

Case Report

Rotating hinge knee as a means of limb salvage in a patient operated on five times for periprosthetic joint infection: from despairs of darkness to lights of joy!

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ABSTRACT

The demand for revision knee arthroplasty is increasing daily with the increase in the number of patients undergoing primary knee arthroplasty. The aim of revision arthroplasty therefore should be the restoration of the mechanical alignment of the limb with the restoration of joint line and biomechanics and these goals should be accomplished with the least possible use of constrained implants which otherwise depends on the degree of bone defects and integrity of collateral ligaments. We have hereby reported a case of a 51-year-old lady operated on five times before who was financially drained, mentally and psychologically depressed with the patient and her relative's considering amputation of the limb as a last resort!

Keywords: Revision knee arthroplasty, Rotating hinge knee, Periprosthetic joint infection

INTRODUCTION

The demand for revision knee arthroplasty is increasing day by day with the increase in the number of patients undergoing primary knee arthroplasty. The need for revision arthroplasty due to any cause be it an infection, osteolysis, malalignment, or periprosthetic fracture poses an immense burden on the patient from a financial, vocational, and psychological point of view particularly in developing parts of the world like India and can make a person emotionally and mentally unstable.¹

The aim of revision arthroplasty therefore should be the restoration of the mechanical alignment of the limb with the restoration of joint line and biomechanics and these goals should be accomplished with the least possible use of constrained implants which otherwise depends on the degree of bone defects and integrity of collateral ligaments.² This justifies the use of a rotation hinge platform that is fully constrained, from the semi-constrained implant as the degree of bone defects increase

and the integrity of collateral ligaments and soft tissue around the joint decrease to attain a perfectly stable and functional joint.³

Rotating hinge knees are used in complex primary arthroplasty, in cases of extensive bone resection as in tumour surgeries as well as in revision surgeries with poor bone stock and status of soft tissues where they help in providing stable articulation around the knee towards a better restoration of joint function.⁴

We hereby report a case of a 51 years old lady operated on five times before who was financially drained, mentally and psychologically depressed with the patient and her relatives considering amputation of the limb as the last resort!

CASE REPORT

A 51 years old lady presented to our outpatient department (OPD) with complaints of her inability to stand without

support post five episodes of surgery around her right knee joint. During the interview, the patient showed signs of severe depression which was graded as 'very severe depression' as per the Hamilton depression rating scale (Score 27/50) and the patient was not able to cope with her activities of daily living as per the history given by the attendants. The attendants were financially drained because of the cost of previous surgeries and were even considering amputation of the limb to finally bring an end to their woes and worry.

Four years earlier she presented to an orthopaedic surgeon (elsewhere) where she was evaluated for right knee joint pain, was counselled, advised and she underwent a partial knee replacement (Figure 1).



Figure 1 (A-B): Pre-operative radiographs showing isolated medial compartment osteoarthritis and postoperative radiograph showing partial knee joint replacement.

After eight months she started complaining of pain and swelling around her right knee joint wherein she was again evaluated by the concerned surgeon (elsewhere) when she underwent debridement and synovectomy with implant retention. Following the operation, she was prescribed eight weeks of antibiotics as per her culture and sensitivity report which was positive for *Acinetobacter baumannii*. Even after eight weeks when her symptoms did not resolve, she underwent debridement, removal of the implant, and application of a cement spacer (DRICS) for antibiotic elution (Figure 2).



Figure 2: DRICS.

After 4 months she underwent revision total knee replacement (TKR) with a long tibial stem (elsewhere) and fixation of the patellar tendon using staples probably due to intraoperative compromise in the patellar tendon (Figure 3).

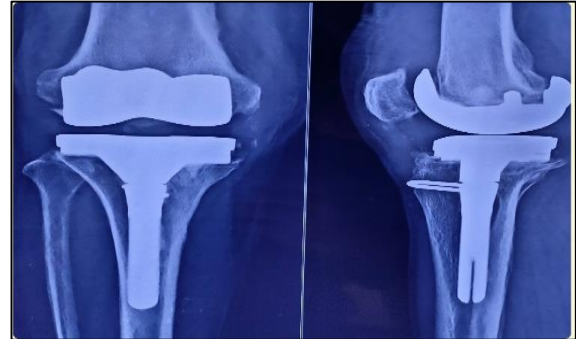


Figure 3: Revision TKR with the use of long tibial stem.

Due to persistent pus discharge from her operative site, she again underwent DRICS after 2 months of her revision replacement (elsewhere) (Figure 4).



Figure 4: Revision DRICS due to persistent joint infection.

After seven months of her DRICS, she presented to our OPD where she was evaluated clinically. She could hardly stand without support because of gross laxity and instability around her right knee joint (Figure 5).



Figure 5: The patient could hardly stand without support due to gross laxity and instability.

On inspection, there was healed scar on anterior aspect of right knee with no active discharging sinuses or excoriation. Her right leg seemed to be in valgus and recurvatum when made to bear weight with support. Walking could not be assessed due to pain and instability in bearing weight.

On palpation there was a relative rise in temperature of her right knee compared to her left and medial as well as lateral joint tenderness was present. Distal neurovascular status was assessed and it was deemed to be intact. There was 10 degrees of recurvatum following which flexion up to 30 degrees was present. There was a joint opening till 20 degrees on either side when varus and valgus stress was given. Her knee society score (part 1) for her right knee was 14/100 and her knee society (part 2) score at the time of presentation to our hospital was 0/100.

Appropriate blood investigations were sent and synovial fluid was aspirated to be sent for culture and sensitivity. (Table 1 and 2).

Table 1: Blood parameters preoperatively.

Blood	Results
Haemoglobin	12.7
WBCs	6660 (Neutrophils 42, lymphocytes 49, eosinophils 2, monocytes 7)
ESR	35
CRP	8
Serum uric acid	5

Table 2: Synovial fluid parameters preoperatively.

Synovial fluid	Results
Protein	3.8
Sugar	68
Total count	140 (polymorphs 60; lymphocytes 40)
Gram stain	No organisms seen
Z-N stain	AFB not seen
GeneXpert	Gene of <i>M. tuberculosis</i> not detected

After appropriate counselling and consent from the patient and her relatives, she was admitted and planned for revision surgery around her right knee using a rotating hinge knee prosthesis. A computed tomography scan was done for assessment of the canal diameter towards the tibia and well as the femoral side (Figure 6).

Intraoperatively after induction and aseptic and antiseptic draping, the original incision was taken; a standard medial parapatellar approach was used to sublaxate the patella for proper joint exposure and instrumentation. The antibiotic spacer was removed and the joint space as well as the femoral and tibial canal were thoroughly debrided of residual cement and fibrous tissue. As a result of severe soft tissue compromise and severe bone loss, Zimmer NexGen® complete knee solution with rotating hinge,

stem extension, and distal femoral augments was used to balance the knee throughout the knee range of motion (Figure 7).

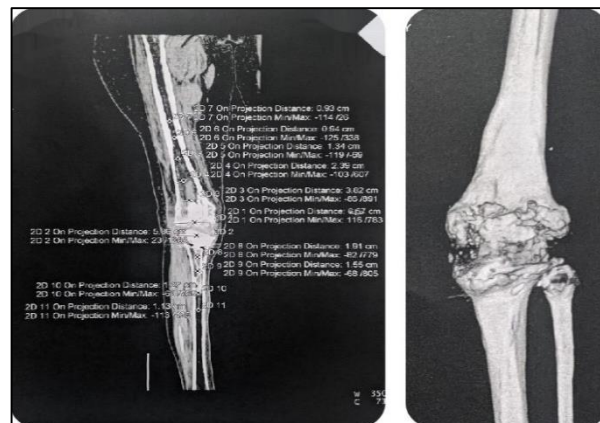


Figure 6: Computed tomography scan for assessment of canal diameter.



Figure 7: Immediate postoperative radiograph.

Postoperatively gentle knee bending exercises and walker-assisted ambulation (with the brace) as much as tolerated were begun from the first postoperative day. The antiseptic dressing was done on the second postoperative day. The patient responded very well to physiotherapy protocol and by the sixth post-operative day, she could do high sitting and active knee extension and ambulate with full weight bearing (with walker and brace). Extended culture and sensitivity reports as well as histopathology reports for tissues sent intraoperatively was negative for infection. The patient was discharged on antibiotics for 8 weeks on basis of previous culture reports which were positive for *Acinetobacter baumannii* with advice to follow up for stitch removal (fourteenth post-op day) and one month henceforth.

After 6 months, the patient returned to our OPD happy as she could ever be. She could walk without support and do everything which she could never have imagined due to her disability. She was again assessed by the Hamilton depression rating scale which graded her in the category of

'no depression' (Score 7/50). Also, her knee society (Part 1) score improved from 14 to 80, and her knee society (Part 2) score improved from 0 to 70 thereby suggesting an excellent outcome of surgery (Figure 8 and 9).



Figure 8: Clinical photographs at 6 months follow-up.



Figure 9: Radiograph at 6 months of follow-up.

DISCUSSION

Herein, we shared a case of a 51 years old lady with severe laxity around her right knee and bone defects which was classified as type 3 according to the Anderson orthopaedic research Institute classification.

In the literature, wide and vivid applications of rotating hinge knee have been documented mostly about severe bone defects and ligamentous laxity. Though some authors widely acclaim its use, higher rates of complications have been reported by others. However we advocated the use of this prosthesis because it was the most suitable option in our case scenario. Joshi and Navarro-Quilis reported the review of seventy-eight revisions using a rotating-hinge prosthesis in patients with aseptic loosening.⁵ Out of seventy-eight, fifty-seven patients showed excellent results of the surgery with a range of motion of 104 degrees in flexion and complete extension. Thus, they advocated the use of hinged revision prostheses in extreme cases of gross instability and massive bone loss.

Pradhan et al reported a retrospective series of 51 rotating-hinge prostheses in revision arthroplasty with a mean follow-up of 4 years with the main indication for revision being infection and aseptic loosening.⁶ Postoperatively forty-four (86%) patients were satisfied with the surgical outcomes and thus they concluded that in complex revisions rotating hinge model may show encouraging results.

Pour et al reported a cohort of forty-four knee arthroplasties with the use of a modern-generation kinematic rotating hinge knee with revision of the previous total knee being the prime indication of the surgery.⁷ In a mean duration of 4.2 years of follow-up, they reported a significant improvement in function and a reduction in pain. Though they also reported failures and complications due to periprosthetic infection in three knees, aseptic loosening in four knees, and periprosthetic fracture in one. Thus, they advocated the use of rotating hinges as a last resort primarily in the elderly and patients with a sedentary mode of life.

Springer et al also reported on a series of 26 knees concerning the results of distal femoral arthroplasty for limb salvage and enlightened the major complications with periprosthetic fracture being the main cause of failure.⁸

CONCLUSION

In our case report, we have mentioned a female who went from being emotionally depressed, with thoughts of getting her limb amputated to end her woes and agony to a happy soul after she could achieve vocational milestones she never thought of, and that too in a short interval of time. Though with the use of a rotating hinge prosthesis patient's symptoms were resolved, the literature mentions risks and complications with the use of rotating hinge arthroplasty and therefore we believe that a close follow up is necessary for these patients to obtain information regarding long-term outcomes.

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