Osteochondritis dissecans—Does platelet rich plasma really help

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ABSTRACT

Osteochondritis dissecans is a common disorder of knee and can be treated by various methods, depending on age of patient and stability of chondral fragment. In Osteochondritis dissecans ICRS type III lesion i.e. articular cartilage discontinuity but no dislocation, variable rate of union as well as high rate of non-union was observed in previous studies when treated with arthroscopic or open reduction and fixation. In previous study it has been also shown that platelet rich plasma help in fracture healing. In this study we are trying to extend the benefit of platelet rich plasma to Osteochondritis dissecans lesion. We took six patients with OCD, ICRS scale of OCD type III lesion. All Patients were operated Arthroscopically. Chondral flap of OCD lesion were fixed with stainless steel cannulated cancellous screw. To enhance union we used platelet rich plasma injections. We assess the union of chondral fragment to parent bone and knee function. Chondral fragment united to parent bone in all patients. To access knee function we used Tegner- Lysholm knee scoring system, in this study preoperatively score was 52.8 where as postoperatively it was 91.8. This study showed PRP is helpful in healing of chondral flap as all the chondral flap of osteochondral lesion united in this study.

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1. Introduction

Osteochondritis dissecans is a common disorder of knee, which results in knee pain and functional impairment of children, adolescent or adult individuals. Its etiology is not clearly understood, but it is thought that, it is a result of ischemia of a localised area of subchondral bone precipitated by infraction, trauma or other cause. As subchondral bone become avascular it results in articular cartilage lesion in form of undisplaced lesion, partially or completely displaced lesion.

Osteochondritis dissecans can be treated, depending on age of patient and stability of chondral fragment. If the lesion is stable and physis is open conservative treatment is done, whereas if lesion is stable and physis is closed multiple drilling is preferred. If lesion is unstable and non salvageable, osteochondral autograft transplant (OATS), Autologous chondrocyte implantation (ACI) or osteochondral allografting can be done depending on size of lesion and demand of patient. If the lesion is unstable and salvageable arthroscopic or open reduction and fixation is done. For the

fixation bioabsorbable nails, pins can be used or nonbioabsorbable screws may be used. Increased non-union rates, up to 33 %, have also been reported with bioabsorbable devices¹. Weckstrom et al.² found significantly better radiographic and functional outcomes in patients arthroscopically treated with bioabsorbable nails (73 % healing), as compared with bioabsorbable pins (35 % healing). In previous study it has been also shown that platelet rich plasma help in fracture healing. We are trying to extend the benefit of platelet rich plasma to Osteochondritis dissecans lesion in this study. Considering variable rate of union and high rate of non-union in fixation of osteochondral fragment, we did the study in patients with osteochondritis dissecans with unstable but salvageable fragment (Type III) lesion of ICRS (International cartilage repair society) scale³ for OCD (Osteochondritis dissecans) lesion, in which chondral fragment was fixed arthroscopically with cannulated cancellous screw and PRP (platelet rich plasma) was injected to knee to enhance the union. The union of chondral fragment and knee function was assessed (Figs. 1–8).

2. Material and methods

The patients who presented to our institute from January 2014 to January 2017 with osteochondritis dissecans and met the inclusion criteria were included in the study. Inclusion criteria was patients with age 15–40 years, with osteochondritis dissecans

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Fig. 1. Coronal section of MRI showing Osteochondritis dissecans lesion preoperatively.

lesion on medial or lateral femoral condyle, ICRS scale of OCD type III lesion i.e. lesion with articular cartilage discontinuity but no dislocation (dead in-situ). Those with multiple lesions, ICRS scale of OCD type I, II or IV, multiple loose fragment in joint or some other cartilage involving disease were excluded from study. In all patients preoperative MRI done to evaluate the lesion.

Fig. 2. Sagittal section of MRI showing Osteochondritis dissecans lesion preoperatively.

Fig. 3. Showing intraoperative picture of Osteochondritis dissecans lesion.

Patients were operated Arthroscopically. In all patients diagnostic arthroscopy done, lesion defined, flap were displaced one side, debridement done with help of shaver, multiple drill hole done till subchondral area reached. Flap was repositioned to the defect, fixed with 2–3 guide-wire, after drilling one or two, stainless steel cannulated cancellous screw placed over guide wire to fix the chondral flap. Utmost care was taken to countersink the screw in flap to prevent future complications.

Postoperatively, patients were kept on range of motion brace. Stitches were removed at 12th postoperative day. After stitch removal, 8–10 ml platelet rich plasma prepared from blood bank and injected in operated knee joint, Three times at interval of three weeks. For preparation of platelet rich plasma 100 ml of venous blood was centrifuged twice. In first spin whole blood was

Fig. 4. Intraoperative picture showing debridement of Osteochondritis dissecans lesion.

Fig. 5. Intraoperative picture showing Osteochondritis dissecans lesion primary fixation by guide wires.

centrifuged at 1500 rpm for 10 min, 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 of WBCs). The upper layer was collected and in second spin, underwent another centrifugation at 3400 rpm for 15 min to concentrate the platelets which results in 8–10 ml of platelet rich plasma. Isometric exercises started in immediate postoperative period. Patients were followed at 3, 6, 9 weeks and then after every month till union was achieved. Operated limb was kept non weight bearing for 10 weeks. Weight bearing allowed

Fig. 6. Intraoperative picture showing Osteochondritis dissecans lesion after final fixation.

when sign of union were present. CT scan was used to assess the union of chondral fragment to parent bone. Tegner and Lysholm knee scoring scale⁴ used to assess knee function preoperatively and postoperatively.

3. Results

Six patients were included in this study. Average age of patients in our study was 21.1 years. Most patients were male (4 male and 2 female). The average area of defect in cartilage is of 2.95 cm² and mainly on medial femoral condyle. Chondral fragment united to parent bone in all patients. Average time of union was 4 months in our study. To assess knee function we used Tegner- Lysholm knee scoring system in this study preoperatively score was 52.8 where

Fig. 7. X ray AP and Lateral view after healing of Osteochondritis dissecans lesion.

Fig. 8. CT scan showing healing of Osteochondritis dissecans lesion.

as postoperatively it was 91.8. None of the patient require implant removal due to any complication. In three patients recurrent swelling and pain were noted on operated limb but it disappears after taking anti-inflammatory medications.

4. Discussion

Treatment options for Osteochondritis dissecans are conservative, multiple drilling, arthroscopic or open reduction and fixation, osteochondral autograft transplant (OATS), Autologous chondrocyte implantation (ACI) or osteochondral allografting depending on age, size and grading of lesion. In this study we took lesion with articular cartilage discontinuity but no dislocation i.e. ICRS scale of

OCD type III lesion, For type III lesion fixation of fragment is considered best option. There are various options for fixation for Osteochondritis dissecans lesion ranging from metal screws, pin, staples various types of bioabsorbable pins and screws.

Variable rate of union as well as high rate of non-union was observed in previous studies. Millington et al.¹ performed surgery on patients having an average age of 19 years (range, 14–39 years) using various absorbable internal fixtures such as pins and screws. Among the 18 patients that were able to be followed for an average of 59 months, six patients (33.3%) showed union failures and complications such as a vitreous body within the joint. Larsen et al.⁵ reported that internal fixation was performed using 2–3 bioabsorbable screws through arthrotomy for seven patients with an average age of 25.6 year (range, 17–46 years). At an average follow-up of 2.6 years, six patients out of seven (85.7%) showed satisfactory results clinically and radiologically, and one showed a nonunion requiring removal of the vitreous body from the joint.

Considering variable rate of union as well as high rate of non-union in osteochondritis dissecans lesion we thought we should add some factor which enhance union of osteochondral lesion. We know Platelet rich plasma contains platelet derived growth factor (PDGF), vascular endothelial growth factor (VEGF), epidermal growth factor (EGF), fibroblast growth factor (FGF) and transforming growth factor (TGF- β 1, TGF- β 2) which are responsible for repair and granulation tissue formation in human body⁶. Previous studies has shown that platelet rich plasma injection are effective in treating non-union of long bones⁷. So in this study chondral flap of ICRS scale of OCD type III lesion were fix with cannulated cancellous screw and to enhance union platelet rich plasma injection were used. when we compare results of our study with previous studies(i.e. Millington et al.¹ showed 33.3% union failure whereas Larsen et al.⁵ 15.3% union failure) our study showed 100% union of chondral fragment. Hence this study showed PRP is helpful in union of chondral flap. The limitation of study was only Six patients were included in this study this is because we took only ICRS scale of OCD type III lesion patients and we use stainless steel cannulated cancellous screw which interfere in post operative MRI, if required. The future study is required, comparing union of chondral flap of OCD lesion after fixation, with and without PRP.

Conflict of interest

There is no potential conflicts of interest relevant to this article and no funding has been provided for the research.

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