



Myringoplasty with Autologous Platelet Rich Plasma -A Prospective Study

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Abstract

Background: The study was conducted to analyse of the effect of autologous Platelet Rich Plasma (PRP) in Myringoplasty.

Methods: This prospective study was conducted at Rajah Muthiah Medical college hospital in the department of otorhinolaryngology, from October 2016 to September 2018, among 20 patients who presented to the hospital with symptoms and signs suggestive of chronic otitis media. The management of the disease with myringoplasty using platelet rich plasma was studied and postoperative graft uptake and improvement in hearing were studied.

Results: The mean age group was 32.1 years. The graft uptake was successful in all patients in whom platelet rich plasma was used in myringoplasty. There was hearing improvement of at least 10 dB in 85% of the patients.

Conclusion: Platelet rich plasma with its various growth factors, has the property of tissue bio stimulation which significantly improves post-operative graft uptake in myringoplasty.

Keywords: Myringoplasty, platelet rich plasma, Tympanic membrane.

Introduction

Chronic otitis media (COM) is a chronic disease of the middle ear. COM is defined as 'chronic inflammation of the mucosa of the middle ear and mastoid cavity, that presents with recurrent ear discharge³. Tympanoplasty is the surgical correction of a perforated tympanic membrane with or without ossicular reconstruction. Myringoplasty refers to simple surgical closure of a perforation in tympanic membrane without ossicular reconstruction. Platelet rich plasma (PRP) with various growth factors has been proved to improve wound healing. PRP has been used in various fields like dermatology,

orthopedics, plastic surgery, dentistry for its beneficial effects. The aim of this prospective study was to study the efficacy of autologous platelet rich plasma in myringoplasty with respect to graft uptake and improvement in hearing.

Materials and Methods

The study was conducted in the department of otorhinolaryngology, Rajah Muthiah Medical College Hospital for duration of two years between October 2016 and September 2018. Totally 20 patients with inactive chronic otitis media-mucosal type (dry ear for atleast 6 to 8 weeks) were included in the study. Children (<12

years), elderly (>60 years), patients with any known comorbid conditions, patients not willing for study and patients having an air bone gap (ABG) of more than 40 dB with suspected ossicular pathology were excluded from study. After obtaining ethical committee approval, informed and signed consents were obtained from all the patients under the study.

Platelet Rich Plasma was prepared under aseptic conditions by as differential centrifugation. After preoperative audiogram and otoendoscopic examinations, patients were posted for myringoplasty using Temporalis fascia graft by underlay technique. After placing the temporalis fascia in position and place and repositioning the posterior tympanomeatal flap, the autologous PRP was applied into external auditory canal over the surface of the graft and tympanic membrane remnant. External auditory canal was filled with antibiotic impregnated gelfoam.

Pure Tone Audiogram was done for the patients postoperatively on the 90th day. Patients had otoendoscopic examinations on 30th and 90th days postoperatively. Then the postoperative graft outcome and hearing improvement of the patients were analysed.

Successful closure of tympanic membrane perforation or a successful graft uptake was defined as a well healed and intact tympanic membrane visualised by otoendoscopic examination at the end of 90 days postoperatively. Improvement in hearing was postoperative hearing gain of atleast 10dB after 90 days.

Results

The mean age of patients under study was 32.1 years. 11(55%) surgeries were performed on right ear and the rest was done on left ear. 13(65%) patients has medium sized perforations, 3(15%) had large perforations and the remaining 4(20%) patients had small size perforations. Graft uptake was successful in all 20 patients (100%).



Figure 1 shows otoendoscopic appearance of tympanic membrane in which PRP myringoplasty was done

Air bone gap (ABG) and mean hearing gain results

	Pure Tone Average in dB
Preoperative ABG (mean +/- SD)	33.75 ± 6.04
Postoperative ABG (mean +/-SD)	20± 6.49
Mean hearing gain	13.75 ± 5.59

Success in terms of hearing gain (≥ 10 dB) was achieved in 17 patients (85%). 3 patients did not get the expected improvement in hearing.

Myringoplasty is a tympanic membrane reconstructive surgery performed to avoid recurrent ear discharge and for improving the hearing.¹ Platelet rich plasma (PRP) is carrier of growth factors which accelerates epidermal, epithelial and endothelial regeneration, enhances collagen synthesis, stimulates soft tissue healing and angiogenesis.²

Biostimulation is the process of activating the anabolic functions of the fibroblast biologically. Fibroblast is activated by the influence of the growth factors. Platelet rich plasma is rich in various growth factors like PDGF, IGF, FGF, TGF, VEGF and HGF.¹²

The Platelet derived growth factors stimulate fibroblast chemotaxis, synthesis and proliferation of collagen. The growth transformation factor (TGF) induces extracellular matrix production, controls cell proliferation and aids in the tissue repair with its intrinsic inflammatory ability. The epidermal growth factor (EGF) stimulates fibroblast chemotaxis, angiogenesis, promotes

keratinocyte production and provisional matrix formation. Overall tissue healing is better over the areas in which PRP was used.^{4,5}

Failure of graft uptake is due to graft migration. Migration may be due to mitotic activity at the centre of a structure with a central to peripheral growth pattern, that is, centripetal to the cell generation centre. Graft uptake could be facilitated by the use substances that promote fast and effective growth by direct cohesion with tympanic membrane remnants.⁶

PRP has inherent ability to accelerate natural healing of the patient and is inherently safe. PRP was also freshly prepared from the patient's own blood under aseptic conditions before the surgery thereby ruling out possibilities of infection and allergy. In our study, as patients own temporalis fascia was used there was no potential risk of graft-host reactions. As the PRP prepared was also autologous and was prepared in strict aseptic conditions, there is almost no concern of spread of infections. It has also been shown that due to the presence of WBCs, PRP grafts are bactericidal.^{7,8}

El-Anwar et al published the results of his work with PRP in myringoplasty and his comparison with conventional methods in 2015. He reported a graft up take rate of 100% when done with PRP. These results are comparable to those of our study. Success in terms of hearing gain (atleast 10 dB) was achieved in 65.6% in case group. Hearing improvement was 85% in our study.⁹

Ahmed R.; et al. assessed the effectiveness of using fat and PRP in myringoplasty in 20 patients and published it in 2018. Results showed addition of PRP to fat myringoplasty resulted in 100% closure rate in small TM perforation and 79.3% in medium sized TM perforation. Our study had much better graft uptake in medium size perforations also.¹⁰

Sharma D et al presented his case series of 50 myringoplasties, with platelet rich fibrin and published it in 2018. At the end of third month 92% cases in whom Platelet rich fibrin was used had a complete graft uptake. These results are almost similar to those of our study.¹¹

Conclusion

Studies on using autologous platelet rich plasma (PRP) in myringoplasty are giving encouraging results on overall graft uptake. Platelet rich plasma accelerates inherent tissue healing property of the tissues. Use of platelet rich plasma in myringoplasty prevents graft displacement and has a very good graft uptake rate.

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