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Role of platelet rich plasma injection in Non-union of shaft tibia.

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Abstract

Non union of tibia accounts to be 2-10%. According to study done by Zura et al overall tibial non-union rate of 7.37%. This study was prospective clinical study. It is based on 15 cases of fracture shaft of tibia treated with interlocking nail and underwent to non-union and was treated with platelet rich plasma injection at fracture site. . In this study 12 patients out of 15 underwent union(80%) when evaluated at 24 weeks . this study showed that platelet rich plasma injection is safe, effective and low cost treatment for delayed and non-union of shaft of tibia.

Keywords –Non-union shaft of tibia, interlocking nail, PRP injection.

Introduction

Fractures of the shaft of tibia account for approximately 16.9/100,000 population with a bimodal distribution of peaks at ages 20 and 50 (1). If fracture of shaft of tibia not unite by the 16 weeks is called as delayed union and if does not unite by 6-9 months than it is called as non-union. Non union of tibia accounts to be 2-10%. According to study done by Zura et al overall tibial non-union rate of 7.37%(2).Various methods are available for treatment of non-union of tibia. From the previous studies we know platelet rich plasma have various growth factors which may help in union of fractures In this study we are trying to extend role of platelet rich plasma in fracture union and evaluating the role of platelet rich plasma injection in treatment of non-union tibia.

Material and methods

The study was prospective clinical study. It is based on 15 cases of fracture shaft of tibia treated with interlocking nail and underwent to non-union from January 2016 to June 2018 . Out of 15 cases 12 were closed fracture where as 3 were compound grade I .Patients which were included in the study was fracture shaft of tibia which were treated with interlocking nail and underwent to non-union. The other options had tried, like dynamisation of nail was done but no callus formation seen in subsequent follow-up x ray. Fracture with established infection, fracture of grade II or higher grade of compounding other systemic disease such as diabetes, imuno compromise patients were not included in the study. After taking written and informed consent to be included in study, in every patient 3 shots of 10ml platelet rich plasma is injected at fracture site at the interval of 3 weeks. For preparations of platelet rich plasma 100 ml of blood centrifuged twice. In first spin whole blood was centrifuged at 1500 rpm for 10 minutes, this results in formation of three layers (a bottom layer composed of RBC , an upper layer composed of plasma, platelets and some WBC, intermediate layer composed of mostly WBC). The upper layer was collected and in second spin, underwent another centrifugation at 3400 rpm for 15 minutes to concentrate the platelets which result in 10-12 ml of platelet rich plasma .After the injection the patients were observed for any complications . After injection 650 mg of Paracetamol and 500 mg of

ciprofloxacin were given orally two times a day for one day. Patient were followed at interval of 6 weeks ,12 weeks,24weeks and up to one year. Every patient were followed for minimum for 1 year and accessed for radiological and clinical sign of union and complications if any. We uses modified RUST scoring system for access the union.

Results

Mean age of patient is 34.4 with range of 18-60 years. Majority of patients were male 12 as compare to 3 were female. 9 patients were with right tibia non-union and 6 patients with left tibia. Mean duration between the primary surgery and diagnosis of delayed union and PRP injection was 4.2 months. In this study 12 patients out of 15 underwent union (80 %) when evaluated at 24 weeks, 2 patients were not united and underwent revision surgery with open reduction and internal fixation with thick nail and bone grafting and finally united. One patient lost in follow-up. No complications were seen in any patients in our study.

Discussion

The autologous bone grafting is the gold slandered in the treatment of non-unions. Cancellous grafts taken from the iliac crest have osteogenic, osteoinductive and osteoconductive properties. They are widely used as the gold standard compared to other grafts (3,4).Although it is gold standard but it is not free from complications like such as infection, haematoma, serous discharge, postoperative pain, and loss of sensation. Two separate studies have reported major complication rates of 2.4% and 8.6% (5,6). With previous study we know Platelet rich plasma contains platelet derived growth factor(PDGF), vascular endothelial growth factor (VEGF), epidermal growth factor (EGF), fi broblast growth factor (FGF) and trans-forming growth factor (TGF-b1,TGF-b2) which are responsible for repair and granulation tissue formation in human body (7) and this may help in union of fracture.Our study showed the similar result. The PRP injections can also be used at places where skin condition is not very good and operative intervention is not possible. In a study by Bielecki et al. (8) of a single dose application of PRP to 32 cases of delayed and non-union, results were reported of union in all the delayed union group and in 65% of the non- -union group. Griffin et al. (9) reviewed the use of PRP in clinical studies and reported that PRP use was safe but no clinical evidence was shown of benefit in acute or delayed fracture union. Our study showed that role of PRP in delayed union and non-union is very promising with union rate of 80%. No complications were seen in any patient in the current study. The limitations of this study are that there was no control group, the number of patients was low and the follow-up period was short.

Summary

Non-union shaft of tibia is a commonly seen and it can be treated with PRP injection at fracture site.

Conclusion

We conclude that platelet rich plasma injection is safe, effective and low cost treatment for delayed and non-union of shaft of tibia. It can be used where skin condition is not favourable for surgical intervention.

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Legends Figure

Figure 1: Clinical picture of patient showing skin condition .

Figure 2 -Showing non-union at fracture site before PRP Injection.

Figure 3 -Callus formation after PRP Injection.

Figure 4 -Union of fracture after PRP Injection.

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