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Case Report

Single-stage contralateral total hip and knee arthroplasty: a report of two cases with literature review

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ABSTRACT

Total hip arthroplasty (THA) and total knee arthroplasty (TKA) have been performed for end stage degenerative arthritis of hip and knee respectively, with reliable functional outcomes. A single joint arthroplasty has wide acceptance, and presents less complications than a staged or simultaneous bilateral joint arthroplasty. Any contralateral or ipsilateral staged or simultaneous two joint arthroplasty have been infrequently performed and occasionally described. We present two cases where contralateral hip and knee arthroplasty were performed in single-stage simultaneously for an end-stage degenerative arthritis. Hip was operated first than knee in both the cases. The clinical, radiological, and functional recovery was graded good in both. There were no complications, or an extended stay in hospital, and blood transfusion requirements were insignificant. The contralateral two joint arthroplasty needs meticulous preoperative work-up, dedicated high volume joint arthroplasty unit, and use of meticulous standard surgical techniques to achieve the desired functional outcomes.

Keywords: Simultaneous, Contralateral, Concurrent, One-stage procedure, THA, TKA

INTRODUCTION

Total hip arthroplasty (THA) and total knee arthroplasty (TKA) are orthopaedic procedures performed to restore the function and mobility for an end-stage degenerative condition of the hip and knee joint. They are performed normally as an isolated procedure. The cognate joint affection occurs commonly and may necessitate a simultaneous or staged THA and TKA in select patient group.[1-4] An index primary arthroplasty has a propensity for contralateral similar joint arthroplasty in about 23% cases within 5 to 8 years.[4] TKA accounts for 70 % of such affections.[4] A noncognate joint may get affected in 5% cases after an index primary unilateral arthroplasty, over an extended period of twenty years.[3] Two contralateral TJA in one stage is a rare surgery accounting for less than 0.05% of all arthroplasty cases.

We report two cases where a single staged contralateral THA and TKA were performed for degenerative arthritis, and we discuss the challenges in their management. We also review the literature to identify the aetiology, complications, and reported outcomes for a contralateral single-stage hip and knee TJA.

CASE REPORT

Case 1

A 56-year-old female from western Uttar Pradesh, presented with disabling right hip pain of more than eighteen months, and associated left knee excruciating pain for the past four months. She reported a progressive right hip pain which worsened with ambulation and weight bearing activities on the right lower limb. Pain in contralateral left knee joint made her dependent with her misery being further compounded by the crisis of the COVID-19 pandemic. She had apparent shortening of the right lower limb and a moderate degree of varus deformity of the left knee. There were painful range of movements

of the right hip. She presented with left knee joint tenderness, moderate joint effusion, and an active painful range of left knee motion of 0 degree to 70 degrees. Motion was limited by medial and posterior knee pain. Plain radiographs of right hip revealed degenerative secondary arthritis of the right hip (Figure 1). Plain radiographs of bilateral knees revealed degenerative arthritis of the left knee joint with diminished medial joint space, osteophytes formation and sclerosis of medial joint cartilage (Figure 2). Blood inflammatory markers were all within normal ranges. The biochemistry profile and cardiac echocardiology evaluation were within ranges. Pre-anaesthetic evaluation graded her as American association of anaesthesiologists (ASA) grade 2.

A one-stage contralateral right THA followed by left TKA was done under spinal epidural anaesthesia. THA was performed first with posterolateral approach in left lateral position. A cement-less acetabular pinnacle cup (Depuy Synthes, IN) implanted with, an uncemented corail femoral stem (Depuy Synthes, IN) (Figure 3). Ceramic on polyethylene hip bearing were used. Thereafter, at the same time position changed to supine position. Left knee was approached with anterior midline incision and medial parapatellar approach for TKA under tourniquet. We used cemented posterior stabilized total knee prosthesis with patelloplasty (PFC Sigma, Depuy Synthes, Germany) (Figure 4). We used drain for right hip and used intra-articular tranexamic acid for left knee.

Figure 1: Antero-posterior radiograph of pelvis with both hips shows obliterated joint space of the right hip with osteophytes formation.

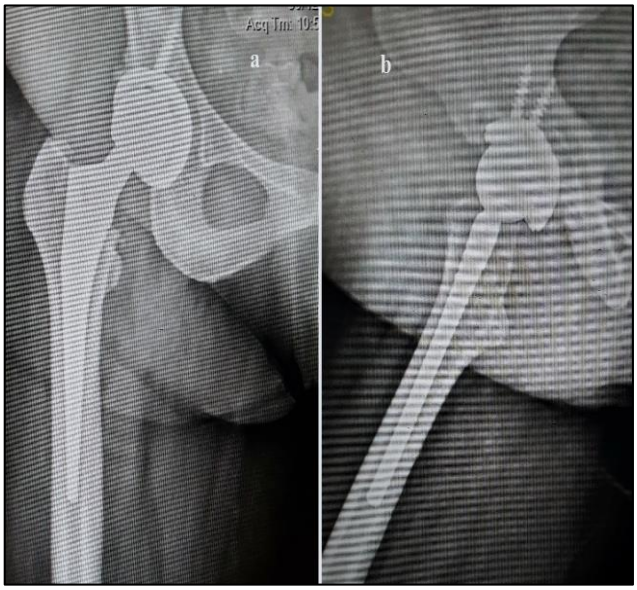

Figure 3 (A and B): Antero-posterior and lateral view radiograph of the right hip with uncemented hip prosthesis *in situ.*

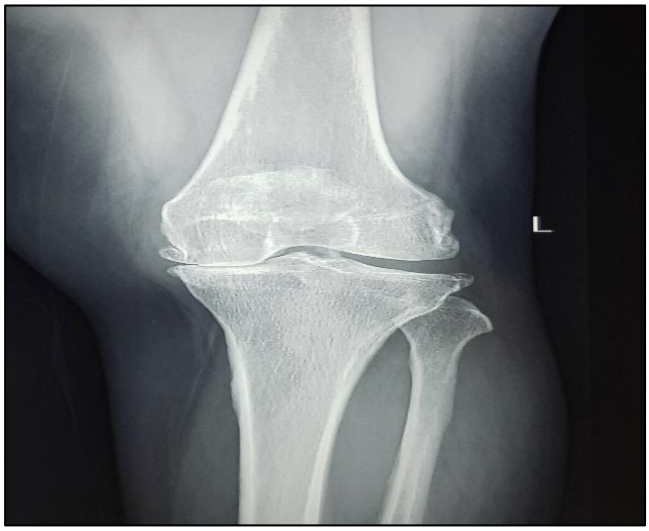

Figure 2: Antero-posterior radiograph of the left knee in standing position with advanced degenerative osteoarthritis.

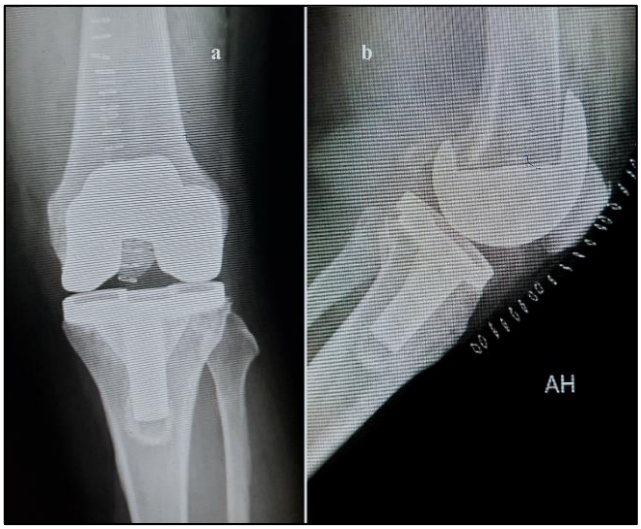

Figure 4 (A and B): Antero-posterior and lateral view radiograph of the left knee with posterior stabilized knee prosthesis.

She was allowed walker support mobilization from next day. She was discharged from the hospital in healthy state in the next five days. At two weeks, her stitches were removed without signs of any wound complications. For six weeks, she was allowed walking with frame support. At three months follow up, she had progressed to pain-free ambulation without any walking aid, and she was allowed all daily routine activities.

Her serial evaluation till eighteen months was done by clinical and radiological assessment. She was mobilising full weight bearing with a painless range of left knee motion to 130° without any extensor lag and range of right hip motion from 0° to 120°. Radiologically, there was no evidence of implant loosening, subsidence, or joint deformation in both the joints. No dislocation of hip was seen in this period of follow-up.

Case 2

A 70-year-old male presented with end stage degenerative arthritis involving the left hip and right knee joint. His arthritis was controlled and had subsided with medications since few years however, with increased limitation in activities and walking there has been aggravation of the arthritic pain. He initially had pain in right knee and subsequently progressed to left hip pain too. At presentation, pain in left hip and right knee was progressive and persisting. The ambulatory support of walker was required since around six months affecting his daily routine activities and quality of life. There was no history of trauma, fever, chills, and other joint pains. There was joint line tenderness and moderate right knee effusion without any induration, erythema or abnormal warmth with active range of right knee movements from 10 to 80 degrees. His left hip had painful rotations and limited range of movements with discomfort in extremes of motion.

Plain radiographs of bilateral knee showed right knee diminished joint space with osteophyte formation and sclerosis along medial joint space (Figure 5). Plain radiograph of pelvis with both hips showed extinct joint space, osteophytes and degenerative changes of left hip (Figure 6). The inflammatory markers were within normal ranges. He underwent biochemical evaluation along with anaesthetist assessment to grade him as ASA grade 3 for surgical intervention. A single stage contralateral left hip and right knee arthroplasty was done.

The left hip was operated first in right lateral position. THA was performed with posterior approach. Hybrid THA with uncemented acetabular cup and cemented femoral stem with metal head and polyethylene bearings was done (Figure 7). After completion, position changed to supine posture and right TKA procedure followed. The posterior stabilized (Depuy PFC Sigma) cemented TKA prosthesis implanted with three pegs oval shaped patellar component (Figure 8). Tranexamic acid was used intravenous prior to THA and intraarticular for TKA. He was mobilized with walker support on second post-operative day and progressed well to be discharged within next five days. Regular follow up at two, six, and twelve weeks showed clinical and functional improvements. The right knee range of movements were 0 to 110 degrees and the left hip score improved significantly. At two years follow up he was mobilizing full weight bearing. There was no radiological evidence of loosening, malalignment and subsidence in this period of follow-up.

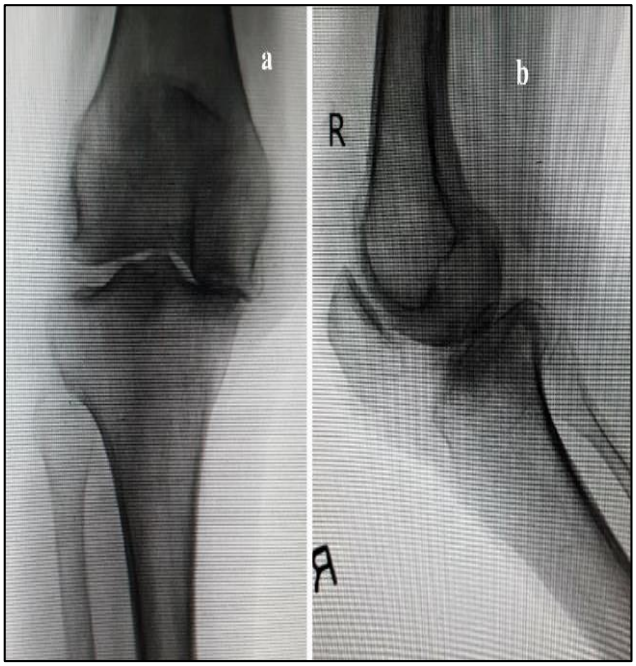

Figure 5 (A and B): Antero-posterior view in standing posture and lateral view radiograph of the right knee with advanced degenerative osteoarthritis.

Figure 6: Antero-posterior radiograph of pelvis with both hips which shows left hip obliterated joint space, osteophytes formation, and osteopenia.

Figure 7: Antero-posterior radiograph of the left hip with hybrid arthroplasty of uncemented acetabulum and cemented femoral prosthesis *in situ*.

Figure 8 (A and B): Antero-posterior and lateral view radiograph of the right knee with posterior stabilized knee prosthesis.

Table 1: Case reports and studies on contralateral/concurrent hip and knee joint arthroplasty.

Study	Age/ sex	Indication	Site of surgery	Complication	Result	Follow-up
Head et al (1977)[7]	3 cases	RA	Ipsilateral THA & TKA	Nil	Good outcomes	-
Ritter et al (2002)[12]	Avg. 71.4 years	OA (73%), RA (9%)	Contralateral (67) & ipsilateral (36) Cases	Dislocation hip (10.5% in contralateral & 8.3% in ipsilateral)	Improved hip and knee scores & 1 death	Avg. 6.5 years
Pagenstert et al (2011)[8]	-	OA	B/L TKA & B/L TAA	Nil	Excellent	2 year
Xie et al (2015)[9]	59 F	Osteopetrosis	Left TKA – 6 months later Right THA	Nil	Good	1 year
Theeriazaam et al (2017)[10]	34 F	RA	Right THA & Right TKA	Nil	Excellent	2 year
Petrillo et al (2019)[6]	6(21)	OA	Concurrent THA & TKA	1 superficial infection, 1 Urinary Tract Infection	Comparable clinical & functional outcomes to staged group	50.2 months
Liu et al (2021)[11]	56 cases	RA & OA	Ipsilateral THA-TKA or TKA-THA (not concurrent)	1 sciatic nerve palsy, peri-prosthetic fracture 4, dislocation 2	Improved hip & knee scores	Median 110 months
Our study 2022	1case-56 F, 2 case- 70 M	Secondary OA	1 case-Right THA & Left TKA, 2 case-Left THA & Right TKA	Nil	Excellent	2.5 years

DISCUSSION

The degeneration affects either both the hip or both the knee joints simultaneously due to biological or mechanical factors leading to arthrtis. The concurrent affection of the hip and knee joint either ipsilateral or contralateral presents infrequently. However, the concurrent affection has significant patient morbidity with marked ambulatory disability. The aetiological factors for a concurrent hip and knee joint affection commonly includes arthritis secondary to obesity, osteoarthritis (OA), rheumatoid affection (RA), metabolic syndrome, and posttraumatic arthritis.[4-6] The probability of symptomatic contralateral knee affection is higher than an ipsilateral knee affection following a hip arthritis due to the gait changes.[3] The risk factors affecting the contralateral joint involvement includes female sex, smoking, diabetes and obesity.[4]

Management with an isolated unilateral THA or TKA has been a successful procedure for the end stage arthritis with proven outcomes. Generally, the complication rates are low with a single TJA. A simultaneous single-stage bilateral THA or TKA has been in practice for select patient group. A simultaneous bilateral THA or TKA has been associated with increased complication rates as compared to a unilateral or staged arthroplasty.[1] The hip dislocation rate has been an area of concern with contralateral or ipsilateral THA or TKA due to abnormal exertion experienced in getting up from a chair with hyperflexion of the hip.[5] However, the advantage of single hospital admission, same rehabilitation time, single anaesthesia, equitable blood transfusion requirement, and reduced financial costs make it an alluring prospect.[2]

A contralateral THA with TKA presents unique challenges which have been rarely detailed or discussed. We reviewed the literature, and to the best of our knowledge, a contralateral THA and TKA has been infrequently practised and rarely reported as shown in Table 1. Although, the first study presenting the results of an ipsilateral or contralateral TJA was conducted some four decades ago in 1977, there have been only few case studies which are subsequently reported.[2,6-12] We are though not reporting the cases for the first time, but because of its rarity we report these cases.

The simultaneous TJA needs good preoperative planning, assessment of medical comorbidities, meticulous surgical techniques to reduce surgical time, and peri-operative management of blood loss.[2,8] The challenges detailed with a concurrent THA and TKA in an osteopetrosis induced arthritis included difficulties in intraoperative component sizing, medullary canal preparation of thickened sclerotic bone, component fixation due to poor cement interdigitation, avoidance of possible iatrogenic fractures, prolonged surgical time and post-operative risk of osteomyelitis.[9] The lower postoperative morbidity was indicated as the reason to consider a concurrent arthroplasty in otherwise fit individuals affected by RA.[10] Six patients out of twenty-one enrolled patients underwent one-stage combined THA and TKA for OA and they were retrospectively compared to a group who underwent a staged TJA procedures.[6] The authors, concluded that there were similar clinical and functional outcomes, complications, and blood transfusion requirements in both the groups in their study.[6] They further observed that the one-stage group had a significant haemoglobin drop post-operatively, and a significant reduction of hospital length of stay as compared to the staged procedure group.

The management in a concurrent TJA should include measures to reduce blood loss, manage postoperative pain, chemoprophylaxis for deep vein thrombosis, and measures to limit the hospital length of stay. In our study, we managed to reduce blood loss and avoid transfusion by using intravenous tranexamic acid during THA and intra-articular tranexamic acid during TKA. We observed lower visual analogue score with pain-free post-operative period and subsequent pain-free mobilization following use of continuous epidural analgesia. The thrombo-prophylaxis was managed with pharmacotherapy with enoxaparin and compression mechanical devices in the immediate post-operative period. The length of hospital stay was of normal duration and comparable to either a bilateral THA or TKA patient.

A concurrent TJA should be considered in a high-volume arthroplasty unit with expertise and experience to conduct the combined procedures in short operative duration with standardised arthroplasty surgical techniques for the select individuals.[6]

CONCLUSION

We would recommend to consider a concurrent THA and TKA in end-stage degenerative arthritis as a single-stage arthroplasty procedure in the properly selected fit candidates.

A short hospital stay, single anaesthesia was found to offer a multitude of advantages including patient convenience, shorter disability, and shorter recovery periods with reduced costs for patient and institutions. It has proven good functional results, and better rehabilitation outcomes.

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Ethical approval: Not required

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