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COMPARATIVE STUDY OF MANAGEMENT WITH MYRINGOPLASTY AND CHEMICAL CAUTERISATION IN TUBO-TYMPANIC TYPE OF CHRONIC SUPPURATIVE OTITIS MEDIA

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ABSTRACT

Introduction CSOM is highly prevalent chronic ear disease. In developing countries like India, where tertiary medical facility is not available to all people, treatment should be cost effective and easily feasible at even primary health centre. With this background a study was performed for closure of small to moderate central perforation with chemical cauterisation and to see whether it is equally effective as that of Myringoplasty or not.

Study design: prospective clinical study.

Methodology: To compare results of chemical cauterisation (TCA) with myringoplasty on non healing small and medium sized central tympanic membrane perforation of pars tensa, 100 patients with dry tympanic membrane perforations. **Result:**

1) Success rate with myringoplasty and chemical cauterisation were 76% and 72% respectively.

2) The improvement of hearing at 3rd month of follow-up after successful procedure with myringoplasty and chemical cauterisation in term of air bone gap less than 10 db were 68.4% and 88.88% respectively

Conclusion:

1) For closure of small central perforation chemical cauterisation is equally effective as myringoplasty.

2) For closure of moderate central perforation, myringoplasty is superior to chemical cauterisation.

3) Hearing improvement was observed better for chemical cauterisation as compared to Myringoplasty.

INTRODUCTION

Discharging ear and deafness are major otolarygological problem faced in India. CSOM is probably the commonest disease seen in otolarygologic clinics. Chronic otitis media was found to be a major cause of conductive hearing impairment.

Early diagnosis of chronic otitis media is important in order to prevent its long-term effects especially hearing impairment. A history of previous ear discharge,

especially when accompanied by episodes of colds, sore throat, cough or some other symptom of upper respiratory infection, should raise the suspicion of CSOM.

Traditionally CSOM is classified into two types- tubotympanic and atticoantral disease. The two principal aims of management in tubotympanic type of CSOM are the eradication of infection at source or in the ear and the closure of the central tympanic membrane perforation by Myringoplasty or chemical cauterisation.

Myringoplasty is one of the technique for management of tubotympanic type of CSOM. It is defined as simple surgical repair of tympanic membrane perforation without ossicular chain reconstruction. The aim of the operation includes closure of central tympanic membrane perforation with fascia graft for improvement of hearing level[1]

In tubotympanic type of CSOM, small pars tensa perforation closure can be done by chemical cautery, Roosa (1876) first used the method of cauterizing the perforation margins using silver nitrate bead and Okuneff (1985) first used trichloro acetic acid for same purpose [2]. This is simple procedure can be done easily on OPD basis even at rural setup with basic ENT instruments .

In developing countries like India, where tertiary medical facility is not available to all people, an alternative treatment should be tried, which should be cost effective and easily performed even at primary health center, as in case of closure of small to moderate pars tensa tympanic membrane perforation in tubotympanic type of CSOM with chemical cauterisation.

As per experience, Myringoplasty is an accepted surgical procedure in central tympanic membrane perforation. Therefore to give a cost effective treatment we have thought of chemical cauterisation in small to moderate sized perforation.

With this background a study was performed in our department to compare whether closure of small to moderate tympanic membrane perforation in tubotympanic type of CSOM with chemical cauterisation is effective as compared to Myringoplasty.

AIMS AND OBJECTIVES

To compare the results of Myringoplasty and Chemical cauterisation in cases of CSOM of tubotympanic type having small to moderate central perforation.

MATERIALS & METHODS

1) This is a prospective study performed in the department of E.N.T Parvara Rural Hospital, Loni.
2) Study period: Patients attending the E.N.T O.P.D of PARVARA RURAL HOSPITAL during the period from July 2010 – October 2012
3) Sample size: Total 100 patients (2 groups).

Inclusive criteria:

1) Chronic discharging ears.
2) Dry Central perforation with duration of minimum 6 weeks.
3) Mild to moderate conductive hearing loss.
4) Normal Eustachian tube and cochlear function.

Exclusion criteria:

1) ASOM

2) Otosclerosis

3) Adhesive Otitis Media

4) Large central perforation.

5) Attico antral type of CSOM.

METHODOLOGY

METHOD OF DATA COLLECTION-

Patients selected are followed by detailed history taking general physical examination and examination of Ear, Nose and Throat. The relevant details are recorded in a Proforma. Selected patients subjected to following investigations.

1) Routine investigations:

a) Haematological investigation.

- Haemogram
- Total leukocyte count
- Differential leukocyte count
- Bleeding time
- Clotting time

b) Urine investigations:

- Urine routine
- Urine microscopic

2) Specific ear investigation:

I) Audiological Tests

a) Pure Tone Audiometry (P.T.A.)

I. Preoperative

II. Postoperative, after healing of perforation.

II) Eustachian Tube Function test (E.T.F)

a) Instillation of antibiotic ear drop in the ear with perforated tympanic membrane and asking the patient whether it trickles down in throat; in patent eustachian tube.

b) Auscultation tube test: It is done by using a stethoscope whose bell is replaced on the external auditory canal of the ear to be tested, patient is asked to perform Valsalva manoeuvre, if the eustachian tube is normal, gush of air is heard through the stethoscope indicating normal ET function.

III) Bilateral X-ray mastoid shuller's view.

3) Patients are randomly divided equally (50 each) into two groups on the basis of treatment protocol:

Group A: for myringoplasty.

Group B: for chemical cauterisation.

4) Measurement of size of perforation: Size of perforation is measured with the help of Otoendoscopy. Thin, non traumatic and transparent plastic strips of different gauge varying from 1 to 6 mm are used to measure maximum diameter of perforation.

5) Patients are further subdivided into classes according to the size of perforation in both groups:

Size of perforation (mm)	Number of classes
0-1	1
1-3	2
3-6	3

6) Treatment: -

I) Group A- patient are treated with myringoplasty.

II) Group B- patients are treated with chemical cauterization.

A) Myringoplasty

- Informed and written consent for myringoplasty is taken. Preoperative anaesthetic check-ups are done for general anaesthesia. Under strict aseptic conditions, underlay technique myringoplasty is done via postaural approach using temporalis fascia graft. Patient is advised antibiotic, analgesic and antihistaminic for 1 week postoperative period.
- Sutures are removed after 1 week.
- Patient is followed up postoperatively initially for weekly interval for one month and 4 weekly for 3 months after it.
- Postoperative audiogram is done 3 months after surgery for hearing assessment.

B) Chemical cauterisation:

a) Preparation of 50% trichloroacetic acid (TCA) : it is prepared by mixing 50 grams of 100% trichloroacetic acid in 100 ml of distil water .

b) Preoperative preparation

- Vital parameters are recorded.
- Informed and written consent for procedure is taken.
- Procedure is done without any local anaesthesia, but if the patient is uncooperative 4% xylocaine can be used to anaesthetize the tympanic membrane by adding a few drops on a small cotton ball and placing it into the external canal wall over the surface of the tympanic membrane for about 10 min.

- Under the Microscope or Otoendoscope the rim of the perforation is cauterized by using cotton tipped Jobson Horne's Probe, dipped in 50% trichloroacetic acid (TCA) until a white cauterized margin of about 0.5mm in width is created.
- Excess of the chemical is drained by using a dry cotton swab. Care must be taken not to scar the promontory.
- Repetition of the cautery at weekly intervals is done, many of them requiring more than one application and the technique is repeated with maximum of five applications.
- After the first application, antibiotic is given for 1 week period.
- Follow up is done at weekly interval for 5 weeks
- During follow up Otoscopic and Otoendoscopic examination is done to assess the healing of perforation.
- PTA is performed to assess the improvement in hearing after healing of perforation.

OBSERVATION AND RESULTS

Table No.1 Age wise distribution

Age in years	Myringoplasty (Group A)		Chemical cauterization (Group B)		Total	
	No.	%	No.	%	No.	%
14-20	7	14	8	16	15	15
20-30	18	36	16	32	34	34
30-40	13	26	15	30	28	28
40-50	7	14	6	12	13	13
50-60	5	10	5	10	10	10
Total	50	100	50	100	100	100
Mean ± SD	**32.00±4.58**		**31.30±4.01**		**31.90±5.14**	

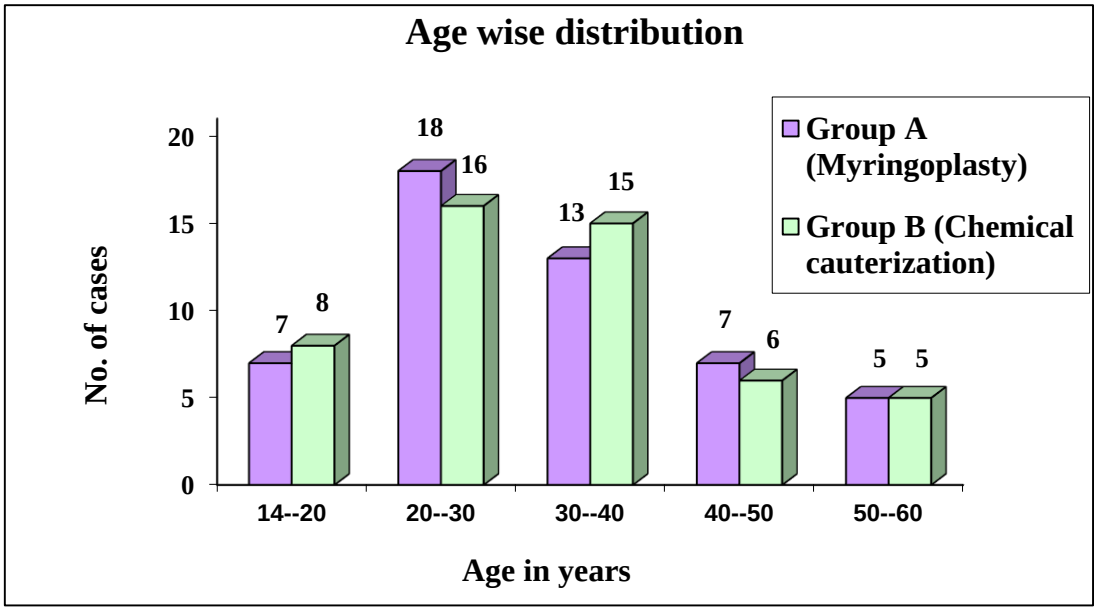

Table no. 1 showed that maximum number of patients belongs to age group between 14 to 40 years in both the groups. The average age in Group A was 32 years while in Group B it was 31.30 years with overall age (i.e. in total) of 31.90 years.

Table No.2: Gender distribution

Gender	Myringoplasty (Group A)		Chemical cauterization (Group B)		Total	
	No.	%	No.	%	No.	%
Male	22	44	23	46	45	45
Female	28	56	27	54	55	55
Total	**50**	**100**	**50**	**100**	**100**	**100**

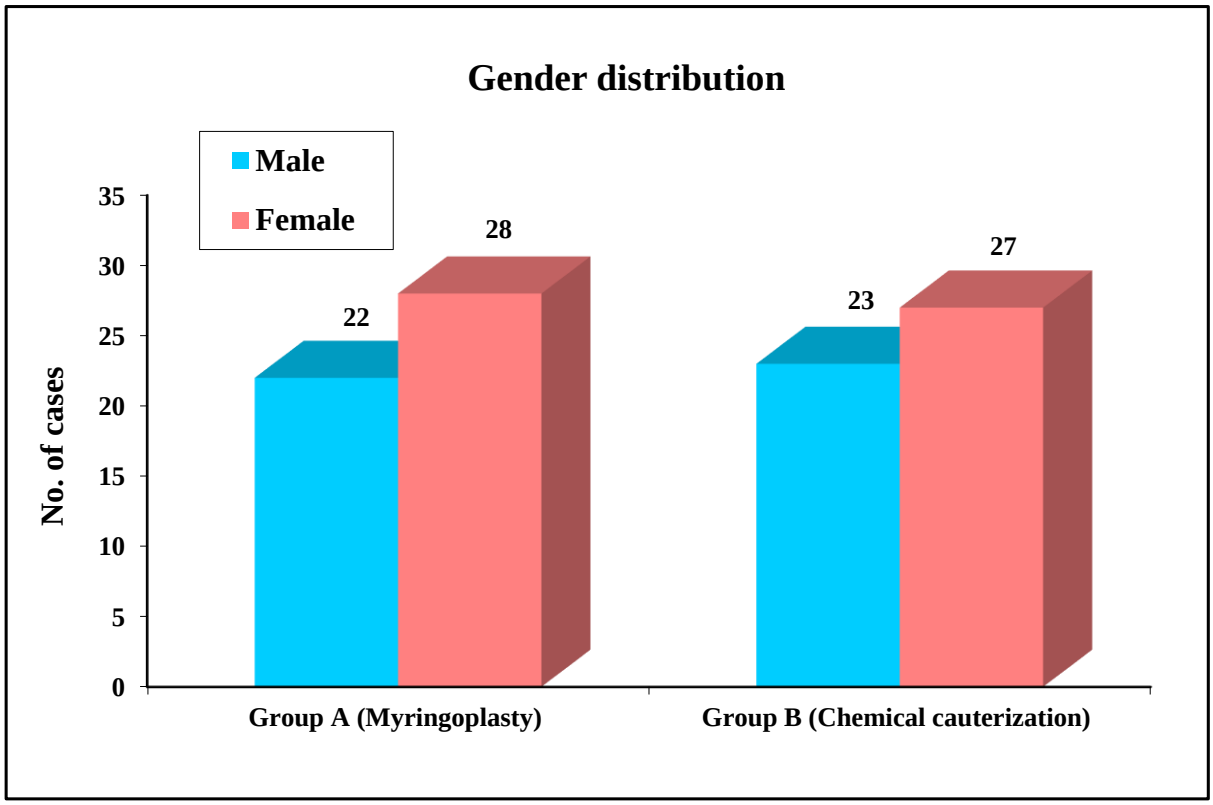

Table no. 2 shows that 55% female and 45% male patients were there in the study, thus there was a slight female preponderance.

Table No. 3: Etiological factors

Etiology	Myringoplasty (Group A)		Chemical cauterization (Group B)		Total	
	No.	%	No.	%	No.	%
Infective	44	88	43	86	87	87
Traumatic	6	12	7	14	13	13
Total	**50**	**100**	**50**	**100**	**100**	**100**

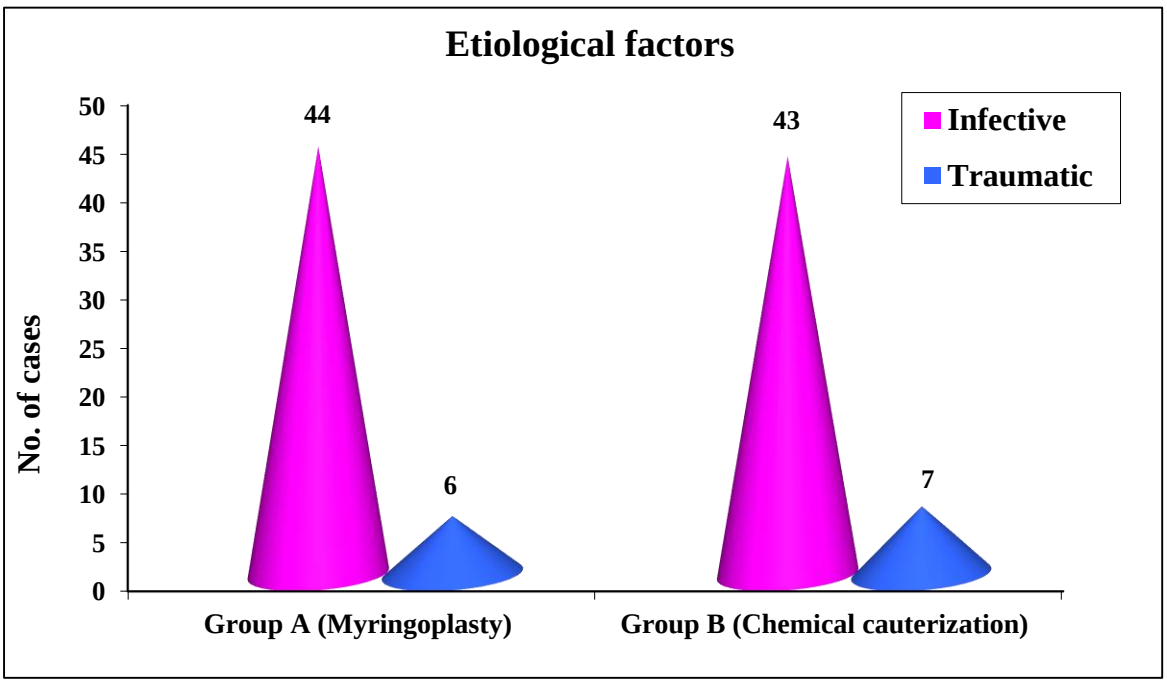

Table no.3 shows that in group A (88%) and in group B (86%) cases were of infective etiology which was higher than traumatic etiology. In total 87% showed infective

etiology and 13% showed traumatic etiology. By applying Z test of difference between two proportions it was found that infective etiology was significantly higher than traumatic etiology (i.e. $p<0.01$)

Table No.4: Success rate related to healing of perforation

Result	Myringoplasty (Group A)		Chemical cauterization (Group B)		Total	
	No.	%	No.	%	No.	%
Successful	38	76	36	72	74	74
Unsuccessful	12	24	14	28	26	26
Total	**50**	**100**	**50**	**100**	**100**	**100**

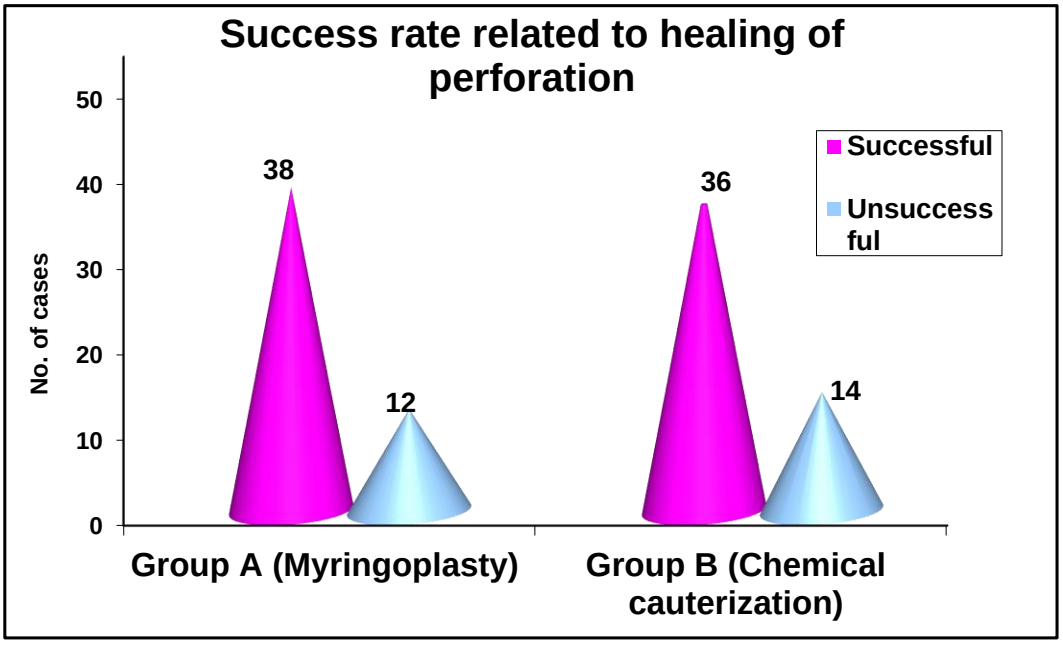

Table No.4 showed that success rate was maximum (i.e. 76%) in group A as compared to group B. Overall 74% success rate was observed.

Z test of difference between proportions of group A and B, was significant ($p<0.05$), i.e. Group A shows higher success rate as compared to group B

Table No. 5: Success rate of treatment in both groups related to size of perforation

Size of perforation (mm)	Healed via myringoplasty		Healed via Chemical cauterisation	
	No.	%	No.	%
0-1	5/5	100	28/32	87.5
1-3	9/11	81.81	6/10	60
3-6	24/34	70.58	2/8	25
Total	**38/50**	**76%**	**36/50**	**72%**

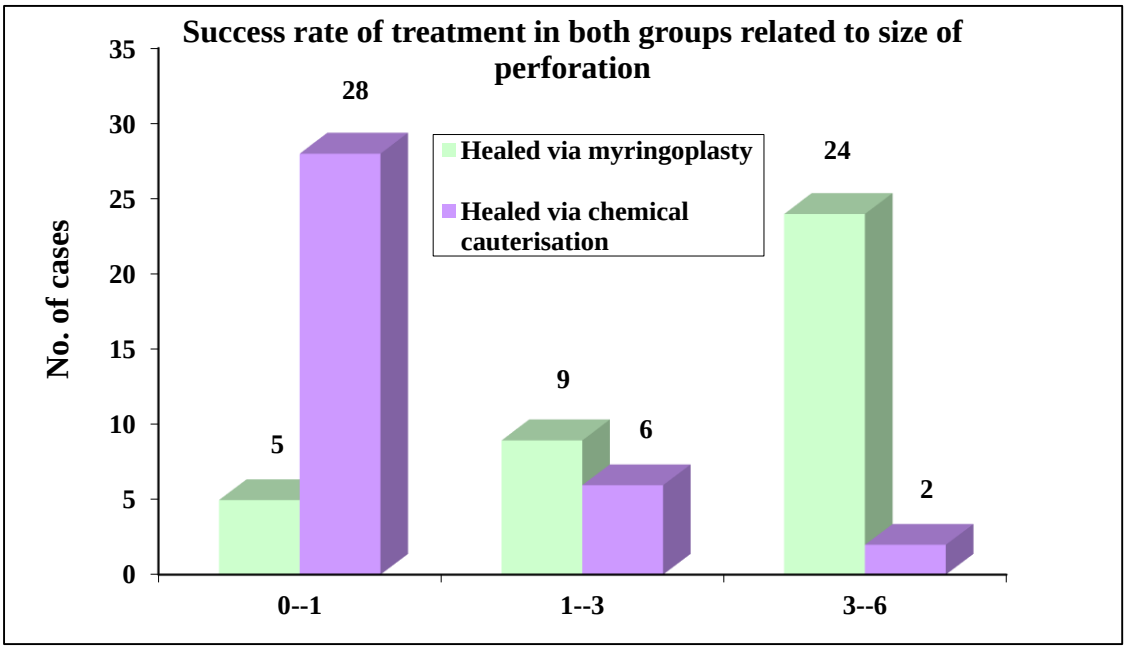

Table No. 5 showed that 89.18% success rate was there in 0-1mm size of perforation as compared to 1-3 mm (71.42%) and 3-6 mm (61.9%). By applying 'Z' test of difference between two proportions the success rate was significantly higher in 0-1mm

size of perforation as compared to 1-3mm and 3-6mm. size ($p<0.01$).Thus the success rate decreases as size of perforation increases. Group A shows better success rate for treatment for all size of perforation. ($p<0.05$)

Table No.6: Success rate of treatment in both groups related to etiology of disease

Etiology	Healed via myringoplasty		Healed via Chemical cauterisation		Total	
	No.	%	No.	%	No.	%
Infective	33/44	75	30/43	69.76	63/87	71.26
traumatic	5/6	83.33	6/7	85.71	11/13	84.61
Total	38/50	76%	36/50	72%	74/100	74

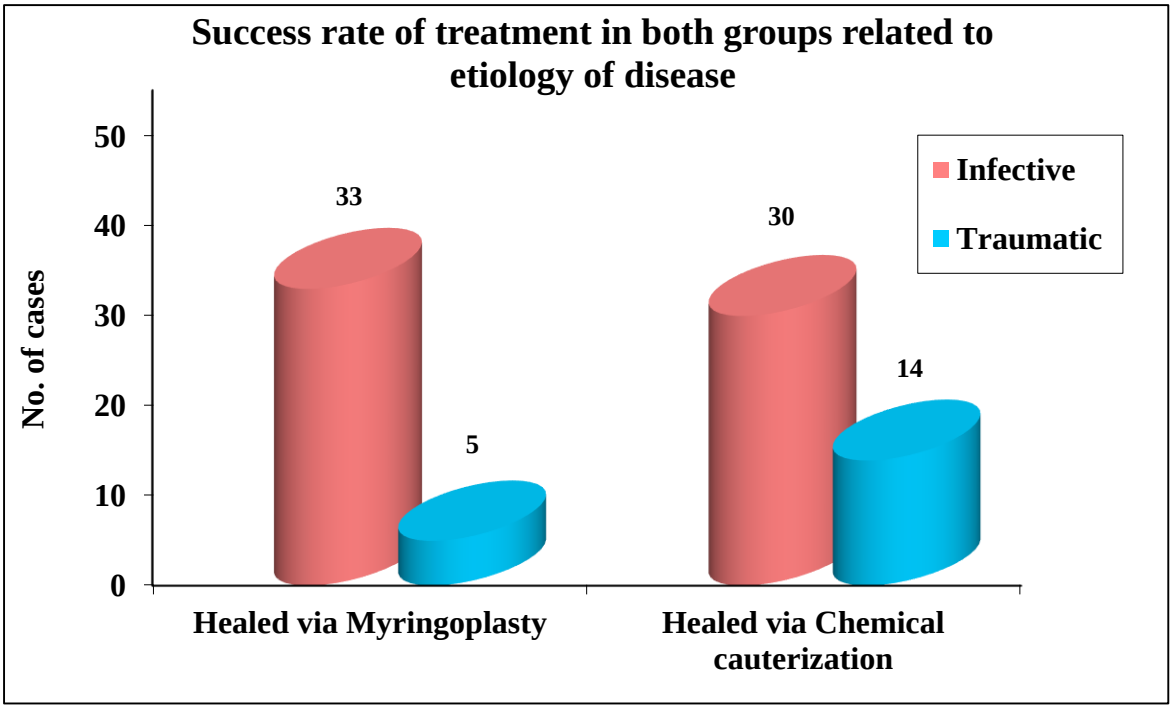

Table No.6 showed that 84.61% success rate of treatment for traumatic etiology and 71.26% for infective etiology. By applying Z test of difference between two proportions there was a significant difference between proportions of success rate for infective and traumatic etiology. ($p<0.01$) Infective etiology had a lower success rate as compared to traumatic etiology.

Table No.7: Success rate of TCA related to weekly application

Total No. of TCA application required	No. of successful result (group B)
1	2
2	8
3	14
4	9
5	3

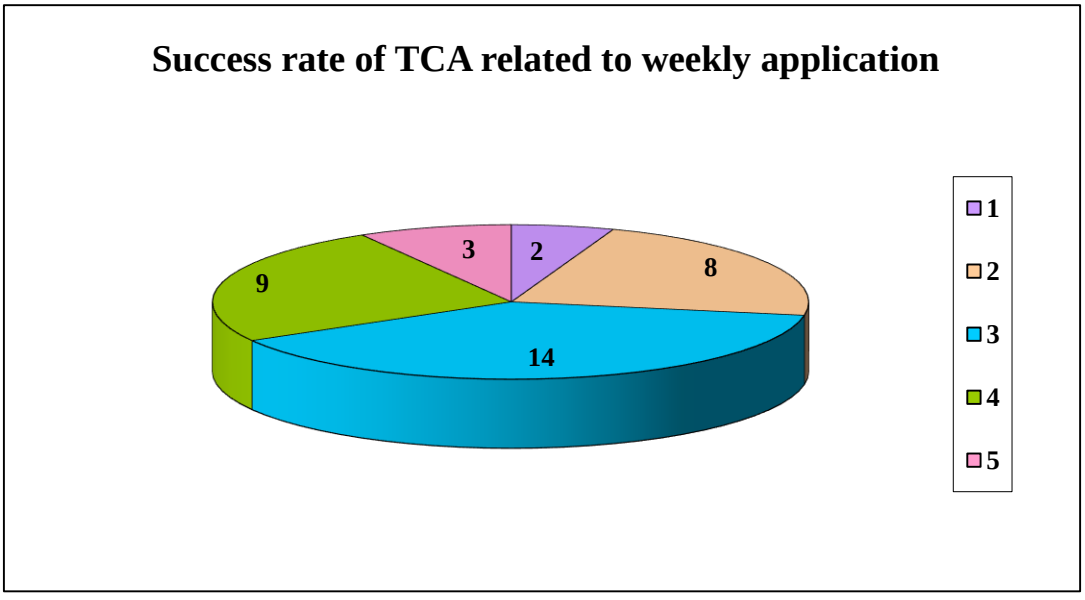

Table No.7 showed that maximum successes rate for TCA was observed with 3 applications as compared to other applications. Average application required was 2.4.

Table No.8: Relations of Air Bone gap closure and success of procedure.

Air bone gap closure (dB)	Healed via myringoplasty		Healed via Chemical cauterisation		Total	
	No. of ear	%	No. of ear	%	No.	%
0-10	26	68.4	32	88.88	58	78.3
10-20	8	21.05	3	8.33	11	14.8
20-30	4	10.52	1	2.77	5	6.75
Total	**38**	**100**	**36**	**100**	**74**	**74**

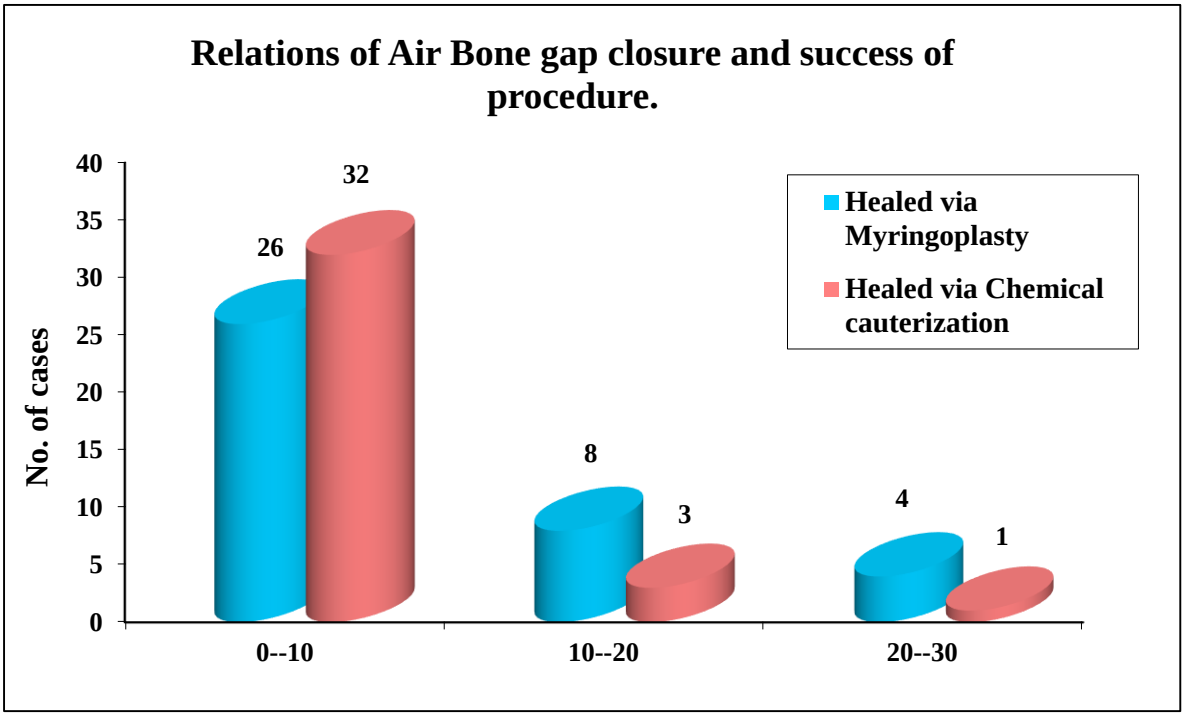

Table No.8 showed that overall 78.3% cases healed with 0-10 dB air bone gap followed by 14.8% with 10-20 dB, and 6.75% with 20-30 dB. It was also observed that air bone closure was better in group B

DISCUSSION

A study of clinical profile in tubotympanic type of CSOM was carried out in 100 cases with mild to moderate conductive deafness with special reference to evaluate results of myringoplasty and chemical cautery and comparison of these two procedures in the treatment of it.

TABLE NO.1: AGE WISE DISTRIBUTION -

In the present study, maximum number of patients i.e. 34 (34%) were in the age group of 20-30 years The average age in Group A was 32 years, in Group B it was 31.30 years and overall it was 31.90 years and minimum number of patients i.e. 10 (10%) were in the age group of 50-60 years. The number of patients decreased as age increased, these results was in accordance with the results of the study conducted by **Kumar N et al, 2012[3]; R Shyamala and P Sreenivasulu Reddy, 2012[4];** in which majority of the patients belonged to age group ranging from 21-30 years and minimal number of patients in the age group ranging from 61- 70 years.

Studies that investigated the relationship between age and otitis media reported that otitis media has its peak incidence and prevalence in preschool years and it decreases as age increases **(Verma AK et al[5], 1995; Rupa V et al[6], 1999; and Sood et al, 2012[7]).**

TABLE NO.2: GENDER DISTRIBUTION

In this study males and females were almost equally affected with slight female preponderance. 45% patients were male and 55% patients were female in this study.

These results are similar to that of other studies conducted by **Wakode PT et al, 2006[8]; Shaheen MM et al, 2012**[9]**; and Kumar N et al, 2012**[3]**.**

A study was conducted by **Verma AK et al (1995)[10]** on 613 children of age group 5-15 year and found that there was no significant association between the prevalence of CSOM and sex. However several studies reported that otitis media was more common among males than females **(Daly KA., 1991)[11].**

This variation in above figures may be because of the fact that the present study mainly included patients from the rural area as this hospital was situated in the rural area. In one study 68.2% female preponderance over 31.8% male was reported in a rural survey of general population **(Mann et al., 1976) [12].**

TABLE NO.4: SUCCESS RATE RELATED TO HEALING OF PERFORATION:

The success rate was maximum (i.e. 76%) in group A as compared to group B. Overall 74% success rate related to healing of perforation was observed. According to this data it seems that healing of tympanic membrane perforation via myringoplasty was better statistically than chemical cauterisation, but this result may be influenced due to disproportionate distribution of cases involving size of perforation (i.e. group B is having large number of cases involving perforation less than 1mm as compared to group A)

Success rate in group A was almost similar to the results of **Tai CF et al (1998) [13] and Sethi A et al (2005)** [14] i.e. 74% and 76% respectively, but inferior to the results of **Yadav SPS (2009) [15], Sengupta A et al (2012)** [16] **and Kumar Nishant et al (2012)** [3] i.e. 80%, 85% and 80% respectively.

Success rate in group B was almost similar to the findings of **Derlacki et al (1953)** [17] 75.6%, **Uppal KS et al (1997)** [18] 78%,, but inferior to the findings of **Shetty SK et al (2010)** [19] 82.1% and superior to **Goldman NC (2007)** [20] 26%, **Bhadouriya S et al (2012)** [21] 68%.

Success rate in group A was significantly higher than group B because in case of myringoplasty a graft is placed medial to tympanic membrane perforation which supports a uniform regeneration of new tympanic membrane without inversion.

TABLE NO. 5: SUCCESS RATE OF TREATMENT IN BOTH GROUPS RELATED TO SIZE OF PERFORATION:

By applying 'Z' test of difference between two proportions there was a significant difference between proportions of success rate in group A and group B (i.e. $p<0.05$). It means healing of central perforation via myringoplasty was better than chemical cauterisation for any size.

Also, it was seen that, as the size of perforation increases healing in group A was better than in group B, it suggests that myringoplasty gives better results than chemical cauterisation in healing of central tympanic membrane perforation as size of perforation increases.

Also, as size of perforation increases the healing rate exponentially decreases in both the groups and more fall was observed in group B, i.e. 100 % (group A), 87.5% (group B) success rate for 0-1mm size of perforation, 81.81% (group A), 60% (group B) success rate for 1- 3 mm size perforation and 70.58% (group A), 25% (group B) success rate for 3-6mm perforation respectively. This shows that there was a sharp fall in success of procedure in group with chemical cauterisation as compared to myringoplasty with increase in size of perforation.

All the above observation were well in agreement with in the study by **Lee et al (2002)[22]** who concluded that medium size perforations were commonest one in their study and the graft take rate was also maximum with medium size perforation (91.3%) as compared to graft take rate of subtotal perforation which was significantly less (77.77%). In case of small size perforation graft take rate was 100%. **Biswas SS (2010)[23]** also found a similar results, i.e. success rate for small perforation was 74.1 % and for large perforation was 56.0 %, showing that small perforations have more favourable outcome.

Bhadouriya S et al (2012) [21] showed that there was a fall in success of healing with chemical cauterisation with increase in size of perforation, which was similar to this study.

But **Wasson JD et al[24]** showed in his study that, perforation size was not predictive or determinant of successful myringoplasty, which was contrary to our observation [60].

TABLE NO.6: SUCCESS RATE OF TREATMENT IN BOTH GROUPS RELATED TO ETIOLOGY OF DISEASE:

Infective etiology have lower success rate as compared to traumatic etiology in both the groups. By applying Z test of difference between two proportions, traumatic aetiology shows highly significant success rate than infective aetiology. ($p<0.01$)

Overall 84.61% and 71.26% success rate was observed in cases of traumatic and infective aetiology which were in agreement with **Lpu ZC, Hu YX and Tang YM (2011) [25] and Habib-Ur-Rehman et al (2007)[26].**

Bhadouriya .S. et al (2012)[21] in his study, have noted higher success among patients with traumatic etiology by chemical cauterisation.

TABLE NO.7: SUCCESS RATE OF TCA RELATED TO WEEKLY APPLICATION.

The maximum success rate for TCA was observed in 3 applications as compared to other numbers of applications and average application required was found to be 2.4.

Average application of chemical cauterisation for complete healing of perforation in different study were**,** 2.8 **Uppal KS et al (1997) [18],** 2.78 **Shetty SK et al (2010) [19],** 3.6 **Sunil Bhadouriya et al (2012)** [21]which were almost comparable with present study.

TABLE NO.8: RELATIONSHIP OF AIR BONE GAP CLOSURE WITH THE SUCCESS OF PROCEDURE.

For reporting the hearing results, following guidelines for air bone closure have been followed i.e. 0-10 dB (excellent), 10-20 dB (good), 20-30 dB (fair) and more than 30 dB (poor) **Kartush, 2002 [27].**

In the present study, considering the successful cases, the post procedure air bone gap closure was recorded to be within 0-10 dB (excellent) in 78.3% of cases, within 10-20 dB (good) in 14.8% of cases and within 20-30 dB (fair) in 6.75% cases. In individual group 68.4% and 88.88% cases shows at 0-10 dB air bone gap closure in group A and B respectively.

In study conducted by **Shetty SK (2010) [19],** who managed the central perforation of tympanic membrane by chemical cauterisation using tri-chloro acetic acid and achieved 91.3% air-bone gap less than 20 dB.

From above discussion it also suggested that air bone gap closure was significantly better for chemical cauterisation. There was no proven reason for better air bone closure in group B, but the minimal manipulation of anatomy of tympanic membrane and middle ear can be the reason.

SUMMARY

A clinical profile of tubotympanic type of CSOM with mild to moderate conductive deafness, evaluation of results of myringoplasty and chemical cautery and comparison of these two procedures was studied in 100 patients, in the Department of E.N.T., Rural Medical Collage, Loni, from July 2010 to October 2012.

I. CLINICAL PROFILE OF TUBOTYMPANIC TYPE OF CSOM

a) Age and Sex-wise distribution

Maximum numbers of patients (34%) were in age group of 20-30 years and both the genders are equally affected with slight female preponderance (55%).

b) Etiological factor

Most of the tympanic membrane perforations (87%) were infective in origin.

II. RESULTS OF MYRINGOPLASTY AND CHEMICAL CAUTERISATION AND COMPARISON OF THERE RESULTS IN CASES OF CSOM OF TUBO-TYMPANIC TYPE OF DISEASE HAVING MILD TO MORDERATE CONDUCTIVE DEAFNESS

a) Success rate related to healing of perforation

Maximum success rate (76%) was observed in group A as compare to group B. Overall 74% success rate related to healing of perforation was observed.

b) Success rate of treatment in both groups related to size of perforation

It was observed that as the size of perforation increases healing in group A was better than in group B, which suggests that myringoplasty gives better results than chemical cauterisation in healing of central tympanic membrane perforation as the size of perforation increases.

c) Success rate of treatment in both groups related to etiology of disease

Overall 84.61% and 71.26% success rate was observed in cases of traumatic and infective etiology.

d) Success rate of TCA related to weekly application

The maximum success rate for TCA was observed in 3applications as compared to other numbers of applications and average application required was found to be 2.4(2-3).

e) Relationship of air bone gap closure with the success of procedure

88.88% cases in group B and 68.4% cases in group A shows excellent (0-10 dB) air bone gap closure.

CONCLUSION

1) It is observed that young females, mostly suffers from CSOM.

2) Most of the central perforations were infective in origin.

3) Myringoplasty was found to give better results than chemical cauterisation for healing any size of central type of tympanic membrane perforations.

4) Healing of central perforations via both modalities was better in cases of traumatic etiology as compare to infective.

5) Average application of chemical cauterization for complete healing of perforation was found to be 2.4(2-3).

6) Hearing improvement was better in cases undergone treatment with chemical cauterization.

7) No significant correlation of failure of procedure was found with occupation and socioeconomic condition of the patients.

8) Hence it was concluded that overall myringoplasty was the better treatment modality for any size of central tympanic membrane perforation in cases of tubotympanic type of CSOM as compared to chemical cauterization, irrespective of occupation and socioeconomic status of the patients, but healing of small central perforation (<1mm) via chemical cauterisation can be opted as preferred choice of treatment over myringoplasty as it avoid unnecessarily exposure to anaesthetic agents, work loss due to stay in hospital, less traumatic procedure and better in terms of hearing improvement.

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