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Original Research Article

Effect of autologous platelet rich plasma on recovery after tonsillectomy in adult patients: a randomized controlled study

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ABSTRACT

Background: Tonsillectomy is performed more frequently in children than in adults but post-operative pain is more in adults and restricts food and water intake affecting daily activities and quality of life. Healing of fossa takes 14-21 days to complete resulting in morbidity till fossa is healed. Platelet rich plasma (PRP) is known for its healing and analgesic effects and has led to its application in various conditions. This arose curiosity regarding the efficacy of PRP in healing of mucosal wound, reducing pain after tonsillectomy in adults.
Methods: Patients above 18 years presenting with signs and symptoms of chronic tonsillitis were chosen. These patients underwent Tonsillectomy followed by topical application of PRP in a randomly selected test fossa. Patients were followed up for assessment of pain and healing of the tonsillar fossa till post-operative day 10 and the results were compared between test and control fossa in each patient.
Results: On post-operative day 10, no patient complained of moderate pain in the test side while there was moderate pain in 4 fossae in the control side limiting their daily activities, majority of test tonsillar fossae were in stage 4 and 5 of healing; whereas control fossae were still in stage 3. Further, the onset of healing of test fossae was quite early compared to control.
Conclusions: Autologous PRP being easily available and cost-effective procedure can be included in routine tonsillectomy procedure as a method to alleviate pain and promote early and accelerated healing of tonsillar fossa in adults.

Keywords: Platelet rich plasma, Tonsillectomy, Pain, Healing of tonsillar fossa

INTRODUCTION

The surgical procedure of tonsillectomy has been in practice from 2,000 years. It is routinely performed by ear, nose and throat (ENT) surgeons more frequently in children than in adults. There are variety of indications and methods of tonsillectomy, like cold steel methods or hot methods, but the complications associated with most of them remain same i.e., haemorrhage, post-operative pain, and delayed healing.

Post-operative pain varies with the indication of tonsillectomy as well as the age of patient (being more in adults than in children).[1] It is often described by patients as comparable to the pain that accompanies an acute episode of tonsillitis. There are different patterns of post-operative pain in patients undergoing tonsillectomy. This pain can restrict patient's food and water intake leading to weakness and dehydration, affecting mood, daily activities and quality of life of patient in the post-operative period. This can also cause morbidity for nearly 10-14 days.

Healing of tonsillar fossa occurs in a manner similar to any other uncovered wound i.e., by formation of granulation tissue, epithelization over it. This process takes over 14-21 days to complete resulting in morbidity of the patient till healing is complete. Platelet rich plasma (PRP) is known for its healing properties and has been widely used in

periodontal and oral surgeries, maxillofacial surgeries, orthopaedics and trauma surgeries, cosmetic and plastic surgeries, and burns treatment.[2] It has also been found that PRP has analgesic effects owing to the inflammatory mediators released by platelets which has led to its application in various clinico-pathological conditions associated with chronic pain.[3] This arouse curiosity regarding the efficacy of PRP (especially autologous PRP as it is easily available and affordable with minimal adverse reactions) in healing of mucosal wounds, in our case to fasten the process of healing of the tonsillar fossae after tonsillectomy in adults and reducing the associated morbidity.[4]

The mortality rates for tonsillectomy range from 1 in 10,000 to 1 in 35,000 with morbidity rates from 1.5 to 14%.[5] Hence, an attempt to alleviate the morbidity associated with tonsillectomy in adult patients by trying out new modalities has gained interest among otorhinolaryngologists.

Hence, the aim of the study is to assess the ability of autologous PRP in reducing the morbidity in adult Tonsillectomy patients in post-operative period in terms of pain and healing of the tonsillar fossae and thus enhancing the recovery.

METHODS

The study was conducted in the Department of Otorhinolaryngology, J. J. M. Medical College, Davangere from July 2022 to June 2024. Forty-one patients above 18 years of age presenting to ENT OPD with symptoms and signs of tonsillitis and undergoing tonsillectomy were chosen for the study. It is a randomized control study, comparative study.

Inclusion criteria

Patients of either sex, age group above 18 years, patients with signs and symptoms of chronic or recurrent tonsillitis, patients undergoing tonsillectomy for tonsillitis by dissection and snare method, and patients willing to participate in study were included.

Exclusion criteria

Exclusion criteria included patients with chronic throat pain of cause other than tonsillitis, patients with bleeding or coagulation disorders, immunodeficiency, sickle cell disease, craniofacial syndrome, cleft palate, suspected malignancy, peritonsillar abscess, spine surgeries, TMJ arthralgia, cervical vertebral pathology, patients undergoing tonsillectomy for indications other than tonsillitis, patients undergoing tonsillectomy by techniques other than dissection and snare method, patients undergoing tonsillectomy as a part of other surgery, patients not fit for surgery, patients with uncontrolled systemic disorders, and patients not consenting for the study.

All patients were subjected to routine ENT history taking, ENT examination and blood investigations pre-operatively.

Autologous PRP was prepared in 2 stages by centrifugation technique. About 10 ml of venous blood was collected in citrate dextrose vacutainer three hours before surgery and centrifuged at 1500 rpm for 15 minutes. A layer of buffy coat formed was aspirated and centrifuged again at 3000 rpm for 15 min to get PRP (Figure 1).

Figure 1: Platelet rich plasma.

The patients underwent tonsillectomy by dissection and snare method. 1 ml of platelet rich plasma was applied topically using cotton swab in one randomly chosen tonsillar fossa for 5 mins. Care was taken to refrain from using of suction catheter in tonsillar fossae during extubation of patient.

Post-operative pain was self-assessed separately for each tonsillar fossae by the patient every morning before taking pain medication, using visual analogue scale (VAS) from post-operative day 1 to 10 and noted down in the VAS pain assessment form. The VAS pain score of 0 was taken as no pain, 1-4 as mild pain, 5-7 as moderate pain and 8-10 as severe pain.

Healing was assessed by direct visualization based on percentage of healing of tonsillar fossae on post-operative day 1, 5 and 10.

The process of healing was staged according to appearance of tonsillar fossae as stage 1-completely covered with fibrin, stage 2-beginning of epithelisation (epithelia covering <30%), stage 3-semi-epithelised (epithelia covering 30-75%), stage 4-almost complete epithelisation (>75%), and stage 5-completely epithelised.[6]

RESULTS

The mean age of patients in our study group was 26.46 years (Table 1). Post-operative pain and healing of fossae were analyzed and compared between test side and control side on day 1, day 5 and day 10 of surgery.

On post-operative day 1, stage 1 healing was observed in 14 test fossae and stage 2 healing was observed in 27 test

fossae; whereas 39 control fossae were in stage 1 of healing with only 2 control fossae in stage 2 healing. The median was 2 in test side and 1 in control side and p value <0.001 which was statistically significant. By post-operative day 5, 5 test fossae and 36 test fossae were in stage 2 and stage 3 healing respectively with p value <0.001 which was statistically significant. On post-operative day 10, 6, 21 and 14 test fossae were in stage 3, 4 and 5 respectively; whereas 3, 33 and 5 control fossae were in stage 2, 3 and 4 respectively with none of control fossae in stage 5 healing (Figure 2).

Table 1: Descriptive statistics for age in the study.

Variable	Mini-mum	Maxi-mum	Mean	Standard deviation
Age (in years)	18	40	26.46	5.823

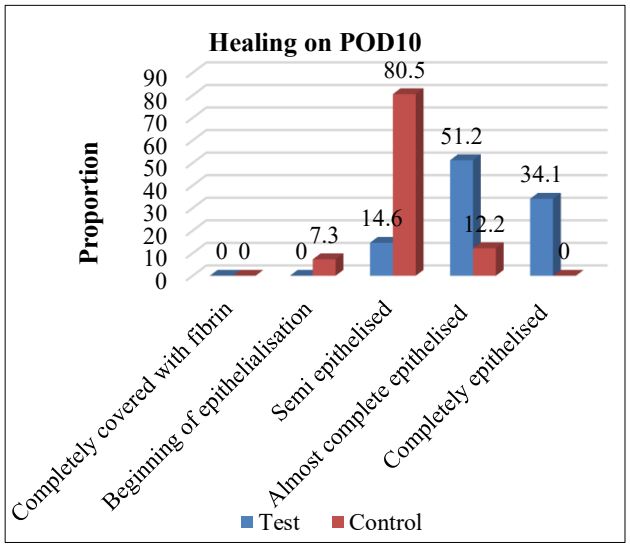

Figure 2: Comparison of proportion of patients with each healing score between test and control sides on post-operative day 10.

Complete or almost complete epithelialization was seen in significantly greater number of fossae in the test side on day 10. Statistically significant changes in the healing of the tonsillar fossae were witnessed on day 5 and day 10 post tonsillectomy similar to study by Kara et al which was the first study to evaluate effect of autologous serum on healing of tonsillar fossa.[6]

In comparison with the study conducted by Stoeckli et al where all wounds healed without complication within 14 days, our study showed early healing of the tonsillar fossae with majority fossae in test side being in stage 4 and 5.[7]

Severity of pain was observed to be significantly greater in the control side on post-operative day 1. 4 (9.8%), 24 (58.5%), 12 (29.3%) and 1 (2.4%) fossa on test side were in no pain, mild, moderate and severe pain respectively i.e., majority of test side having only mild pain.

17 (41.5%), 21 (51.2%) and 3 (7.3%) test side had no pain, mild and moderate pain respectively on post-operative day 5. 1 (2.4%), 8 (19.5%), 30 (73.2%) and 2 (4.9%) control side had no, mild, moderate and severe pain respectively on post-operative day 5.

Most of the patients had no pain in the test side on post-operative day 10; majority had mild pain in the control side on post-operative day 10 (Figure 3). No patient complained of moderate pain in fossae in the test side while 4 fossae in the control side still had moderate pain limiting their daily activities.

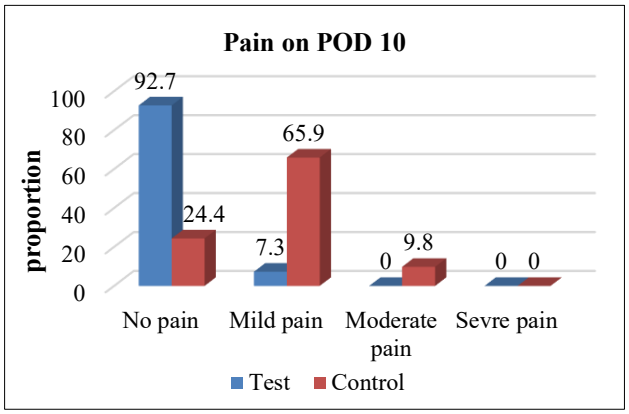

Figure 3: Comparison of patients with each post-operative pain score between test and control sides on post-operative day 10.

Table 2: Distribution of gender in the study.

Gender	N	%
Male	7	17.1
Female	34	82.9

The VAS score was consistently low in the test side compared to the control side. There was statistically significant decrease in post-tonsillectomy pain by day 5 ($p<0.05$) with only 3 test side fossae having moderate pain compared to 30 fossae in the control side having moderate pain and 2 fossae developing severe pain by post-operative day 5.

The study conducted by Kütük and Özdaş observed a significant decrease in pain was observed up to 10 days post-tonsillectomy. Our study too had comparable results with only 3 fossae in the test side having mild pain whereas 27 fossae and 4 fossae on control side still had mild and moderate pain respectively on post-operative day 10 showing that patients were significantly relieved of pain by post-operative day 10.[8]

The study by Stoeckli et al reported a presence of significant of pain in patients till post-operative day 7 followed by a significant reduction. In our study, there was early reduction in pain in the sides where PRP was applied

topically compared to the control side where significant pain was present even after post-operative day 10.[7]

DISCUSSION

This study was comprised of 41 patients diagnosed with chronic tonsillitis aged between 18-40 years of age. There were 7 male patients (17.1%) and 34 female patients (82.9%) (Table 2). In comparison to the study conducted by MN. Chettri et al which comprised 36 subjects (20 (55.6%) male and 16 (44.4%) females.[9]

Tonsillar fossa side selection was randomised, with blinding of the principal investigator who collected the data. The test side was on the right in 21 patients (approx. 50%) and the left side was the control. The test side was on left in 20 patients (approximately 50 %) and the right side was the control. This is similar to the study conducted by Chettri et al where test side was on the right in 18 cases (50 per cent) and on the left in 18 cases (50%).[9]

All patients diagnosed with chronic tonsillitis had presented with chief complains of throat pain. Minimum duration of throat pain in our study was 0.5 years and the maximum duration was 10 years with a mean of 2.2 years.

All patients underwent thorough ENT examination and the enlargement of tonsils were graded as per Brodsky's grading scale. 3 patients (7.3%) had grade 1 tonsils, 21 patients (51.2%) had grade 2 tonsils, 16 patients (39%) had grade 3 tonsils and 1 patient (2.4%) had grade 4 tonsils. Grade 2 tonsils were prominent in our study similar to the study by Kara et al whereas grade 3 tonsillar enlargement was predominant in study conducted by Nanditha et al.[6,10]

All patients underwent tonsillectomy by dissection and snare method and post-operative pain and healing of fossae were analyzed and compared between test side and control side on day 1, day 5 and day 10 of surgery.

On post-operative day 1, stage 1 healing was observed in 14 test fossae (34.1%) and stage 2 healing was observed in 27 test fossae (65.9%); whereas 39 control fossae (95,1%) were in stage 1 of healing with only 2 control fossae (4.9%) in stage 2 healing. The median was 2 in test side and 1 in control side.

By post-operative day 5, 5 test fossae (12.2%) and 36 test fossae (87.8%) were in stage 2 and stage 3 healing respectively. Similar to study conducted by Kara et al where most of the test fossae were in stage 3 healing by post-operative day 5. 10 control fossae (24.4%), 28 control fossae (68.3%) and 3 control fossae (7.3%) were in stage 1, 2 and 3 respectively similar to study by Kara et al, where most of the control fossae were in stage 2 by post-operative day 5.[6] The number of fossae with semi epithelialisation was significantly greater in test side, while in most of them in control side beginning of epithelialisation was seen on day 5.[6]

On post-operative day 10, 6 (14.6%), 21 (51.2%) and 14 (34.1%) test fossae were in stage 3, 4 and 5 respectively; whereas 3 (7.3%), 33 (80.5%) and 5 (12.2%) control fossae were in stage 2, 3 and 4 respectively with none of control fossae in stage 5 healing. Complete or almost complete epithelialisation was seen in significantly greater number of fossae in the test side on day 10. Statistically significant changes in the healing of the tonsillar fossae were witnessed on day 5 and day 10 post tonsillectomy similar to study by Kara et al which was the first study to evaluate effect of autologous serum on healing of tonsillar fossa.[6]

In comparison with the study conducted by Stoeckli et al where all wounds healed without complication within 14 days, our study showed early healing of the tonsillar fossae with majority fossae in test side being in stage 4 and 5. There were no post-operative complications in our study.[7]

Severity of pain was observed to be significantly greater in the control side on post-operative day 1. 4 (9.8%), 24 (58.5%), 12 (29.3%) and 1 (2.4%) fossa on test side were in no pain, mild, moderate and severe pain respectively i.e., majority of test side having only mild pain. This was similar to the study done by Chettri et al where the maximum pain score was 3 i.e., mild pain on the test side on post-operative day 1. 3 (7.3%), 19 (46.3%), 19 (46.3%) of control fossae had no pain, mild and moderate pain respectively on post-operative day 1 i.e., majority of control side having mild or moderate pain. Whereas, in the study conducted by Chettri et al the maximum pain score of 4 i.e., mild pain on the control side was observed on post-operative day 1.[9] 17 (41.5%), 21 (51.2%) and 3 (7.3%) test side had no pain, mild and moderate pain respectively on post-operative day 5. 1 (2.4%), 8 (19.5%), 30 (73.2%) and 2 (4.9%) control side had no, mild, moderate and severe pain respectively on post-operative day 5. Severity of pain was significantly greater in the control side on post-operative day 5, with pain being absent in many fossae of test side. The results being similar to those obtained in study by Kara et al.[6]

Further, the test side showed accelerated healing where most of the test fossae were in stage 3 healing by post-operative day 5 while the control fossae were in still in stage 2. Complete or almost complete epithelialization was seen in significantly greater number of fossae in the test side by day 10.

Limitations

The parameters in the study like pain and healing were compared between the 2 fossae of individual patients. These parameters may vary when compared among different individuals due to presence of other factors (e.g. associated comorbidities).

CONCLUSION

Adult tonsillectomy is associated with significant post-operative pain interfering daily activities leading to

delayed return to normal day to day activities. Topical application of platelet rich plasma to the tonsillar fossa was observed to be effective in reducing the post-operative pain, and thus the morbidity. PRP also provided the added benefit of early healing of the tonsillar fossa. Furthermore, there are studies which showed the use of PRP reduced the risk of hemorrhage, post-operative complications and need for post-operative analgesics. Autologous PRP being easily available and cost-effective procedure can thus be included in routine tonsillectomy procedure as a method to alleviate pain, accelerate healing and enhanced recovery of the patients.

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