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Osteochondritis Dessicans- Primary Fixation using Bioabsorbable Implants

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Abstract

Introduction: Osteochondritis dessicans (OCD) is a localized condition where a section of articular cartilage and underlying subchondral bone separate from the joint surface. It is important to diagnose unstable OCD early and fix the fragments primarily as the results of any surgical management at late presentations are guarded. Use of bioabsorbable implants for fixing OCD is recent and we report one such case in grade IV OCD.

Case Report: We present a 14 year old girl who came with a history of acute pain, swelling, inability to bear weight on the right knee following a dance practice. MRI showed stage IV osteochondral fragment measuring 20x 8mm lying free. This was primarily fixed with bioabsorbable implants. 10 months follow up showed excellent clinical and functional results.

Conclusion: This case highlights the advantages of early primary fixation whenever possible. By far, to our knowledge, this is the first case of successful treatment of stage IV OCD using bioabsorbable implants.

Keywords: Osteochondritis Dessicans, bioabsorbable implants, osteochondral fractures, adolescent knee injuries, arthroscopy.

Introduction

Osteochondritis Dessicans (OCD) is a localized condition where a section of articular cartilage and underlying subchondral bone separate from the joint surface. If this involves a weight bearing area it can progress to degenerative joint disease. The condition is found primarily in the knee, ankle and elbow joints. The knee is the most commonly affected, being involved in nearly 75% of cases [1, 2].

They are overuse injuries resulting from repetitive micro trauma. In children, they are seen in athletically active adolescents and 50-80% is seen on poster lateral aspect of medial femoral condyle. 15-20% of the times it is seen on lateral femoral condyle. Repeated stress and altered vascularity of subchondral bone result in localized osteonecrosis. This progresses through the stages of instability, nonunion and fragment separation[3,4].

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Acute osteochondral fractures differ from OCD lesions in that they result from single traumatic event. The vascularity is intact and 60-70% of the lesions are in the medial patellar facet. Recent papers report treatment of OCD by internal fixation using bioabsorbable implants [5-9]. Review of literature have shown few papers of stage 1,2 and 3 lesions of OCD being fixed primarily but this would probably be the first case of stage 4 lesion being fixed primarily by bioabsorbable implants

Case Report

A 14 year old girl who presented with history of acute pain, swelling, inability to bear weight on the right knee following a dance practice. Clinically she had a hemarthrosis and restricted movement of the knee. Radiograph revealed a loose body in the lateral gutter and MRI/CT confirmed that it was an osteochondral fragment measuring around 20 x 8mm from weight bearing area of lateral condyle femur (Fig.1 &2).

Considering the age of the patient, size of the fragment and weight bearing area, it was decided to do an open reduction and internal fixation with bioabsorbable implants[10,11].

Arthroscopy was done 9th day after injury and the large defect on the femoral lateral condyle identified. The

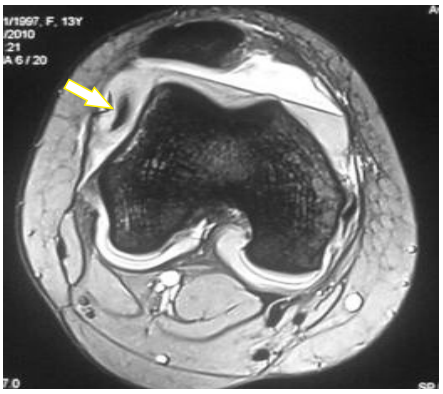

Figure1: MRI Scan of knee showing a small loose body in the lateral gutter (Arrow)

Figure 2: CT scan showing an osteochondral defect in the weight bearing area of lateral femoral condyle

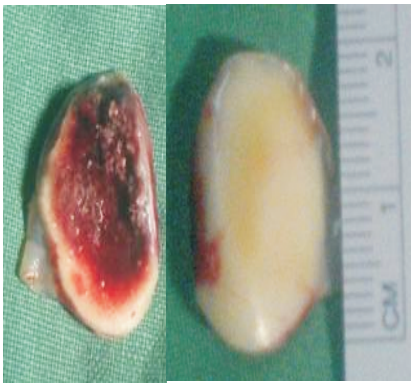

Figure 3: Osteochondral fragment measuring 20x 8mm

loose fragment was found in the lateral gutter. According to both Guhl's classification[12] and Ewing and Voto classification [13] this was a stage IV lesion. It measured 20 x 8mm and consisted of smooth articular cartilage and subchondral bone (Fig. 3). The cartilage was mildly frayed at the edges on one side but the surface looked smooth but pale. This was fixed back to the defect through mini arthrotomy. The raw area was curetted and prepared to accept the osteochondral fragment. A K-wire was used for temporary fixation of fragment. C-arm was not used as the lesion was visible through the arthrotomy incision. 1.5mm bioabsorbable pin and a 2mm bioabsorbable cortical screw were used to securely fix the fragment. The child was kept non weight bearing for 6 weeks.

Static Quadriceps exercises were started immediately post-surgery in cylinder cast. The cast was removed after 6 weeks and gentle active and passive knee mobilization was initiated. With this physiotherapy, full range of pain free movements was achieved by 10 weeks post-op. CT scan at the end of 9 months showed good alignment and fixation of the fragment (Fig. 4) and the child resumed dancing by 12 months post-surgery.

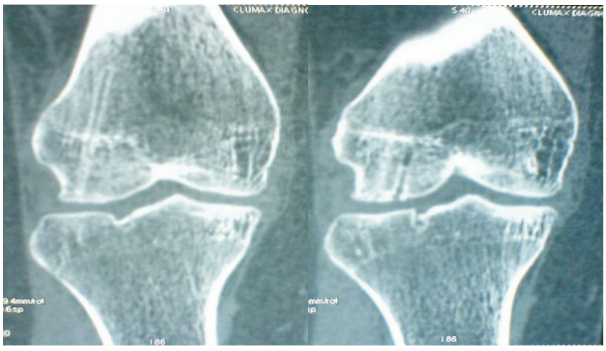

Figure 4: CT scan at 9 months post-op shows good union of OCD fragment

Discussion

OCD in adults could be the result of undiagnosed, untreated or conservatively treated juvenile onset osteochondritis. Cahill et al has shown that conservative treatment has failed in 40 out of 92 patients of juvenile OCD [14]. The long term results of conservative or excision of fragments of lateral condyle end up with grade 2 or 3 OA at average follow up of 13 years[15].

Many treatments have been tried for OCD, including removal of the fragment [16], drilling [17-19]and curettage of the crater, Microfracture, replacement of the native fragment with internal fixation, allograft replacement, autograft replacement and autologous chondrocyte transplantation [20].

The treatment of OCD lesions of the knee differ according to the fragment type and age of the patient. Stable lesions in skeletally immature patients are treated with conservative management with good result [21]. Drilling alone resulted in 50% improvement rate in adult form although much better results are reported in children [19,22]. The autologous cartilage transplant technique used in the treatment of OCD lesions has gained great popularity in recent years. This technique is a cartilage transfer method, which increases subchondral bone vascularization that helps the recovery of OCD lesion [23]. Autologous chondrocyte implantation with or without bone grafting has been used with good success rate [20,24,25]. However the technique is done only in few selected centres backed by culture laboratory and is expensive.

Pascual-Garrido et al reported 88% cell viability in

detached osteochondral fragments in OCD, thus supporting internal fixation as a good option [26]. Smilie et al introduced the fixation method using wires [27], which was followed by other fixation methods like screws, Herbert screw or Wagner procedure [28]. Herbert screws have shown 93% successful results however the disadvantage is requirement of a second surgery for implant removal [29].

Bioabsorbable pins have been used with good success rate [5-7]. Problems with these smooth pins are high rate of backout and lack of compression and stability [6]. Two kind of threaded devices have been reported to be used for OCD in young children. Tabaddor et al reported use of Threaded bioabsorbable device called "Smart nail' and reported good outcome in 22 of 24 patients [8]. Camathias et al in recent study reported used of partially threaded bioabsorbable screws with good results in 12 of 13 patients [9]. Thus good results are reported with use of bioabsorbable screws in OCD in children. However both these studies focused on lesion less than stage IV. In study by Tabaddor et al there was one case with grade IV lesion, however this case showed no healing and required repeat surgery with chondrocyte implantation. They did not recommend bioabsorbable fixation for stage IV lesions and suggested use of metal screws for the same. In study by Camathias et al [9] stage IV lesions were excluded from the study probably based on recommendations of Tabaddor et al [8]. Thus in this sense our report is first report of successful treatment of stage IV lesion with partially threaded bioabsorbable screw in a skeletally immature patient. This was possibly because of early presentation, prompt diagnosis, immediate surgical intervention and an adequate stable fixation achieved by use of a combination of screw and a pin. We feel adequate fixation is the key and more than one implant can be used if fixation is not stable. Also combination of screw and pin can accommodate for lack of compression by smooth pin and achieve a better fixation. Again in our follow up no complications like screw or pin back out, breakage, or synovitis were encountered. We found bioabsorbable implants to be safe and gives successful result in our case of stage IV OCD.

Conclusion

Internal fixation is a good option for acute OCD even in cases with completely dislodged fragment. Use of bio screw can attain good healing and has advantage of not requiring second surgery for implant removal.

Clinical Message

Early fixation of free floating fragment of Osteochondritis Dessicans using bioabsorbable screws achieved good clinical and functional result in our case.

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References

1.O'Connor MA, Palaniappan M, Khan N, Bruce CE. Osteochondritis dissecans of the knee in children. A comparison of MRI and arthroscopic findings. J Bone Joint Surg Br. 2002 Mar;84(2):258-62.

2. Schenck RC Jr, Goodnight JM. Osteochondritis dissecans. J Bone Joint Surg Am. 1996 Mar;78(3):439-56.

3.Aichroth P. Osteochondral fractures and their relationship to osteochondritis dissecans of the knee. An experimental study in animals. J Bone Joint Surg Br. 1971 Aug;53(3):448-54.

4.Zywiel MG, McGrath MS, Seyler TM, Marker DR, Bonutti PM, Mont MA. Osteonecrosis of the knee: a review of three disorders. Orthop Clin North Am. 2009 Apr;40(2):193-211.

5. Din R, Annear P, Scaddan J. Internal fixation of undisplaced lesions of osteochondritis dissecans in the knee. J Bone Joint Surg Br 2006; 88:900–904.

6. Weckstrom M, Parviainen M, Kiuru MJ, Mattila VM, Pihlajama¨ki HK. Comparison of bioabsorbable pins and nails in the fixation of adult osteochondritis dissecans fragments of the knee: an outcome of 30 knees. Am J Sports Med 2007; 35:1467–1476.

7. Matsusue Y, Nakamura T, Suzuki S, Iwasaki R. Biodegradable pin fixation of osteochondral fragments of the knee. Clin Orthop Relat Res 1996; 322:166–173

8. Tabaddor RR, Banffy MB, Andersen JS, McFeely E, Ogunwole O, Micheli LJ, Kocher MS. Fixation of juvenile osteochondritis dissecans lesions of the knee using poly 96L/4D-lactide copolymer bioabsorbable implants. J Pediatr Orthop. 2010 Jan-Feb;30(1):14-20.

9. Camathias C, Festring JD, Gaston MS. Bioabsorbable lag screw fixation of knee osteochondritis dissecans in the skeletally immature. J Pediatr Orthop B. 2011 Mar;20(2):74-80.

10. Dervin GF, Keene GC, Chissell HR. Biodegradable rods in adult osteochondritis dissecans of the knee. Clin Orthop 1998;356:213-21.

11. Din R, Annear P, Scaddan J. Internal fixation of undisplaced lesions of osteochondritis dissecans in the knee. J Bone Joint Surg Br. 2006 Jul;88(7):900-4.

12. Guhl JF. Arthroscopic treatment of osteochondritis dissecans Clin Orthop Relat Res. 1982;167:65–74

13.Ewing JW, Voto SJ. Arthroscopic surgical management of osteochondritis dissecans of the knee. Arthroscopy. 1988;4(1):37-40.

14.Cahill BR, Phillips MR, Navarro R: The results of conservative management of juvenile osteochondritis dissecans using joint scintigraphy. A prospective study. Am J Sports Med 17:601406, 1989.

15. Twyman RS, Desai K, Aichroth PM. Osteochondritis dissecans of the knee. A long-term study. J Bone Joint Surg Br. 1991 May;73(3):461-4.

16.Aglietti P, Ciardullo A, Giron F, Ponteggia F. Results of arthroscopic excision

of the fragment in the treatment of osteochondritis dissecans of the knee. Arthroscopy 2001:17:741-6.

17.Aglietti P, Buzzi R, Bassi PB, Fioriti M. Arthroscopic drilling in juvenile osteochondritis dissecans of the medial femoral condyle. Arthroscopy 1994;10:286-91

18.Kocher MS, Micheli LJ, Yaniv M, Zurakowski D, Ames A, Adrignolo AA. Functional and radiographic outcomes of juvenile osteochondritis dissecans of the knee treated with transarticular arthroscopic drilling. Am J Sports Med 2001;29:562-72

19.Boughanem J, Riaz R, Patel RM, Sarwark JF. Functional and radiographic outcomes of juvenile osteochondritis dissecans of the knee treated with extra-articular retrograde drilling. Am J Sports Med. 2011 Oct;39(10):2212-7.

20.Peterson L, Minas T, Brittberg M, Lindahl A. Treatment of osteochondritis dissecans of the knee with autologous chondrocyte implantation: results at two to ten years. J Bone Joint Surg [Am] 2003;85-A(Suppl 2):17-24

21.Detterline AJ, Goldstein JL, Rue JP, Bach BR Jr. Evaluation and treatment of osteochondritis dissecans lesions of the knee. J Knee Surg. 2008;21(2):106-115.

22. Edmonds EW, Albright J, Bastrom T, Chambers HG. Outcomes of extra-articular, intra-epiphyseal drilling for osteochondritis dissecans of the knee. J Pediatr Orthop. 2010 Dec;30(8):870-8.

23.Hangody L, Karpati Z, Toth J, Dioszegi Z, Kendik Z, Bely M. Transplantation of osteochondral autografts of the weightbearing surface of the knee joint and the patellofemoral joint in dogs. Hung Rev Sports Med 1994;35:117-23.

24.Filardo G, Kon E, Berruto M, Di Martino A, Patella S, Marcheggiani Muccioli GM, Zaffagnini S, Marcacci M. Arthroscopic second generation autologous chondrocytes implantation associated with bone grafting for the treatment of knee osteochondritis dissecans: Results at 6years. Knee. 2011 Nov 22.

25.Gobbi A, Kon E, Berruto M, Filardo G, Delcogliano M, Boldrini L, Bathan L, Marcacci M. Patellofemoral full-thickness chondral defects treated with second-generation autologous chondrocyte implantation: results at 5 years' follow-up. Am J Sports Med. 2009 Jun;37(6):1083-92.

26.Pascual-Garrido C, Tanoira I, Muscolo DL, Ayerza MA, Makino A. Viability of loose body fragments in osteochondritis dissecans of the knee. A series of cases. Int Orthop. 2010 Aug;34(6):827-31.

27. Smillie IS. Treatment of osteochondritis dissecans. J Bone Joint Surg Br 1957;39:248-60.

28.Thomson NL. Osteochondritis dissecans and osteochondral fragments managed by Herbert compression screw fixation. Clin Orthop Relat Res 1987;224:71-8

29. Makino A, Muscolo DL, Puigdevall M, Costa-Paz M, Ayerza M. Arthroscopic fixation of osteochondritis dissecans of the knee: clinical, magnetic resonance imaging, and arthroscopic follow-up. Am J Sports Med 2005; 33:1499–1504.

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