



TOTAL KNEE ARTHROPLASTY IN PATIENTS WITH PRIOR QUIESCENT DISTAL FEMUR OSTEOMYELITIS

Orthopaedics

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ABSTRACT

Osteomyelitis around the knee joint if not treated in time will lead to degeneration of knee joint and those patients will have symptoms for which a total knee arthroplasty would be indicated. Very few studies are available in the literature, in which the surgeons have performed primary total knee arthroplasty in cases of previous quiescent osteomyelitis around the knee. The objective of these reports is to investigate whether prior quiescent osteomyelitis around the knee joint would result in high rate of recurrence of infection after primary total knee arthroplasty? Which antibiotics should be used if intraoperative cultures are negative in patients with quiescent osteomyelitis and what would be the duration of antibiotics? Here we present case reports of 2 patients who underwent total knee arthroplasty after previous distal femur osteomyelitis and their functional outcomes after total knee arthroplasty with a follow-up period of 2 years. Both the patients preoperatively were limited to indoor ambulation and had significant difficulties with stair climbing, reported significant improvement in climbing up and down stairs, ambulatory distance and activities of daily living in the post-operative period. None of the patients had clinical signs of deep prosthetic joint infection at 2 years follow-up.

KEYWORDS

Quiescent Osteomyelitis, Total Knee Arthroplasty, Culture Negative Osteomyelitis.

INTRODUCTION

Osteomyelitis around the knee joint if not treated in time, generally presents with destroyed articular cartilage and leads to considerable knee pain and functional limitations in a person. Such patients may have symptoms for which a total knee arthroplasty would be required(1). Many studies show that incidence of periprosthetic joint infection is high in patients with prior history of osteomyelitis around the knee as compared to routine cases(2-4).

In modern world, total knee arthroplasty is a durable, reliable, reproducible and safe procedure but deep infection remains a major source of failure in patients which undergo total knee arthroplasty with history of prior osteomyelitis(5,6). Very few studies are available in the literature, in which the surgeons have performed primary total knee arthroplasty in cases of previous quiescent osteomyelitis around the knee. However, the resolution of infection is not assured even after several years without any symptoms(7). Also, the duration and use of post-operative antibiotics in patients undergoing total knee arthroplasty with quiescent osteomyelitis is unclear.

The objective of these reports is to share two cases of prior quiescent distal femur osteomyelitis who underwent primary total knee arthroplasty and their functional outcomes after the surgery with a followup period of 2 years. Also, we tried to answer some questions like, which antibiotics should be used if intraoperative cultures are negative in patients with quiescent osteomyelitis and what would be the duration of antibiotics?

Case Study

Case 1:

History:

63 years old gentleman presented with complains of right knee pain for the past 40 years. Patient was apparently asymptomatic 40 years back when he developed right thigh and knee pain along with swelling and pus discharge from the lower aspect of right thigh. Patient was diagnosed with right distal femur osteomyelitis and has been operated elsewhere with incision and drainage, 3 times around right knee in 2006, 2008, 2010 respectively, following which knee swelling and pus discharge subsided but patient had persistent knee pain. The Details of the causative organism for osteomyelitis were not available with the patient. Patient's pain had gradually increased over the last 10 years and now he was not able to walk without support. He had difficulty in climbing up and coming down from stairs.

Clinical examination: patient's right knee, he had multiple healed scars of previous surgery with skin puckering as shown in the **Fig1**. Medial joint line tenderness was present. Varus deformity of 10 degrees. Fixed flexion deformity of 30 degrees. Range of motion from 30-40 degrees. No distal neurovascular deficit. Pre-operative knee society score- 58.

Fig 1: Showing patient's right knee, having multiple healed scars of previous surgery with skin puckering in the preoperative period.



Case 2:

History:

62 years old lady presented with complains of left knee pain for the past 20 years. Patient was apparently asymptomatic 20 years back when she developed left knee pain, swelling and high-grade fever. Patient went to a nearby hospital where she was diagnosed with distal femur osteomyelitis and was operated with incision and drainage for the same in the year 2000 at a local hospital, after which the knee swelling and fever subsided but patient had persistent knee pain.

Over a period of last 20 years the knee pain had gradually increased for which the patient used to take over the counter analgesics and now patient was not able to walk without support. she had difficulty in climbing up and coming down from stairs and was not able to perform her routine household activities.

Clinical examination: patient's left knee, she had 8 cm long healed scars of previous surgery over the anterior aspect of knee joint. patient had medial joint line tenderness. Varus deformity of 10 degrees, Fixed flexion deformity of 5 degrees, Range of motion from 5-90 degrees, No distal neurovascular deficit. Pre-operative knee society score- 52.

Preoperative:

Before total knee arthroplasty, a systematic work-up directed at the detection of residual infection was done for each patient. Laboratory tests included a white blood cell count with differential, erythrocyte sedimentation rate, and a C-reactive protein. Both patients had normal laboratory test results.

Plain radiographs of knee were done to look for signs of persistent infection such as periosteal new bone formation, endosteal scalloping or the presence of a sequestrum (**Fig 2**), which were not present in both the patients.

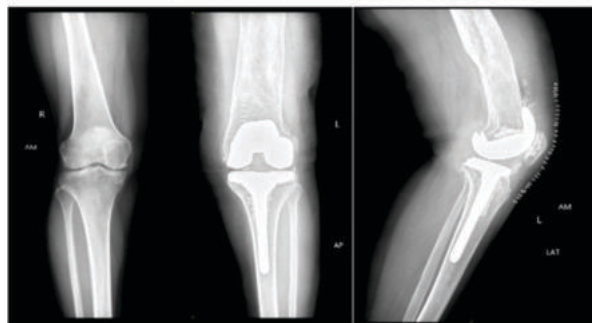
Fig 2: Showing Pre-operative AP and Lateral view of the left femur with osteomyelitis changes.

**Intraoperative:**

Both patients at the time of surgery underwent histopathological and microbiological culture examination in the form of multiple deep tissue specimens of synovium. Drain was used during wound closure for both the patients and drain tip culture was also done. The results of intraoperative tissue culture and drain tip culture were negative in both the patients.

The total knee arthroplasty was done as a single-stage procedure in both the patients using Depuy Johnson & Johnson PFC sigma posterior stabilized cemented knee implant (Warsaw, USA) with 40g Depuy Smartset GHV gentamicin bone cement and Biocomposite (STIMULAN Rapid cure) beads containing Vancomycin and gentamycin (Fig 3)

Fig 3: Showing Post-operative AP and Lateral view of the left femur after Total knee arthroplasty

**Postoperative:**

After surgery both the patients were started on oral faropenem 200mg and linezolid 600mg for 2 weeks followed by combination of oral rifampicin 450mg and levofloxacin 500 mg for 1 year(8). Patients were followed up at regular intervals for 2 years and clinical outcomes were assessed using knee society scoring system, visual analogue scale for pain, objective improvement in the range of motion of knee joint and overall patient satisfaction in returning to their daily activities.

DISCUSSION

Prior to total knee arthroplasty, each of the laboratory tests for infection were normal for both the patients. Total knee replacement in both of patients with prior osteomyelitis around the knee was reliable in relieving pain and improving function of the knee joint. Both the patients preoperatively were limited to indoor ambulation and had significant difficulties with stair climbing, reported significant improvement in climbing up and down stairs, ambulatory distance increased, post-operative range of motion of knee increased in case 1 by 20 degree and case 2 by 30 degrees and improvement in activities of daily living in the post-operative period was seen (Fig 4).

Fig 4: Showing Post-operative Right knee Range of motion



None of the patients had clinical signs of deep prosthetic joint infection at 2 years follow-up. Post-operative knee society score in the both the patients was excellent (93 in case 1 and 95 in case 2)

The role of arthroplasty in quiescent osteomyelitis considered to be resolved remains to be clearly defined, and there is a risk of complications especially of failure due to infection. In quiescent osteomyelitis, resolution of infection remains uncertain even after several years free of symptoms. Most of the times intra-operative deep tissue samples (joint fluid, synovial tissue, bone section) show negative culture reports, which create a dilemma in the surgeon's mind regarding the use of antibioprophyllaxis molecules in such patients. Literature suggests in cases of quiescent osteomyelitis, the molecules of standard arthroplasty antibioprophyllaxis may be prescribed, but with treatment beginning after intra-operative deep sampling and being maintained until definitive results are obtained(7). In our cases too, we used the rifampicin for 1 year along with the standard antibioprophyllaxis since the prevalence of tuberculosis is significant in our part of the world and mycobacterium tuberculosis remains as one of the many agents causing quiescent osteomyelitis.

The indicators of a successful total knee arthroplasty are pain relief, improved function, and absence of infection. It has been suggested that patients with comorbid conditions like diabetes or rheumatoid arthritis along with extensive soft tissue scarring and a relatively poor vascular supply around the knee joint in a prior bone infection setting may account in part for the poor outcomes after total knee arthroplasty(5,6,9-11). All these conditions lead to difficulties in exposure of knee joint during the surgery and as a result in return leads to greater soft tissue dissection and the formation of potential dead spaces which increase the chances of infection. Both of our cases had intraoperative tissue adhesion due to previous osteomyelitis and care was taken to prevent any dead space formation to avoid chances of infection.

We believe the cornerstone to prevent infection is a thorough clinical history and examination of patient in preoperative evaluation along with adjuncts like advanced laboratory and pathology investigations(10,11). The treating surgeon must utilize all the available patient's data and use clinical judgment to minimize the risk of recurrent infection in this subgroup of patients(12)

Our findings in this study were in concurrence with available literature on total knee arthroplasty with prior osteomyelitis that, with a careful preoperative and intraoperative evaluation and the use of antibiotic bone cement for fixation, total knee arthroplasty in patients with prior osteomyelitis can be expected to provide good pain relief, functional improvement, and an acceptably low rate of deep prosthetic infection(12)

The main limitation of this study was the limited sample size therefore it was not possible to prove the statistical significance of the results.

CONCLUSIONS

A careful preoperative evaluation and the routine use of antibiotic bone cement for total knee arthroplasty in patients with prior bone infection can be expected to provide good pain relief, functional improvement, and an acceptably low rate of deep prosthetic infection.

REFERENCES:

- Ivey M, Clark R. Arthroscopic debridement of the knee for septic arthritis. *Clin Orthop*. 1985 Oct;(199):201-6.
- Wymenga AB, van Horn JR, Theeuwes A, Tmuytjens HL, Slooff TJH. Perioperative factors associated with septic arthritis after arthroplasty: Prospective multicenter study of 362 knee and 2 651 hip operations. *Acta Orthop Scand*. 1992 Jan;63(6):665-71.
- Zimmerli W, Trampuz A, Ochsner PE. Prosthetic-Joint Infections. *N Engl J Med*. 2004 Oct 14;351(16):1645-54.
- Willis-Owen CA, Konyves A, Martin DK. Factors affecting the incidence of infection in hip and knee replacement: AN ANALYSIS OF 5277 CASES. *J Bone Joint Surg Br*. 2010 Aug;92-B(8):1128-33.
- Wasielewski RC, Weed H, Prezioso C, Nicholson C, Puri RD. Patient comorbidity: relationship to outcomes of total knee arthroplasty. *Clin Orthop*. 1998 Nov;(356):85-92.
- Yang K, Yeo SJ, Lee BPH, Lo NN. Total knee arthroplasty in diabetic patients. *J Arthroplasty*. 2001 Jan;16(1):102-6.
- Bauer T, Lacoste S, Lhotellier L, Mamoudy P, Lortat-Jacob A, Hardy P. Arthroplasty following a septic arthritis history: A 53 cases series. *Orthop Traumatol Surg Res*. 2010 Dec;96(8):840-3.
- Osmon DR, Berbari EF, Berendt AR, Lew D, Zimmerli W, Steckelberg JM, et al. Diagnosis and Management of Prosthetic Joint Infection: Clinical Practice Guidelines by the Infectious Diseases Society of America. *Clin Infect Dis*. 2013 Jan 1;56(1):e1-25.
- Insall JN. Total knee arthroplasty in rheumatoid arthritis. *Ryumachi Rheum*. 1993 Dec;33(6):472.
- Wukich DK, Abreu SH, Callaghan JJ, Van Nostrand D, Savory CG, Eggli DF, et al. Diagnosis of infection by preoperative scintigraphy with indium-labeled white blood

- cells. *J Bone Joint Surg Am.* 1987 Dec;69(9):1353–60.
11. Scher DM, Pak K, Lonner JH, Finkel JE, Zuckerman JD, Di Cesare PE. The predictive value of indium-III leukocyte scans in the diagnosis of infected total hip, knee, or resection arthroplasties. *J Arthroplasty.* 2000 Apr;15(3):295–300.
 12. Lee GC, Pagnano MW, Hanssen AD. Total knee arthroplasty after prior bone or joint sepsis about the knee. *Clin Orthop.* 2002 Nov;(404):226–31.