



Total Knee Arthroplasty (TKA) in Ankylosed Knee with Fracture Supracondylar Femur

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Abstract

Total knee arthroplasty indication and contraindication in an ankylosed knee with supracondylar femur fracture are poorly defined in the literature. Many of reports in this situation is either a retrospective study or very less mention or no mention for indication of surgery with fixation of fracture and TKA in fused knee in single sitting. TKA in ankylosed knees is a challenging procedure, and if combined with a fracture it becomes bigger challenge. Here in this case report we present TKA in an ankylosed knee with a supracondylar fracture femur done in a single stage. This case imposed many challenges as bony fusion was one issue, muscle atrophy and a recent fracture was the other major concern. The patient was young and had desire that he could have some procedure done so he gains functional range of movement. The Knee Society Score (KSS) [1] increased from 35 improved to 90 and functional outcome reported is good. This case was a learning lesson in managing a primary complex TKA.

Keywords: Total Knee; Arthroplasty; Ankylosed Knee; Supracondylar; Femur

Introduction

Ankylosis of the knee is a severe functional limitation that becomes worse when pain is present. Ankylosis of a joint could be true (intra-articular) or false (extra-articular). Moreover, intra-articular ankylosis may be fibrous or bony. The causes of fibrous ankylosis which is usually painful, are tubercular or septic arthritis, non-infective inflammatory arthritis, and prolong immobilization. Bony ankylosis is usually a sequela of suppurative arthritis, tubercular arthritis (with secondary bacterial infection in peripheral joints), trauma, neurological injury, ankylosing spondylitis, chronic juvenile, or adult rheumatoid arthritis (RA). Arthrodesis of the joint is a classical indication for such patients, since it resolves the pain; however, the severe functional limitation remains. Total joint replacement is one of the biggest advances in reconstructive surgery. It has been developed in a way to resolve pain and functional

limitation in young and elderly patient. It is classically indicated in cases of degenerative processes and squeals of inflammatory diseases and has been greatly developed in orthopedic practice. In this era alternative of arthrodesis of the knee as a therapeutic procedure that could reduce the pain, regain functionality is a TKA. However, Fusion takedown is a challenging procedure and if combined with a fracture should be taken up by experienced hands.

Case Summary

45 years old gentlemen presented to us with a history of slip and fall at home and sustained injury to his right lower limb. The injured knee had movements and was fixed in extension because of monoarticular tuberculosis diagnosed at the age of 14 years. A full course of anti-tubercular drugs was taken. Prior to the fall, patient did not have pain, but his activities were limited due to a stiff limb

gait. On clinical examination there was pain swelling over the distal thigh, no scars were present and distal neurovascular status was normal. On laboratory examination his blood parameters including c-reactive protein and erythrocyte sedimentation rate were within normal limits and his chest radiograph was also normal. Radiograph and CT scan (Figure 1a,1b,1c,1d) showed bony ankylosis in the patello-femoral joint and a supracondylar fracture femur AO classification A3.33 right [2].



Figure 1a: X-Ray Lateral view of Knee.



Figure 1b: X ray Knee Anteroposterior (AP) and Lateral (Lat) view.



Figure 1c: Computed Tomography (CT scan) of Knee.

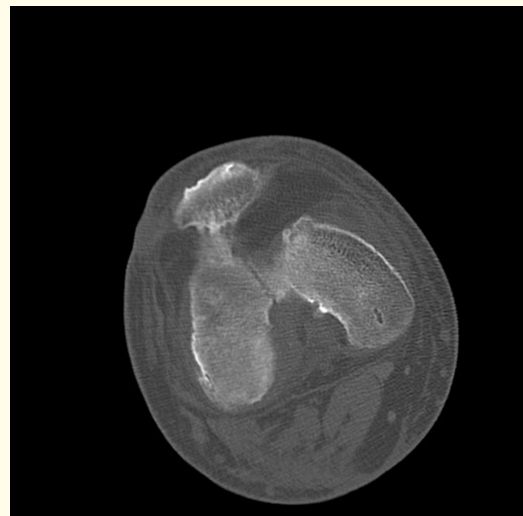


Figure 1d: Computed Tomography (CT scan) Knee.

A thorough discussion with the patient was done that there would be two possibilities for treating ankylosis: fixation of the fracture alone of the knee or TKA with fixation of the fracture, with the risk of short durability and the need for arthrodesis in the event of arthroplasty failure. It was also discussed that constrained knee implants might also be required. The patient signed an informed consent statement to undergo total arthroplasty and a fixation. A proper discussion with the patient was done, with the pros and the

cons and it was agreed and if not, we may just end up with fracture fixation only. We did a meticulous planning and as regards to implant selection, trauma set back up, constrained, and hinged knee prosthesis were also kept in standby.

The patient was operated under spinal anaesthesia. A midline skin incision and a medial parapatellar approach done. A Pin was inserted at the attachment of the tibial tubercle to prevent Patellar tendon avulsion. The quadriceps muscle was markedly atrophied and a modified V-Y quadricepsplasty was done initially to avoid patellar tendon avulsion and to lengthen the contracted quadriceps muscle for a better exposure. Patello-femoral osteotomy with an oscillating saw and release of retro patellar scar was done to free the patella posteriorly (Figure 2). A lateral retinacular release was done to free the patella enough for eversion or inversion without the need for a more extensile exposure. This enabled us to have a good exposure to lateral condyle of distal femur as well. Separation of ankylosed patella was performed taking care of infra patellar ligament. Ankylosed tibio-femoral joint breakdown was done under guidance of image intensifier taking proper care of the lateral, medial and posterior structure of knee with an osteotome and mallet (Figure 3). The ankylosis was taken down with attention to preservation of bone stock. The fracture was exposed from lateral side and before stabilization refreshing of both end of fracture side was done and then stabilized initially with Kirshner's wires and then fixed with a lateral distal femur anatomic locking compression plate and screws. This was managed in the same incision. Now as we had already fixed the femur, we used the Extra-medullary alignment for femur under image intensifier guidance and with assumption of centre of hip to the centre of femur and calculated joint line with reference from medial and lateral epicondyles, the distal femoral cut was taken. We could achieve approximately ninety degrees flexion of the knee after distal femur cut.

The Tibial condyle was exposed using medial, lateral, and posterior retractors taking care of the soft tissues and neurovascular bundle posteriorly. The posterior cruciate ligament was assessed intraoperatively and was found intact Proximal tibial cut was taken using landmark of the anterior cruciate ligament stump and extramedullary alignment jig aligning it parallel with the medial one third and lateral two third of the tibial tuberosity and to the second toe. A proximal tibial cutting jig with three degrees slope inbuilt was used as at this juncture. After confirming proximal tibial cut



Figure 2: Patellar osteotomy with an oscillating saw.



Figure 3: Tibiofemoral breakdown done using a saw under image guidance.

was taken. Following this insert trails of size 18 (minimum size of spacer present with the implant system) were used to check the flexion and extension gap (Figure 4a,4b). A stable flexion and extension gap were obtained. The sizing of the femur was done using posterior referencing jig and was ascertained that the posterior femoral condyle cut was parallel to proximal tibial cut and

flexion gap was matched as illustrated in the figure. The chamfer cuts were then taken. As the fracture was stable and we already attained distal screw fixation of the plate and the PCL was intact we planned a cruciate retaining femoral component. The stability with the trial component was checked in flexion of 90°, 30°, 60° and in full extension and was adequate and stable. The stability of the knee was also assessed by application of Varus-valgus and antero-posterior stress with the knee in full extension and 30° of flexion after the trial components had been inserted. Routinely we do not resurface the patella however it was cleared of osteophytes. The patellar tracking was checked and confirmed throughout the range of motion and no patellar mal tracking was present. The trial component stability and the good patellar tracking was present (Figure 5), so we finally fixed with bone cement using a Stryker Scorpio NRG cruciate retaining femoral component (Stryker, Marwah, USA) and a metal backed tibial component. No tibial stems were used. The quadriceps tendon was lengthened by approximately 1.5 cm and the capsule was closed and the V-Y quadricepsplasty, was repaired while the knee was maintained in 30° of flexion. After a watertight closure of the capsule. Standard suction drains with an external diameter of 3 mm was kept intracapsular capsular and attached by a closed system to pre vacuumed container. Closure was done in layers. The drains were removed in the second day post-op. Standard short-term antibiotic prophylaxis with cefuroxime was administered. There was no neurovascular deficit post operatively. Venous Thromboembolism Prophylaxis consisted of subcutaneous injection of Enoxaparin for two weeks. Immediate post-operative X ray showed well fixed implant (Figure 6a,6b).

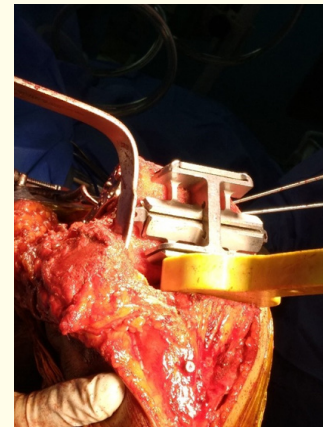


Figure 4b: Balance in Flexion.



Figure 5: Trial implant.

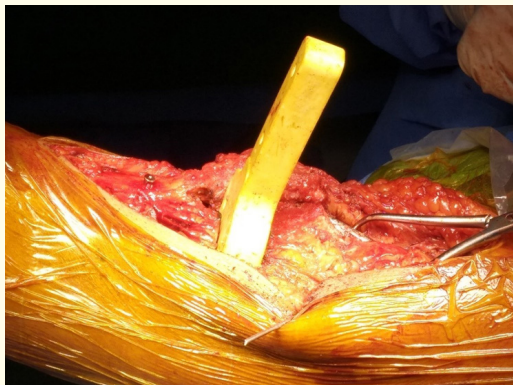


Figure 4a: Balance in Extension.

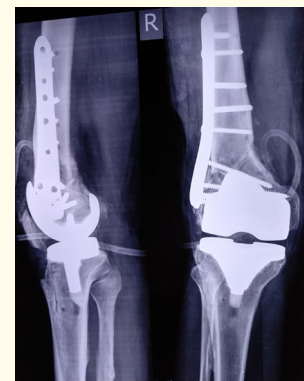


Figure 6a: Xray radiograph (AP) and Lateral (lat) post-operative.



Figure 6b: Scanogram.

During the postoperative treatment, continuous passive movement equipment was used and active quadriceps building exercises were encouraged. We did use continuous passive movement (CPM) equipment, since we judged that it necessary to detect any adherence or movement restriction within the first 72 hours Post operatively the patient was made to sit on day one and non-weight bearing mobilization was started on post-operative day two. The patient was admitted for 14 days as regular physiotherapy was done. The wound healing was not an issue and the patient was successfully discharged with a painless mobile knee joint with a range of flexion 0° degrees to 85° degrees and a non-weight bearing mobilization was advised till further review.

Upon the first review after six weeks, knee movements were pain free, from zero degrees to ninety degrees but extensor lag of 10° to 15° was still present. The radiographs (Figure 7a,7b) showed signs of fracture healing and osteointegration and a well-fixed plate.

Partial weight bearing (twenty five percent/toe touch) was started and quadriceps strengthening exercises was continued. In the second review at 12 weeks full weight bearing mobilization was started with a walker. Movement of the operated knee was from zero to roughly ninety-five to one hundred degrees with no extensor lag present on examination by the end of 12 weeks and 24 weeks. The Knee Society Score (KSS) [1] increased from 35 to 70 in the first 6 weeks follow up. At the end of 12 weeks it increased to 80 and the patient was satisfied. At about 24 weeks the KSS improved to 90. The radiographs (Figure 8a, 8b) showed signs of union and a well-fixed implant was seen in situ.



Figure 7a: 6 weeks follow up anteroposterior view (AP).



Figure 7b: X-ray lateral (lat) view 6 weeks follow up.



Figure 8a: X-Ray radiograph antero posterior (AP) view 12 weeks follow up.



Figure 8b: 12 weeks follow up lateral (Lat) view.

Discussion

In this case report, we have dealt with the ankylosed knee and fracture in a single stage surgery. The most important aspect was, what to do and how to approach patient whether to fix fracture only and not resolve functional limitation or a two-stage surgery. First to fix fracture and resolve functional limitation in second stage TKA or whether fix fracture and do TKR in same in a single

stage. If the patient would have presented without a fracture the complexity would have been less as we dealt with two issues at the same time. There has not been any case report in literature like this. Planning and a proper implant selection are the key to success.

Exposure was contemplated to be difficult and we took standard midline incision and a medial parapatellar approach. In a case series by Kim., *et al.* a medial parapatellar incision used in 39 knees and a midline anterior longitudinal incision was used in 60 knees. A V-Y quadricepsplasty was performed initially, which enabled a better exposure and avoided patellar tendon avulsion. The osseous ankylosis was taken down with attention to preservation of bone stock and careful preservation of the medial and lateral soft-tissue sleeves during exposure. In the series by Kim., *et al.* [3] in 68 knees (69%) the patella was osteotomised as well from the femoral condyle. They have shown to use Intramedullary instrumentation for the femur and extramedullary instrumentation for the tibia. In this case report we had to use extramedullary instrumentation for the femur as well due to co-existing fracture. We managed to put a cruciate retaining implant along with fixation of the fracture. We believe that surgeon should be prepared with implants having a full range of constraint. Extensive soft-tissue releases may be required to obtain proper exposure and balance, and constrained condylar implants should be available in the event instability. For knees without any ligamentous stability, a true hinge will be required. Stryker Scorpio NRG Cruciate retaining Prosthesis (Stryker, USA) was implanted and the stability of the knee including the fracture was assessed, it was kept in mind that if we could not get stability in sagittal and coronal plane, we would have to use a constrained knee. There was no collateral ligament or extensor mechanism avulsion during surgery.

Few things in this case showing advantage of non-constrain implant with no use of box cut as in cruciate retaining implant which enabled us to stabilize the fracture and adequate fixation. Considering the age we ended up in preserving more bone and this can be added up in the advantages. In a study by Kim., *et al.* [3] where they have analysed in 104 knees and have shown excellent results with condylar constrained knee or posterior-stabilised implants and mentions that the stability was excellent. However, in their series no patient had a fracture along with ankylosis. Hinged TKA has Schurman., *et al.* [4] described arthroplasty of an ankylosed knee in the case of a 24-year-old patient. Given the young age of these patients and the possible need for future revision, we sought

to perform arthroplasty in the least aggressive manner possible. For this, we used prostheses which were cruciate retaining, and we did not replace the patella, since there was less bone resection. We also could have all the distal screws of the distal femur locking compression plate fixed as there is no Box cut so a stable fixation could be achieved. Hinged TKA is indicated where the collaterals would have been redundant but considering then patients age this should be kept as the last option.

Postoperative rehabilitation was carried out by a physiotherapist. We did use continuous passive movement (CPM) equipment since we feel that it necessary to detect any adherence or movement restriction within the first 72 hours. Manipulation of postoperative joint limitations should be performed as early as possible, as suggested by Yercan, *et al.* [5]. Improved movement was observed in their series of patients, although a limitation of five degrees of extension occurred, and the mean flexion gain was 85 degrees in six weeks' time. Naranja, *et al.* [6] described a mean flexion gain of 62° in a multicenter study. Rajgopal, *et al.* [7] reported a mean flexion gain of 61° in 84 knees of 54 patients who presented severe joint limitation.

A significant reduction in pain was observed as well. From a two-year follow-up of a series of nine cases like this study, Bradley, *et al.* [8] considered their results to be satisfactory about reductions in pain and partial gains in movement. Rajgopal, *et al.* [7] presented a series of 84 knees among 53 patients with severe joint limitation. After a mean follow-up of nine years, they considered their results to be good because their patients experienced reduced pain and improved quality of life. In the present case movement of the operated knee ranged from zero to roughly ninety-five to one hundred degrees with no extensor lag present on examination by the end of 24 weeks. The Knee Society Score (KSS) [1] increased from 35 to 70 in the first 6 weeks follow up. At the end of 12 weeks it increased to 80 and the patient was satisfied. At 24 weeks the KSS improved to 90.

In the present case, no serious complications that required extensive revision occurred. Kim, *et al.* [3] performed arthroplasty in 16 patients with ankylosis of the knee following pyogenic infection or tuberculosis. In most of those cases, the results were satisfactory, with postoperative infection occurring in just two cases. In a multicenter study of 35 patients who underwent total arthroplasty of their ankylosed knees, Naranja, *et al.* [6] reported an early complication frequency of 24% and a major complication frequency of 35%. The frequency of infection was 14% in their group of patients.

There is no doubt that arthroplasty of ankylosed knees is a challenging procedure, and if combined with a fracture, it becomes challenge. Nevertheless, the possibility of gains in movement and significant reductions in pain may compensate for the risks. In the event of complete failure in the attempt to perform arthroplasty, we would have performed fixation.

Conclusion

Our patient was pleased that he gained his functional range of movement, managed to sit, walk, and resume his activities of daily living in a much better way which is important to his sense of well-being.

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Bibliography

1. Alicia J. "Scoring systems and their validation for the arthritic knee". In: Insall JN, Churchill SN, editors. *Surgery of the Knee*. 3rd edition. New York: Livingston (2001): 1507-1515.
2. "Fracture and dislocation compendium. Orthopaedic Trauma Association Committee for coding and classification". *Journal of Orthopaedic Trauma* 10 (1996): 1-154.
3. Kim YH, *et al.* "Total knee arthroplasty in bony ankylosis in Gross flexion". *The Journal of Bone and Joint Surgery* 81 (1999): a296-300.
4. Schurman JR and Wilde AH. "Total Knee Replacement after Spontaneous Osseous Ankylosis. A report of three cases". *Journal of Bone and Joint Surgery* 72 (1990): 455-459.
5. Yercan HS, *et al.* "Stiffness after total knee arthroplasty: prevalence, management, and outcomes". *Knee* 13 (2006): 111-117.
6. Naranja RJ, *et al.* "Total knee Arthroplasty in a previously ankylosed and arthrodeseed knee". *Clinical Orthopaedics and Related Research* 331 (1996): 234-237.
7. Rajgopal A, *et al.* "Total knee arthroplasty in stiff and ankylosed knees". *The Journal of Arthroplasty* 20 (2005): 585-590.
8. Bradley G, *et al.* "Total prosthetic replacement of ankylosed knee". *The Journal of Arthroplasty* 2 (1987): 179-183.