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42.1 Femoroacetabular Impingement

Femoroacetabular impingement (FAI) is defined as an abnormal interface between the proximal femur and the acetabulum causing pain and articular degeneration [1]. FAI causing pain and activity limitation that is refractory to NSAIDs, injections, and physical therapy may be treated with surgery.

42.1.1 Operation

Options for treatment include arthroscopic debridement, osteoplasty, and in some cases labral repair. Arthroscopy allows the abnormal joint lesions, most commonly referred to as cam and pincer lesions, to be visualized. An osteoplasty is performed with a high-speed burr to remove the bone and recontour an optimal articular interface. In addition to bone resurfacing, labral tears are often present. Any damaged labral tissue may either be removed or be repaired depending on its viability. If the tissue is removed, the patient can generally bear weight as tolerated soon after the procedure. If it is repaired, the patient should be kept toe-touch weight-bearing for 4–6 weeks to allow for biological healing. Hip arthroscopy with osteoplasty has surpassed open hip dislocation and osteoplasty as the gold standard for the management of FAI [2].

42.1.2 Rehabilitation

At present, no universally agreed-upon protocol exists for post arthroscopic FAI rehabilitation, but there are some common principles across various protocols. Patients who undergo arthroscopic osteoplasty require a period of protected weight-bearing, up to six weeks, and are encouraged to perform early passive range of motion (PROM) exercises to limit stiffness [3]. As weight-bearing and range of motion advances, muscular strengthening is added to the rehabilitation protocol. Rehab progresses from submaximal isometric hip, thigh, and abdominal muscle exercises to resisted and eccentric exercises with a focus on the gluteal muscles (particularly gluteus medius) [4].

42.2 Hip Labral Tears

42.2.1 Operation

Surgery is indicated to repair labral tears when conservative measures do not control the patient's symptoms or when functional limitations are unsatisfactory. While the most common cause of labral tears is FAI, they may also be traumatic in etiology (i.e., hip dislocation, acetabulum fracture). If tears are not repairable, the labrum is removed with full weight-bearing as tolerated afterward. Labral tears are most commonly repaired through the use of arthroscopy with the use of bio-absorbable or permanent anchors. In some cases, articular cartilage damage is also present along with the labral tear. These are classified as chondral defects and are treated with microfracture. Multiple small holes are made in the defect to incite an inflammatory and healing response. Fibrocartilage ideally fills the defect and re-establishes the articular surface [5]. After microfracture, non-weight-bearing or toe-touch ambulation is necessary for at least 3–6 weeks to allow for the initial stages of fibrocartilage formation.

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42.2.2 Rehabilitation

Rehabilitation protocols following acetabular debridement or repair focus on progressive range of motion (ROM) and soft tissue flexibility with strengthening in the later phases. Most of the acetabular defects are located anterior or antero-superiorly, thus limiting movements that stress this area. Initially, weight-bearing is limited to 50% for 7–10 days progressing to weight-bearing as tolerated for debridement. Labral repair patients are limited to toe-touch weight-bearing for 3–6 weeks. If the surgery involves additional procedures, such as microfracture, the weight-bearing restrictions can increase to 6 weeks. Early ROM is encouraged avoiding flexion and internal rotation of the hip to limit strain on the labral repair [6].

42.3 Hip Dysplasia

42.3.1 Operation

Adult dysplasia of the hip refers to an abnormal anatomical relationship of the acetabulum and the femoral head, most commonly resulting in a shallow acetabulum with decreased coverage. Treatment for this condition varies depending on severity of the deformity, patient age, and degree of joint damage or arthritis resulting from the deformity. Young patients may undergo pelvic osteotomy to rotate the acetabulum and increase femoral head coverage.

42.3.2 Rehabilitation

After surgery, protected weight-bearing is necessary for 6–8 weeks. Older patients with advanced arthritis typically undergo total hip arthroplasty (THA) with immediate post-operative weight-bearing.

42.4 Hip Osteoarthritis

The most common surgical treatment for persistent osteoarthritic pain is THA. Pelvic osteotomy and hip resurfacing may be performed in the early stages of disease for temporary relief. Younger patients and those who wish to preserve their native hip may look to these procedures for relief. Outcomes are enhanced when the procedure is performed soon after a failed course of conservative therapy [7].

42.4.1 Total Hip Arthroplasty

THA includes femoral head resection and acetabular reaming. The components can be a combination of metal, plastic, or ceramic and are fixated with or without cement. The common surgical approaches to THA include the posterior, direct anterior, direct lateral, and anterolateral [8]. The main goal of elective arthroplasty is early ambulation combined with adequate analgesia to allow the patient to be safely and rapidly discharged and minimize thromboembolic events. Weight-bearing after THA is supported for both cemented and cementless fixations [8]. All approaches have unique characteristics but should allow the patient to bear weight as tolerated immediately after surgery unless there is an adverse intra-operative event reported by the surgeon.

- *The posterior approach:* It has been the most approach and is associated with some increased risk of posterior dislocation and sciatic nerve palsy. Rehabilitation should avoid hip flexion and internal rotation for that reason. Stair climbing should be carefully monitored and sitting in a deep-seated chair should be avoided. The anterior approach has a higher risk of intraoperative femoral shaft fracture and anterior thigh numbness. Hip extension and external rotation may provoke an anterior dislocation; however, this is very rare.
- *Anterior approach:* The anterior approach to the hip is a safe, muscle-sparing, and fully extensible approach offering potentially great short- and medium-term advantages in total hip arthroplasty patient. Complications may include lateral femoral cutaneous nerve injury, and femoral fractures are more common in this approach as compared to posterior approach. The anterior approach operative time is longer but has a shorter time to discharge and a greater percentage of home discharge [9].
- *The lateral and anterolateral approaches:* It has a very low dislocation rate but carries a risk of abductor weakness. Physical therapy is started immediately after surgery for all approaches and continues for 4–6 weeks.

42.4.2 Pelvic Osteotomy

Pelvic osteotomy, or peri-acetabular osteotomy (PAO), includes multiple bone cuts around the acetabulum so that the articular surface can be rotated around the femoral head to change the contour and the coverage. Peri-acetabular osteotomy is indicated for the treatment of residual hip dysplasia to improve joint mechanics and can be classified as either reconstructive or salvage procedures. In some cases, the pos-

terior column of the pelvis is preserved, and the patient may be weight-bearing as tolerated after surgery. If the posterior column is osteotomized during surgery, the patient will be toe-touch weight-bearing for a period of 6–8 weeks. The risk of dislocation after pelvic osteotomy is low and rarely requires precautions. Pelvic osteotomies are indicated for the pre-arthritic or mildly arthritic acetabulum or femoral head, whereas salvage procedures (including THA) are indicated for patients with established osteoarthritis and/or an incongruent hip joint that is less amenable to reorientation of the acetabulum [10].

42.4.3 Hip Resurfacing

Hip resurfacing is an alternative to THA and includes the young, active male with a sufficiently large femoral head size [11]. The femoral neck and some bone stock in the femoral head are preserved, while the outer cortex of the femoral head and the acetabulum are resurfaced. A metal-on-metal interface replaces the articular surface and weight-bearing as tolerated is allowed right after the procedure. Although rare, stress fractures of the femoral neck have been encountered within a year of surgery. Unexplained onset of pain with ambulation should bring this to mind.

42.5 Hip Dislocation

Ninety percent of all hip dislocations are posterior; however, they can occur in all four directions (anterior, posterior, superior, and inferior). The initial treatment is emergent closed reduction to decrease the rate of avascular necrosis of the femoral head [12]. Examination under anesthesia is sometimes performed after reduction to assess the stability of the hip joint. X-rays and CT scans should confirm concentric reduction without evidence of fracture or any intra-articular loose body.¹⁹ In the stable simple dislocation, toe-touch weight-bearing is recommended for the first four weeks followed by progressive weight-bearing as tolerated [13].

Complex dislocations involving fracture of either the femoral head or the acetabulum are initially closed reduced pending the definitive surgical intervention. While waiting for the appropriate medical clearances, the reduction may require traction. The femoral head fractures require either open reduction and internal fixation (ORIF) or arthroplasty depending upon the configuration. After an ORIF, ROM can be started immediately with non-weight-bearing ambulation for 6–8 weeks until there is proper evidence of healing.²¹ The acetabular fractures are reviewed in the next section.

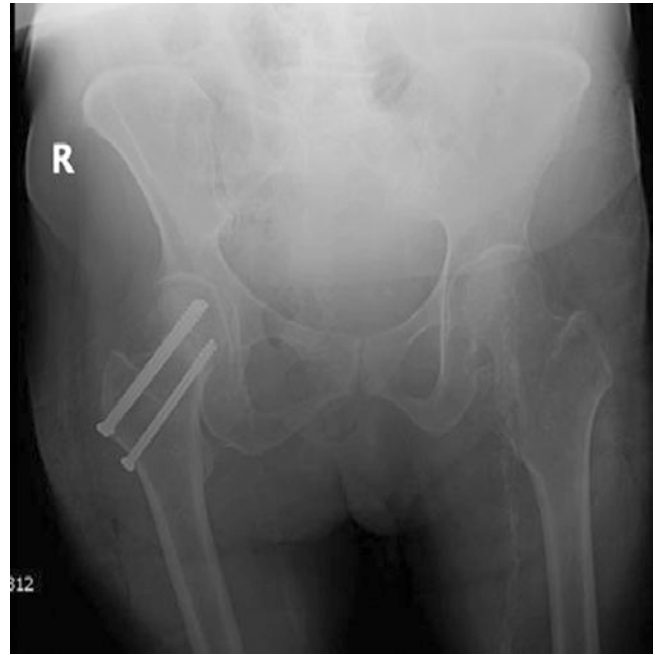


Fig. 42.1 Internal fixation of femoral neck fracture with cannulated screws. (Synthes 7.3 mm Cannulated Screws, Johnson and Johnson Medical Devices, West Chester, PA)

42.6 Hip Fractures

42.6.1 Femoral Neck Fracture

Operative management of proximal femoral fractures is based on patient activity level, anatomic location, and fracture displacement. The goal of fixation of all hip fractures is expedited weight-bearing as tolerated and ambulation. Anatomic reduction and internal fixation of femoral neck fractures are paramount in the younger patients to preserve the viability of the native hip. In the elderly, nondisplaced fractures of the neck of the femur may be treated with percutaneous internal fixation (Fig. 42.1), whereas displaced fractures require arthroplasty. The arthroplasty may replace the femoral head alone (hemiarthroplasty) or both the head and the acetabulum (THA) depending upon the degree of arthritic disease that is present. Severely displaced fractures of the femoral neck may require arthroplasty even in young patients if the viability of the femoral head is poor.

42.6.2 Intertrochanteric and Subtrochanteric Fracture

Injury at the intertrochanteric level or below in all age groups and activity levels is managed with percutaneous screw fixation, intramedullary nails (Fig. 42.2), or plate and screw fixa-

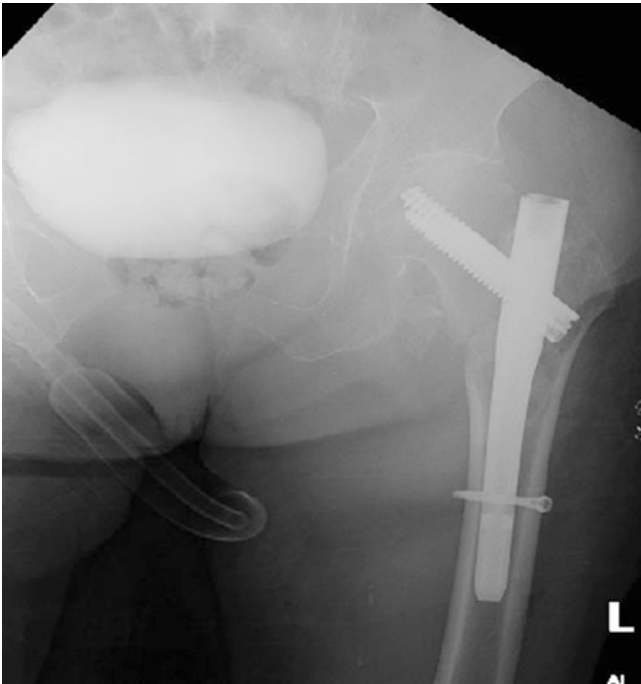


Fig. 42.2 Open reduction and internal fixation of intertrochanteric hip fracture with cephalomedullary nail. (Smith and Nephew Intertan™. Smith and Nephew, Memphis Tennessee.)

tion (Fig. 42.3) [14]. Immediate full weight-bearing is started if the construct is surgically stable. The rehabilitation of elderly hip fracture patients is highly challenging and extremely important to short- and long-term function of these individuals.

42.6.3 Acetabular Fracture

The majority of the weight-bearing surface of the acetabulum is located in the superolateral and posterior aspect of the dome. Fractures of the articular surface occur as a result of both high-energy mechanisms in young individuals and low-energy falls in osteoporotic patients. Goals of both operative and non-operative treatment include restoration of the articular surface, early ROM, and weight-bearing once bony healing has occurred. Acetabular fractures may be treated conservatively if the articular surface is well aligned and stable for weight-bearing ambulation. If an ORIF is required (Fig. 42.4), partial weight-bearing is necessary for the first 3 months [15]. Early ROM and core strengthening exercises can be started immediately after either approach.



Fig. 42.3 Screw and side plate fixation for an intertrochanteric fracture. (Smith and Nephew, Compression Hip Screw™, Memphis, Tennessee.)



Fig. 42.4 Open reduction and internal fixation of a posterior wall acetabulum fracture via posterior approach. (Synthes 3.5 mm reconstruction pelvic plates, Johnson and Johnson Medical Devices, West Chester, PA.)

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