Arthroscopic Screw Fixation Versus Arthroscopic Subchondral Bone Drilling In Osteochondritis Dissecans(OCD) of the Knee

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ABSTRACT:

BACKGROUND:

Osteochndritis Dissecans is relatively rare disorder commonly affect adolescent males, non weight bearing area of the medial femoral condyle is the most common site. OCD is a radiological diagnosis with MRI sensitivity about (97%). Non operative treatment indicated in juvenile form and stable type. Operative intervention indicated in adult form and unstable lesions.

OBJECTIVE:

To the postoperative clinical knee functional outcome between arthroscopic screw fixation and arthroscopic subchondral bone drilling in OCD.

PATIENTS AND METHODS:

A retrospective comparative non randomized study was performed on 10 patient (8 males and 2 females) with adult form of OCD. The patients were divided into 2 groups(A and B), each group consisting of 4 males and 1 female. All patients in group(A) underwent arthroscopic screw fixation, and all patients in group (B) underwent arthroscopic subchondral bone drilling. After 3, 6 and 12 months follow up, the 2 groups were compared preoperative and postoperative according to Lasholm Score changes.

RESULTS:

In both groups (A and B), the difference in improvement of the clinical knee outcome postoperatively better than preoperatively according to Lasholm Score(P value less than 0.001) which was statistically significant, and the difference in improvement in group (A) better than in group (B) postoperatively, P value < 0.001 which was statistically significant.

CONCLUSION:

Arthroscopic screw fixation in OCD has statistically better clinical knee functional outcome than arthroscopic subchondral bone drilling, and it is recommended to do arthroscopic screw fixation if possible.

KEY WORDS: osteochondritis dissecans, arthroscopic screw fixation, and arthroscopic subchondral bone drilling.

INTRUDUTION:

Osteochondritis dissecans is the most common cause of loose body in the joints of adolescents characterized by localized subchondral bone necrosis, relatively rare disorder and may cause considerable disability[1]. The estimated incidence about 15 to 30 case per 100,000 person in general population[1,2]. OCD commonly affect male between 10 to 20 years of age and male are affected 3 to 4 times more than female[3]. The femoral condyles is the most common site affected followed by talar dome and capitellum of the humerus[4]. Non weight bearing area of the medial femoral condyle is the most common location in 85% of cases[5]. Twenty to thirty percent of the lesions are bilateral[3]. Mutiple lesions, although rare, occasionally have been noted[6]. Patella, femoral head, glenoid of scapula, tibial plateau, head of talus and vertebrae are less frequent site for OCD[6,7]. The etiology of OCD not clear, but genetic predisposition, repetitive trauma, ischaemia and abnormal ossification all have been playing a role[1,3]. Clinically the patient usually presented with vague knee pain which is activity related, some limitation of joint movement and stiffness following period of rest[8]. Giving way, sensation of catching and inability to extend the knee fully[9]. Effusions, crepitus, joint line tenderness, and Wilson's sign may be positive(flexion of the knee to 90 degree, internal rotation of the tibia and slowly extending the knee may reproduce

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pain in OCD)[1,2,3]. OCD is a radiological diagnosis, anteriopostrior(anterioposterior alone may miss diagnosis of lesion of posterior aspect of medial femoral condyle), lateral and tunnal views are required and if lesion is diagnosed, X-ray of the contralateral knee indicated[1]. MRI is the most sensitive(97%) test for detecting unstable lesions and the most accurate test for staging lesions[10,11]. Stage 1and 2 are stable, while stage 3 and 4 considered to be unstable in which the cartilage is breached and the synovial fluid present between the fragment and the underling bone(Table 1)[12]. Distinguishing between stable and unstable lesions is necessary in planning for surgical treatment[11]. Conservative treatment indicated in stable lesion and juvenile form of OCD, (before closure of physis)[3] . One half of the lesions heals over a period of 10 to 18 months with conservative treatment which include observation, avoid sport activities for 6 to 8 weeks, activity modification and physical therapy[1]. Period of immobilization has been indicated but prolong splinting should be avoided because it lead to stiffness and quadriceps atrophy[8]. Operative treatment indicated in adult form(after closure of physis) of OCD, persistent symptoms following conservative treatment, sensation of catching which include development of loose body in the joint and in unstable lesions(type 3 and 4)[1]. Operative treatment using arthroscope which is preferred over arthrotomy, include drilling of the defect to encourage revascularization, marrow stimulation techniques (abrasion, subchondral bone drilling and microfracture), excision of fragment and removal of loose body, pining to stabilize the fragment using either stainless- steel or bioabsorbable pins, screw fixation to stabilize the fragment using either specialized screw or Herbert-screw or bioabsorbable screw, osteochondral autograft transplant, osteochondral allograft transplant, autologuos chondrocyte implantation, and use of mesenchymal stem cells and matrix augmentation[13,14,15]. Decision making about appropriate surgery depend on both lesional (size, depth, stability) and patient(age, sport activity level) factors[16]. The current study compare postoperative knee functional outcome of arthroscopic Herbert-screw fixation versus arthroscopic subchondral bone drilling in OCD (these are the only 2 methods can be done in our hospital for the time being)

Table 1: MRI staging of OCD.

PATIENTS AND METHODS:

A retrospective comparative non randomized study was performed on 10 patients (8 males and 2 females) with an average age of 25 years ranging from 20 to 30 years who had been diagnosed clinically and radiologically (including MRI) to have adult form of OCD (stage 3 and 4). Table 2 show the master chart. Arthroscopic screw fixation or subchodral bone drilling were done for all patients included in this study during the period from 4-8-2013 to 10-6-2015. The patients were divided into two groups (A and B), each group consisted of 5 patients (4 males and one females), all patients were admitted to hospital one day before surgery and all required preoperative preparations were done. Prophylactic antibiotics were given to all patients half hour before skin incision, supine position, general, spinal or epidural anesthesia was used, pneumatic tourniquet was applied on the proximal thigh, scrubbing, drabbing, high standard anterolateral and anteromedial arthroscopic portals were used. Diagnostic arthroscopic tour was performed in all cases. In group (A) arthroscopic debridement of fibrous tissue from the base of OCD, microfracture of the base to improve subchondral blood supply, reduction of the fragment and fixation with Herbert- screw (titanium type, two screw). All devices were be buried under cartilage (Figure 1 and Figure 2 shows one of the patient operated on in this study). Postoperative anterioposterior and lateral plain X-rays of operated knee were done. Physiotherapy and partial weight bearing with tolerance as soon as possible. In group (B) arthroscopic debridement of unstable cartilage, removal of loose body if present and multiple drilling through the subchondral bone adjacent to stable cartilage using K-wire 2 mm diameter to penetrate the cancellous bone which is confirmed by coming blood or fat droplets (Figure 3 shows one of the patient operated on in this study). Postoperative physiotherapy and 6 weeks non weight bearing. The subjective clinical knee outcome was measured for all patients preoperatively and 3, 6, and 12 months postoperatively using Lasholm Score, and the results of group (A) compared with the results of group (B). plain X-rays was used for all patients in group (A) and MRI(in some patients of group (A and B)) postoperatively.

Table 1: MRI staging of OCD.

Stage 1: articular cartilage thickening and low signal intensity (stable).

Stage 2: articular cartilage breached and low signal intensity behind the fragment indicate fibrous tissue attachment (stable).

Stage 3: articular cartilage breached and high signal intensity behind the fragment and the underling subchondral bone (unstable).

Stage 4: loose body (unstable).

Table 2: Master chart.

Patients Number	Age	Gender	Size of lesion	Type of lesion	Treatment
1	25	male	2-3cm	unstable	Arthroscopic screw fixation
2	20	male	2-3cm	unstable	Arthroscopic screw fixation
3	24	male	2-3cm	unstable	Arthroscopic screw fixation
4	30	male	2-3cm	unstable	Arthroscopic screw fixation
5	22	female	2-3cm	unstable	Arthroscopic screw fixation
6	30	male	2-3cm	unstable	Arthroscopic subchodral bone drilling
7	23	male	2-3cm	unstable	Arthroscpic subchondral bone drilling
8	23	male	2-3cm	unstable	Arthroscopic subchondral bone drilling
9	26	male	2-3cm	unstable	Arthroscopic subchondral bone drilling
10	27	female	2-3cm	unstable	Arthroscopic subchondral bone drilling

Figure 1 :preoperative plain x-ray of OCD Postoperative plain x-ray of OCD.

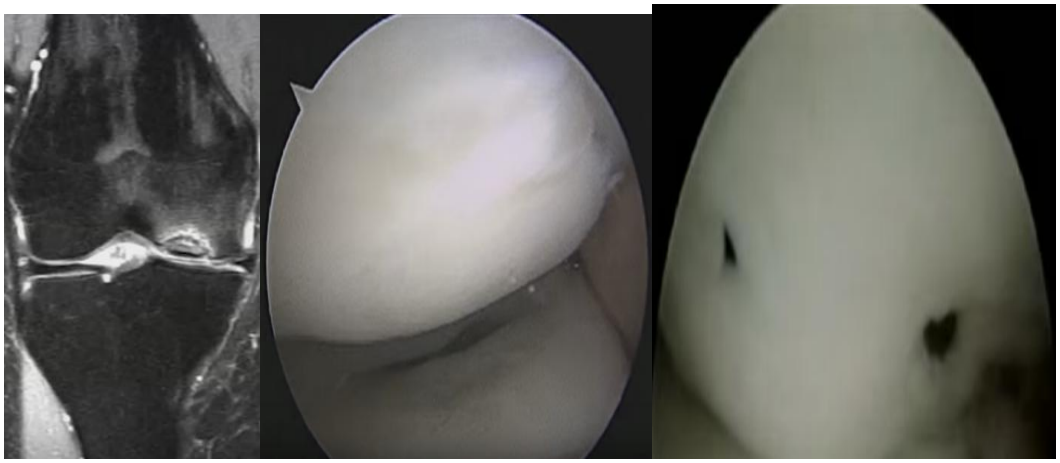

Figure 2: Arthroscpic screw fixation of OCD Arthroscopic view of OCD MRI of OCD.

Figure 3 :Arthroscopic view of loose body Arthroscopic view of subchondral bone drilling Arthroscopic view of OCD.

RESULTS:

The time from the diagnosis of the lesion to the time of surgery is relatively short ranging from 6 to 12 months. Clinically all the patients in group (A) and (B) feels better postoperatively, with better result in group (A) than in group (B) regarding to Pain, movement and stiffness of the knee according to Lasholm Score. In group (A) the mean of Lasholm Score preoperatively and postoperatively was (67.8 and 93.8) respectively as shown in table (3). The result was statistically significant(P value < 0.001). In group (B) the mean of Lasholm Score preoperatively and postoperatively was (69.4 and 77.4) respectively as shown in table (3). The result was statistically significant(P value <0.001).The difference between the improvement (changes in Lasholm Scores) in group (A) and improvement in group (B) was statistically significant (P value <0.001).

Table 3: Preoperative and Postoperative Lasholm Scores for group (A) and (B).

Patients number	1	2	3	4	5
Group(A) Lasholm Score preoperative	67	73	65	70	64
Group (A) Lasholm Score postoperative	93	91	96	94	95
Group (B) Lasholm Score preoperative	70	71	71	67	68
Group (B) Lasholm Score postoperative	76	80	78	77	76

DISCUSSION:

Internal fixation of unstable OCD in skeletally mature knee with metal screws provide satisfactory union rate, good knee function, better activity level, superior knee outcome, and prevent secondary osteoarthritis[17]. Arthroscopic screw fixation is an effective method of repairing of OCD of the knee according to the evaluation of process of healing with MRI , second-look arthroscopy to remove hardware, in addition to assess fragment stability and the clinical outcome evaluated by Lasholm Score[18]. Eighty seven percent of the knees healed to normal according to IKDC grading and 93% according to X-ray assessment at 6 years follow up[20]. Subchondral bone drilling indicated for defect less than(2-3 cm) and larger defect in patients with low demand, this technique permit influx of stem cells from bone marrow to subchondral bone lesion resulting in fibrocartilage growth[19].Large lesions more than 2cm treated with subchondral bone drilling had been deteriorated with time due to decreased rsilience of fibrocartilage[22]. Seventy seven percent of the patients showed satisfactory result at 5 years follow up[21]. The finding of the previous studies[17,18,19,20,21,22] mentioned above support the current study which showed significant clinical improvement in the knee functional outcome postoperatively according to Lasholm score in group(A) and group (B), with better improvement in group (A), and this might be due to the factors mentioned above. In spite of some limitations in this study which include small sample size, and short term follow up (long term follow up may provide some clinical benefit). This study showed better clinical knee functional outcome following arthroscopic screw fixation of OCD, rather than arthroscopic subchondral bone drilling.

CONCLUSION:

OCD is relatively rare disorder, and may lead to some disability, diagnosed radiologically. The result of arthroscopic screw fixation if possible superior to arthroscopic subchondral bone drilling. Further studies, large sample size, long term follow up were required for better clinical result.

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