Case Report
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TOTAL KNEE ARTHROPLASTY IN SEVERE VALGUS DEFORMITY OF KNEE OSTEOARTHRITIS WITH NON-CONSTRAINED IMPLANT: A CASE REPORT

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ABSTRACT

Osteoarthritis (OA) is main cause of musculoskeletal disability all over the world. The incidence and prevalence of OA increase with aging . The treatment for grade four of knee osteoarthritis (OA) as classified by Kellgren and Lawrence is knee replacement. Approximately 10% of patient need TKA have valgus deformity and 15% of it is severe deformity. In type-III deformity (severe osseous deformity) with an incompetent medial soft-tissue sleeve is best managed with a constrained or hinged total-knee design, but it is not always available due to insurance limitation. In this case we choosed to manage the type III deformity using non constrained or hinged total knee design and achieve knee balancing by a soft tissue procedure (MCL tightening). Reporting female patient Mrs. S, a 61-year-old with painful and valgus deformity on the right knee. Her range of motion preoperatively was 5-100° with 30° fixed valgus deformity on the right knee. We performed total knee arthroplasty used non-constraint implant with additional soft tissue procedure to gain ligament balance by shifted MCL origin with its bone (epicondyle) superior and anteriorly. Intra operative we were able to correct valgus deformity and achieved 5-90° range of motion. Total knee arthroplasty is a procedure that contains two main steps, bone cut and soft tissue balancing. In valgus knee tightness found at lateral site with loosening at medial site. In its severe condition medial collateral ligament may be found disfunctioned . Selective soft tissue release was effective to achieve good ROM and aligment without prosthetic constraint needed which was helped to manage patient when the constraint implant was not accessible. after 3 month post operative we found patient was able to stand and walk without pain and device with 080° range of motion, stable and corrected valgus deformity.

Keywords: Osteoarthritis, disability, valgus deformity

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INTRODUCTION

Osteoarthritic (OA) is the most common form of arthritis. It is a chronic, degenerative change of the joint. Primary OA is caused by mechanical wear and tear that naturally occur to the articular cartilage with aging. In OA progression, more joint tissues changed, there are seen in the subchondral bone synovium, synovial fluid, joint capsule and ligaments (1).

Osteoarthritis (OA) is the main cause of musculoskeletal disability all over the world. The incidence and prevalence of OA increases with aging. The patient complaints of pain and swelling as the result of decreased joint mobility (2). The treatment for grade four knee osteoarthritis (OA) as classified by Kellgren and Lawrence is knee replacement. Approximately 10% of patient need TKA have valgus deformity and 15% of it is severe deformity (1,3). The primary goals of therapy are to improve function without pain of the knee (4). The valgus deformity has bone loss with metaphyseal remodeling, from lateral femoral

PRESENTATION OF CASE

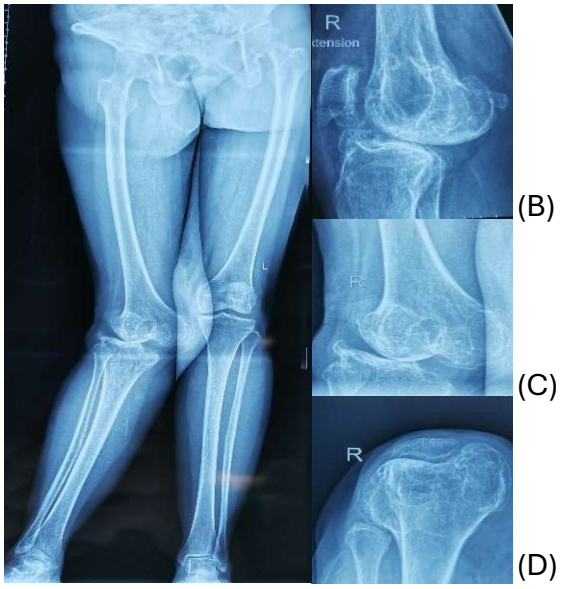
Female patient Mrs. S is a 61-year-old, with progressive painful deformity of her right knee for three years before she came to the hospital and worsened this last one year. She has no trauma history. The pain was increased by weight bearing activity such as walking and standing. She had Nonsteroidal Anti-Inflammatory Drugs (NSAID) medication and physiotherapy for three months and no improvement. From physical examination the patient was found to have valgus deformity and difficulty to stand and walk due to pain on her right knee (Figure 1) she was able to bend the knee for 100° with condyle and lateral tibial plateau and soft tissue contracture consisting tight lateral structure such as iliotibial band, lateral collateral ligament, popliteus tendon, posterolateral capsule and hamstring muscle (3).

According to Ranawat classification valgus deformity has been classified into three types. A type-I deformity has minimal valgus and medial soft-tissue stretching. A typical type-II fixed valgus deformity has a more substantial deformity (>10°) with medial soft tissue stretching A type-III deformity is severe. osseous deformity after a prior osteotomy with an incompetent medial soft-tissue sleeve, which is best managed with a constrained or hinged total knee design (2,3).

In this case we choose to manage patients with type III deformity using non constrained or hinged total knee design due to its unavailability with additional soft tissue procedure (MCL tightening) to achieve the balance. 5° less of knee extension. The radiological result showed 30° valgus deformity with joint space narrowing, sclerotic of subchondral bone, lateral subluxation and osteophytes (Figure 2). The patient agreed for total knee arthroplasty, and it was performed by the author. For osteoarthritis knee with severe valgus deformity 30°. The choice of implant is constraint implant but due to limitation of insurance coverage the patient was treated with non-constrained implant and soft tissue balancing procedure by tightening MCL to achieve the balance.

(A) (B) (C)

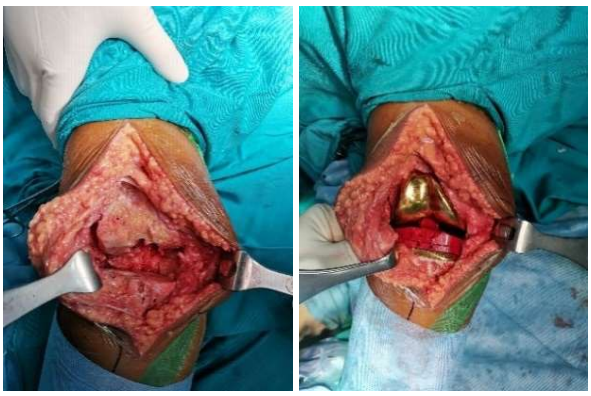
Figure 1. Pre operative clinical condition A. Front, B. Behind, C. Lateral (source: internal documentation)



(A) (B) (C) (D)

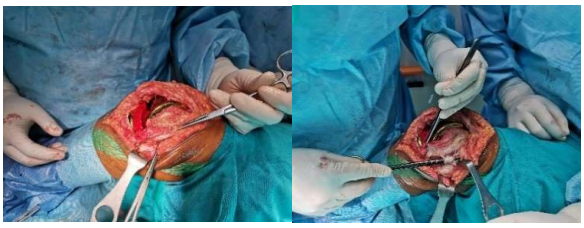
Figure 2. Pre operative radiology showed right knee joint line narrowing, lateral subluxation, sclerotic, osteophytes and severe valgus deformity A. Full lower limb, B. lateral view, C. Posterior View, D. anterior view (source: internal documentation)

We performed surgery with a patient in supine position, under spinal anesthesia. Prophylactic antibiotic administered 30 minutes prior to incision and before torniquet inflated. Patient then draped in sterile manner. We used medial parapatellar approach. Skin incised started midline 5cm above patella and one third medial in patella and stop just medial site of tibial tubercle.



(A) (B)

Figure 3. Imbalance was found between lateral and medial site intra operative in flexion and extension A. Before used implant, B. After using implant.



(A) (B)

Figure 4. (A). Clamp marks of the medial collateral ligament. (B). Elongation of medial collateral ligament.

Figure 5. (A). Exposure of medial collateral ligament (B). Tightening of MCL by osteotomy of medial femoral condyle and shifted to superior and anterior femur until it tightened and balanced and fixated with

kistner wire and cortical screw. (source: internal documentation)

Arthrotomy was performed at half centimeter medial of quadriceps tendon down to medial site of patella, patellar tendon and stop on the medial site of tibial tubercle. We started with femoral bone cut in 6° valgus. Tibial bone cut performed perpendicular with joint line. The extension and flexion gap balancing were evaluated. We found imbalance between lateral and medial site, tight on the lateral and loose in medial site (Figure 3. A,B). After removed all the osteophyte on the lateral and posterolateral site we performed lateral release by step incision using 15 blades on the iliotibial band and postero lateral capsule. After lateral release we found lateral site was tighter than medial site and there was a MCL elongation on the medial site (Figure 4. A,B).

Tightening on the medial site was done after implant and insert has been installed. We used primary total knee implant from implantcast with insert 12,5 mm thick. We performed osteotomy of MCL insertion at medial femoral condyle and shifted it to proximal and anterior fixated with 3.5 cortical screw and kistner wire 2.0 (Figure 5 A,B) that made as staple. After the capsule had been closed, we found the potential range of motion for this patient was 5-90°. The wound was closed layer by layer. With adequate analgetic the patient started the range of motion exercise in first day and started to walk using walker in second day. The valgus was corrected and ROM in third day post operation was 5-65 °. Two months after surgery the patient was able to walk without pain and didn't need device for ambulation with knee range of motion improved 5-80° and reach 0-80° range of motion at three months after surgery.

(A) (B)

Figure 6. post operative right knee with painless, stable and corrected valgus deformity A. Alignment view, B. X-ray view.

DISCUSSION

Total knee arthroplasty is a procedure that contains two main steps, bone cut and soft tissue balancing. It can be approached by medial parapatellar approach or lateral para patellar approach (6). Bone cut may be performed for femoral or tibial first, mostly femoral cut has range from 5-7° valgus even some authors use 3°. For tibial cut its done perpendicular with the joint line. In valgus knee tightness found at lateral site with loosening at medial site. In severe valgus knee deformity medial collateral ligament may be found dysfunctional. Contracted lateral structures are released in several ways with excellent outcome.

It can be achieved by soft tissue release or by shifting its attachment on the epicondyle distally (7). Ranawat was known for inside out technique based on proximal tibial cut perpendicular joint line and femoral cut 3°

valgus with purpose to avoid under correction of the valgus deformity. Inside out technique of Ranawat began by remove the osteophytes and then extend the knee ,clean and dry the joint by irrigation and then measure the structure tightness by palpate used some device like cobb elevator the posterior cruciate ligament, posterolateral corner, iliotibial band, make sure all the remain PCL is released as well as the posterolateral capsule but left the popliteus tendon intact when possible, if necessary lengthened iliotibial band use pie crust technique (3). Besides release of tight lateral structure, it also needed to tighten the medial component such as MCL, some technique written by Krackow et al and Healy et al (8).

MCL tightening was done by removing it from its origin at epicondyle to superior position until the tightness is enough and then fixated using nonabsorbable suture in its new position and surgical staple at its original origin. It can also be done by transecting the loose MCL and suture it again using non absorbable suture (5). Another Way to make the MCL tight by remove it with a little piece of epicondyle bone to superior position and secure MCL using screw, and we were using this method for our patient (8). Whiteside et al released the LCL and popliteus tendon from their bone attachment but left some attached at their periosteum and synovial membrane and then released the iliotibial band.

Those ligament release was performed with trial implant inserted. LCL and popliteus tendon were effective in flexion because these ligaments attach near epicondyle. The Iliotibial band and capsule were only stabilized in extension because these structures are attached far from flexion and extension axis (7). There were several ways to balance the knee by soft tissue release around knee but until now there's no superiority of the soft tissue release. Selective soft tissue release was effective to achieve good ROM and alignment without prosthetic constraint needed and more release were required for more severe deformity (9,10). Better load distribution, stability and longevity were able to be achieved by soft tissue balancing (11).

CONCLUSIONS

We had performed total knee arthroplasty in severe valgus deformity of osteo arthritic knee using non constraint implant, and by added MCL tightening we achieved balancing of the knee. Three months post operative we evaluated valgus deformity was corrected with ROM 0- 80 °, patient felt satisfied with the result because she was able to do weight bearing activity without pain.

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