CASE REPORT

Total Knee Arthroplasty in Severe Unstable Knee: Case-Report and Literature Review

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Abstract

Multiplanar or global laxity in arthritic knee is rare , most of this patients have neuromuscular disorder (post poliomyelitis , spinal dystrophy) or history of knee trauma. Ligament insufficiency and severe bone loss is significant in this patient. The estimated prevalence for the concurrence of charcot marie-tooth (CMT) with myasthenia gravis (MG) suggests an extremely rare event. We have presented a 54-year-old female patient with CMT and MG complaining of progressive pain, swelling, and crepitation of the knee joints who had been undergone total knee arthroplasty (TKA) with rotating hinge prosthesis. She had an acute myasthenia crisis soon after operation with prolonged intubation and intensive care unit admission. Radiographies and physical examination revealed bilateral severe unstable arthritic knee joints and left knee posterior dislocation. Short-term postoperative follow-up revealed improved knee function and resolution of all symptoms in the operated side.

Keywords: Charcot marie-tooth, CMT, MG, Myasthenia gravis, TKA, Total knee arthroplasty, Unstable knee

Introduction

Soft tissue laxity is common in severe deformed knees that need arthroplasty (1). Laxity is usually uniplanar,sometimes biplanar and rarely multiplanar. Uniplanar laxity is common in varus deformity (lateral side) and valgus knee (medial side) (2). Sometimes, posterior laxity (in recurvatum deformity) complicates the varus or valgus knee, but, multiplanar laxity and severe bone loss are difficult situations that although coexist rarely (in gonarthorosis or rheumatoid arthritis), they may happen in post-traumatic cases or neuromuscular disorder (such as spinal dystrophy and post poliomyelitis) (2-7).

Case presentation

Clinical History

A 54-year-old female presented with progressive pain and deformity, swelling, limited range of motion, and frequent giving way in both knees. She has had these symptoms for 20 years ago, but she has been unable to walk without walker since 3 years ago. The patient had a history of 30-year charcot marie-tooth (CMT) affecting both lower limbs, history of 10-year myasthenia gravis (MG) and thymectomy since 9 years ago. She was taking prednisolone, cyclosporine, pyridostigmine, losartan (for hypertension), atorvastatin and alendronate.

The patient was walker-dependent and unable to perform personal activity without assistance at the hospital admission time.

Physical Examination

Equinus deformity of both ankles, clawing of foot fingers, calf atrophy, and hypoesthesia of lateral side of both legs were seen in examination. Ankle dorsiflexion was absent and ankle foot orthosis were prescribed [Figure 1]. Swelling, crepitation and deformity with no skin abnormality were notable in both knees. The right knee range of motion was 10º-100º (10 degrees of flexion contracture), while the left knee range of motion was 15º-90º (15 degrees of flexion contracture). There was global laxity (anteroposterior and mediolateral) of both knees with more severity in left side. Quadriceps force of both knees was 4/5. Patella was stable in left but lateral subluxation was seen in the

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Figure 1. Equinus deformity, toes clawing and leg calf atrophy of lower extremities.

right knee.

Imaging

Plain X-ray of both knees revealed severe degenerative joint disease with multiple calcified loose bodies. Moreover, obvious anterior dislocation of the left knee and lateral subluxation with severe bone defect and patella subluxation of the right knee were evident [Figure 2].

As plain radiography is typically reasonable for severe arthritic unstable knees, other imaging techniques such as computed tomography or MRI were not necessary.

Treatment

With regard to patient disability and bilateral involvement we decide to perform bilateral staged total knee arthroplasty. A total knee arthroplasty with rotating hinge prosthesis was performed due to more pain and deformity in left side [Figure 4]. Everything was fine after surgery until two days after surgery when the patient started feeling weakness in limbs, dyspnea and fatigue. The patient was admitted at the ICU with diagnosis of myasthenia crisis, intubated and received plasmapheresis for five times. She was weaned off the mechanical ventilator after 7 days. The patient received one week of subacute rehabilitation and returned home independent in daily living activities, transfers, and ambulation to 100 feet with a right ankle foot orthosis and a wide rolling walker [Figure 3]. The patient gained a painless range of motion of 0-120 degrees on her left side after three months. Symptoms were resolved significantly and the patient was able to walk. She was put in waiting list for the right side.

Discussion

Myasthenia gravis (MG) is a treatable autoimmune disease , whereas CMT is a hereditary condition with slow progression. The estimated prevalence for the concurrence of CMT with MG suggests it as an extremely rare event. To the best of our knowledge only 3 patients have been reported to have MG and typical CMT simultaneously, so far (8–10).

Neuropathic arthropathy is a progressive destructive process mostly resulting from an underlying disease. Today diabetes mellitus is the main cause of Neuropathic arthropathy, and there is no report of involvement of large weight-bearing joints such as the knee in CMT. Painful neuroarthropathy of both knees in our patient was a difference between our case with diabetic Charcot joint. Surgical intervention must be considered when the knee is involved and the conservative treatments fail.

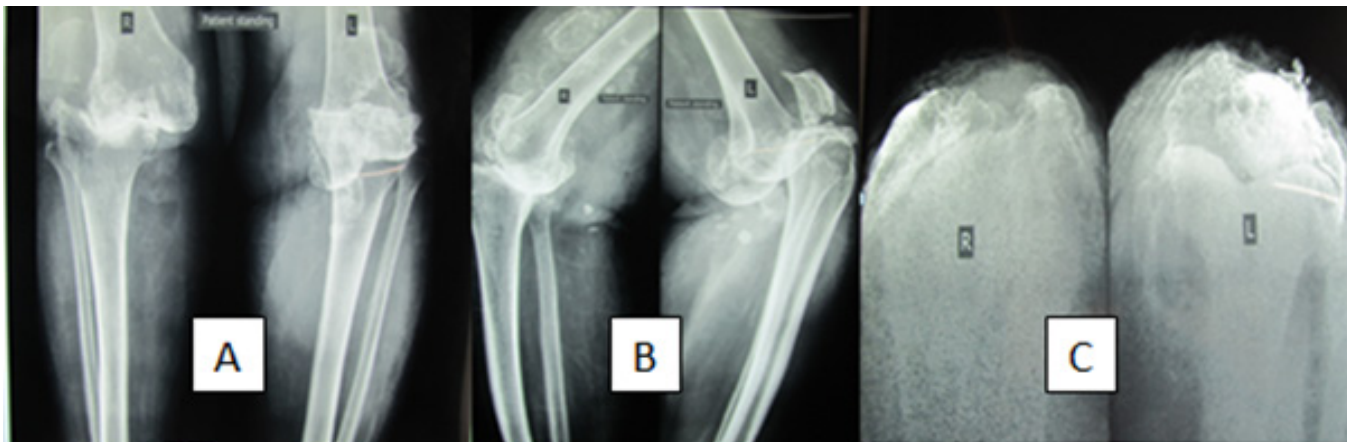

Figure 2. A. AP and B. lateral and C. Patella view of the knees showing severe arthritic unstable knee, note the left knee dislocation.

Figure 3. Preop and postoperation walking of the patient(note to deformity correction).

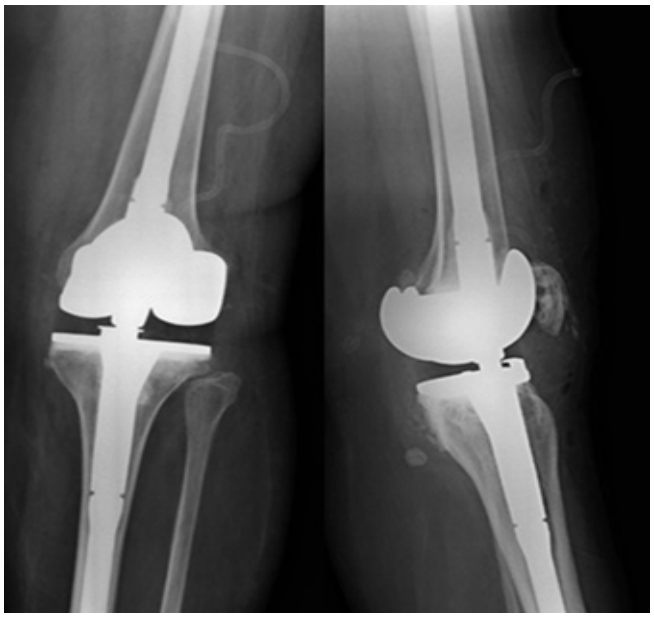

Figure 4. Post operation X-ray of left knee after total knee arthroplasty with long stem rotating hinge prosthesis.

Nowadays, with application of new generations of TKA devices and considering the high incidence of failure, the results of arthrodesis are still better than arthroplasty (11-12). The first report of successful TKA in charcot-like joint was released in 1986 (13).

Using some specific devices (such as rotating hinge) in some selective patients will eventuate better results in TKA in Charcot joints. The key considerations for successful TKA in these cases are: preoperation planning (proper device selection ,correct medical situation), good ligamentous balancing, use of custom made or augmented prosthesis with long stem component, and total synovectomy.

Mullaji classified instability in TKA in three types [Table 1]: type 1, severe coronal instability (lateral or medial); type 2, severe coronal and sagittal instability, and type 3, global (all plane) instability (14).

In Type 1 instability, the lateral (in varus deformity) or medial (in valgus deformity) soft-tissue structures may show significant laxity and pose a challenge in equalizing the medio-lateral gap balance [Figure 5]. In Type 2 instability, in addition to the lax lateral or medial soft-tissue structures, the posterior structures

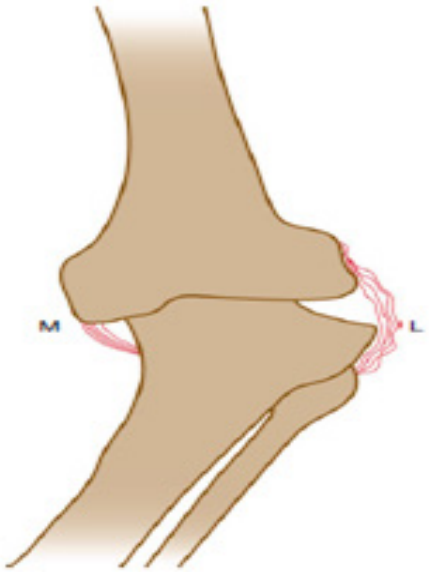

Figure 5. Type 1 instability. The lateral side (L) in varus knees or the medial side(M)in valgus knees shows excessive laxity.

Table 1. Classification of instability
Type 1: Severe coronal plane (medial or lateral) laxity
Type 2: Severe coronal (medial or lateral) and sagittal (Posterior) plane laxity
Type 3: Global (medial, lateral and posterior) laxity

may be attenuated due to an associated hyperextension deformity [Figure 6]. In Type 3 instability [Figure 7], three sides of the knee (medial, lateral and posterior) show significant laxity and the patient may present with a subluxated or a dislocated knee joint (14). Both knees

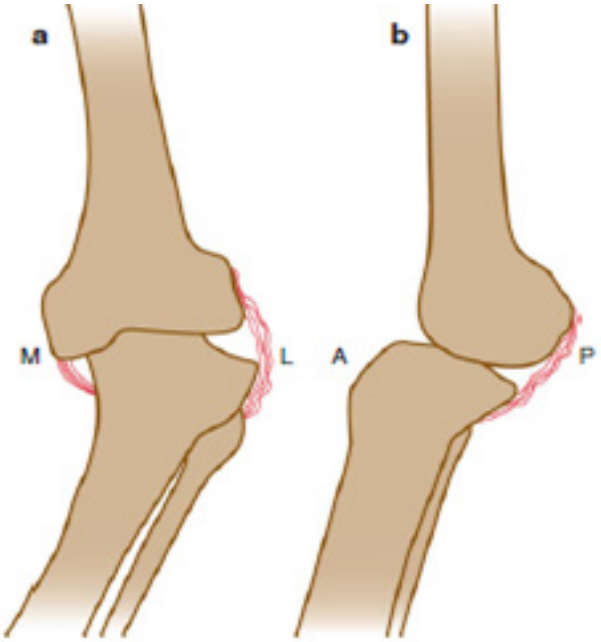

Figure 6. Type 2 instability. The lateral side (L) in varus knees or the medial side (M) in valgus knees (a) and the posterior aspect (P) of the knee (b) show excessive laxity.

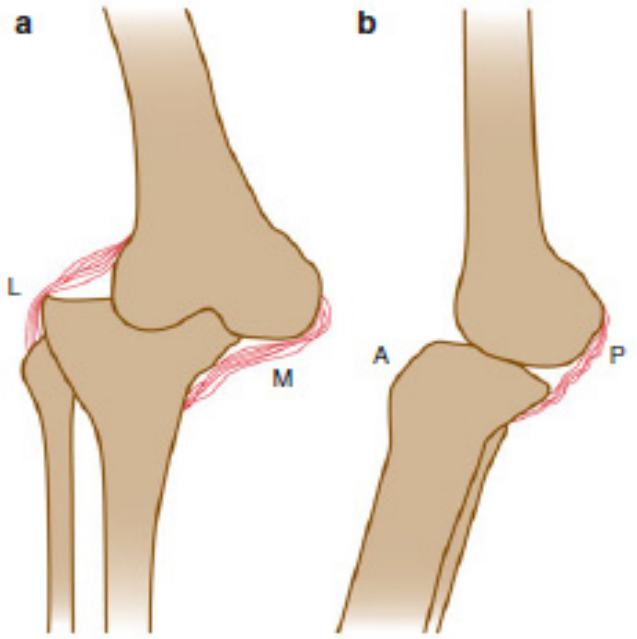

Figure 7. Type 3 instability. The lateral (L), medial (M) (a) and posterior (P) aspect (b) of the knee show excessive laxity.

of our patient were type 3 classification of mullagi and we performed TKA with rotating hinge prosthesis to resolve obstacle problems in this patient. Acute myasthenia crisis after index operation with serious life danger was an important point in our patient.

The disease must have been controlled with appropriate plasmapheresis before any surgery in this patient. Close observation of vital signs and respiratory system is mandatory after surgery.

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