Use of an Ilizarov Fixator for Deformity Correction Prior to Revision Knee Arthroplasty


Abstract

Malalignment is associated with an increased rate of loosening of knee prostheses. We present a case of primary knee replacement failure due to pre-existing tibial deformity. Correction of the deformity and associated malalignment was undertaken using the Ilizarov osteotomy method prior to full knee revision surgery.

An important consideration before undertaking any major knee revision surgery is the issue of the presence of malalignment, which is associated with an increased rate of loosening of knee prostheses. We present a case of primary knee replacement failure due to pre-existing tibial deformity, which was corrected using the Ilizarov osteotomy method prior to full knee revision surgery.

Case Report

Six years following total knee replacement for osteoarthritis, a 69-year-old female presented to the clinic with progressively increasing pain in the operated knee. Examination revealed a marked varus deformity of the knee, an associated varus deformity of the lower leg, and a limited, painful range of knee movement. Radiographs of the knee revealed significant loosening of the tibial component of the knee prosthesis, with a secondary varus deformity. Further radiographs of the complete tibia revealed an additional distal, malunited tibial fracture, also in significant varus (Fig. 1).

Although revision surgery was indicated, it was felt that the main predisposing factor in failure had been the abnormal biomechanics created by the malalignment of knee and ankle joints. This deformity therefore had to be corrected prior to performing any revision surgery. Routine investigations, including blood tests, excluded any evidence of coexisting infection.

In view of the perceived risks associated with open acute correction, it was decided that gradual correction using the Ilizarov method should be carried out as a separate surgical procedure. Following preoperative planning, tibial osteotomy and application of a hinged Ilizarov frame was performed. An all-wire construct was used (Figs. 2).

Gradual correction of deformity was carried out over two months; the frame was locked and the patient was encouraged to fully weightbear. Full angular correction was obtained, and a degree of anteroposterior translation was accepted.

Four months following surgery, the corticotomy was consolidated. The Ilizarov frame was removed and replaced by a temporary below-knee plaster cast for support, and the patient again was allowed to steadily increase weightbearing (Fig. 3).

A further two months later, revision knee arthroplasty was performed. The surgery was a success, and, at 3-month follow-up, the patient was pain-free and had good mobility and function (Fig. 4).

Discussion

It has been suggested that malunited fractures of long bones, by altering the contact stresses and load transmission through adjacent joints, predispose to degenerative changes.\(^1,2\) A varus tibial deformity leads to increased compression forces in the medial compartment of the knee.\(^3\) Malalignment has also been demonstrated to be associated with an increased rate of loosening of knee prostheses.

In a study examining the results of total knee arthroplasties in patients with extra-articular deformities, revision surgery was required, in several cases, for tibial loosening.\(^4\) It was
suggested that severe extra-articular deformities should ideally be surgically corrected prior to total knee arthroplasty, thus avoiding mechanical complications such as instability and loosening.\(^4\)

In our case reported here, the deformity pre-existed the primary knee replacement which, although initially successful, went on to early failure. In such cases, therefore, it is clear that such a deformity should be corrected to avoid early failure of a revision operation. A number of techniques are available to achieve this, including open acute correction separate to or at the same time as knee revision surgery. The risks of the soft tissue stripping required for acute correction with secondary wound breakdown were felt to be high in this patient. The less invasive Ilizarov technique was therefore chosen.

The Ilizarov technique has been reported previously for the successful treatment of acute and nonunited fractures around prosthetic knee replacements, both in the femur and tibia.\(^5,6\) A tensioned wire construct rather than pin construct was used in this case due to the surgeon’s perceived benefit of improved bone fixation and reduced incidence of pin track infection. Good pin track care, early treatment of infection with antibiotics, and replacement of infected wires (not required in this

Figure 1 Radiographs at presentation. Loose tibial component of knee prosthesis and malunited tibial fracture.

Figure 2 Ilizarov frame, in situ, after tibial osteotomy.

Figure 3 Alignment after removal of Ilizarov frame.

Figure 4 Postoperative result after revision knee arthroplasty.
case) will also reduce the chances of developing established bone infection in such settings.

This case report is, we believe, the first published on a staged Ilizarov deformity correction prior to full knee revision surgery. This technique should, therefore, be born in mind for correction of deformity in failed total knee replacement.

Disclosure Statement
None of the authors have a financial or proprietary interest in the subject matter or materials discussed, including, but not limited to, employment, consultancies, stock ownership, honoraria, and paid expert testimony.

References