REVISION TKR

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Total knee arthroplasty has been widely performed in the post 20 years, which most patients enjoy a gratifying result with the current design of prosthesis. An occassional patient has problems post-operatively which is defind as failure, leading to re-operation or revision surgery.

It is imperative to clearify the cause of failure and detailed plan made prior to any re-operation. A specific diagnosis must be obtained before any surgical intervention is contemplated.

CAUSES OF FAILURE

A. Mechanical

1. Aseptic loosening

This is the most common type of failure, Loosening caused by malalignment, prosthetic (implant) wear or instability, Currently, the most common type of prosthetic failure, which most commonly is polyethlene wear.

Polyethylene wear, synovitis occurs, leading to a significant knee effusion which is painless. Aspiration of the knee may show polyethylene fragments if the aspiration in centrifuged, Metal wear is occuring, the aspiration may show this debris and be discolored secondary to the metallosis. Radiolucent lines greater than 2 mm. (particularly if they are complete), migration of the implants, or change in alignment of the extremity with subsidence of an implant are diagnostic of loosening, use aspiration.

2. Patellar problems

Patellar fracture, avascular necrosis of patella and subluxation or dislocation of the patella ----> lateral subluxation is much more common than medial. The patella subluxtion laterally during flexion and extension of the knee. The same synovitis can cause ligament relaxate and instability and often is associated with pain.

B. Biologic -----> Infection

Infection is one of the most devastating problems leading to failure of TKR. It is characterized by constant pain, that is occurs not only with activity but also at rest and at night. It is characterized by an effusion associated with erythema and/or drainage from the knee.

PRE-OPERATIVE PLANNING

The success of revision TKR is primarily predicated on the original mode of failure.

With this is mind, certain principles merit observation.

1. The surgeon must make every possible attempt to identify the precise cause of failure, or to understand the mode of failure,
2. Every knee about to undergo revision TKR should be aspirated pre-operatively, occassionally multiple times, to obtain adequate culture material for the diagnosis of infection.
3. Pre-operative planning
   Surgeon must be scrutinized for surgical approach, templating for appropriate sizing, using the contralateral limb if necessary.
4. Surgeon must have sufficient modular components to accommodate a wide range of intra-operative selections.

SURGICAL TECHNLQUES

1. A tourniquet proportional to the thigh should be placed as for proximal on the limb as possible, because extensile exposure is occasionally required beyond that which was originally anticipated.
2. It is important to avoid the creation of adjacent parallel skin incisions unless absolutely necessary.
3. The surgeon should particularly avoid the creation of large flaps.
4. If infection is diagnosed, a synovectomy incorporating all nonviable soft tissue should be considered. Viable synovium should be retained because it is the antibiotic delivery system to the joint.
5. If particle disease and osteolysis are the cause of failure, a full synovectomy should be performed to clear the joint of particles that might perpeuate osteolytic activity in the revised knee.
6. Learn the technique of component extraction in detail, try not to create unnecessary bone loss.

It is crucial in an uncemented component that the periphery be freed before any attempt at extraction. The pattern of bone loss from the removal of porous components is often peripheral, as opposed to the central bone loss typical of cemented. Components, and may create uncontained defects that require augmentation or grafting.

7. Reconstruction
   At this juncture, the surgeon must have an organized approach to the reconstruction of the knee arthroplasty. Althoughsystems and techniques may differ, several principles currently transcend individual designs and prejudices.

THE APPROPRIATE STEPS FOR RECONSTRUCTIVE THE JOINT ARE :

1. Re-establish the tibial plateau. Because the tibia has already been squared and protected, the surgeon need only select the appropriate size tibial tray to optimize coverage and to support the peripheral tibial cortical bone.
2. Apply femoral component and balance the knee in both flexion and extension.
3. Attempt to restore the joint line as close as possible to its original anatomic location. This location generally lies one finger bredth about the tip of fibular head, one finger breadth below the distal pole of patella, or at the site of the residual meniscal rim scar.
4. Reconstruct the patello-femoral articulation
   Retain the previous patellar prosthesis it is common and secure.

An unstable or fragile patellar component is worse than non at all, and occasionally it may be preforable to tubularize or to centralize the extensor tissues without benefit of prosthetic reconstruction.

The inferior pole of the patella should never be below the level of the joint line list excessive forces disrupt the extensor mechanism or flexion be incomplete. If in this case, distal femoral augments can be used to lower the joint line even further. A lateral retinacular release may also be necessary to ensure proper extensor treating.

5. Defects

As a rule, defects 5 mm. or less can be filled with cernent, defects from 5 mm. to 1 cm. may required bone grafting or augmentation, and massive defects may required large structural allografts.

The use of intramedullary stems to protect grafts, augments, and unreleased bones is very common and quite appropriate. It is generally preferable not to cement extended stem in either the tibial or femoral canals because of the potential difficulties of subsequent extraction.

6. Fixation

The vast majority of knee revisions are performed with methylenethacryate fixation. Surface cementing with press fit intramedullary stems is currently the most prevalent approach. It is crucial that all components be assembled and tested before the cement is mixed. Generally cement all three components at one tissue because this form of assembly allows the knee one last period of adjustment in balance and rotation.

CONCLUSION

Although the challenges are often prodigious and the risk quite high, there are few surgical satisfactions that exceed the reconstruction of failed TKR. It is hoped that improved instrumentation and the continued evoluation of modular knee systems will further facilitate this demanding procedure.The surgeon must always plan for future problems in revision knee surgery.