

## Total Hip Dislocation

Maxime Coles MD

A total hip dislocation (THA) is defined as the complete loss of articulation contact between two artificial joint components. It represents the failure of an implanted prosthetic device used to restore functionality in the lower extremity. The dislocation represents the loss of contact of the components. It is estimated that by the year 2030, more than 500.000 total hip arthroplasties will be performed yearly in the United States. Dislocations of a total hip prosthesis will become more and more frequent.

A well-inserted total hip replacement represents one of the most successful operations performed on the musculoskeletal system. It needs continuous care because it can be the subject of extensive and serious complications especially when the one who seeks for the benefits shows little attention to its functionality. Serious complications will happen in about 2% of patients who benefited from such an operation within a year of the operation. Physicians and patients should be aware of the situation in avoiding any repeated trauma to the prosthesis.

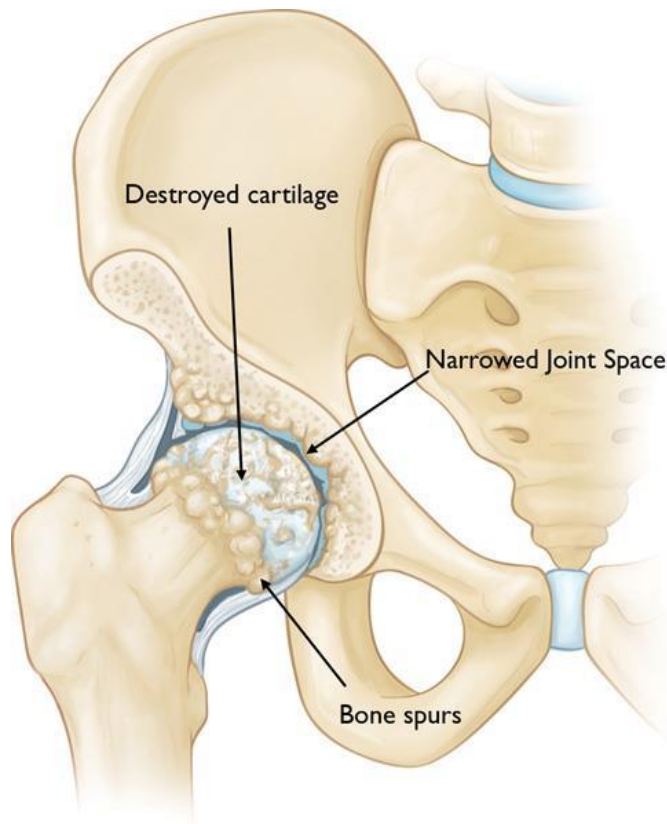
The rate of dislocation in a primary total hip dislocation, ranges from 0.2% to 10% per year as reported in the international registries but the rate of dislocation may increase to 28% whenever such hip underwent already a previous revision. The choice of prosthetic devices and the time between the procedure has also a lot to do with the dislocation as well as other risk factors like advanced age, concomitant neurological disease, poor compliance.

Patient should be taught to avoid certain motion to benefit fully from the replacement of the hip such as bending forward while in a standing position. They should avoid any internal rotation of the flexed hip which benefited from the replacement. The condition of the soft tissues and a balance of muscular tension can be a major cause of instability.

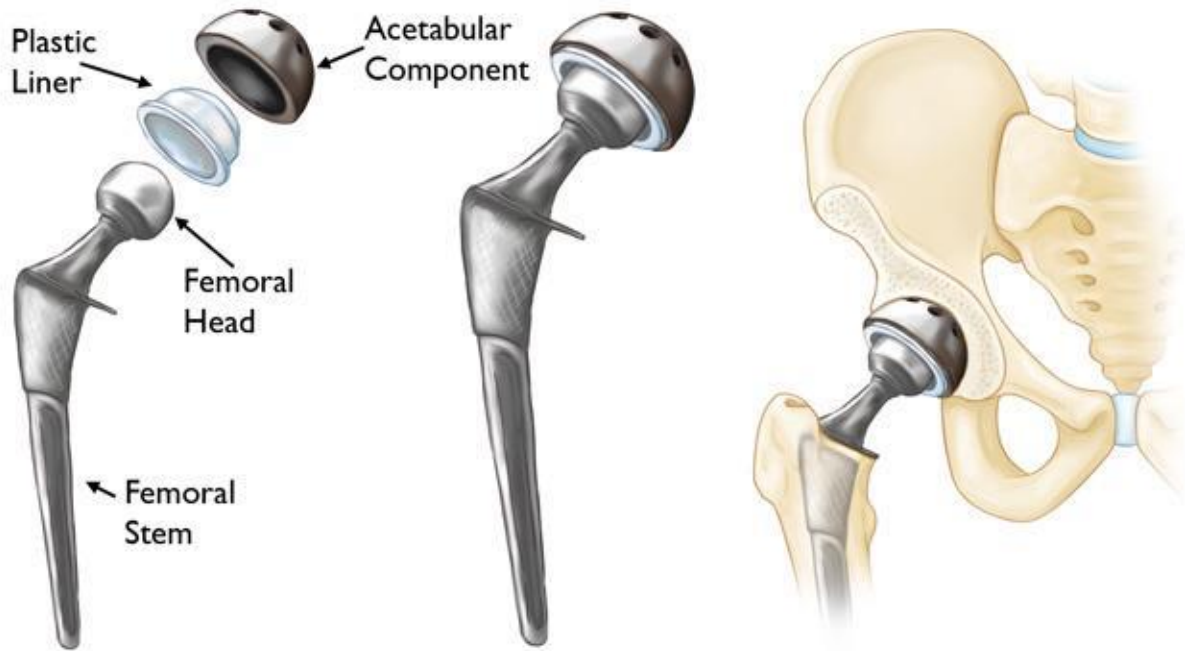
Conservative treatment can be justified the first time a total hip dislocation occurs without any obvious cause. If a mechanical cause of instability is found, undeniably, a revision of the components must be performed because the dislocation will repeat itself. The more it dislocates, the more unstable the prosthetic components will become and further the polyethylene insert (Plastic) will suffer plastic deformity.

A dislocated total hip replacement is an emotionally traumatizing event that should be prevented. Such an operation should be performed with suboptimal technique and a proper selection of the patients should be meticulously performed. A cooperation between patient and surgeon with proper understanding of the mechanics of such prosthesis can help in the survival of a total hip replacement. Risk assessment, optimal technique, best positioning of the different components, soft tissue balance and the experience of a total joint surgeon may give the best outcome.

Although a Total Hip Replacement (arthroplasty) is one of the most successful surgical procedures in the hand of an experienced orthopedic surgeon, it brings comfort to a patient with an osteoarthritic hip and offers substantial pain relief in improving the quality of life and in increasing mobility. Complications after such procedure remain a challenge for both, the patient and the orthopedic surgeon reaching a range between 2 to 10%. Other complications can be Aseptic loosening (36.5%), Infection (15.3%).



Degenerative arthritis of a hip joint is the most common indication for a hip replacement



Different components of a Total Hip prosthesis with a femoral stem, a metallic or ceramic femoral head, a polyethylene liner and a metallic or polyethylene socket.



Radiographs of a pelvis with bilateral total hip replacements demonstrating a left Total hip dislocation, with asymmetry and rotation of the component in the acetabular. Both sockets and the right femoral stem were cemented. The presence of a bone plug on the right side is noted while the left femoral stem is uncemented. (Press-fit).

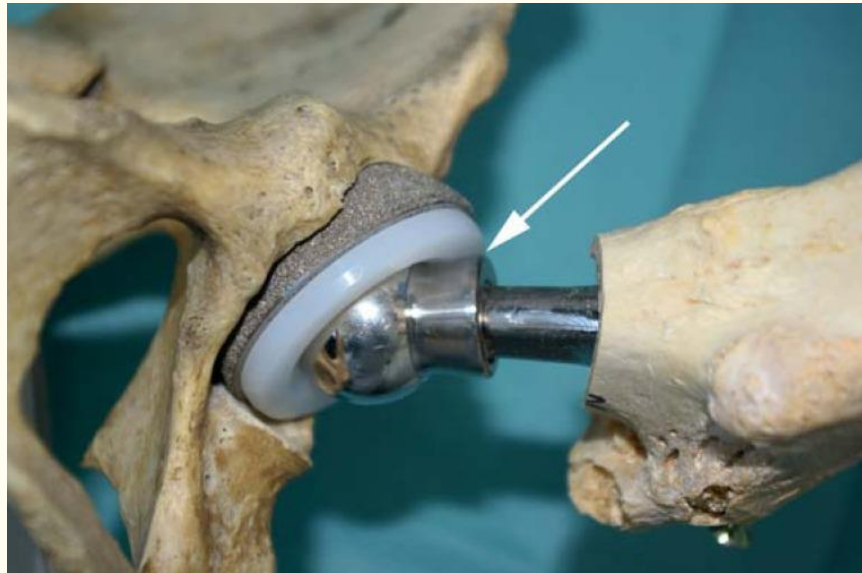
In a THA dislocation, it is important to distinguish whether the triggering mechanism was caused by a significant trauma or an everyday insignificant motion of the daily living activity. The latter is suggestive of inadequate tissue tension or component mal-positioning. Is it an early dislocation within 6 months of insertion or is it a late dislocation after more than six months of insertion. Early dislocation is seen with mal-positioning of the prosthetic devices while a late dislocation is seen because of material failure... like a problem in the polyethylene component or a combination of the two mechanisms. An hyperlaxity of the joint can result facilitating the dislocation anteriorly, posteriorly or inferiorly.

Risks factors for total hip dislocation are looked for in pre and post operatively or even intra-operatively on the operating room table because of the implant itself or the patient or even the physician. So, such factors can be corrected preventively. A key-factor rests on the muscular and capsular stability in the recipient of a total hip replacement especially among people suffering from neuromuscular conditions like in Parkinson's disease, dementia or muscle dystrophy. In patients older than 80, a higher risk for fall and a lack of compliance is noted to be a cause. Some studies attribute a higher risk of dislocation to women (Wetters et al.) during the years 1998-2003. Finally, because of anatomical variations, patient suffering from congenital hip dysplasia or metabolic diseases or inflammatory arthropathies (avascular necrosis) can be added to the patients at risk.

Patients benefiting from a total hip replacement following a prior fracture of the femoral neck or a revision from a peri-prosthetic fracture have also a higher chance to sustain a dislocation of the components (25-50%) because of soft tissue trauma, extensive scarring, bone loss and heterotopic ossification in the soft tissue. Attention should be given in those cases when this procedure is contemplated.

Finally, the surgical approach itself can contribute to the dislocation, as well as the positioning of the components and the proper tension in the soft tissue although the surgeon experience is important. The posterior approach of the hip requiring the detachment of the short external rotators has shown to be associated with a higher degree of dislocation (4%) when compared to an anterolateral or anterior approach or even trans-gluteal. This is why the repair of the posterior capsule was recommended but adversely, it was also found that the presence of such remanent capsule, encourage the formation of ectopic bone. In brief, all the approaches combine a total risk for dislocation of 30%.

The alignment of the implants during a Total Hip Replacement is of primordial importance for the stability of the artificial joint, femoral positioning and inclination/anteversion or retroversion of the acetabular cup play an essential role in the stability of the components and in a way in the survival of the prosthetic devices. Acetabular and femoral implants design guaranty the survival of a Total Hip Replacement, contributing as well to the instability.



Here is an extended prosthetic head (long collar), used to gain length and improve the soft tissue tension can become the cause of impingement itself with the rim of the polyethylene insert and can serve as a lever and be responsible of the dislocation.

The ratio head-to-neck is of special importance for the stability of the prosthesis and the impingement. The larger the femoral head (36mm), the better range of motion-free range of motion you will obtain. The smaller head (28mm) favors more impingement with the acetabular component. A larger femoral head provides more stability but encourage more corrosion.

The more Total Hip Replacement is performed, the more we will have to understand the pattern of instability. Discussion as the proper way to treating a dislocation, has bought many to perform their attempt at self-reduction or to allow a layperson to perform the reduction without anesthesia prior to bringing self to an emergency room for hospital care. Often at examination, the lower extremity is foreshortened and externally rotated. One should ask about the intensity of the trauma which has precipitated the dislocation and questioned if this is the first time or if it is a recurrent dislocation. How long ago was the primary total hip replacement and a record of the dislocation should be kept in file.

Proper radiographic studies should always be performed: AP Pelvis, and a lateral view to rule out implant loosening or prosthetic fracture. Laboratory

studies should look for infection in which case, a joint aspiration and a cell count may be necessary especially in late dislocations also aseptic loosening.

If the conventional radiographs are inconclusive to prove any implant mal-positioning, a CT-Scan, providing three dimensional views of the prosthetic components may help. If the CT-Scan is not conclusive of mal-positioning or loosening, a short anesthesia in the operating room can be beneficial. In case of distortion of the extremity compression of the vessels and nerves, immediate attempt at reduction is essential. Once re-located, the hip joint is brought to a range of motion to check for stability while conservative treatment with physiotherapy can be initiated with limitation in flexion and adduction.

Once dynamic fluoroscopic study demonstrates instability of the components, a revision of the total Hip Replacement become mandatory to avoid recurrent dislocations. Many choices in prosthetic devices can be offered if a revision is contemplated. The French offers recently a new and special prosthetic device called the “tri-polar cup” which can also be used in revision and also for people at risk for total hip dislocations.

Dislocation of total hip dislocations can be a traumatic event for patients. They may lose confidence in the procedure (artificial joint) or/and reproach the surgeon for the outcome. Pre-operative risks factors like advanced age, limited compliance and neuro-muscular diseases, need to be discussed and proper techniques need to be applied in the hands of an experienced surgeon. Keep in mind that 2% of primary total hip replacement will dislocate while the percentage will increase to 28% among patient benefiting from a revision procedure.

Bigelow was the first one to describe the treatment of a hip dislocation by the mean of a closed reduction. Over the years, so many have developed their own method of manipulation of the hip to achieve a successful result. I will go over some of the most often used techniques.

- 1- Bigelow maneuver: The patient is supine on the bed or on the floor and the physician is standing on the side of the bed. The physician grabs the ankle of the affected extremity with one hand while the opposite forearm is placed behind the knee, in keeping the hip flexed at 90



degrees flexion and the extremity abducted and internally rotated while an assistant stabilizes the pelvis in a downward pressure. Vertical traction is applied while abducting, externally rotating and extending the extremity to dislodge the femoral head.



Bigelow Maneuver

- 2- Allis Maneuver: The Allis maneuver is a variant of the Bigelow where the surgeon grabs the affected extremity and flexes the knee at 90 degrees while an assistant stabilizes the pelvis against the bed. Traction is applied by grasping the knee, in line with the thigh (femur) while the hip is kept flexed up to 90 degrees. Upon reduction, the hip is gently extended and externally rotated to allow the return of the femoral head into the acetabulum.



Allis Maneuver

- 3- Howard Maneuver: Patient is in a supine position and physician and assistant stand on the side of the affected hip. The hip is then flexed at 90 degrees angle and the assistant applies a lateral traction force on the thigh of the affected extremity. Another assistant can stabilize the pelvis. The physician grabs the knee to apply traction in the axis of the femur while performing internal and external rotation until the femoral head relocate the acetabulum.



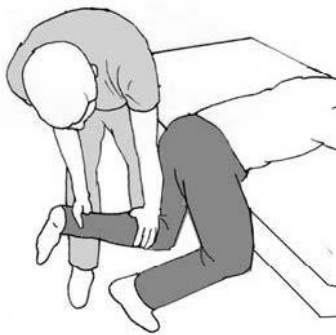
Howard Maneuver

- 4- "Piggyback" method: Patient is supine at the end of a gurney and the affected extremity is flexed at the hip while the bent knee is placed over the physician shoulder. One or both shoulder is used as a fulcrum to apply a downward force on the patient leg (tibia) until reduction is obtained.



#### Piggyback method

- 5- Stimson Gravity Maneuver: Patient is placed on a prone position with the involved lower extremities flexed at 90 degrees at the hip and knee, on the edge of a gurney. A downward force is applied over the lower extremity while internal and external rotations are performed until reduction is achieved. The physician can prefer the use of his knee to apply downward pressure over the popliteal fossa of the patient's affected leg while patient is kept sedated. I used to sit down on the popliteal area to bring more downward traction when I used this technique. Be careful to not allow the patient to slide off the bed and be sure the airway is secured.



#### Stimson Gravity Maneuver

- 6- The Waddle technique is a new technique of reduction which has been used at the Oschner orthopedic clinic, in New Orleans and is basically, a combination of the Allis and Bigelow techniques where an assistant hold on the patient pelvis down on the bed or the gurney. The physician places his forearm behind the knee flexed to 90 degrees on the affected lower

extremity while the hip is kept flexed at 60 to 90- degrees, and leaning back gently, he delivers a steady pull on the lower extremity in the axis of the femur with minimal strain on the back of the physician performing the maneuver. He can internally rotate the extremity or adduct at ease if needed. A knee immobilizer is used in post reduction in order to avoid re-dislocation.

- 7- So many other methods and techniques of reduction of hip with little modification like the Fulcrum maneuver, Captain Morgan maneuver, the Lefkowitz maneuver, the East Baltimore technique etc. I will refer any orthopedic residents to our textbook to learn the variants because in many cases, we need to improvise to be successful.

Maxime Coles MD

Ste Croix VI (Jan 2024)

NB: This paper is dedicated to our orthopedic residents to help them mastering the art of reducing a total hip dislocation

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