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PAPER PATCHING- A SIMPLE, EFFECTIVE TECHNIQUE IN CASES OF SMALL CENTRAL PERFORATIONS OF THE TYMPANIC MEMBRANE

Otorhinolaryngology

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ABSTRACT

Paper patch myringoplasty is a simple, out-patient procedure to close perforated tympanic membranes. In this study, we assess the outcome of paper patching in small central perforations of the tympanic membrane and the factors associated with successful healing of a perforation. 30 patients attending ENT OPD at Bundelkhand Medical College Sagar with central perforation of the tympanic membrane of size less than 4mm and conductive hearing loss less than 40dB were subjected to the procedure of paper patching on out-patient basis. There was complete healing after the procedure of paper patching in 24 out of 30 participants, the success rate being 80%. The mean age of patients in the success group was 32 years, while in the failure group it was 40.5 years. The mean gain in pure tone average was 5 dB. The success rate was highest in traumatic perforations. We found a negative correlation between healing and time interval between onset of disease and procedure. The success rate was highest in perforations upto 2 mm and least in perforations of size 3-4mm, suggesting a clinical correlation between size of perforation and healing. Given the high success rate, ease of the procedure, and significant improvement in hearing outcomes, paper patching should be considered a first-line treatment option for eligible patients with small central perforations of tympanic membrane and mild hearing loss.

KEYWORDS

Myringoplasty, paper patching, tympanic membrane

INTRODUCTION

Perforations of the tympanic membrane constitute a large number of cases in otolaryngology. Myringoplasty or reconstruction of the tympanic membrane is one of the most commonly performed procedures in the field of otolaryngology. The tympanic membrane not only performs the function of the conduction of sound waves but also serves a protective function to the middle ear cleft and round window niche. A perforation decreases the surface area available for sound transmission and allows sound to pass directly into the middle ear. Various methods for the closure of tympanic membrane defects have been studied. Considerable measures are being taken, not only to produce a dry ear but also to conserve and even improve hearing. Paper patch myringoplasty is a simple procedure to close perforated tympanic membranes. It was introduced in 1887 by Blake. The use of paper patches in an outpatient setting has been a widely used technique for many decades. This procedure can be done at the outpatient unit. The paper patch serves as a bridge over which the epithelium at perforation edge migrate[1]. The perforation edge is cauterized by using chemicals such as trichloroacetic acid, tincture ferric perchloride, silver nitrate etc. There is no incision scar and no need for surgical procedure which reduces the expense of treatment and hospital stay. There are very less chances of complications. In this study, we assess the outcome of paper patching in small central perforations of the tympanic membrane and the factors associated with successful healing of a perforation.

MATERIALS & METHODS

30 patients attending ENT OPD at Bundelkhand Medical College Sagar, who were clinically diagnosed with small central perforation of the TM were selected according to inclusion and exclusion criteria during the period of 18 months. Informed consent was taken.

After considering the above criteria of selecting the patient, detailed history was taken and examination was done with help of Welch Allyn Otoscope and examination under microscope was done to confirm the findings.

Pure tone audiometry (PTA) was done. Dry ear for at least 2 weeks was ideal prerequisite for repair.

Inclusion Criteria: Patients between 11-70 years of age, Central perforation of the tympanic membrane of size less than 4mm, Conductive hearing loss upto 40dB

Exclusion Criteria: Squamosal disease, Ossicular necrosis, History of previous middle ear surgery, Tympanosclerotic patch, Patients suffering from chronic sinusitis/ tonsillitis/ severe DNS or allergic rhinitis resulting in Eustachian tube dysfunction or chronic systemic disease, Patients choosing alternate treatment options

The following clinical factors were assessed- Age, etiology of perforation, time interval between onset of disease and procedure, size of perforation, site of perforation, pure tone average. On outpatient basis, the patients were taken up for the procedure of paper patching. The External auditory canal was cleaned of any cerumen or debris using Povidone iodine solution. Cotton balls soaked in 4% xylocaine were used to anaesthetise the tympanic membrane. Under the microscope, the rim of the perforation was cauterised using a cotton tipped microneedle dipped in 50% trichloroacetic acid until a white margin was created. A sterile cigarette paper was used for patching, 1.5 times bigger than the perforation site. It was placed over the perforation by over-lay method and gel foam was kept over it. Otoscopy and Pure Tone Audiogram were done at the end of 3 months. The improvement in hearing was assessed in terms of pure tone average and compared to obtain the final outcome of the study.

RESULTS & OBSERVATIONS

The success rate of the procedure of paper patching was found to be 80% in our study i.e. closure or healing of the perforation occurred in 24 out of 30 patients within a period of 3 months of the procedure. The mean age of patients in the success group was 32 years, while in the failure group it was 40.5 years. The mean pure tone average of patients before the procedure was 27dB and 22dB 3 months after the procedure. The mean gain in pure tone average was 5 Db.

According to etiology, the success rate in patients with infective etiology was 75%, 100% in cases with traumatic etiology and 66% in cases of iatrogenic etiology.

For assessment of time interval between onset of disease and procedure, time period was divided into 4 groups- less than 3 weeks, 3 weeks to 3 months, 3 months to 1 year and more than 1 year. The success rate was highest in perforations less than 3 weeks old (100%) And least in perforations older than 1 year (55.6%) suggesting in a negative correlation between healing and time interval between onset of disease and procedure.

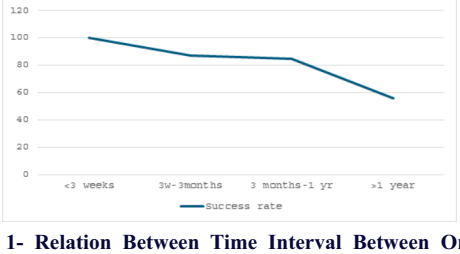

Figure 1- Relation Between Time Interval Between Onset of Disease and Procedure and Success Rate

Size of Perforation: Success rate was highest in perforations upto 2 mm (100%) and least in perforations of size 3-4mm (55.6%), suggesting a clinical correlation between size of perforation and healing.

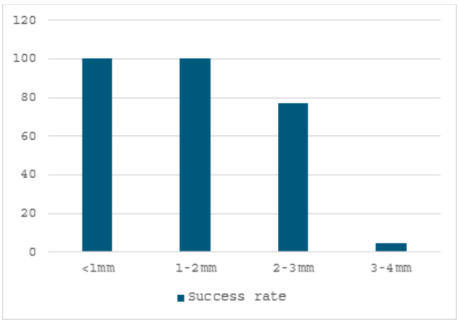

Figure 2 Relation Between Size of Perforation and Success Rate

Site of perforation : perforations lying in anterior half of the tympanic membrane showed a slightly higher success rate ie. 83.3% as compared to perforations involving the posterior half (77.8%).

Table 1- Success Rate in Relation With Various Clinical Factors

Clinical Factor	Success group (no. of patients)	Failure group (no. of patients)	Success rate
Etiology			
- Infective	15	05	75%
- Traumatic	07	00	100%
- Iatrogenic	02	01	66%
Time interval			
- <3 weeks	06	00	100%
- 3 weeks- 3 months	07	01	87.5%
- 3 months- 1 year	06	01	85.7%
- > 1 year	05	04	55.6%
Size of perforation			
- <1mm	02	00	100%
- 1-2mm	08	00	100%
- 2-3mm	10	03	77%
- 3-4mm	04	03	57%
Site of perforation			
- Anterior	10	02	83.3%
- Posterior	14	04	77.8%

DISCUSSION

The study was conducted at a tertiary care center, Bundelkhand Medical College, Sagar, to evaluate the results of management of small central perforations of tympanic membrane by paper patching. Paper patching is a popular procedure due to the cost effectiveness and ease. This procedure could be done at the outpatient unit. The chief objective of paper patch myringoplasty as described by Juers in 1958 are to break and evert the stratified squamous epithelial barrier along the perforation margin, to stimulate tympanic membrane growth and to provide a scaffold for guiding the growth of squamous epithelium. The paper patch serves as a bridge and Lets the epithelium at perforation edge migrate. However, the success rate of paper patching varies between 12.5% and 84%[2].

There was complete healing after the procedure of paper patching in 24 out of 30 participants, the success rate being 80%. Our results were similar to other studies. Akkoca et al took 67 cases of traumatic tympanic membrane perforations and the success rate of paper patching was 91%. In the study done by Arora et al, the success rate was 76%[3]. Comparing with other office procedures, Debnath et al compared chemical cauterization to Fat Plug Myringoplasty. It was found that the two procedures showed significant improvement in post operative hearing threshold. The overall success rate was 90.9% in patients undergoing Fat Plug Myringoplasty and 83.33% in patients undergoing Chemical Cauterization[4]. In the study done by Jayakumar et al, complete closure was achieved in 54% for chemical cauterization and 53% for Gelfilm patchingwith platelet rich plasma[5].

In our study, the mean age of patients in the success group was 32 years, while in the failure group it was 40.5 years. This result was similar to the study done by Lee et al in which patients in the failure group were significantly older than those in the success group (39 years of age in the success group and 48.6 years of age in the failure group)[6]. This can be attributed to poor wound healing in older population. Aging is associated with alterations in wound healing due to delays in macrophage and T-cell infiltration, angiogenesis, and epithelialization.

The mean pure tone average of patients before the procedure was 27dB and 22dB 3 months after the procedure. The mean gain in pure tone average was 5 Db. In the study done by Debnath et al, there was a mean gain of about 8.66dB[4]. In the study done by Jayakumar et al, the mean gain pure tone average following cauterization was 2.17 dB[5].

The relation between etiology of the perforation and closure of tympanic membrane was also noted in the present study. The success rate was highest in traumatic perforations. In the study done by Lee et al, in cases of traumatic TM perforation, TM perforation completely healed in 83.3% cases[6]. Park et al reported a high success rate (84.2%) of paper patching in patients with TM perforation from trauma. Many studies have shown that traumatic perforations of the tympanic membrane have a tendency to heal spontaneously, as stated by Gao et al[7]. While in cases of infectious etiology (CSOM), there are various other confounding factors which delay healing, such as eustachian tube dysfunction and recurrent upper respiratory tract infections.

In our study, we found a negative correlation between healing and time interval between onset of disease and procedure, similar to the studies by Lee et al and Arora et al. In long standing perforations of tympanic membrane there occurs a squamous epithelial growth, which curves around the perforation edge inwards thus giving an epithelial lined perforation margin through which the healing of tympanic membrane perforation does not occur.

In our study, the success rate was highest in perforations upto 2 mm and least in perforations of size 3-4mm, suggesting a clinical correlation between size of perforation and healing. In the study done by Akkoca et al, closure was observed in all ears with small perforations. In study by Golz et al the closure rates were 55.7% in small perforations while that for larger perforations (>5 mm) the closure rate was 12.5%[8].

CONCLUSION

In conclusion, in cases of dry, small central perforations of the tympanic membrane, paper patching offers a cost-effective, minimally invasive alternative to surgical myringoplasty, reducing the need for anesthesia and hospitalization. The procedure is simple, can be performed in an outpatient setting, and requires minimal equipment, making it accessible even in resource-limited settings. Given the high success rate, ease of the procedure, and significant improvement in hearing outcomes, paper patching should be considered a first-line treatment option for eligible patients with small central perforations of tympanic membrane and mild hearing loss. It has been observed that patients with perforations of tympanic membrane tend to take over-the-counter drugs or empirical antibiotics prescribed by general practitioners. This leads to persistent wet ear, drug resistance and unresolved perforations. Awareness should be raised among patients to visit otolaryngologists immediately in cases of tympanic membrane perforations, especially traumatic perforations, so that prompt management decisions can be made and the perforation can be resolved as early as possible.

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