The clinical examination included a general examination and local examination of ear, nose and throat. Examination of ear included otomicroscopy and pneumatic otoscopy.

Following features were appreciated in cases of retraction pockets (Sade, 1979)

1. Presence of a retraction pocket with or without a visible fundus.
2. Degree of atelectasis of the rest of the drum.

Table-VII : Surgical treatment performed

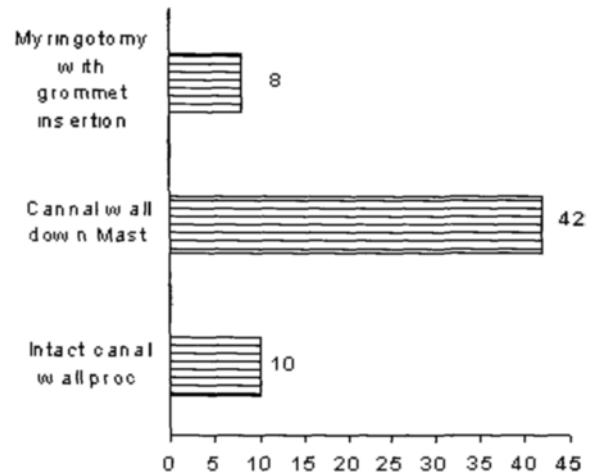


Table - VIII : Size of the mastoid antrum as assessed intraoperatively

Size of the Antrum	Large	Small
No. of Cases	10	
No. of Cases %	76%	24%

3. Extent of collapse.
4. Ossicular chain erosion.
5. Presence or absence of flakes suggestive of cholesteatoma.

The retraction pockets were classified as that of
 - Pars tensa (Sade, 1979)
 - Pars Flaccida (Tos, 1988)

The investigations included routine investigations for anaesthesia fitness and specific investigations like the pure tone audiogram and radiological investigations (X-ray mastoid-Schuller's view and HRCT Temporal bone). HRCT Temporal bone was done in cases that showed absence of cholesteatoma on clinical examination at random (22 of the 60 cases).

Various surgical procedures like myringotomy with grommet insertion to canal wall up and canal wall down procedures were carried out. The grommets were inserted in the antero-inferior quadrant and the grommet used was an intermediate term Shepard's grommet. Majority of our patients underwent a canal wall down tympanomastoidectomy. Thick temporalis fascia was used as graft.

Postoperatively, the patients were followed up for a variable period of time. The minimum period of follow-up was 1 year. The patients were followed up on 7th, 15th, 30th, 60th and 90th day and later on 6th, 9th, 12th months, postoperatively. Along with presence or absence of recurrent retractions, postoperative otorrhea, otalgia, vertigo post-aural swelling, etc. were also noted. Postoperative audiogram was performed to assess postoperative hearing status.

RESULTS

Various aspects of retraction pockets like the age and sex distribution, clinical features and management were studied in all the 60 cases. The results derived were tabulated (Tables I to VIII).

DISCUSSION

Retraction of the tympanic membrane is one of the most important entities in the pathological disease of the ear as its study encompasses the study of the mastoid air cell system, the eustachian tube and even the embryogenesis of the ear i.e. the routes of aeration. There are various factors like ear infections in childhood to recurrent upper respiratory infections in adults that not only contribute to the formation of retraction pockets but also affect the outcome of an already formed one. Our present study of retraction pockets was a prospective study. All the cases were selected from our Out-Patient Department. After selecting the patients, they were subjected to a detailed history taking and local examination that included an otomicroscopic examination, Valsalva's manoeuvre and Politzerisation. The patients with a dysfunctional eustachian tube were excluded from the study.

The aims of our study were :

- Determination of the size of mastoid antrum and its influence on formation of retraction pockets.
- Determination of the best possible surgical outcome in cases of retraction pockets.

The size of the mastoid antrum was determined by

- Preoperatively by a High Resolution Computed Tomography of the temporal bone
- Intraoperatively-In cases where antrum was explored.

The best possible surgical outcome was determined by a follow up of the patient for a period of at least 1 year after undergoing surgery. The absence of recurrent retraction was an indicator for efficacy of the procedure. Surgical procedure

appropriate for each individual case was carried out :

- Myringotomy with grommet insertion
- Intact canal wall tympanomastoidectomy
- Canal wall down tympanomastoidectomy.

A clear male preponderance was seen in our case study. The male to female ratio was 2.3 : 1. This may be due to a greater outpatient attendance of males, a common trend seen in our country (Table I). The youngest patient was 7 yrs of age while the oldest was 66 years of age. Maximum patients i.e. 20 (34%) were seen in the age group of 11 to 20 yrs, followed by 21 to 30 yrs. i.e. 14 patients (23%) and 31 to 40 yrs i.e. 10 patients (17%). Age groups 1 to 10 and 41 to 50 had 6 patients each (10%) and age groups 51 to 60 and 61 to 70 had 2 patients each (3%) (Table II). Otorrhea was found in all 60 cases i.e. 100%. Mills (1991) has found otorrhea in 31% of the 13 cases of pars tensa retraction pockets in his study. However, otorrhea in all cases is not unusual as in a country like India where 2 major factors play a part viz.

1. Late presentation for review to a consultant due to poor access to major hospitals by the rural population.
2. High propensity for secondary bacterial infection due to unhygienic living conditions and hot, humid environmental conditions.

Our results, however, are in agreement with Sade (1979) who has found that at least 3/4th of his cases of atelectatic ears had a history of mucopurulent otorrhea.

Most of the cases i.e. 38 of the 60 cases (63%) had a posterosuperior disease (Table IV). This finding is similar to Bennet (1970), Mills (1991) and Wash et al (1995) who have also implicated posterosuperior region as the most common site for retraction pockets. However, Sade (1979) has found retractions to be equally common in all the four quadrants of the tympanic membrane.

One of the specialized investigations we chose to lay stress on was a High Resolution Computed Tomography of the temporal bone. In this study, we have attempted to unveil the role of a large sized antrum in retraction pockets. Grewal & Hathiram (1997) have consistently found a large sized antrum in ears with retraction pockets. HRCT would serve as an excellent objective investigation to consolidate such a claim. HRCT temporal bone was done in 22 of the 60 patients. Since the presence of cholesteatoma would alter the size of the antrum (Kobayashi et al, 1994), the cases, which did not show clinical evidence of cholesteatoma, were

subjected for HRCT The antrum was large in 82% cases and small and contracted in 18% (Table VI) (Fig I) Again, during surgery of the 42 cases where the antrum was explored, 76% of the cases had a large antrum, while 24% of the cases had a small contracted antrum (Table VIII)

The presence of a large antrum in an atelectatic ear challenges all the traditional views of a poorly pneumatic or a sclerotic mastoid in cases of atelectatic ears As far back as in 1918, Wittmaack (1918) suggested that infantile sterile otitis media neonatorum or non secretory otitis media occurring soon after birth could lead to permanent residual fibrosis causing thickening of the epithelial tissue This would impede the normal process of pneumatization by forming numerous adhesions in the middle ear Such an 'apneumatic mastoid' would predispose the ear to atelectasis Aoki et al (1990) have also proved the fact by experimental studies on pigs that an early infection 5-7 days following birth results in significantly smaller mastoid process on the infected side with shorter length and area of mastoid, remarkable hypocellularity and increased thickness of cortical bone

However, we feel that a large mastoid antrum has a greater potential to exert negative pressure on the tympanic membrane and hence either aids in formation of a retraction pocket or contributes in deepening of an already formed one (Fig II) The volume of the middle ear is not large enough to cause a retraction pocket and hence we believe that antrum size is also important in formation of a retraction pocket due to its ability to exert a greater negative middle ear pressure The position of the retraction pockets (found more in the posterosuperior region) in close proximity towards the aditus and going towards the antrum further confirms our claim Thus, in the presence of a blocked eustachian tube, larger the antrum, larger will be the negative pressure Our theory of a large sized mastoid antrum in cases of retraction pockets also forms the basis for the treatment of retraction pockets If a large sized antrum is one of the major causative factors in the formation of retraction pocket, bypassing it becomes important to prevent the reformation of a retraction pocket Canal wall down tympanomastoidectomy effectively plays that role It makes the complex middle ear cleft simpler by lowering the ridge and dividing the cleft into two by a temporalis fascia graft Now, the tympanic cavity communicates with the eustachian tube and the mastoid cavity with the exterior

Some researches like Wehr (1981) advocate an intact canal wall technique, which converts a large honeycomb of cells

into a single large mastoid air cell and reconstruction of the structures altered during surgery as far as possible However, we are of the opinion that an intact canal wall procedure makes the mastoid air cell system more complex and the newly created larger single mastoid air cell has a greater ability to exert negative pressure on the middle ear resulting in recurrent retraction We also feel that long-term results of a ventilation tube or grommet is very unpredictable and "risky" in an Indian setup, as the follow up of our patients is extremely poor

The absence of recurrent retraction forms a sound basis for efficacy of surgical treatment We have found no recurrence in 42 canal wall down tympanomastoidectomies that we have carried out Of the 10 intact canal wall procedures carried out, 2 cases showed recurrent retraction i.e. 20% Jansen (1986) has found a 40% recurrence rate in 50 intact canal wall procedures he has performed

Our recurrence rate in myringotomies with grommet insertion was 25% This is nearly consistent, with studies of various researchers like Wash et al (1995) who found a 17% recurrence on a 10 month follow up, Blaney et al (1999) who had an initial success rate of 67% and following revision surgery 75% and Srinivasan et al (2000) who showed a recurrence of 26% with a mean follow up of 16 months

During surgery we also used certain adjunctive procedures like insertion of 4 to 5 pieces of 1.0 chromic catgut in 12 cases where adhesions were found between the pars tensa and promontory They were laid between the tympanic end of eustachian tube and the sinus tympanicus This helps in preventing the reformation of adhesions between the pars tensa and promontory Various materials have been used by other researchers like Polythene sheathing (House, 1960), Paraffin wax (Rambo, 1961), precarved Teflon (Austin, 1969) and Silastic (Sheehy, 1972) However, we feel catgut provides a better solution in our patients as it is a "single-stage" procedure and "second look" surgery is not required However, the most popular material used today is Silastic sheeting In a country like India where the follow-up is very poor, revision surgery for removal of silastic is not always possible and here catgut offers a better option as it is a single stage procedure Also, we feel that it is more physiological as it is round in contour, which confirms to the contour to the eustachian tube opening and is versatile since it can be cut as per the length required After breaking the adhesions, we place 2 pieces from the eustachian tube

opening to the sinus tympanicus and an additional 2-3 pieces are placed next to them (Fig III) Catgut gets absorbed completely in 60-120 days by which time the graft is taken up. During this period, it effectively prevents the reformation of recurrent atelectasis. All the cases in which we used catgut showed a mobile drum postoperatively as checked by Valsalva's manoeuvre

CONCLUSION

In our study of 60 cases of retraction pockets, spanning over a period of five years, there was a predominance of disease in posterosuperior region with otorrhea being the most common presenting symptom. The application of High Resolution Computed Tomography and our intraoperative experience showed a large sized mastoid antrum in most of the cases as an important factor in the formation of a retraction pocket. Since a large antrum is one of the main etiological factors, bypassing its effect of negative pressure becomes important in preventing recurrent retractions. With this view in mind, we recommend canal wall down tympanomastoidectomy as one of the most effective treatment options in retraction pockets. Our study has proved its efficacy over an intact canal wall procedure as well as myringotomy with grommet insertion. Also, the use of 1-0 chromic catgut in selected cases to prevent reformation of adhesions yields good results and provides advantage of being a "single-stage" procedure obviating the need for a "second-look" surgery.

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