Problems After Knee Arthroplasty

Managing Instability Following Total Knee Replacement

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While there are many causes of primary total knee replacement (TKR) failure, perhaps the most common complaint from the patient is a feeling of instability. Instability can be due to problems with the extensor mechanism or it can be related to problems associated with excessive sagittal plane motion, polyethylene wear, etc. Patients presenting with complaints of instability are becoming increasingly more frequent and often are related to some degree of wear of the polyethylene space. To make this diagnosis, it is necessary to do a thorough medical history and physical examination and examine radiographs sequentially. Often, a progressive thinning of the polyethylene liner (usually on the medial side) can be observed, but if only one set of radiographs is reviewed, the diagnosis may be less obvious.

Many of the cruciate-retaining knees that were implanted during the 1980s and early 1990s had round-on-flat or flat-on-flat designs and subsequently present with instability. They were posterior cruciate ligament (PCL)-retaining knees. Because of the relatively unconstrained design of some of these knees, it was not unusual to develop excessive laxity of the PCL or even a frank rupture of the PCL, leading to excessive sagittal plane motion. These patients often will present with instability of the knee, particularly noticeable on uneven surfaces and on stairs. They report "my knee feels unstable," and the only finding on examination is a small effusion, a posterior sag, and excessive sagittal plane motion.

Posterior-stabilized knees were implanted with the hope that sagittal plane motion would be controlled. While this usually is the case, it is not always so. Fracture of the polyethylene post has been reported as has excessive wear of the post, leading to complaints of instability. If a patient has sagittal plane instability with a posterior-stabilized knee, one needs to think of either a fractured post or a worn post in the differential diagnosis.

MANAGEMENT

How much constraint will be required to revise an unstable total knee? There are four options: 1) a constrained liner, 2) posterior-stabilized implant, 3) varus/valgus constrained implant, and 4) a hinge. Therefore, the question arises, "Which one should be chosen for a particular patient?"

The principle one should follow is that the minimum amount of constraint should be used to restore stability to the knee. Thus, at revision, one would start with either a constrained polyethylene insert or a posterior-stabilized knee and then, if unsuccessful in obtaining stability, move on to a varus/valgus constrained implant or even to a hinge.

The surgeon needs to answer the question, "How much constraint will I need?" The answer will depend on the status of the medial collateral ligament. If the medial collateral ligament is intact, one can use a constrained liner or posterior-stabilized knee at revision. On the other hand, if the medial collateral ligament is torn but reconstructable, then one can ordinarily use a varus/valgus constrained device. If the medial collateral ligament is absent and nonreconstructable, this may be an indication for a hinge (Figure).

Increasing constraint at revision TKR is not without its problems. The forces across the knee joint have to be dissipated somewhere, and this will occur at either the bone-cement interface or at the stem-bone interface. There is concern about the possibility of stem loosening as the level of constraint increases.

Using the technique of metaphyseal cementing combined with canal filling stems in revision TKR, it is possible to observe radiolucent or radiosclerotic lines around the stem that may well be indicative of movement secondary to stress transfer at the stem-bone interface. While this has not resulted in a clinical problem, nevertheless, these radiographic findings are of some concern.

Is there a role for hinges at revision TKR? The answer is yes, and the major indication is the absence of a medial collateral ligament. If a patient has no medial collateral ligament or a ligament that is nonreconstructable, then it gen-
ing that the post will restore varus/valgus instability to the knee. This is a lot to ask a polyethylene post alone to do in the absence of any soft-tissue support. In that situation, therefore, the patient is better served with a rotating hinge.

The other indication for a hinge at revision is an unstable flexion gap. If, at revision, it is impossible to restore flexion stability to the knee with a nonlinked hinge (varus/valgus constrained post), then the knee almost certainly will dislocate in flexion. This problem should be dealt with by using a hinge.

**CONCLUSION**

In the management of the unstable total knee, one needs to anticipate the need for constraint. Careful preoperative planning including history and physical evaluation of the ligamentous support of the knee is mandatory. A thorough study of current and past radiographs is important.

It is recommended that the minimum amount of constraint necessary to achieve stability should be used at the time of revision TKR. Most of these cases can be dealt with using a posterior-stabilized or varus/valgus constraint (nonlinked) implants. Occasionally, particularly in a patient with an absent or nonreconstructable medial collateral ligament, a rotating hinge prosthesis may be indicated.

**REFERENCES**