Chapter Thirteen

Management of Chronic Posterior Tibial Subluxation

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Chronic fixed posterior tibial subluxation in the multiple ligament injured knee, although extremely rare, is a difficult problem that requires complex management. There are two opposing goals after catastrophic ligamentous knee injury: stability and range of motion. Achieving both of these goals can be very difficult.[1–8] Multiple ligamentous reconstructions are currently the recommended method of dealing with acute unstable knee injuries.[1–4,9–11] Despite modern techniques, recurrent knee laxity or stiffness can be problematic.[1–3,5–8,11,12] These problems are amplified in the case of a chronic posterior tibial subluxation.

To reduce the chronic posterior tibial subluxation, complete releases of scar tissue and capsule are required. Unfortunately, the instability created by this extensive release places increased stresses on the reconstruction. In an attempt to decrease stress on the newly reconstructed ligaments and still allow knee motion, an appropriate form of postoperative protection should be utilized. A limited period of a skeletally fixed knee hinge has been used successfully for this complex problem and can be helpful in reestablishing stable motion and may best achieve the goals of stability and range of motion.

Incidence

Knee dislocations, in general, are rare with an incidence ranging from 0.001% to 0.013%; an orthopaedic surgeon is likely to encounter only a handful of knee dislocations during a career.[3,7,9] Knee dislocations with chronic posterior tibial subluxation are even more rare, and only a small number of case reports have been written about the presentation and management of this problem.[13–17]

Clinical Presentation

Chronic posterior tibial subluxation usually presents itself in limited number of clinical settings. It is a preventable problem that occurs secondary to a delay in diagnosis or inappropriate management. Knee dislocations are not always obvious and can be easily overlooked in the initial assessment of a multiply injured patient with other life-threatening injuries. In one study, Laasonen and Kivioja analyzed the care of 340 trauma patients in the intensive care unit at a single center.[18] These authors found that the physicians initially missed 45 (4.2%) out of 1071 fractures and dislocations of the pelvis and lower extremities. The most severe of the missed injuries were dislocations of the hip and knee. Physicians preoccupied with more life-threatening injuries, and seeing no overt signs of multiple ligament injuries to knees, sometimes overlook these conditions. The overt nature of these injuries is related to their tendency to spontaneously reduce and to the associated disruption of the capsule that allows the acute effusion to escape. The delay in diagnosis is a potentially limb-threatening situation that can lead to chronic posterior tibial subluxation if the delay is significant and the knee is allowed to heal in a malreduced position.

Sometimes, despite an accurate and timely diagnosis, the use of an inappropriate form of initial stabilization can lead to the same result of chronic posterior tibial subluxation. Again, in the case of the multiply injured patient, definitive surgical reconstruction of a knee dislocation often must be postponed while other medical personnel address the patient's more life-threatening injuries. During the period between the injury and surgical reconstruction, the knee dislocation should be reduced and appropriately positioned in full extension and stabilized. Depending on the situation, plaster splints, postoperative braces, and skeletal fixation can all be reasonable methods to stabilize the knee as long as the reduction can be maintained. Chronic posterior tibial subluxation occurs when the chosen method of stabilization is inadequate and there is loss of reduction, which goes unnoticed for some time. Initial and early repeated radiographs should be taken to prevent this occurrence; if at any time the reduction cannot be maintained, a more reliable form of stabilization must be utilized.

Chronic posterior tibial subluxation can also occur following inadequate reconstruction of an acute multiple ligament injured knee. If the knee is never fully reduced, the ligaments are insufficiently reconstructed, or the postoperative protection of the reconstruction is inadequate, residual posterior subluxation can persist and become fixed.

Still, chronic posterior tibial subluxation most commonly occurs after conservative treatment of a multiple ligament injured knee with inadequate immobilization and monitoring. Specifically, this has been most frequently reported after a multiple ligament injured knee has been reduced, placed in a cast, and not monitored appropriately to ensure the reduction.[13–17]

Patients with chronic posterior tibial subluxation may present with complaints of pain, stiffness, and instability. As with any other joint with normal sensory capacity, the malreduced knee causes much pain and disability for the patient. Because of the pain, scarring, and joint incongruity, patients can have significant limitations in knee range of motion and function. However, in addition to the decreased range of motion and stiffness, instability of the knee can be present, contributing to the disability. Inadequate healing of the cruciate ligaments and the posterolateral structures often occurs and can result in persistent anterior, posterior, varus, and rotational instability.

Physical Examination

The physical examination of patients with chronic posterior tibial subluxation is quite remarkable. Gait, if possible, is usually antalgic and significantly affected by either or both the limited range of motion and instability. Grossly, the femoral condyles are very prominent beyond the anterior crest of the tibia secondary to the chronic posteriorly subluxed tibia (Figure 13.1). The range of motion in the flexion and extension arc is greatly reduced. The ligamentous examination usually reveals concomitant instability, especially

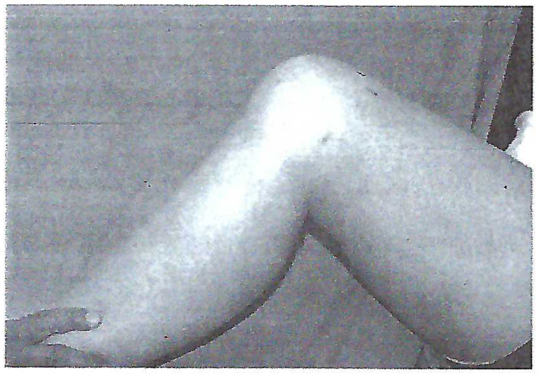


Fig. 13.1. Clinical photograph of chronic fixed posterior tibial subluxation demonstrating the prominence of the femoral condyles beyond the anterior crest of the tibia.

to varus, external rotation, and posterior stresses. A thorough neurologic examination is also important because if coexisting deficits, which usually involve the peroneal nerve, are present, these can both affect prognosis and treatment outcome. The vascular examination is not as crucial as in the acute situation, but chronic vascular insufficiency following the original injury may require further investigation before an extensive reconstruction is considered.

Radiographic Analysis

Radiographic analysis can be helpful to confirm the fixed posterior tibial subluxation and evaluate the knee for other injuries that may affect the treatment and prognosis. In cases of chronic posterior tibial subluxation, the plain lateral radiograph is most striking and will reveal the obvious posterior position of the tibia relative to the femur (Figure 13.2). The deformity is usually more obvious with knee flexion. The anteroposterior radiograph is also important to detect any medial or lateral displacement. Plain radiographs are also helpful to identify any associated fractures, retained hardware, degenerative joint changes, and other bony abnormalities that may

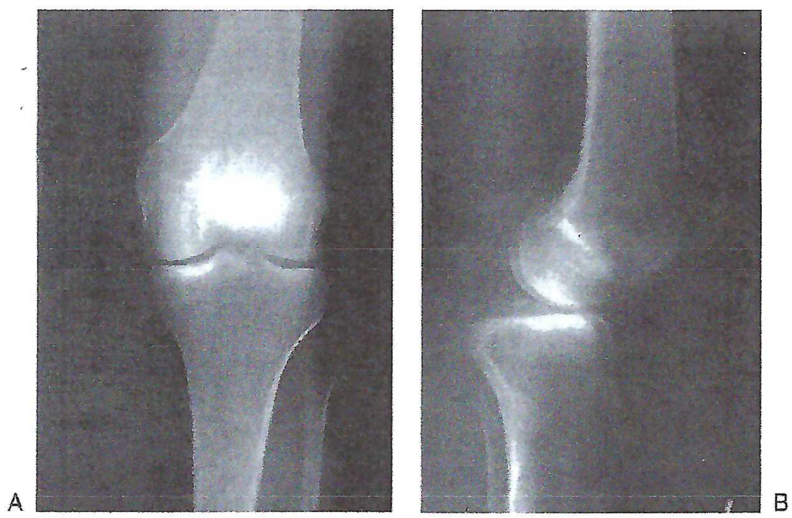
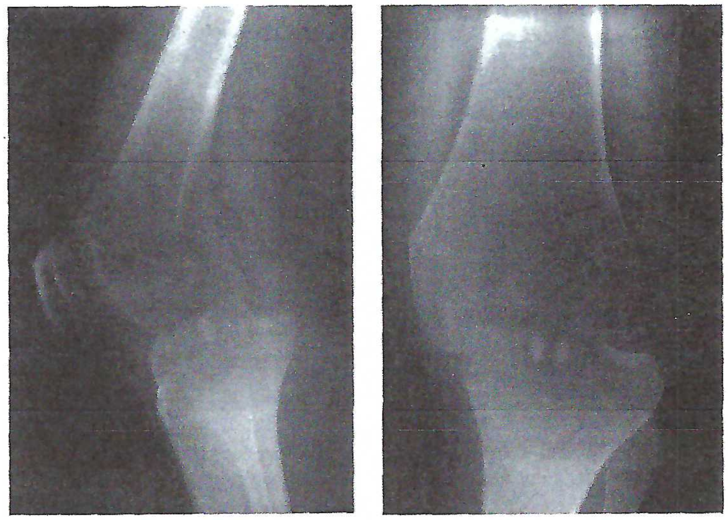


Fig. 13.2. Plain (A) anteroposterior and (B) lateral radiographs demonstrate chronic posterior tibial subluxation. (A From Ref. 17 by permission of *Sports Medicine and Arthroscopy Review*.)



A B

Fig. 13.3. Radiographs demonstrating chronic posterior tibial subluxation 3 months after injury and 10 weeks after surgery: (A) lateral radiograph and (B) anteroposterior radiograph. There is significant posterolateral displacement of the tibia relative to the femur, suggesting gross insufficiency of the posterior cruciate ligament and the posterolateral corner structures. The radiographs also demonstrate some retained hardware in the region of the tibial insertion of the anterior cruciate ligament, representing an attempt by the previous surgeon to primarily repair a tibial avulsion of the anterior cruciate ligament. The patient's previous surgery involved reattachment of the avulsed ACL with suture anchors, repair of the posterior and anterior horns of the medial meniscus, reattachment of the anterior and central portions of the lateral meniscus, and repair of the posterolateral corner including the arcuate and fabellofibular ligaments and the lateral capsule. The patient's leg was in a cast for 5 weeks after surgery, and the reduction was lost (From Ref. 17 by permission of *Sports Medicine and Arthroscopy Review.*)

affect treatment (Figure 13.3). For example, evidence for the pattern of injury and help in directing surgical treatment can be provided by avulsion fractures (e.g., of the tibial spine), posterior cruciate ligament (PCL) insertion, medial collateral ligament (MCL) origin, lateral capsule (Segond's fracture), and the head of the fibula. Magnetic resonance imaging (MRI) provides an excellent assessment of the ligamentous, bony, meniscal cartilage, and articular cartilage injuries (Figure 13.4). A thorough knowledge of all the injuries, especially that of the articular cartilage, is essential before surgical treatment is begun. Other subtle findings, such as residual bone contusions, can be detected on the MR image and may help the surgeon decipher the pattern of injury and better plan his or her approach.

Treatment Options

The options for treatment include nonoperative management with or without bracing, amputation, arthrodesis, total knee replacement, and open reduction with or without ligament reconstruction. Nonoperative treatment

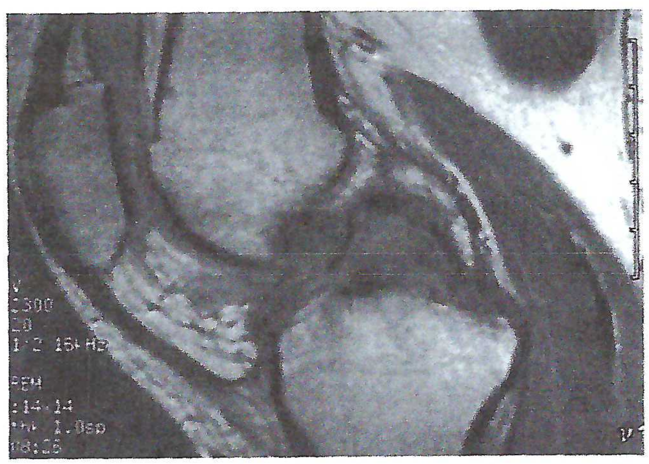


Fig. 13.4. A sagittal MR image demonstrating chronic posterior tibial subluxation in another patient. Six months prior to this study, the patient had stepped off a curb and sustained an acute posterior dislocation. She was initially treated with a closed reduction and cast immobilization. (From Ref. 17 by permission of *Sports Medicine and Arthroscopy Review.*)

is usually not a realistic option unless the patient has a significant medical contraindication or strong personal opposition to surgery. Inability to comply with an extensive postoperative rehabilitation protocol because of a severe and permanent head injury is an obvious example.

Amputation may be appropriate for the patient with associated severe and unsalvageable distal soft tissue, bony, or neurovascular injuries. Arthrodesis and total knee arthroplasty may be best recommended for those with damaged or degenerative articular cartilage surfaces. Arthrodesis may be most appropriate in the face of paralysis, a neuropathic joint, chronic infection, or a failed and irreparable extensor mechanism.[14,19]

Arthroplasty offers the best functional outcome for those with unsalvageable articular cartilage injury. Petrie et al. reported 2 cases of chronic posterior tibial subluxation after knee dislocation in which the articular surfaces were irreparably damaged and for which the senior author performed constrained total knee arthroplasty.[14] At short-term follow-up of 8 and 9 months, both patients were ambulating with assistive devices and had a range of motion of 0 to 80° and 3 to 95°, respectively. Open reduction and immobilization without reconstruction have been reported but are not likely to achieve an optimal functional outcome.[13] Henshaw et al. described treatment with open reduction, maintenance of the reduction with Steinmann pins, and placement of a cylindrical cast for 12 weeks.[20] The final result yielded a range of motion from 5 to 40°. Last, open reduction with ligament reconstruction probably offers the best chance for the most functional outcome for patients with a salvageable distal extremity, near normal articular surfaces, and the ability to tolerate and comply with a significant operative and postoperative course.[15,17]

Surgical Approach, Reduction, and Reconstruction

The first step in treatment is an accurate diagnosis of all the pathologic components of the knee. Optimization of the outcome calls for a good understanding of the directions of stiffness and instability, other associated pathology, and the expectations of the patient. This in turn requires a careful history, physical examination, and appropriate radiographic analysis. The surgery begins with a thorough examination under anesthesia to confirm the pattern of stiffness and instability without the presence of patient guarding. Arthroscopy may also be helpful to diagnose or address any meniscal or articular cartilage pathology that might be more difficult to visualize through an open incision. The surgical exposure is attained through an anterior oblique incision running from proximal lateral to distal medial. This direction of incision is chosen to allow exposure of the posterolateral structures, which are often deficient. Thick medial and lateral subcutaneous flaps are raised with sharp dissection to expose the deep structures. A medial parapatellar arthrotomy is performed, the patella is everted, and the joint inspected for other meniscal and cartilaginous pathology. Sometimes, the proximal tibial insertion of the medial collateral ligament needs to be elevated from the bone to gain sufficient exposure and perform a safe release.

The first goal of surgery is to reduce the tibia under the femur. In the case of chronic posterior tibial subluxation, this usually requires a complete circumferential release. There is usually extensive scar that must be excised within the intercondylar notch and the posterior and lateral regions of the joint. Through internally and externally rotating the tibia, the release can be extended laterally and medially to safely reach the posterior aspect of the joint without damaging the extensor mechanism, the neurovascular structures, and any other functioning structures that are not preventing the reduction. Particularly, the tibial attachment of the posterior horns of the meniscus should be well maintained. Once the tibia can be reduced under the femur without tension, the release is complete and the reconstruction can begin.

The second goal of surgery is to reconstruct all the deficient ligamentous structures. In the case of a chronic posterior tibial subluxation, one must be knowledgeable about the available graft options and the techniques for ligamentous reconstruction of the posterior and anterior cruciate ligaments (ACL), the posterolateral corner, and the MCL. Since extensive surgery is required to perform the release, allogenic graft sources are generally preferred to limit the morbidity from graft harvest. For the cruciate ligaments and the posterolateral corner, allogenic bone–patellar tendon–bone and Achilles tendon offer excellent graft options, depending on availability. The order of reconstruction begins with reestablishing the central hinge through reconstruction of the ACL and the PCL and maintaining the knee in a reduced neutral position with radiographic confirmation. This is followed by reconstruction of the posterolateral corner. The medial collateral ligament is less likely to need to be reconstructed owing to its natural tendency to heal. In a fixed subluxation, however, if the MCL heals with the knee in a malreduced position, release will be required. Reconstruction of the MCL can then be performed by advancement with or without augmentation using an autogenous semitendinosus tendon.

Postoperative Care

Based on the extent of the surgical release and the inherent stability of the reconstruction, an appropriate amount of postoperative protection must be selected. The objective is to limit the stress on the ligament reconstruction while still allowing for early range of motion. In the case of chronic posterior tibial subluxation, the release may need to be so extensive that nothing remains intact but the skin, extensor mechanism, and neurovascular bundle. In this situation, casts are inappropriate for regaining postoperative motion and have resulted in a loss of reduction.[14–17] A postoperative brace and supervised physical therapy, appropriate for most knee dislocations, may not be sufficient, and skeletal fixation may be need to be considered. A hinged skeletal fixator can maintain the reduction and allow some early range of motion to best achieve the early postoperative goals (Figure 13.5). Owing to the limited number of indications for the hinge, there have been only a few case reports of its use; however, the results have been successful.[15,17]

In addition to selecting an appropriate form of postoperative protection, the importance of closely monitoring the reduction in the early postoperative period cannot be underestimated, especially as the patient attempts to regain motion. Failure to progress with pain and motion may be an early sign of persistent subluxation. Weekly anteroposterior and lateral postoperative radiographs to confirm the reduction are strongly recommended in the early postoperative period. In the patient who is failing to progress but does not show any obvious posterior subluxation on standard radiographs, lateral radiographs in different degrees of flexion may be beneficial to detect pathologic posterior subluxation with flexion.

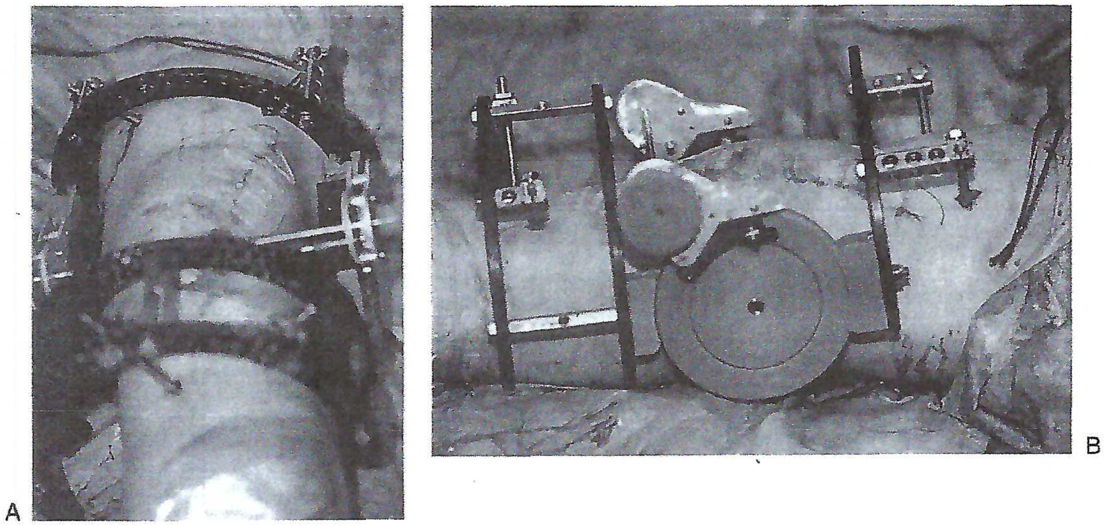


Fig. 13.5. (A,B) Intraoperative photographs of placement of the hinge. (Courtesy of Compass Elbow Hinge; Smith & Nephew Orthopaedics Inc., Memphis, TN.)

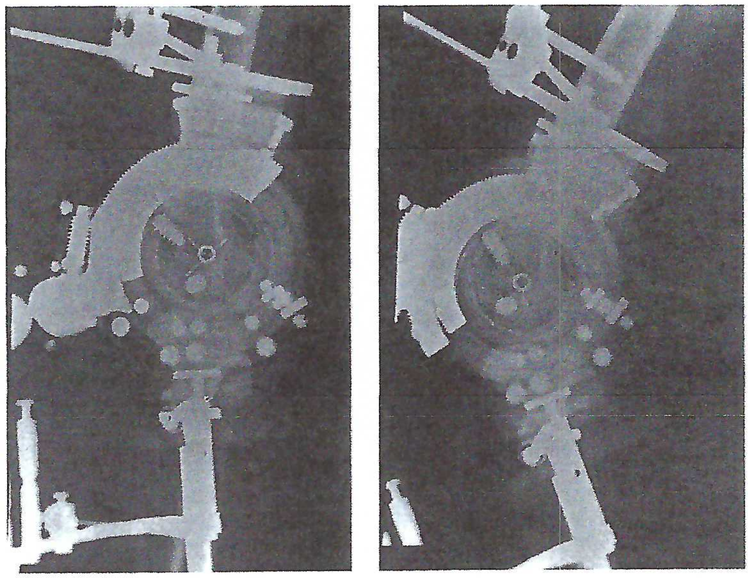
Use of Hinges

Hinge Description

The original surgically emplaced hinge was designed for use on the elbow (Compass Elbow Hinge; Smith & Nephew Orthopaedics Inc., Memphis, TN) (Figure 13.5). Since that time, the same company has developed a prototype for universal application to the ankle, elbow, or knee. This version has a poly (ether imide) body with 7° of fixed valgus angulation to accommodate the anatomic valgus alignment of the patient. The hinge can be used for either the right or the left knee by simply inverting the device and reversing its superior and inferior ends. When applied to the knee, the hinge allows 0 to 120° of flexion. Stainless steel rings allow many different sites for skeletal fixation as well as enough clearance for the anterior soft tissues of the thigh in most patients. The hinge also has a single-axis design with a centering hole for easy application.

Hinge Application

Placement of an external hinge must be accurate to allow the most anatomic knee motion (Figure 13.6). To achieve optimal position for the hinge, the placement of an axis or centering pin is critical. The placement of the centering pin is dependent on finding the most isometric point on the medial and lateral femoral condyles. This is done by placing a pin in the middle of both the medial and lateral collateral ligament insertions on the tibia and fibula, respectively, 3 cm distal to the joint line. One end of a suture can be placed around each of these pins, while the other end is placed proximally on the medial and lateral femoral condyles. The specific point is then identified on both the medial and lateral femoral condyles where the suture does not lengthen or shorten through a range of knee motion. Once these points have been identified and marked on the femoral condyles, the centering pin is placed from lateral to medial through both of them. The hinge's centering holes are then placed over the centering pin to ensure optimal placement of the hinge. Two 5.0 mm Schantz pins are placed in both the femur and



A B

Fig. 13.6. Lateral radiographs of the knee in (A) extension and (B) flexion demonstrate how accurate positioning of the hinge allows for flexion and extension of the knee. This hinge was applied following an open release, reduction, and reconstruction of the ACL, PCL, and posterolateral corner. (From Ref. 17 by permission of *Sports Medicine and Arthroscopy Review*.)

the tibia through the semicircular rings of the hinge to secure it to the bones. The semicircular rings allow for multiple choices for Schantz pin placement; pin placement through the quadriceps and its extensor mechanism should be avoided. The hinge is always applied with the knee in full extension because the hinge allows a normal range of motion for only a limited arc.

Hinge Biomechanics

In an attempt to study the function of this hinge design, a biomechanical examination was conducted (Figure 13.7).[20] The hinge was applied to fresh cadaveric knee specimens. Radiopaque reference markers were placed on the tibia and femur, and each knee was taken through a range of motion from 0 to 100°. Fluoroscopic images were taken at different positions of flexion to quantify changes in anterior and posterior tibial translation and changes in joint compression and distraction. Two experimental interventions were

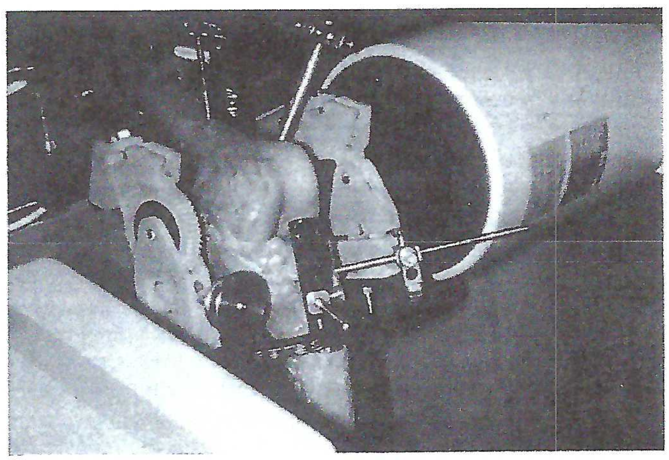


Fig. 13.7. The hinge applied to a fresh cadaveric knee specimen. With femoral and tibial reference markers, fluoroscopy was used to measure motion between the distal femur and proximal tibia with flexion of the knee specimen. (From Ref. 20 by permission of the *American Journal of Knee Surgery*.)

Table 13.1. *x*-Axis motion (compression-distraction): differences from the control (the contralateral knee with intact ligaments and no hinge)

Knee position in flexion (degrees)	Knee with intact ligaments and hinge (mm)[a,b]	Knee with disrupted ligaments and hinge (mm)[a,c]
0	0.50 (3.12)	−0.88 (2.85)
20	0.88 (3.44)	−1.62 (3.74)
40	1.38 (2.45)	−0.62 (3.46)
60	1.62 (1.97)	−0.25 (3.92)
80	1.88 (2.30)	0.12 (3.00)
100	1.50 (2.20)	0.50 (2.51)

[a]Numbers in parentheses are standard deviations.
[b]Positive values, joint compression.
[c]Negative values, joint distraction.
Source: Data from Ref. 20.

studied that consisted of an intact knee with the hinge and a knee with multiple ligament disruptions and a hinge. The experimental specimens were compared in pairs against the contralateral knee as a control. The control knee remained intact and without a hinge.

Tables 13.1 and 13.2 list the mean differences and standard deviations of motion mismatch between knee and hinge motion for both interventions, hinge placement with ligaments intact, and hinge placement with the ligaments disrupted, at different angles of flexion. None of the compression–distraction values were statistically significant for knee and hinge mismatch; this is probably a result of the large standard deviations. However, a trend is evident. With the ligaments intact, addition of the hinge resulted in increasing amounts of joint compression with knee flexion (Figure 13.8). When the ligaments were cut, there was some degree of distraction with 0° of knee flexion, which seemed to gradually decrease and became compressive at 80° of flexion (Figure 13.9).

In contrast, the anterior–posterior translation values were statistically significant for knee and hinge mismatch. With the ligaments intact, addition of the hinge resulted in increased amounts of posterior translation, which became statistically significant at 80° of flexion (Figure 13.10). Similarly, when the ligaments were cut with a hinge in place, there was an increasing amount of posterior tibial translation, which became statistically significant at 60° of flexion. There was also a significant amount of anterior tibial translation at 0° in this group (Figure 13.11).

All in all, these results indicate that the hinge allows only a limited range of motion that does not significantly alter tibial translation or joint

Table 13.2. *y*-Axis motion (posterior–anterior tibial translation): differences from the control (the contralateral knee with intact ligaments and no hinge)

Knee position in flexion (degrees)	Knee with intact ligaments and hinge (mm)[a,b]	Knee with disrupted ligaments and hinge (mm)[a,b]
0	0.00 (1.07)	−2.62[c] (2.88)
20	−0.38 (1.92)	−0.75 (2.60)
40	1.25 (2.44)	1.88 (3.36)
60	1.38 (0.96)	4.25[c] (4.50)
80	3.38[c] (2.39)	7.00[c] (5.29)
100	4.62[c] (2.97)	9.88[c] (4.39)

[a]Numbers in parentheses are standard deviations.
[b]Positive values, posterior tibial translation; negative values, anterior tibial translation.
[c]$P < 0.05$.
Source: Data from Ref. 20.

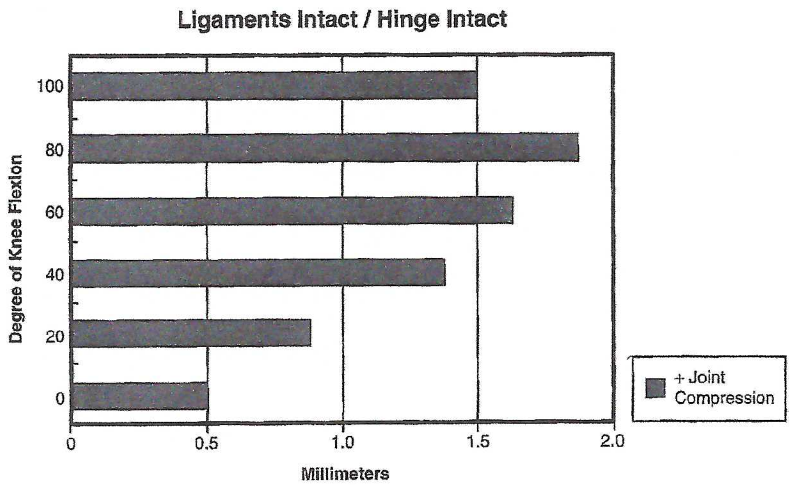


Fig. 13.8. Mean trends for distal femoral motion mismatch in the x-axis (compression–distraction) plane between the knee and the hinge with the ligaments intact. Positive values represent increases in joint compression, and negative values represent increases in joint translation (distraction) for each of the differing degrees of knee flexion. None of the x-axis values were statistically significant; this is likely because of the large standard deviation. However, a trend is evident: joint compression increased with increasing amounts of flexion. (Adapted from Ref. 20, by permission of the *American Journal of Knee Surgery*.)

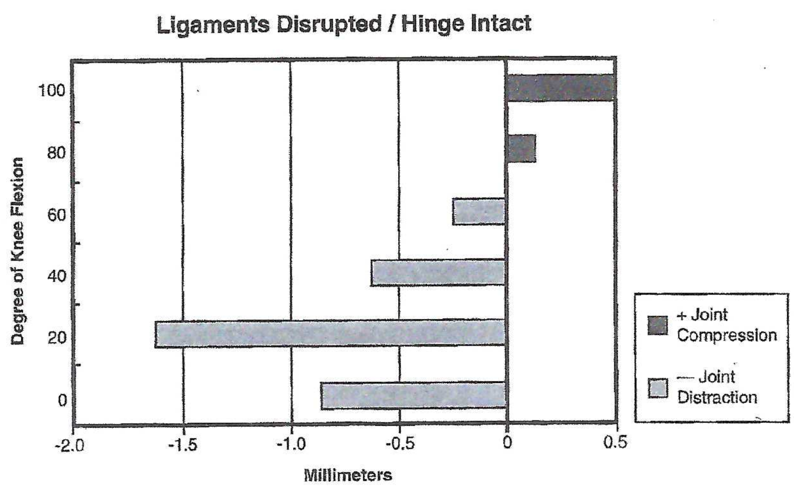


Fig. 13.9. Mean trends for distal femoral motion mismatch in the x-axis (compression–distraction) plane between the knee and the hinge with the ligaments disrupted. Positive values represent increases in joint compression, and negative values represent increases in joint translation (distraction) for each of the differing degrees of knee flexion. When the ligaments were cut, there was some degree of distraction with 0° of knee flexion, which seems to gradually decrease and became compressive at 80° of flexion. (Adapted from Ref. 20, by permission of the *American Journal of Knee Surgery*.)

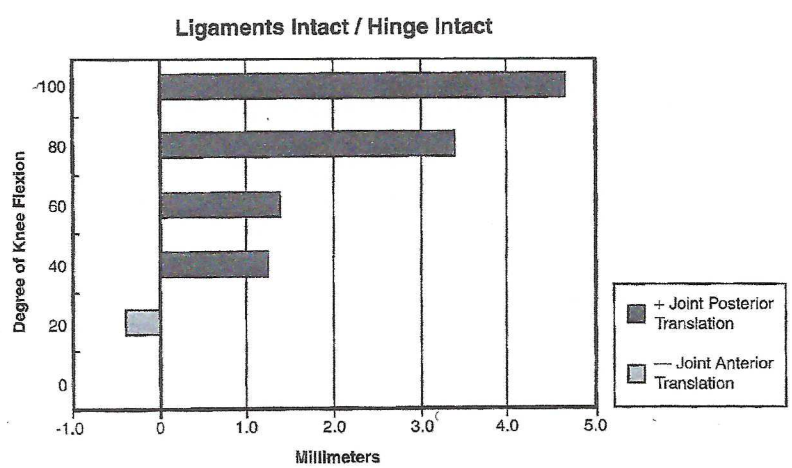


Fig. 13.10. Mean trends for distal femoral motion mismatch in the y-axis (posterior–anterior translational) plane between the knee and the hinge with the ligaments intact. Positive values represent increases in posterior tibial translation, and negative values represent increases in anterior tibial translation for each of the differing degrees of knee flexion. Increased amounts of posterior tibial translation became significant at 80° of flexion. (Adapted from Ref. 20, by permission of the *American Journal of Knee Surgery*.)

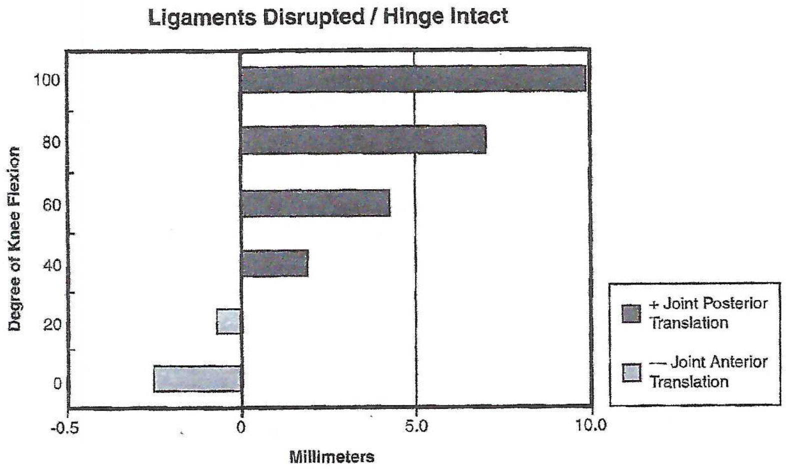


Fig. 13.11. Mean trends for distal femoral motion mismatch in the *y*-axis (posterior–anterior translational) plane between the knee and the hinge with the ligaments disrupted. Positive values represent increases in posterior tibial translation, and negative values represent increases in anterior tibial translation for each of the differing degrees of knee flexion. There was an increasing amount of posterior tibial translation, which became significant at 60° of flexion. There was also a significant amount of anterior tibial translation at 0° of flexion in this group. (Adapted from Ref. 20, by permission of the *American Journal of Knee Surgery*.)

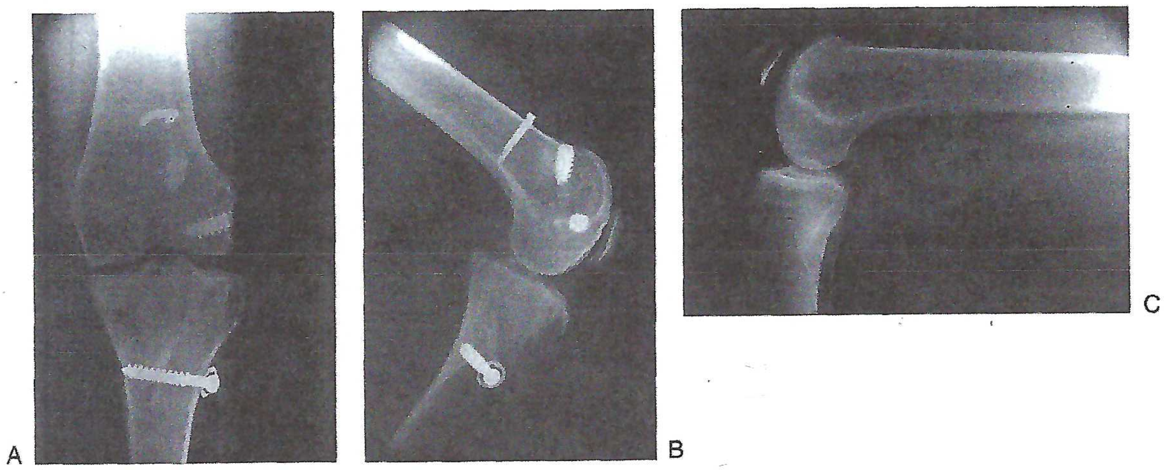
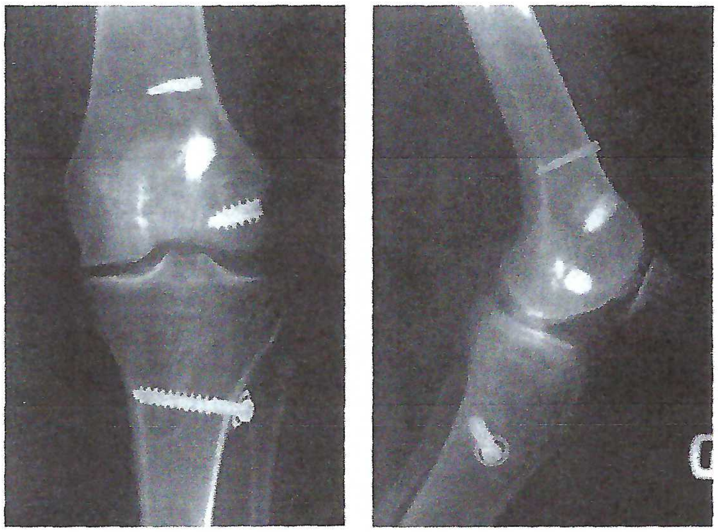


Fig. 13.12. Fourteen months after reduction and reconstruction with hinge application, the anteroposterior radiograph (A) reveals symmetric reduction with a slight reduction in the medial joint space. Comparison lateral radiographs reveal symmetric centering of the joint with the tibia slightly anterior to the femur at 90° of flexion between the injured (B) and noninjured (C) knees. (From Ref. 17, by permission of *Sports Medicine and Arthroscopy Review*.)

compression and distraction. Whether this amount of motion is sufficient to improve the outcome of the grossly unstable knee is unknown.

Clinical Results of Using the Hinge

Clinically, the hinge has been successful in the limited number of cases for which it has been utilized.[15,17] Successful use of the hinge was originally described in a report on two patients from Simonian et al.[16] and supported by a case report by Richter and Lobenhoffer.[15] Each report described using the hinge for only the first 6 weeks following surgical release and allogenic ligament reconstruction for patients with intact articular surfaces presenting with chronic fixed posterior tibial subluxation. After 1-year follow-up, Simonian et al. reported a return of a functional range of motion (−5 to 105° and 0 to 120°), stability (symmetric to the contralateral limb and 5 mm of anteroposterior translation with the anterior surface of the tibia flush with the femoral condyles at 90° of flexion), function (ability to participate in moderate level sporting activities), and an excellent radiographic outcome (Figure 13.12). Recent 6-year follow-up for 1 of the 2 patients



A B

Fig. 13.13. Six-year postoperative radiographs of the patient with chronic posterior tibial subluxation described in Figures 13.3; 13.6; and 13.11: (A) anteroposterior and (B) lateral.

revealed occasional knee soreness, no limitations or change in function, but some radiographic signs of arthritis (Figure 13.13). At 1-year follow-up, Richter and Lobenhoffer reported no pain or impairments with activities of daily living and a return to volleyball, a Lysholm score of 94 points, a Tegner activity score of 4 points, posterior translation of 6mm by KT 1000 arthrometor, and a lateral radiograph without posterior sag at 30° of flexion.

Discussion

Chronic fixed posterior tibial subluxation in the multiple ligament injured knee, although extremely rare, is a difficult and entirely avoidable problem that requires complex management. Unfortunately, it presents itself after mismanagement. Chronic posterior tibial subluxation is most easily treated by maintaining a high clinical suspicion, providing appropriate management, and properly ensuring reduction for acute multiple ligament knee injuries. Patients with chronic posterior tibial subluxation present with pain, limitations of motion and function, and instability. Proper treatment depends on an accurate diagnosis of the limits to motion, ligamentous insufficiencies, and the other associated injuries such as neurovascular compromise and meniscal and articular cartilage lesions. In patients not having unsalvageable articular cartilage and neurovascular injuries, surgical treatment for chronic posterior tibial subluxation has the two main objectives of reduction of the tibia under the femur and reconstruction of all of the ligamentous deficiencies. Achieving a reduction often requires surgical release of all soft tissues, with the exception of the skin, the extensor mechanism, and the neurovascular structures. To restore stability, all ligamentous deficiencies should be addressed. Since the instability created from this extensive release places increased stresses on the ligamentous reconstruction, the importance of the postoperative protection and monitoring of the reduction should not be underestimated. Appropriate postoperative protection should attempt to optimize early range of motion while maintaining an adequate reduction. In a limited number of cases reported in the literature, surgical release to attain a reduction followed by ligamentous reconstruction with allografts and a limited 6-week period of hinged skeletal fixation has allowed a successful outcome for patients with the complex problem of chronic posterior tibial subluxation.

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