

Management of Severe Knee Flexion Contracture of 140° with Fibrous Ankylosis in a Resource-Limited Setting: A Case Report

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Learning Point of the Article:

Severe knee flexion contracture with ankylosis in resource-limited settings can be effectively managed through a combined approach of distal femoral osteotomy, acute shortening, soft tissue release, and gradual distraction osteogenesis, aiming for a stable, functional straight limb.

Abstract

Background: Chronic knee flexion contracture in children is a rare but disabling condition, particularly in low-resource settings where access to rehabilitation and advanced surgical care is limited.

Case Report: We report the case of a 14-year-old boy with an 8-year history of fixed knee flexion contracture following previous knee surgery for infection. The patient presented with inability to walk upright and was forced to crawl for mobility. Clinical and radiographic evaluation confirmed severe contracture and distal femoral deformity. A posterolateral approach with distal femoral osteotomy, acute shortening, soft tissue release, peroneal nerve decompression, rotational skin flap, and gradual distraction osteogenesis using a uniplanar dynamic external fixator was performed. After 5 months, the patient achieved a straight, fused limb, enabling independent upright ambulation.

Conclusion: This case demonstrates that complex knee contractures in resource-limited settings can be successfully managed by distal femur osteotomy, acute shortening, uniplanar dynamic external fixation, and soft tissue reconstruction.

Keywords: Knee contracture, distraction osteogenesis, uniplanar dynamic external fixator, resource-limited settings.

Introduction

Flexion deformity of the knee is the inability to fully extend the knee; it could be due to poor muscle power of the quadriceps muscle or failure of the hamstring muscle to lengthen [1]. In delayed presentations after septic arthritis, bony ankylosis could be the cause of stiffness. Marginal joint distraction with gradual joint narrowing can also cause fibrous ankylosis in tuberculosis arthritis [2].

Progressive knee flexion deformity is common in spastic type cerebral palsy primarily because of soft tissue contracture and shortening [3]. Arthrogryposis which usually manifests after

birth and involves multiple joints could be the cause of severe knee contracture [4].

Disabling knee contracture can be caused by popliteal pterygium syndrome, juvenile rheumatoid arthritis, hemophilic arthropathy, trauma, prolonged immobilization, and burns [5,6,7,8].

Diagnosis of bony ankylosis can be made using X-rays or computed tomography scans, and this imaging shows the extent of bony growth around the affected joint [9].

Management of knee contracture is a challenging procedure and it ranges from stretching physical therapy to complex bony and

Author's Photo Gallery



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Figure 1: Pre-operative clinical photograph demonstrating the patient's mobility mode, showing that due to the inability to walk upright and lack of walking aids, he was forced to crawl for mobility.

soft tissue procedures [10,11,12].

Case Report

A 14-year-old male patient presented to our hospital with inability to extend his left knee and difficulty walking for the past 8 years. Since he could not afford walking aids, he had to crawl whenever he needed to move (Fig. 1). On inspection, there was an old, healed longitudinal surgical scar over the posterolateral aspect of the distal thigh. The knee was locked in 140° flexion, with no further flexion or extension possible (Fig. 2). The hip and ankle ranges of motion were normal. Plain radiographs revealed disappearance of the joint space, with the distal femur slightly deformed in a fixed flexion position (Fig. 3).

The past medical history revealed that the patient had knee swelling, pain, and fever 8 years earlier, for which he underwent surgery at a local health facility. He was discharged after his symptoms subsided but was not advised to undergo physical rehabilitation. Since then, he has had progressive difficulty walking and increasing stiffness of the knee.



Figure 2: Pre-operative clinical photograph demonstrating a fixed, severe left knee flexion contracture of 140° in a 14-year-old patient.

Laboratory findings

- WBC: 7,800/mm³
- Hemoglobin: 13 g/dL
- ESR: 15 mm/h
- CRP: < 5 ng/L

Surgical technique

Informed consent was obtained from the patient's family. One gram of intravenous ceftriaxone was administered preoperatively. Under spinal anesthesia, the patient was placed in the right lateral position, and the surgical site was prepared and draped in a sterile manner.

A longitudinal incision was made along the posterolateral

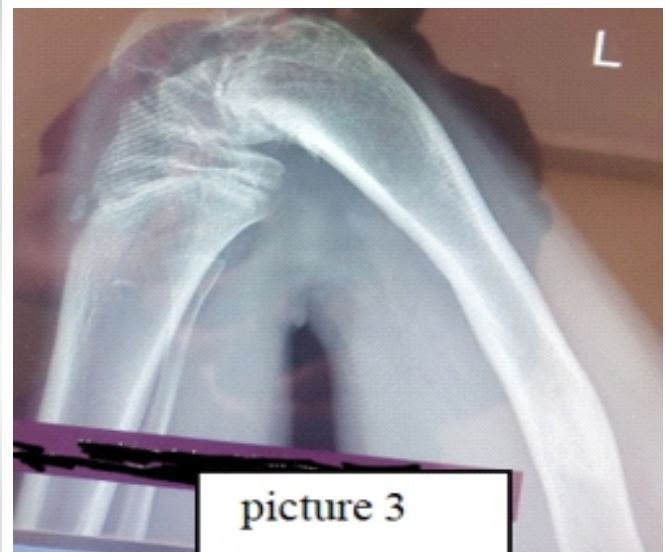


Figure 3: Pre-operative lateral radiograph of the left lower limb showing a severe fixed knee flexion deformity accompanied by significant apex-anterior distal femoral angular deformity.

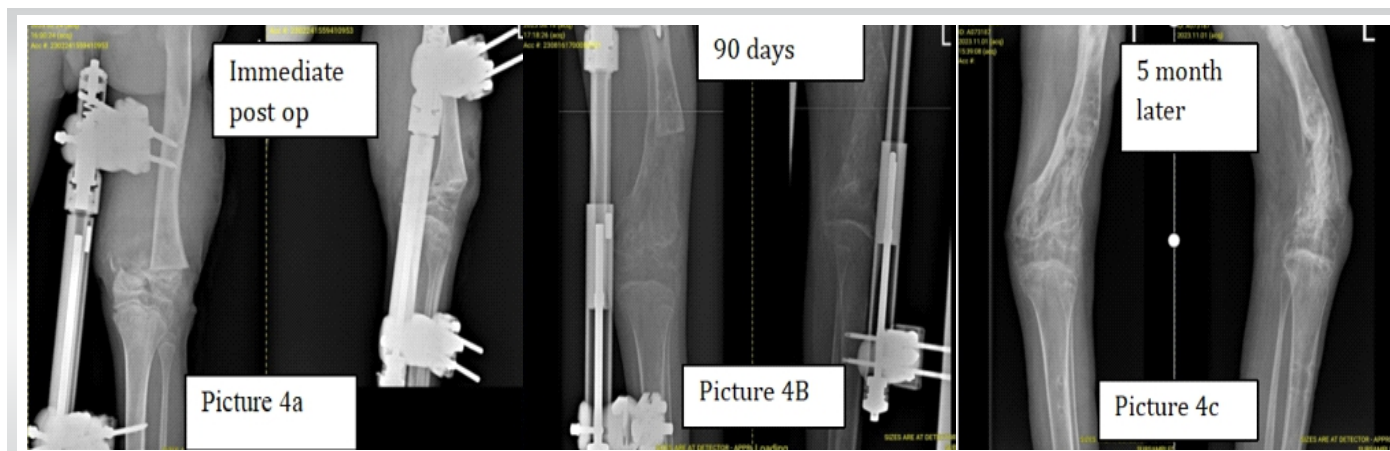


Figure 4: (a) (immediate post-operative AP and lateral radiographs): Post-operative radiographs demonstrating the distal femoral osteotomy site with compression achieved across the osteotomy planes. (b) (90-day post-operative): Radiographs demonstrating the distraction zone at approximately 90 days, showing progressive bone regeneration and adequate lengthening gap maintenance under external fixation. (c) (5 months later/consolidation phase): Follow-up radiographs showing substantial cortical maturation of the regenerated bone column following the completion of the distraction phase.

aspect of the distal femur. After careful dissection of the scar tissue, the peroneal nerve was identified and found entrapped within fibrous tissue. The nerve was gently freed by meticulous soft tissue dissection. The distal femur was then exposed, and a wedge osteotomy was performed. Soft tissue tension was assessed, and further femoral shortening was carried out to relieve tension on the peroneal nerve. The bone was reduced, and a uniplanar dynamic external fixator was applied, achieving compression at the osteotomy site.

During extension, a skin contracture was noted over the popliteal area. The scarred skin was excised, and a rotational flap was performed to cover the defect. The patient remained stable postoperatively.

The osteotomy ends were kept compressed for 10 days, after which distraction was started at a rate of 1 mm/day for 10 days, achieving an extra 1 cm of lengthening compared to the contralateral limb. Considering the patient's age of 14 years and his proximity to skeletal maturity, this additional lengthening was carefully planned to account for the remaining growth potential of the contralateral side, ensuring no significant limb length discrepancy would remain at skeletal maturity. Once the limb length discrepancy was corrected, the external fixator was maintained for an additional 2 months for consolidation (Fig. 4a-c).

Outcome

At the 5-month follow-up, the patient achieved a straight, fused leg with improved alignment. He was able to walk upright, without pain and

without the need for walking aids (Fig. 5).

Discussion

Severe knee flexion contractures combined with joint ankylosis present a complex surgical challenge. Conventional soft-tissue release is often inadequate in these cases, particularly when contractures exceed 90° [4,5]. Our patient had a 140° flexion contracture with an ankylosed knee joint, making standard correction techniques insufficient.

Femoral extension osteotomy is a recognized method for correcting fixed flexion deformities, particularly in post-traumatic, post-poliomyelitis, or ankylosed knees [12]. In extreme deformities, acute correction carries risks of neurovascular compromise, soft-tissue injury, and instability [3,



Figure 5: (Clinical follow-up): Clinical photographs demonstrating the patient at final follow-up after adequate consolidation, showing independent, upright ambulation with a corrected, pain-free gait, and restored lower extremity alignment.

7].

Distraction osteogenesis using circular external fixators allows gradual correction while minimizing tension on soft tissues and neurovascular structures [1,5,6,8,11,13]. This technique has been successfully applied in hemophilic knee contractures [5,10], arthrogryposis [4], post-traumatic or post-burn flexion deformities [7], and juvenile-onset ankylosing spondylitis [8]. Kim et al. reported using the Ilizarov frame for popliteal pterygium, highlighting the safety and effectiveness of gradual angular correction [6].

In our patient, we employed a hybrid approach: Femoral osteotomy with acute shortening followed by gradual distraction. Osteotomy provided mechanical realignment, shortening protected neurovascular structures, and gradual distraction facilitated soft-tissue adaptation [11,12]. However, due to the severity of the deformity and underlying ankylosis, the final outcome was a straight-leg fused knee, which restored functional alignment and stability.

This case emphasizes that in extreme flexion contractures with ankylosed joints, the surgical goal may shift from achieving normal range of motion to obtaining a stable, functional limb. Careful planning, staged correction, and gradual soft-tissue adaptation are essential to minimize complications and optimize functional outcome [1,4,5,8,11,12]. However,

extended follow-up is ongoing to monitor long-term skeletal remodeling and functional outcomes in this growing patient.

Conclusion

For severe knee flexion contractures with ankylosis, a combined approach of femoral osteotomy, acute shortening, and distraction osteogenesis using uniplanar dynamic external fixation in a resource-limited setting can safely restore functional limb alignment. In cases where full motion cannot be achieved, a fused straight-leg outcome provides a stable, functional extremity, consistent with principles of limb reconstruction and gradual deformity correction.

Clinical Message

In managing severe knee flexion contractures with ankylosis in resource-limited settings, achieving joint extension can expose a popliteal skin contracture defect that requires excision of scarred tissue and coverage with a rotational flap. Integrating this soft-tissue reconstruction with distal femoral wedge osteotomy, acute shortening, peroneal nerve decompression, and gradual distraction osteogenesis via a uniplanar dynamic external fixator safely restores functional limb alignment and achieves a stable, straight fused extremity when full joint mobility is unachievable.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil

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Conflict of Interest: Nil

Consent: The authors confirm that informed consent was obtained from the patient for publication of this article

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