ORIGINAL ARTICLE

Management of Complex Knee Deformities in Asian Population: Our Experience of 11 Cases

Professor Syed Shahid Noor¹; Dr. Mehroze Zamir²; Dr. Muhammad Kazim Rahim Najjad³

Introduction

Osteoarthritis (OA) of the knees and non specific lower back pain are one of the most common disorders of population of Asia Pacific region [1]. Knee OA has significant effect on the quality of life of patients [2], as they are not able to perform their daily activities with ease and gradually develop dependence on other family members. This leads to eventual disconnection from the social life and development of depression in patients. Incidence of knee OA is well documented in Asian countries [3-5] with figures reaching up to 28% in the urban population of Pakistan [3]. Incidence is found to be greater in patients of female gender [6,7] and those with greater body mass index (BMI) [8]. Population of Pakistan has tendency to develop OA earlier than the European population mostly having isolated involvement of the knee joints only [9].

Total Knee Arthroplasty (TKA) is a life changing procedure for such patients. Great improvements in quality of life [10] and outcome measure scores [11] have been observed in patients undergone TKA. Our patients are challenging further as compared to western population because they present late for consultation when the disease and deformity is advanced. Their expectations are high, as they wish to resume their ground base activities such as kneeling for prayers. Furthermore with financial constraints present with most of the patients, one has to be careful in choosing the type of implant and keep in consideration other alternative available options. This case series encompasses our experience of TKA on patients with variety of challenging deformities, their short term outcome and a review of the literature.

Case Series

Case 1 and 2: Mild Varus Deformities (Figure 1)

These 52 (Figure I, case A) and 59 (Figure I, case B) year old females both suffered from bilateral knee OA for more than 5 years. Both of these patients underwent TKA via standard surgical technique comprising medial parapatellar approach, soft tissue balancing in flexion and extension, special emphasis on correct patellar tracking, and use of Johnson and Johnson Rotating Platform High flexion

- 1 Head of Orthopaedics Dept., Liaquat National Hospital Karachi, Pakistan; Dept. of Orthopaedics, First floor, K-Block, Liaquat National Hospital Karachi, Pakistan, 74800
- 2 Resident Orthopaedics, Liaquat National Hospital Karachi, Pakistan; WSA – 16, Block – 14, Water Pump Federal B Area, Karachi, Pakistan 75950
- 3 Senior Registrar Orthopaedics Dept., Liaquat National Hospital Karachi, Pakistan; B-8, Akber Apartments, Civil House Road, Cantt, Karachi, Pakistan

Figure I: Cases of bilateral knee OA with mild varus deformities and achieved end results

implant. These patients also underwent cycles of physiotherapy in the pre-operative period to build up quadriceps and enhance range of motion. During peri-operative period, they had multi-modality pain management protocol including continuous epidural infusion, intravenous and oral analgesia. At home sessions of physiotherapy were also scheduled for these patients to enhance recovery and all above management helped these patients in achieving their goal of kneeling for prayers post TKA. Both are in regular follow up for 6 years now and have no complications.

Case 3: Moderate Varus Deformity: (Figure II)

This 65 year old hypertensive female had bilateral knee OA for 12 years. The angular deformity in the coronal plane was 15°. She underwent initial phase of physiotherapy to improve quadriceps strength followed by bilateral TKA. Special attention was given to soft tissue release that lead to correction of deformity and good post operative results. The surgical technique involved medial parapatellar arthrotomy, subperiosteal release of the soft tissue envelope starting from the tibial tuberosity all the way upto posterior aspect of the tibia preserving the superficial medial collateral ligament within the soft tissue envelope that is raised. Removal of medial and posterior tibial osteophytes

and the attachment of semimembranosis at posteromedial aspect of tibia was also released. She achieved a range of motion of 130° and was still symptom free at 7 years follow up.

Figure II: Patient with moderate varus deformity

Case 4: Severe Varus Deformity: (Figure III)

63 year old lady with lady with bilateral knee OA for 15 years presented to our outpatient clinic when she was unable to walk for more than few steps without support. She had both severe varus deformity along with moderate flexion contractures bilaterally. After adequate discussion of outcome and possible need of constrained implant she underwent TKA with extensive soft tissue release at medial sides. Medial release was similar to case 3; whereas fixed flexion contractures were corrected by removal of osteophytes from posterior femoral condyles and release of the posterior capsule. After balancing of gaps at trial there was no ligamentous instability noted, so a primary implant was used and post operatively rehabilitation program was start-

Figure III: Case with severe varus deformity

ed. She achieved 90° of range of motion and had no problems till her last follow up at 5 years.

Case 5: Unilateral Severe Varus Deformity (Figure IV)

68 year old female had right knee deformity of 45° varus angulation in the coronal plane. We had arranged for constrained implant considering the extensive deformity but with after the required medial release, we were able to achieve a balanced knee in both flexion and extension with Posterior stabilized type of implant with a long stem. She has a 8 year follow up with active life and good functional outcome.

Figure IV: Severe varus of unilateral knee

Case 6: Unilateral Severe Varus Deformity (Figure V)

This 49 year old diabetic and hypertensive obese female had a history of OA for last 8 years. She had bilateral varus knee deformity more pronounced in left knee. Radiographs revealed bone loss in both knees more worse in the left side. Pre-operative planning included the availability of augments and stems. After dissection and surface cuts, the final defect was effectively dealt with autologous bone grafting and use of long stem tibial component for stability. She had no complaints at her last 4 year follow up.

Figure V: Varus deformity treated with bone grafting

Case 7: Challenging Varus Deformity (Figure VI)

70 year old female was referred to the outpatient clinic with extreme deformity of left knee. She had bilateral knee OA for 20 years and was wheel chair bound for last one year as she was not able to stand without support. There was a past history of surgery for deformity correction of left tibia at the age of 55 years of age. She had 55° of varus angulation which was calculated on anteroposterior radio-

graphs on left side. Intra operatively right side was easily managed; and at the left side after medial release, the post-teomedial bone loss was managed with the tibial cut. We had metal augments and long stem implants available in the operating theatre but a larger spacer was the only requirement that provided adequate stability along with primary tibial and femoral components. She achieved mobility and good range of motion after an extensive period of physiotherapy and rehabilitation and was symptom free at two years follow up visit.

Figure VI: Severe varus treated successfully with primary TKA implant

Case 8: Challenging Varus Deformity (Figure VII)

60 years old lady with high BMI and bilateral knee OA presented with severe varus deformities, especially on the left side. Intraoperatively right knee was dealt with medial soft tissue release and a primary TKA implant but left side had significant bone defect on the medial tibial condyle for which metal augment and long stem implant was used. Post operatively she was having good recovery and rehabilitation. At 3 months she suffered a fall in which her right patella got fractured and there was left anterior tibial plateau fracture. For these injuries she underwent tension

Figure VII: Varus deformity with progression to recovery and later complication along with final result

band wiring of right side and screw fixation of left side. She started full weight bearing mobilization immediately in the post operative period. She still needs a stick to walk at 1 year follow up.

Case 9: Valgus Deformity (Figure VIII)

62 year female presented to our clinic with left sided severe valgus knee and OA. She underwent closing wedge osteotomy of left femur 20 years back at some other institute. Radiographs revealed deformity and plate applied over medial aspect of femur. After pre-operative planning TKA was carried out through midline incision. First the implant was removed and lateral release left the knee was carried out. Instability was noted and a need of constrained knee was felt and same was implanted. She is doing well at 3 years follow up.

Figure VIII:
Valgus deformity
with successful
correction after
TKA

Case 10: Wind Swept Deformity (Figure IX)

This 55 year old lady had severe varus deformity in her right and moderate valgus deformity of her left knee along with different degree of bilateral flexion contractures. The valgus left knee was managed with soft tissue release and bone grafting of the defect along with a primary implant. Right side after release of the varus resulted in instability and therefore constrained condylar knee was used to solve the issue. She still walks without support after 4 years of TKA.

Figure IX: Wind swept deformity corrected with TKA

Case 11: Fixed Flexion Contractures (Figure X)

70 year gentleman presented with bilateral knee OA and inability to walk for last 3 years. He had bilateral knee contractures of more than 60° on both sides. Intraoperatively careful posterior release was carried out and he was able to mobilize again without support after 3 months of aggressive rehabilitation and physiotherapy. He lost to follow up after 7 years.

Figure X: Fixed flexion deformity treated with TKA

Discussion

Asian patients with knee OA vary from western population as described earlier. In fact there are various differences in between Asian population of different regions. Siow et al observed that Indians show lower functional outcome scores when compared to Chinese population after TKA [12]. Moreover there were also differences in ages at which TKA were performed and BMI of the patients, however post operative Knee range of motion was comparable.

Our series of cases include a vast variety of deformities that require individual attention to minute details of that single patient. Despite of that, one must be clear in mind that the steps of achieving a successful TKA can never be bypassed. These include:

- Correction of deformity in all planes

- Restoration of mechanical axis
- Balanced flexion and extension gaps
- Restoration of joint line and
- Correction of patella-femoral tracking

A varus knee is the most common deformity one encounters while performing TKA. It may be due to either primarily OA of the knee or due to extra articular deformity of femur or tibia. Varus deformity can be effectively dealt with soft tissue release in most of the cases. Structures described to release medial gap include deep medial collateral ligament, Superficial medial collateral ligament, posterior oblique ligament, attachment of the semimembranosus tendon and the pes anserinus tendon. Different authors have recommended different order in which the release of tissues is carried out to achieve gap balancing. Seo et al preferred posterior oblique ligament release followed by deep medial collateral ligament to achieve varus correction [13]. He observed good results with this pattern of release and the size of spacer used was also smaller. Sim et al has advocated the use of adjunct medial epicondylar osteotomy along with soft tissue release to achieve varus correction [14].

Valgus knees are more difficult to manage as compared to varus since release of soft tissue leads to instability easily and use of constrained variety of implant is then unavoidable. Rajgopal et al observed good long term outcome of TKA of valgus knees with soft tissue release of iliotibial band and popliteus, and use of constrained implants wherever necessary [15]. Moreover there may be hypoplastic condyles and deficient tibial bone stock in severe deformities. In such cases cement made augments, metal augment and autologous bone grafting are valuable options. Autologous bone grafting is beneficial in particular as it also provides with future bone stock if revision is required [16].

Ankylosis of the knee can be very difficult to manage. The cause of ankylosis (whether arthritis or infection) must be established and detailed outcome and procedure should be discussed with the patient. Ankylosis is common in extension [17], but there have been case reports where ankylosis in extreme flexion is also dealt appropriately and good results attained [18]. It is important to keep in consideration that wide range of motion is usually not attainable and there is a chance of extension lag.

Fixed flexion deformity is another entity that is usually dealt in knee arthroplasty most commonly in conjunction with varus or valgus. Severe flexion contractures can be first managed by skeletal traction followed by TKA as in our case, whereas there are authors advocating application of traction in post operative period for management of residual contractures after correction [18]. Patients with

fixed flexion contractures achieve better improvement in functional results when compared to those patients without contractures [19].

Conclusion

Severe deformities of knees in Asian patients can be predictably corrected to improve and transform their quality of life. This requires advance surgical skill, careful pre operative clinical and radiological assessment and planning. Post operative pain management and extensive rehabilitation are also an essential component for achieving good results and patient satisfaction.

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