Total Knee Arthroplasty Combined with Ligament Reconstruction for the Treatment of Severe Knee Valgus Deformity and Knee Subluxation with Medial Collateral Ligament Injury

Sir,

Knee valgus deformity and knee subluxation, often accompanied by medial collateral ligament injury, represent a significant pathology of the knee joint. This condition results in severe pain and marked impairment of joint function for affected individuals.[1] The development of knee valgus deformity with knee subluxation is primarily attributed to a combination of knee ligament injury, meniscus damage, and joint inflammation.[2] Prolonged arthropathy can precipitate structural alterations within the knee joint, ultimately resulting in knee valgus deformity and subluxation.[3] This pathological state significantly impacts patients' quality of life, manifesting as pain, restricted joint function, gait abnormalities, and, in severe instances, joint disability. The implementation of total knee arthroplasty in conjunction with ligament reconstruction represents an effective intervention to enhance the structural integrity and function of the knee joint. Moreover, this approach facilitates the restoration of damaged ligaments and reestablishes the stability of the knee joint.

The following case illustrates this treatment modality.

A 60-year female patient presented with a history of right knee pain and functional limitations that manifested 10 years prior without identifiable triggers. Initially managed at a local medical facility, she received pharmacological pain management and acupuncture therapy, leading to symptom alleviation and subsequent discharge. Over time, the recurrent episodes progressed, culminating in the development of knee deformity. Physical examination revealed right knee valgus deformity, positive patellar grinding test, positive medial knee stress test, and pronounced limitation in knee mobility (Figure 1A, B). Radiographic findings indicated degenerative changes, valgus deformity, and knee joint subluxation within the right knee joint (Figure 1C). MRI evaluation revealed osteoarthropathy, valgus deformity with subluxation, medial and lateral meniscus prolapse, medial collateral ligament injury, and bone marrow oedema in the right knee joint (Figure 1D).

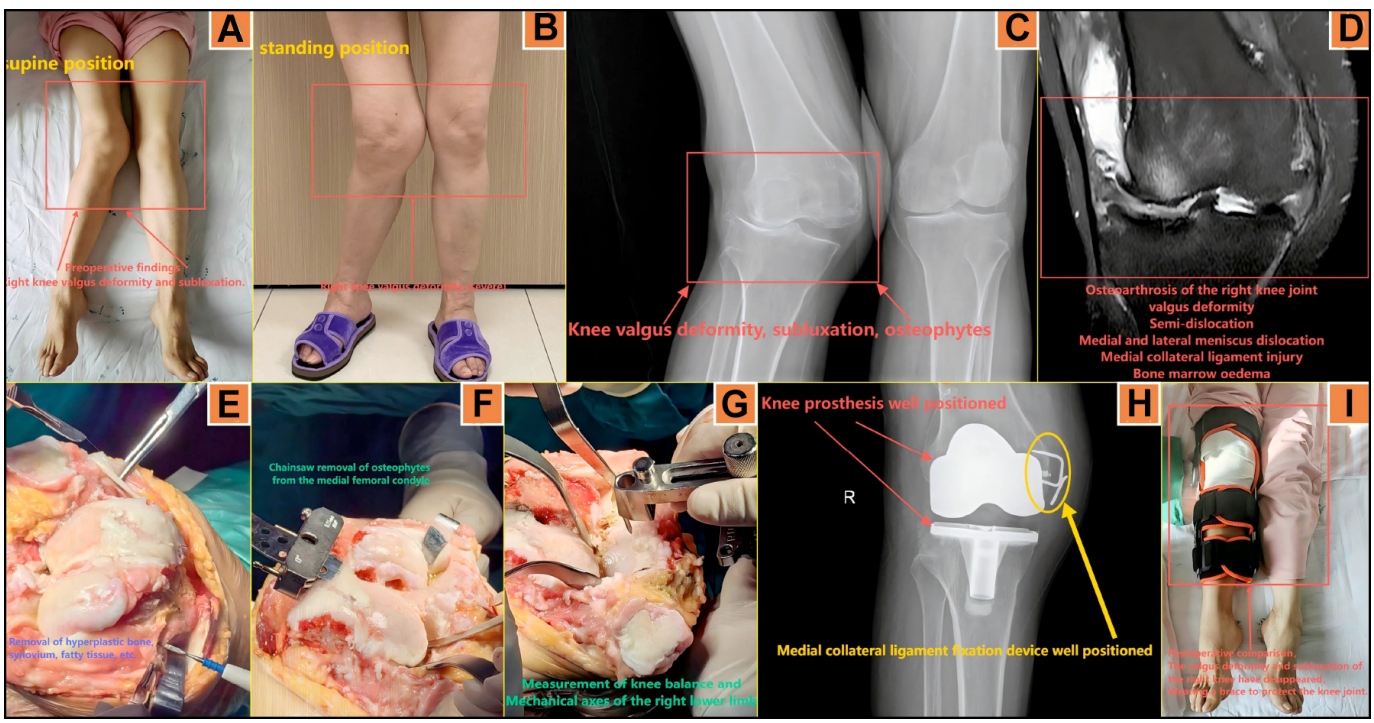

Figure 1: (A, B) Upon physical examination, manifestations were observed including a right knee valgus deformity, positive patellar grinding test, positive medial knee stress test, and a notable restricted knee range of motion. (C) Radiographic imaging revealed the presence of degenerative alterations in the right knee joint, in conjunction with valgus deformity and knee joint subluxation. (D) Magnetic resonance imaging (MRI) examination depicted osteoarthropathy in the right knee joint, showcasing valgus deformity, subluxation, medial and lateral meniscus prolapse, medial collateral ligament injury, and bone marrow oedema. (E) Excision of the hyperplastic bone was performed utilising a bone-biting forceps. (F) A chainsaw was employed for the removal of the hyperplastic bone from the medial femoral condyle. (G) Surgical intervention involved repair of the medial collateral ligament to ensure the structural integrity of the knee joint. (H) Postoperative x-ray imaging confirmed the appropriate positioning of the artificial joint and ligament repair device following right knee arthroplasty, with satisfactory joint spacing. (I) Subsequent physical examination demonstrated complete resolution of the right knee joint deformity.

Upon admission, a thorough examination of the right knee joint was conducted, and the identified lesion was excised under general anaesthesia. Intraoperatively, the observation revealed a significant presence of osteophytes, synovial hyperplasia, and a medial collateral ligament injury in the right knee joint. The excessive synovial tissue was initially excised employing an electrocoagulator, followed by the removal of the proliferated bone using a bone-biting forceps (Figure 1E). Subsequently, the overgrown bone of the medial femoral condyle was meticulously removed with a chainsaw (Figure 1F), while any remaining bone tissue and meniscus were cleared with the electrocoagulator. The procedure further included evaluating the knee joint's balance and measuring the mechanical axis of the right lower limb, along with the meticulous repair of the medial collateral ligament to ensure knee stability (Figure 1G). Postoperatively, x-ray imaging conducted one day after the procedure revealed satisfactory positioning of the artificial joint and ligament repair device post-right knee arthroplasty, with well-maintained joint spacing (Figure 1H). The clinical evaluation indicated complete elimination of the deformity in the right knee joint (Figure 1I). Subsequent three-month follow-up showed a gradual reduction in the patient's knee pain and significant enhancement in joint functionality.

Total knee arthroplasty combined with ligament reconstruction is considered as the optimal treatment for severe knee valgus deformity accompanied by knee subluxation.[4] The postoperative regimen involves anti-infective and analgesic therapy, in conjunction with rehabilitation, to achieve favourable outcomes.

COMPETING INTEREST:
The authors declared no conflict of interest.

AUTHORS' CONTRIBUTION:
HL: Drafted, revised, and edited the manuscript.
WX: Collected and analysed the data and interpreted the result.
ZZ: Participated in the questionnaire survey and data collection.
All authors approved the final version of the manuscript to be published.

REFERENCES

1. Liu P, Zhang C, Lu Z, Feng J, Xu W, Yang Z. Global research status and trends of UKA for knee osteoarthritis: A bibliometric analysis. *Arthroplasty* 2020; **2(1)**:20. doi: 10.1186/s42836-020-00039-3.
2. Matsuda S. Alignment and ligament balance of total knee arthroplasty. *Knee* 2022; **35**:A1. doi: 10.1016/j.knee.2022.04.001.
3. Liu XY, Yu QP, Chen XM, Zeng WN, Zhou ZK. Effects of preoperative valgus deformity in patients undergoing neutrally aligned total knee arthroplasty: A retrospective cohort study with a minimum five-year follow-up. *Jt Dis Relat Surg* 2024; **35(3)**:529-37. doi: 10.52312/jdrs.2024.1800.
4. Gokkus K, Atmaca H, Ugur L, Ozkan A, Aydin AT. The relationship between medial meniscal subluxation and stress distribution pattern of the knee joint: Finite element analysis. *J Orthop Sci* 2016; **21(1)**:32-7. doi: 10.1016/j.jos.2015.10.001.

Hanlei Li[1], Wendong Xie[2] and Zhiqi Zhang[3]

[1]Department of Orthopaedics, Gansu Provincial Hospital, Gansu, China
[2]Department of Orthopaedics, Gansu University of Chinese Medicine, Gansu, China
[3]Department of Orthopaedics, Minle County Hospital of Traditional Chinese Medicine, Minle County, China

Correspondence to: Dr. Zhiqi Zhang, Department of Orthopaedics, Minle County Hospital of Traditional Chinese Medicine, Minle County, Zhangye, Gansu Province, China
E-mail: 273153896@qq.com

Received: November 05, 2024; Revised: December 08, 2024; Accepted: December 10, 2024
DOI: https://doi.org/10.29271/jcpsp.2025.04.546