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Lateral unicondylar knee arthroplasty in osteonecrosis of lateral femoral condyle

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Abstract---Osteonecrosis of the knee usually more common on the medial femoral condyle. Lateral femoral condyle involvement is rare. In chronic cases, it becomes a challenge for surgeons to treat such cases with advanced arthritis and chronic collapsed cartilage involving most of the femoral condyle using micro fracture, core decompression, fixation of free fragment for restoring the articular cartilage. Unicompartmental knee arthroplasty (UKA) is a procedure that enables restoring normal knee kinematics along with its function for arthritis limited to either compartment of knee joint by preserving unaffected compartment and sparing knee ligaments. We report a 24-year-old male patient with 4 years history of left knee joint pain and walking difficulty following history of Road Traffic Accident (RTA) 5

years back. Local examination of left knee joint revealed tenderness over lateral aspect of left knee joint with fixed flexion deformity of 10 degree and extension lag of 30 degree. Radiological findings suggestive of unicompartamental post traumatic osteonecrosis of lateral femoral condyle. Surgical intervention aiming for anatomical and functional restoration of knee joint in form of Lateral Unicondylar Arthroplasty of lateral condyle was done. Patient was followed up for a period of 1 year. There were no complications noted and patient was mobilized immediately. UKA should be considered as a viable option of treatment for younger patients with isolated posttraumatic lateral compartment disease as it provides pain relief with full range of movements and early rehabilitation.

Keywords---posttraumatic osteonecrosis knee, lateral unicondylar knee arthroplasty (LUKA), osteonecrosis knee, osteonecrosis lateral femoral condyle.

Introduction

Posttraumatic osteonecrosis of knee results due to loss of vascularity to the affected part of the bone, which gradually leads to collapse, detachment of cartilage from subchondral bone and appears as a loose body in the joint, leading to pain and disability ^[1]. This can further lead to osteoarthritis if left untreated ^{[1],[2]}. Osteonecrosis of the knee usually more common on medial femoral condyle (94%), while Lateral femoral condyle involvement is rare ^[3]. In chronic cases, it becomes a challenge for surgeons to salvage articular surface of femoral condyle with advanced arthritis and chronic collapsed cartilage involving most of the femoral condyle using various techniques like arthroscopic micro fracture, core decompression, fixation of free fragment, hence Unicondylar knee arthroplasty (UKA). Unicompartamental knee arthroplasty (UKA) is a procedure that enables restoring normal knee kinematics along with its function for arthritis limited to either compartment of knee joint by preserving unaffected compartment and sparing knee ligaments ^{[2],[4],[5]}. So, we report a case of lateral femoral condyle osteonecrosis of knee treated with lateral Unicondylar arthroplasty (LUKA).

Case Presentation

A 24-year old male patient presented with left knee joint pain and walking difficulty since 4 years following history of Road Traffic Accident (RTA) resulting in high impact injury 5 years back. Pain was insidious in onset, gradually progressive, aggravated while walking and relieved while taking medications and rest. Patient had no history of any previous knee surgery, alcohol intake or steroid treatment. Physical examination revealed tenderness over lateral aspect of left knee joint with antalgic gait. Local examination of left knee joint revealed tenderness on lateral joint line with fixed flexion deformity of 10 degree and extension lag of 30 degree [Fig. 1a]. Wasting of thigh and calf muscles was evident.



Fig. 1a. Clinical photographs showing 30 degrees extensor lag of left knee and 10 degrees fixed flexion deformity.

Radiological evaluation included standard Xray of knee joint AP standing and lateral view and MRI scan. Subchondral collapse with flattening of lateral femoral condyle suggestive of avascular osteonecrosis with moderate joint effusion and tear of anterior horn of lateral meniscus. [Fig. 1b and Fig. 1c]



Fig. 1b. Preop x-ray showing osteonecrosis of lateral femoral condyle



Fig. 1c. MRI showed Subchondral collapse with flattening of lateral femoral condyle suggestive of avascular osteonecrosis with moderate joint effusion and tear of anterior horn of lateral meniscus

Due to persistent pain, limitation of movement and extensile osteonecrotic lesion involving more than 50% of articular cartilage, surgical intervention was performed aiming for anatomical and functional restoration of knee joint in form of cemented Lateral Unicdylar Arthroplasty of lateral condyle left knee joint using lateral approach by a team of well qualified and experienced arthroplasty surgeons [6]. [Fig. 2a] Intraoperatively, loose osteochondral fragment of lateral femoral condyle was found and excised, softening of underlying subchondral bone was also noted which was addressed by careful distal femoral cuts preserving normal bone and removing entire necrotic bone.



Fig. 2a Pictures showing incision mark and osteonecrosis of lateral femoral condyle

Post-operatively, patient was allowed full weight bearing walking from 2nd post-operative day and active physiotherapy after pain subsided with analgesics.

Post-operative radiographs showed well aligned lateral femoral and tibial component placements with adequate bone preservation. [Fig. 2b]

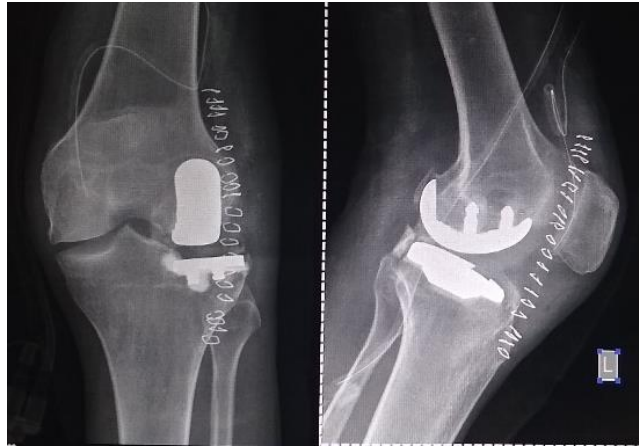


Fig. 2b. Immediate Post op x-ray after lateral condylar knee replacement

No complications were noted intra-operatively as well as post-operatively. At the end of 1 year on final follow-up patient had presented with full knee range of movements with no difficulty in walking and able to do activities of daily living. [Fig. 3a]



Fig. 3a. The patient is free from symptoms and with full range of movements without any flexion deformity with range from 0 to 130 degree at 1-year follow-up

Also, Standard AP and lateral x-rays were taken at final follow-up to evaluate and assess the tibial and femoral components of UKA. [Fig.3b]



Fig. 3b. Final follow-up x-ray at the end of 1 year

Discussion

Posttraumatic osteonecrosis of knee as described by Yamamoto and Bullough [7], suggests that it is subchondral insufficiency fracture and localized osteonecrotic area is a result of fracture. Also, it occurs in elderly population with decreased bone mineral density. We report a rare case of 24years old male with lateral femoral condyle posttraumatic osteonecrosis which may be due to subchondral insufficiency fracture due to RTA 5 years back. Usually, lateral femoral condyle involvement in Osteonecrosis is rare but as it is posttraumatic it can either be medial or lateral compartment involvement.

Unicompartmental osteonecrosis of knee can be managed conservatively and operatively, depending upon various factors like symptoms, age, and progress of disease [8]. Non operative management is considered initial treatment of choice, provided size of lesion is small (<3.5 cm²) and presented during early stage, pre-collapse phase [9, 10, 11]. These includes analgesics, bisphosphonates and protected weight bearing with functional bracing with or without using wedges [12]. Though Yates et al [13] achieved good results with conservative management, we feel patients are often unable to function adequately through activity modification or bracing. We didn't opt for conservative line of management as the disease progression duration was around 4 years which resulted with larger lesion, subchondral collapse, and loose articular tissue.

When disease is in pre subchondral collapsed stage, surgical intervention in the form of joint preserving techniques like arthroscopic debridement & micro fracture, core decompression, osteochondral graft transplant and osteotomy are recommended [9, 10, 11]. Keeping in mind the duration of disease, size, extent and collapse of lesion in our patient, we thought none of this could help revive vascularity in already avascular necrotic and fragmented loosened osteochondral tissue.

With further disease progression with a larger lesion and severe collapse, Osteotomy with allograft and bone resurfacing surgeries like UKA and TKA

remains suitable alternative [14]. Often young adults with high functional demand presenting late with severe degenerative changes secondary to osteonecrosis, pose greater difficulty to surgeons [15,16,17]. In case of partial thickness loss of articular cartilage along with valgus deformity, several tibial or femoral osteotomies exist to correct the deformity and to redirect the load through medial compartment, restoring normal knee function thereby relieving knee pain [16,17,18]. When there is full loss of cartilage with large intraarticular defect in the affected compartment, osteotomy or any extraarticular procedure is not beneficial [16, 17]. Hence, UKA and TKA being surface replacement surgery can replace the surface defect and remove the dead necrotic tissue. LUKA has efficacy of 86% to 100% of pain relief and 63% to 100% functional restoration at 5 to 13 years, even in relatively young patients with advanced degenerative disease [19,20,21]. LUKA is a valuable option for treatment of isolated posttraumatic lateral compartment arthritis with pain relief, early mobility, and durability [22].

According to Heyse et al., the KSS and WOMAC scores of 52 patients with osteonecrosis of knee were 173 and 8 points respectively at 11 years mean follow-up [23]. Langdown et al., after comparing outcomes of UKA in Osteonecrosis found no implant failure in either group [24]. When there is unicompartmental affection, UKA is a better option for treatment of TKA, thereby preserving unaffected compartment of knee. The popularity of UKA has been increasing since advent of new prosthesis design, less invasive technique and patient satisfaction along with good durability as compared to TKA [25].

Management of unicompartmental osteonecrosis of knee with UKA or TKA is still debatable and depends upon extent of lesion and degenerative arthritic changes. Few studies suggested poor outcome of UKA as compared to TKA in Osteonecrosis of knee [26,27]. But, after cutting through fractured osteochondral tissue during bone cutting for UKA, poor quality of edematous remnant subchondral bone may become exposed affecting the survival of uncemented UKA [28], so better to opt for cemented UKA so as to allow interdigitation of bone and cement in cemented UKA [29].

Conclusion

Post traumatic osteonecrosis of lateral femoral condyle in a young patient presenting late with severe collapse and large osteochondral lesion can be treated effectively with LUKA providing additional benefit of immediate pain relief, early mobilization, preserving bone stock and ligaments, and providing scope for future revision surgery.

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