An Insight about Complications of Total Hip Arthroplasty after Fracture Acetabulum

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Abstract

It has been reported that complications associated with (THR) in patients with posttraumatic arthritis are higher when compared to those in patients with primary osteoarthritis. Despite the difficulties associated with performing THA in patients with PTA from previous acetabular fracture (including soft tissue scarring, existing hardware, and acetabular bone loss) and the relatively high complication rates, THA in patients with PTA following prior acetabular fracture leads to significant improvement in pain and function at 10-year follow-up. Further high quality randomized controlled studies are needed to confirm the outcomes after delayed THA in these patients.

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Introduction:

It has been reported that complications associated with (THR) in patients with posttraumatic arthritis are higher when compared to those in patients with primary osteoarthritis.(1)

1) Nerve palsy:

The overall incidence of nerve palsy after primary total hip arthroplasty has been reported to be 0.5% for arthritis, 2.3% for hip dysplasia, and 3.5% for revision surgery.(2)

The sciatic, femoral, obturator, and superior gluteal nerves can be injured by direct surgical trauma, traction, pressure from retractors or components, extremity positioning, limb lengthening, and thermal injury from cement.(3)

The sciatic nerve is particularly susceptible to injury in posttraumatic cases and during revision surgery because it may be bound within scar tissue posteriorly, which places it at risk during the exposure. Injudicious retraction of firm, noncompliant soft tissues along the posterior edge of the acetabulum can cause a stretch injury or direct contusion of the nerve. (3)

Exposure of the sciatic nerve during a posterior or posterolateral approach is not necessary routinely, but it is advisable if the anatomy of the hip is distorted as it may be displaced from its normal position and may be tethered by scar tissue. If so, it is carefully exposed, mobilized, and protected during the remainder of the operation. Usually it can be identified more easily in the normal tissue proximal or distal to the scar by the characteristic loose fatty tissues that surround it. While the soft tissues from the posterior aspect of the femur are being released, the dissection must remain close to the femur, especially in revision procedures. Sciatic nerve palsy also has been reported as a result of subgluteal hematoma formation, which may occur after prophylactic or therapeutic anticoagulation. Subgluteal hematoma should be suspected in patients with pain, tense swelling, and tenderness in the buttock and thigh and with evidence of a sciatic nerve deficit. Early diagnosis and prompt surgical decompression are imperative. (4)

Patients with sciatic or peroneal neuropathy should have the foot supported to prevent fixed equinus deformity. In most patients, partial function returns, although complete recovery is uncommon. (4)

Late exploration of the nerve may be considered if some recovery is not present in 6 weeks or if a mass of cement or a transacetabular screw is suspected to be compressing the nerve. CT of the acetabulum is helpful in delineating the position of an offending device. (4)

Nerve damage can be avoided by cautious handling of the various retractors intraoperatively and by the placement of both the hip and the knee in flexion for 3–4 days after the operation.(4)

2) Dislocation:

The prevalence of dislocation after total hip arthroplasty is approximately 3%. Postoperative dislocation has been reported to increase with abductor weakness which can occur from prior surgery and trauma. (5)

Posterior approach, component malposition, uncorrected bony and/or component impingement and inadequate soft tissue tension are variables under the surgeon's control that have been implicated. (5)

Most dislocations occur within the first 3 months after surgery. The dislocation often is precipitated by malpositioning of the hip at a time when the patient has not yet recovered muscle control and strength. Late dislocations can be caused by progressive improvement in motion after surgery. Impingement caused by component malposition or retained osteophytes may not become

manifest until extremes of flexion and adduction are possible. Late dislocations are more likely to become recurrent and require surgical intervention. **(5)**

Postoperative dislocation can be minimized by counseling for all patients to ensure proper rehabilitation and positioning compliance after the procedure, proper orientation of the cup (inclination of 30–45° in the frontal plane and 10–15° of anteversion, routine using of trial components to better ensure proper component positioning, removal of soft tissue and bony impingement, using a large-diameter femoral head or dual mobility cups and using of braces postoperatively in patients who have complex surgery. Mobilization is accomplished in a prefabricated abduction orthosis that maintains the hip in 20 degrees of abduction and prevents flexion past 60 degrees. **(6)**

If one or both components are malaligned, and dislocation becomes recurrent, revision surgery usually is required. Specific causes for instability mentioned previously should be sought and specifically corrected. **(6)**

3) Infection:

Patients with a previous infection have a higher risk of developing a postoperative infection. Poorly vascularized tissue from prior trauma and surgery ,the complexity and duration of these operations, the large exposure and extensive dissection, soft tissue stripping and the frequent use of bone grafts increase the risks of infection.**(7)**

A reasonable citeria (**Table 7**) was developed to diagnose the periprothetic joint infection (PJI).

Table 1: Proposed 2018 score-based definition for periprosthetic joint infection. **(8)**

Major criteria (at least one of the following)	Decision
Two positive growth of the same organism using standard culture methods	Infected
Sinus tract with evidence of communication to the joint or visualization of the prosthesis	

Minor Criteria	Threshold		Score	Decision
	Acute€	Chronic		
Serum CRP (mg/L)	100	10	2	Combined preoperative and postoperative score: ≥6 Infected 3-5 Inconclusive* <3 Not Infected
or				
D-Dimer (ug/L)	Unknown	860		
Elevated Serum ESR (mm/hr)	No role	30	1	
Elevated Synovial WBC (cells/µL)	10,000	3,000	3	
or				
Leukocyte Esterase	++	++		
or				
Positive Alpha-defensin (signal/cutoff)	1.0	1.0		
Elevated Synovial PMN (%)	90	70	2	
Single Positive Culture			2	
Positive Histology			3	
Positive Intraoperative Purulence¥			3	

The treatment of infected total hip arthroplasties consists of one or more of the following:

1. Antibiotic therapy

2. Debridement and irrigation of the hip with component retention

3. Debridement and irrigation of the hip with component removal

4. One-stage or two-stage reimplantation of components

5. Arthrodesis

Management choices are made based on the chronicity of the infection, the virulence of the offending organism, the status of the wound and surrounding soft tissues, and the physiological status of the patient.**(8)**

4) Heterotopic Ossification:

Patients with post-traumatic arthritis who had undergone previous ORIF have a higher incidence of developing heterotopic ossification (HO) ranges from 2% to 90%.**(9)**

Postoperative HO varies in amount from a faint, indistinct density seen radiographically in the region of the abductors and iliopsoas to complete bony ankylosis of the hip joint. **(9)**

Calcification can be seen radiographically the third or fourth week; however, the bone does not mature fully for 1 to 2 years. The following classification of **Brooker et al.** is useful in describing the extent of bone formation: **(9)**

Grade I: islands of bone within soft tissues

Grade II: bone spurs from the proximal femur or pelvis with at least 1 cm between opposing bone surfaces

Grade III: bone spurs from the proximal femur or pelvis with less than 1 cm between opposing bone surfaces

Grade IV: ankylosis

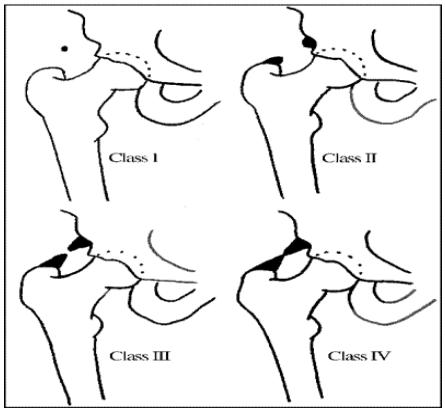

Fig. 1: The **Brooker** Classification of Heterotopic Ossification around the hip join**(9)**

Most patients who develop heterotopic HO are asymptomatic; however, restricted range of motion and pain may occur in patients with more severe **Brooker** grade III or grade IV ossification. **(9)**

Routine prophylaxis is not recommended for all patients, but some form of prophylaxis is warranted in high-risk patients. **(9)**

Prophylactic efforts in prevention of heterotopic bone include low-dose radiation and nonsteroidal anti-inflammatory drugs (NSAIDs). **(10)**

Preoperative and postoperative radiation regimens with doses of 500 cGy have been successfully used. In a multicenter evaluation of radiation prophylaxis, failures occurred more commonly in patients treated more than 8 hours preoperatively or more than 72 hours postoperatively than in patients treated in a shorter perioperative time frame. Radiation exposure is limited to the soft tissues immediately around the hip joint, and ingrowth surfaces must be appropriately shielded. **(10)**

NSAIDs have been shown to reduce the formation of heterotopic bone in many studies. Historically, nonselective cyclooxygenase-1 (COX-1) and cyclooxygenase-2 (COX-2) inhibitors for 6 weeks have been recommended, although courses of administration of 7 days have been reported as successful. **(10)**

An operation to remove heterotopic bone rarely is indicated because pain usually is not severe, and excision of established heterotopic bone is a difficult procedure. Decreased technetium bone scan activity indicates that the heterotopic bone is mature and that excision can take place safely. Extensile exposure is required, and the ectopic bone obscures normal landmarks. Range of motion should improve with excision, but pain may not be reliably alleviated. Radiation and NSAIDs have been used successfully to prevent recurrence.**(11)**

5) Limb length discrepancy:

The incidence of LLD after primary THA has been reported to range from 1 % to 27 %.

Discrepancy of leg length (LLD) is common after arthroplasty of the hip, with lengthening being the more noticeable to patients than shortening. **(12)**

Most patients with minor leg-length discrepancy after THA have few symptoms, and the majority of patients with moderate leg-length discrepancy have readily manageable symptoms. However, a minority of patients, mostly those with marked LLD, may have substantial disability as a result of pain or functional impairment.**(13)**

LLD has been associated with back pain and sciatica, neuritis, gait disorders, general dissatisfaction, dislocation, and early loosening of components. LLD can lead to gross dissatisfaction, morbidity, and revision surgery.**(14)**

Undoubtedly, the literature has proved that absolute equalization of limb length is difficult to achieve and LLD cannot be eliminated after THA. The boundary between acceptable and unacceptable levels of disparity remains undefined.**(14)**

6) Periprosthetic loosening:

Many patients with acetabular fractures are active young males; this situation is associated with a higher risk of failure due to wear and loosening after THA.**(15)**

Aseptic loosening or osteolysis is a biological process that is initiated by macrophage phagocytosis of particulate debris, causing an aseptic foreign body granulomatosis.**(16)**

They should be differentiated from other, nonpathological causes of periprosthetic lucencies. In a cemented arthroplasty, a < 2 mm lucency at the bone-cement interface indicates the formation of a fibrous membrane (representing the lucency), outlined by a thin, sclerotic demarcation line.**(17)**

This is thought to represent a stable fibrous reaction to cement. In a cementless arthroplasty, a similar < 2 mm lucency also outlined by a thin sclerotic line, along a polished segment where no bony ingrowth is expected, indicates fibrous bony ingrowth and is thought to provide sufficient stability.**(17)**

The differential diagnosis between septic and aseptic loosening can be very challenging radiologically, especially when no previous radiographs are available. However, the presence of a femoral periosteal reaction or rapid progressive disease are indicative of septic rather than aseptic loosening.**(18)**

- **Mechanical failure of the reconstructing bulky graft:**

The major concerns with this surgical method of socket setting in the original acetabulum and augmentation with bone grafts to defective iliac bone are loosening of the socket caused by compromised mechanical strength of the graft during the process of incorporation and remodeling of graft bone and subsequent increases in the revision rate. **(19)**

But actually despite that graft resorption may be noted by normal plain x-rays on the short term follow up, However, during long-term follow up, it was observed that reduced or absent radiodensity of the original floor of the pseudoacetabulum, reorientation of trabeculae in the graft, and generation of radiodense bands in the graft or along the outer surface of the graft original iliac outer wall to the lateral edge of the socket surface may occur. **(19)**

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