ORIGINAL RESEARCH PAPER
Volume - 12 | Issue - 05 | May - 2023 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

STUDY OF AUTOLOGOUS PLATELET-RICH PLASMA IN IMPROVING CLINICAL OUTCOME OF MYRINGOPLASTY

Otolaryngology

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ABSTRACT

Background- Autologous platelet rich plasma is gaining popularity worldwide since it enhances wound healing due to the growth factors present in it. [1] Our study aims to evaluate the outcome of tympanoplasty in conjunction with platelet rich plasma for treating tympanic membrane perforation. **Objective-** To compare efficacy of use of Autologous Platelet-Rich Plasms during Myringoplasty vs Conventional Myringoplasty in terms of improving clinical outcome. **Methods-** A Comparative Observational study was done in the Department of Otorhinolaryngology at Pt. J. N. M. Medical college Raipur from December 2021 to October 2022. Study procedure was explained and informed consent was taken. Total 72 patients were included in the study. Intraoperatively, In Group A PRP soaked gel foam was kept in middle ear as well as in the meatus and in group B Medicated gel foam was utilised. The results were examined at end of 1 month,3 month and 6 month. **Result-** In our study it was seen that Group A undergoing Myringoplasty with autologous Platelet-Rich Plasma showed better improvement in hearing between 10dB to 20 dB, (86.1%) had graft uptake within 1 month of treatment, (83.3%) with early duration of healing (20-30 days) as compared to (Group B). **Conclusion-** Usage of platelet-rich plasma in the conventional myringoplasty technique has improved the success rate of graft uptake and reduced graft migration. It accelerate the closure of tympanic membrane and has better hearing outcome.

KEYWORDS

Platelet-rich plasma (PRP), myringoplasty, autologous, air-bone gap, Pure tone audiometry

INTRODUCTION

With the advent of tissue engineering, various bioactive molecules have been applied during the regeneration progress with encouraging results.Platelet-rich plasma was developed in the 1970s and was first used by Ferrari in Italy in 1987 in cardiothoracic surgery.[1] It contains many growth factors (e.g. platelet-derived growth factors, PDGF), accelerating the regeneration of endothelial tissue and enhancing tissue healing.[2,3] Platelet-rich plasma (PRP) is made up of 95% platelets, 4% RBCs, and 1% white blood cells. Some of the other factors from PRP are platelet-derived growth factor, TGF-β1, vascular endothelial growth factor, insulin-like growth factor, interleukin, etc.

Chemotaxis, mitogenesis, metabolism, differentiation, and other processes are all influenced by these variables4.It has shown to influence Human pre adipocytes and tympanic keratinocytes proliferation, thus playing a main role aiding facial lipostructure surgeries In our field of Otorhinolaryngology, platelet rich plasma is being used widely in intranasal surgeries such as Septoplasty, Endoscopic sinus surgery.

It reduces postoperative crusting, bleeding and dryness of nasal mucosa[3] During Skull base surgeries such as CSF leak repair via endoscope trans-sphenoidal approach, leukocyte enriched platelet rich fibrin was launched as a new graft material in endoscopic spontaneous CSF leak repair.[6]

Otological uses of platelet rich plasma are mainly focused on improving graft uptake during procedure such as Myringoplasty, Tympanoplasty with or without Cortical Mastoidectomy. Many studies have been done internationally which show that autologous platelet rich plasma increases graft uptake, reduces the healing time, improves hearing, decreases infection rate and improves the overall success rate of getting an intact tympanic membrane post operatively.[7,8]

MATERIALS AND METHODS

This was a comparative observational study involving 72 cases of chronic suppurative otitis media (mucosal type) with conductive hearing loss coming to Department of ENT at Dr. B.R.A.M. Hospital, Raipur, Chhattisgarh over a period of 1 year from December 2021 to December 2022, following approval by the Institutional Ethical Committee.

The study subjects comprised of 2 groups, Group A (36 cases) who underwent Myringoplasty with autologous Platelet-Rich Plasma and Group B (36 cases) underwent conventional Myringoplasty. Comparison of Surgical outcome was done between 2 groups in terms of assessment of Neo-tympanum by Examination under microscope, Audiometry and duration required for formation of Neo-tympanum.

The inclusion criteria involved Patient with safe CSOM planned for conventional Myringoplasty who consented for use of autologous PRP. The Patient who refuse to give consent for Autologous PRP were excluded.

RESULTS

The patients were observed on basis of the age, sex, side of ear involved, size of perforation, side of surgery, healing outcome, rate of infection, duration of healing days, pre op A-B gap, post op A-B gap and graft uptake at 1 month, 3 month and 6 month. Group A (n=36; myringoplasty with autologous platelet rich plasma) and Group B (n=36; conventional myringoplasty).Patients in (Group A) (80.6%) had better improvement in hearing between 10dB to 20 dB as compared to (Group B) (55.6%) as shown in Fig 1.

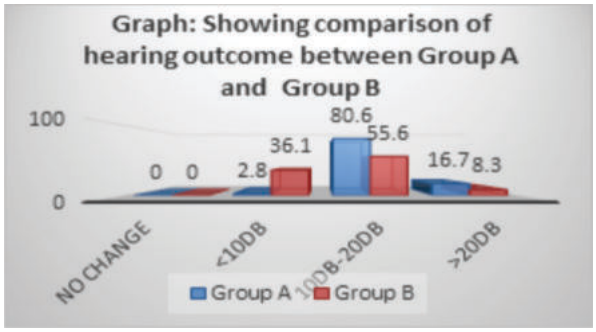

Figure 1 Depicting Comparison of Hearing Outcome between Group A and Group B

Rates of infections was more in (Group B) (22.2%) as compared to Group Ai.e. 16.7% as shown in Figure 2. In Group A 83.3% of patients healing was also Early i.e. in range of 20-30 days as compared to patients of Group B which was between 31-40 days (69.4%). Significant improvement in postoperative A-B gap was observed in (Group A) as compared to patients in (Group B).

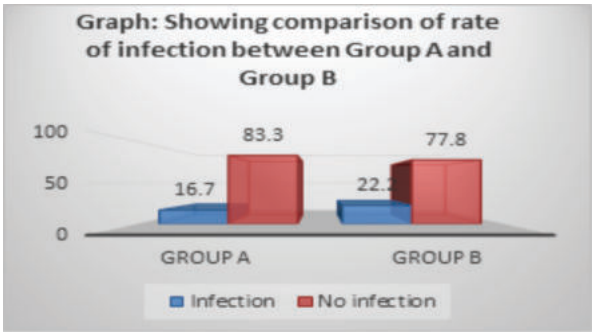

Figure 2 Depicting Comparison of Infection Rate between Group A and Group B.

P value for this comparison was 0.002.(Group A (86.1%) had graft uptake within 1 month of surgery whereas 70.2% of the patients in Group B had graft uptake by 1 month. The p value of comparison was 0.112. Numerically majority of the patients who received conventional myringoplasty (Group B) had female preponderance. On comparing the ear Involvement, no significant difference in terms of ear involvement was seen.However numerically in (Group A), in majority right ear (41.7%) was involved whereas in (Group B), majority had left ear involved (36.1%). On comparing Size of perforation between groups no significant difference was obtained as revealed by the insignificant p value of 0.483. However numerically, in Group A (55.6%) majority had medium size perforation and in Group B (52.8%) patients had medium size perforation.

DISCUSSION

The use of platelet-rich plasma in various branches of medical fields have given promising results in improving clinical outcome of various Surgeries. In our study, hearing improvement was significantly higher in patients who received myringoplasty with autologous platelet rich plasma (80.6%) with improvement in hearing between 10dB to 20 dB as compared to the patients who received myringoplasty only (55.6%). Similar to our results in Vignesh et al9 study showed improvement in PTA (pure-tone average) after the procedure; however, the improvement in the PRP group is more than that in the control group. The mean PTA improvement in the PRP group during the pre-operative and 3-month post-operative period is 33.63 ± 2.85 and 27.71 ± 4.22 respectively 90 whereas in the control group it was 33 ± 3.78 and 28.7 ± 4.5 in the pre- and post operative period respectively. This is in accordance with studies done by Fawzy et al.10 Hosam et al12 showed that reduction in rate of infection in the PRP group from 23 ± 4.70 in the peri-operative period and 16.50 ±6.51 in the post-operative period. In our study, Rates of infections were higher in group B (22.2%) as compared to group A (16.7%). This highlights that majority of the patients who received myringoplasty with autologous platelet rich plasma had healing without any infection. In majority of the patients group A (83.3%) healing was earlier in range of 20-30 days as compared to patients of group B which was between 31-40 days was 69.4% with statistically significant difference ($p<0.05$). In line with our findings, Vignesh et al9 study showed that the percentage of closure at 1st month and 3rd month was higher among the PRP group than the control group which was statistically significant. Near complete closure at the 1st month of the post-operative period was seen in 96.4% and 71.1% in the PRP and control group respectively. Similarly, at the 3rd month post-operative period, 86.8% and 52.6% had 100% closure in the PRP and control groups respectively.[9] A study done by Sankaranarayanan G et al13 stated that the closure in the PRP group was 72% whereas in the control group it was only 40% at the end of the 1st month. At the end of the 3rd month, the closure was 96% and 80% in the PRP group and the control group respectively, which matches the present study findings. A study done by Fouad et al[14] also proved the successful closure of the tympanic membrane in the PRP group was 85.7% higher than that in the pure myringoplasty group.

Shiomi et al. stated that irrespective of the size of the perforation, addition of platelet-rich plasma to the conventional myringoplasty technique has significantly increased the success rate of graft uptake.15 The Vignesh et al[9] study showed a significant reduction in ABG after surgery. The mean reduction of ABG in the PRP group was 8.68 ± 4.8, and the mean ABG reduction in the control group was 6.05 ± 4.05. The ABG reduction was higher among the PRP group. This is in accordance with a study done by ErsozluT 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 al16 and Shanmugam et al17 showed that the mean difference in the Airbone gap in those with PRP is 13.75 ± 5.59, which is slightly higher than the present study.[16]

In our study, on comparing the graft uptakes between groups significant difference was obtained between both the groups ($p<0.05$) However, numerically majority of the patients in group A (86.1%) had graft uptake within 1 month of treatment whereas 70.2% of the patients in group B had graft uptake by 1 month. The Vignesh et al.[9] study showed that nearly 97.4% had graft uptake at 1st month in the PRP group, which is higher than the control group, which had only 89.5% graft uptake. Similarly, at 3 months, the graft uptake was higher among the PRP group than the control group which is statistically significant.The result of the Vignesh et al.[9] study on graft uptake is in accordance with the study done by Yadav SPS et al.[20] 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.7 and Fawzy et al[10] showed a much lower success rate of 84% than the present study.

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. Sharma D et al[18] achieved 100% graft uptake rate in small perforation, 92% in medium size and 80% in large perforation in the case group. Though the study had results comparable to the present study, the correlation of graft uptake rate to the size of perforation has not been done in the present study. Another study by Taneja et al.[19] found the success rate of graft uptake was 85.3% in control group and 95.1% in PRP group. Hearing Improvements in control group was 46.3% and in PRP group was 78.0%. This study confirms addition of PRP in tympanoplasty enhances the success rate in graft uptake early healing with improvement in hearing.

CONCLUSIONS

The present study concludes that the usage of platelet-rich plasma in the conventional myringoplasty technique has improved the success rate of graft uptake and reduced the graft migration. It has also shown to accelerate the closure of tympanic membranes. The addition of PRP has also revealed greater audiological outcome in terms of air-bone gap closure, in the pure-tone audiogram. Platelet-rich plasma, an autologous serum which is rich in proteins and growth factors, helps and promotes healing with no noticeable side effects in our study. Moreover, addition of PRP has not altered the cost of the procedure significantly. In our study no complication or side effects was observed while results were comparatively better after adding PRP. We highly recommend use of PRP to improvise clinical outcomes of Tympanoplasty.

REFERENCES:

1. Ehrenfest DM, Rasmusson L, Albrektsson T. Classification of platelet concentrates: from pure platelet-rich plasma (P-PRP) to leucocyte-and platelet-rich fibrin (L-PRF). Trends in biotechnology. 2009 Mar 1;27(3):158-67.
2. Tate KS, Crane D. Platelet rich plasma grafts in musculoskeletal medicine. Journal of Prolotherapy. 2010 May;2(2):371-6.
3. Salaheldin AH, Hussein A. Effect of platelet-rich plasma on nasal mucociliary clearance after submucous diathermy of inferior turbinate. Egyptian Journal of Ear, Nose, Throat and Allied Sciences. 2012 Jul 1;13(2):71-5.
4. Cole BJ, Seroyer ST, Filardo G, Bajaj S, Fortier LA. Platelet-rich plasma: where are we now and where are we going? Sports Health, 2010; 2(3):203–210
5. Choukroun JI, Braccini F, Diss A, Giordano G, Doglioli P, Dohan DM. Influence of platelet rich fibrin (PRF) on proliferation of human preadipocytes and tympanic keratinocytes: A new opportunity in facial lipostructure (Coleman's technique) and tympanoplasty?. Revue de laryngologie-otologie-rhinologie. 2007 Jan 1;128(12):2732.
6. Khafagy YW, Elfattah AM, Moneir W, Salem EH. Leukocyte-and platelet-rich fibrin: a new graft material in endoscopic repair of spontaneous CSF leaks. European Archives of Oto-RhinoLaryngology. 2018 Sep 1;275(9):2245-52.
7. El-Anwar MW, Elnashar I, Foad YA. Platelet-rich plasma myringoplasty: a new office procedure for the repair of small tympanic membrane perforations. Ear, Nose &Throat Journal.2017;96(8):312-26. 87
8. Nair NP, Alexander A, Abhishekh B, Hegde JS, Ganesan S, Saxena SK. Safety and Efficacy of Autologous Platelet-rich Fibrin on Graft Uptake in Myringoplasty: A Randomized Controlled Trial. International archives of otorhinolaryngology. 2019 Jan;23(01):077- 82
9. Vignesh R, Coumare VN, Gopalakrishnan S and Karthikeyan P. Efcacy of autologous platelet-rich plasma on graft uptake in myringoplasty: a singleblinded randomized control trial. The Egyptian Journal of Otolaryngology (2022) 38:6.
10. Fawzy T, Hussein M, Eid S, Guindi S. Effect of adding platelet-rich plasma to fat grafts in myringoplasty. The Egyptian Journal of Otolaryngology 2018, 34:224–228.
11. Saeedi M, Ajalloueian M, Zare E, Taheri A, Yousefi J, Mirlohi SMJ et al. The effect of

PRP-enriched gelfoam on chronic tympanic membrane perforation: a double- blind randomized control trial. The International Tinnitus Journal. 2017;21(2):108- 111.
12. Hosam M, Shaker M, Aboulwafa A. effect of topical use of platelet rich fibrin in repairing center tympanic membrane perforation using the endoscopic inlay butterfly cartilage myringoplasty technique. Egypt J Otolaryngol 2017, 3: 557-563.
13. G Sankaranarayanan, V. Prithiviraj, RV Kumar. A Study On Efficacy Of Autologous Platelet Rich Plasma In Myringoplasty.Otolaryngology Online Journal, 2013;3(3).
14. Fouad YA, Abdelhady M, El-Anwar M, Merwad E. Topical platelet rich plasma versus hyaluronic acid during fat graft myringoplasty.Am J Otolaryngol. 2018;39(6):741–5.
15. Shiomi Y, Shiomi Y. Surgical outcomes of myringoplasty using platelet-rich plasma and evaluation of the outcome-associated factors. Auris Nasus Larynx. 2020;47(2):1917
16. Ebrahim AR, Fouad YA, Ali MB, El-Baz Safe.Myringoplasty of centraltympanic membrane perforation A fat graft from the ear lobule and platelet rich plasma.. Zagazig Univ Med J. 2018;24(2):143–9.
17. Shanmugam R, Gnanavelu Y, Shanmugam VU, Swaminathan B, Nivas P, Bharath I. Myringoplasty with Autologous Platelet Rich Plasma -A Prospective Study. JMSCR; 2018; 06(10):1170-117
18. Sharma D, Mohindroo S, Azad RK. Efficacy of platelet rich fibrin in myringoplasty. Int J Otorhinolaryngol Head Neck Surg. 2018;4(3):677–81.
19. Taneja M. Role of platelet rich plasma in tympanoplasty. Indian J Otolaryngol Head Neck Surg. 2020;72(2):247–50.
20. Yadav SPS, Aggarwal N, Julaha M, Goel A. Endoscope assisted myringoplasty. Singapore Med J. 2009;50(5):5102.