

A Study of Efficiency of Autologous Platelet Rich Plasma in MyringoplastyQazi Abdul Bari Siddique¹, Y. Sailaja²^{1,2}Assistant Professor, Department of ENT, Ayaan Institute of Medical Sciences, Kanakamamidi Village Moinabad Mandal Hyderabad, Telangana State

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Conflict of interest: Nil

Abstract:**Background:** The efficacy of autologous platelet-rich plasma in myringoplasty is a subject of interest as it presents a novel approach to enhance the healing process of the tympanic membrane.**Aim and Objective:** To find out the efficacy of platelet-rich plasma on graft uptake in patients undergoing myringoplasty.**Materials and Method:** A prospective, randomized, controlled trial was conducted at a tertiary care hospital's otolaryngology department, Ayaan institute of Medical sciences, Hyderabad. 60 Patients were randomly assigned to two groups using a computer-generated randomization table. The experimental group received myringoplasty with the application of autologous platelet-rich plasma (PRP), while the control group underwent conventional myringoplasty without PRP, after approved by institutional ethical committee and following inclusion and exclusion criteria.**Results:** Success rate of graft uptake among cases was higher compared to controls and this difference between the groups were statistically significant. (p-value = 0.028). The difference between preoperative and postoperative values is statistically significant in both groups (p < 0.001 for cases and p = 0.001 for controls).**Conclusion:** Autologous platelet-rich plasma appears to improve the efficiency of myringoplasty by promoting faster tympanic membrane closure and early hearing improvement.**Keywords:** Tympanic Membrane, Platelet-Rich Plasma, Myringoplasty etc.

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Introduction

Chronic suppurative otitis media is defined as chronic inflammation of the mucoperiosteal lining of the middle ear cleft. It is associated with a persistent or intermittent infected discharge through a non-intact tympanic membrane. It is prevalent in developing countries like India and is more common in lower socio economic groups. The incidence is very high among rural population than in urban population. [1] The overall prevalence rate is 46 and 16 persons per thousand in rural and urban population.

Myringoplasty is a surgical procedure aimed at repairing a perforation in the tympanic membrane (eardrum) to restore hearing and prevent recurrent ear infections. While various graft materials and techniques have been employed to achieve successful closure of the tympanic membrane, the quest for improved outcomes continues. In recent years, the use of autologous platelet-rich plasma (PRP) has garnered attention in the field of regenerative medicine due to its potential to enhance tissue healing. PRP is a concentration of platelets derived from the patient's own blood, containing a rich array of growth factors and

cytokines that can promote tissue repair and regeneration. The efficacy of autologous platelet-rich plasma in myringoplasty is a subject of interest as it presents a novel approach to enhance the healing process of the tympanic membrane.

This treatment modality capitalizes on the body's natural healing mechanisms, potentially offering improved closure rates, reduced healing times, and better auditory outcomes. By exploring the integration of PRP into myringoplasty, thus we aim to refine surgical techniques and improve the overall success of tympanic membrane repair. So this study undertaken to find out the efficacy of platelet-rich plasma on graft uptake in patients undergoing myringoplasty.

Materials and Method

A prospective, randomized, controlled trial was conducted at a tertiary care hospital's Otolaryngology department, Ayaan institute of Medical sciences, Hyderabad. The study was approved by the institutional ethics committee, and informed consent was obtained from all participants. Patients aged 18–60 years with a

unilateral chronic tympanic membrane perforation of traumatic or non-infectious etiology, with an intact ossicular chain confirmed by otoscopy and audiometry, were included. Exclusion criteria were active ear infection, history of previous ear surgery, systemic diseases affecting wound healing and coagulation disorders.

60 Patients were randomly assigned to two groups using a computer-generated randomization table. The experimental group received myringoplasty with the application of autologous platelet-rich plasma (PRP), while the control group underwent conventional myringoplasty without PRP.

Method

Demographic data like age, gender, side of ear, site of perforation were noted down, venous blood was collected from the patients in the experimental group and processed using a centrifugation method to obtain PRP. The PRP was activated with calcium chloride and thrombin before application. All surgeries were performed under local anaesthesia

by the same experienced otolaryngologist. After raising a tympanomeatal flap, the edges of the perforation were freshened. In the experimental group, a thin layer of activated PRP was applied to the edges of the perforation and the graft material (temporalis fascia).

The graft was then placed using an underlay technique. In the control group, the procedure was identical, except for the application of PRP. Patients were advised to avoid water exposure and strenuous activities. Follow-up visits were scheduled at 6 months postoperatively. Outcomes were assessed by otoscopic examination for graft take and audiometric tests for hearing improvement.

Data were analyzed using SPSS software version 25. The chi-square test was used to compare categorical variables, while the independent t-test was used for continuous variables. A p-value of <0.05 was considered statistically significant.

Observation and Results

Table 1: Demographic and preoperative clinical data distribution between the groups

Variable	Cases (n=30)	Controls (n=30)	t-test/Chi-square	p-value
Age				
Mean± SD	35.631± 4.82	32.74± 6.71	1.65	0.1034
Gender				
Male	19	17	0.27	0.598
Female	11	13		
Size of Perforation				
Medium	26	23	1.001	0.316
Large	4	7		
Side of Eye				
Right	11	14	0.6171	0.432
Left	19	16		
Haemoglobin Concentration				
Mean± SD	11.94 ± 1.69	12.43 ± 0.81	1.43	0.1575
Platelet Count				
Mean± SD	298.74 ± 64.91	291.42 ± 69.73	0.42	0.6754

The mean age of cases is 35.63 ± 4.82 , and for controls, it is 32.74 ± 6.71 . The difference is not statistically significant ($p = 0.1034$).

The distribution of male and female participants is similar between cases and controls, with no significant difference ($p = 0.598$). The majority of participants in both groups have medium-sized perforations. The difference in size distribution is not significant ($p = 0.316$). The distribution of right

and left ear involvement is similar between the groups, with no significant difference ($p = 0.432$). The mean haemoglobin concentration is slightly lower in cases (11.94 ± 1.69) compared to controls (12.43 ± 0.81), but the difference is not significant ($p = 0.1575$).

The mean platelet count is similar between cases (298.74 ± 64.91) and controls (291.42 ± 69.73), with no significant difference ($p = 0.6754$).

Table 2: Graft uptake takes distribution between the groups

Graft Uptake	Cases (n=30)	Controls (n=30)	Chi-square	p-value
Success	27	10	4.81*	0.028 (Significant)
Failure	3	20		

*p-value<0.05, statistically significant at 5% level of significance. Success rate of graft uptake among cases was higher compare to controls, and this difference between the groups were statistically significant.(p-value = 0.028)

Table 3: Graft uptake takes distribution between the groups

Air Borne Gap	Cases (n=30)	Controls (n=30)	t-test	p-value
Pre-operative	29.61 ± 3.76	31.48 ± 2.76	1.72	0.089
Post-operative (5 months)	7.28 ± 0.91	14.63 ± 1.97	18.55	0.0001
t-test/p-value	31.61/<0.001	27.12/0.001		

*p-value<0.05, statistically significant at 5% level of significance

Mean preoperative air-bone gap is 29.61 ± 3.76 in cases and 31.48 ± 2.76 in controls, with no significant difference ($p = 0.089$). And mean postoperative air-bone gap significantly reduces to 7.28 ± 0.91 in cases and 14.63 ± 1.97 in controls. The difference between preoperative and postoperative values is statistically significant in both groups ($p < 0.001$ for cases and $p = 0.001$ for controls).

Discussion

Myringoplasty is primarily performed for reconstructing the tympanic membrane using grafts in cases of inactive chronic otitis media–mucosal type. Platelet-rich plasma (PRP), a type of autologous serum, is abundant in proteins such as fibrin, fibronectin, vitronectin, and various growth factors[2]. These special proteins aid in clot formation, thereby enhancing healing. PRP is superior to fibrin glue, which lacks growth factors. This study aimed to evaluate the effectiveness of autologous PRP on graft uptake in myringoplasty. The results showed a significant reduction in the air-bone gap, improvement in pure-tone average, graft uptake. The mean age of the study participants in the control group is 32.74 ± 6.71 , and the mean age of the study participants in the PRP group is 35.631 ± 4.82 . Most of the study participants (51%) in both groups is 21–40 years with majority male in PRP and equal in the control group. Similarly, studies done by Fawzy et al. and Singh et al. showed the mean age of the study participants was around 28.5 ± 5.9 years [3, 4].

The present study showed a significant reduction in ABG after surgery. The mean reduction of ABG in the PRP group was 7.28 ± 0.91 , and the mean ABG reduction in the control group was 14.63 ± 1.97 . The ABG reduction was higher among the PRP group. This is in accordance with a study done by Ersozlu T et al. which showed that the mean ABG difference in the PRP group is 10.3 ± 6.74 and in the control group was 7.23 ± 6.72 . A study done by Ebrahim et al. and Shanmugam et al. showed that the mean difference in the air-bone gap in those with PRP is 13.75 ± 5.59 , which is slightly higher than the present study [5, 6]. The present study showed that nearly 90% (27) had graft uptake after 5 month in the PRP group, which is higher than the control group, which had only 33.33% graft uptake. The result of the present study on graft uptake is in accordance with the study done by Yadav SPS et al. which showed that after the 3-month period the graft uptake was 95% and 85% in the PRP and

control groups respectively. The studies by El-Anwar et al. and Fawzy et al. showed a much lower success rate of 84% than the present study [7, 8]. The present study thus in accordance with other studies showed that the addition of platelet-rich plasma resulted in higher graft uptake than the graft alone group and revealed that PRP would be important in the success rate of the myringoplasty procedure. The reason for the graft failure could be due to recurrent upper respiratory tract infection, Eustachian tube dysfunction, and poor compliance of instructions to be followed in the post-operative period including general hygiene by the patient. The strength of this study is that it emphasizes the effectiveness of PRP in revision cases that yields good results. It was examined by a single-blinded examiner for all the cases and documented. Since PRP is autologous, it is easy and safe to prepare. The limitations of our present study are this is a single centre study, this has a smaller sample size, quantity and quality of PRP could not be standardized for all samples, and we have not taken follow up after 1 and 3 month in the study due to patients unavailability for follow up.

Conclusion

From above observation and results and after discussion with other studies, we can conclude that, autologous platelet-rich plasma appears to improve the efficiency of myringoplasty by promoting faster tympanic membrane closure and early hearing improvement. Further studies with larger sample sizes and longer follow-up periods are needed to confirm these findings and to explore the mechanisms underlying the beneficial effects of PRP in ear surgery.

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