The occasional posterior hip dislocation reduction

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INTRODUCTION

Traumatic dislocation of the hip, although a rare diagnosis for most of us, constitutes a true orthopedic emergency.[1–3] Closed reduction of a posterior hip dislocation requires the ability to perform procedural sedation, teamwork, and a knowledge of the proper method of the application of judicious force to the dislocated joint. Treatment of this dislocation is further complicated by the following factors:[1,2]

- the patient may have other, more serious, injuries to the thorax, abdomen or pelvis that require immediate attention;
- the dislocation should ideally be reduced within 6–8 hours to prevent the complication of avascular necrosis of the femoral head;
- a fair degree of force may be necessary to effect successful reduction, especially in a large patient.

Ideally, the patient would be transferred to an institution with full anesthesiology and orthopedic services, but when this is not possible or desirable within the 6–8 hour time frame, responsibility for successful reduction falls on the rural physician.

ANATOMY AND PATHOPHYSIOLOGY

The hip is a ball-and-socket joint located deep within the body, where a strong network of ligaments and muscles render it quite stable. A dislocated hip therefore serves as a marker of a large amount of force having been applied to the body. Hence, there is a risk of concurrent — and possibly more life-threatening — injury to the thorax, abdomen or pelvis.[2,3]

On the other hand, concurrent injury elsewhere (found in 71% of hip dislocations in one study[3]) may mask this injury from medical staff. It has been recommended to screen for this injury in severe trauma;[1,3] a full range-of-motion of the hip will rule it out.

Hip dislocation is most commonly posterior (80%–95% of cases), with the "ball" displaced posterior to the acetabulum, where it may injure the sciatic nerve.[2] About two-thirds of cases are said to be caused by motor vehicle crashes, the mechanism being the flexed and adducted femur striking against the dashboard, driving the femoral head backward. Most of the other cases are caused by a fall from a height (e.g., a ladder), but elderly patients and patients in the weeks following hip arthroplasty may dislocate the joint after more minimal trauma, such as a fall out of bed. The injury has also been reported in extreme sports, such as snowboarding.[1,4,5]

Most of the remaining 5%–20% of dislocations are anterior. This article will concern itself with the more common posterior dislocation.

SIGNS AND SYMPTOMS

Unless the patient is obtunded, or distracted by other severe injuries, this injury is very painful. The leg will be foreshortened, in a position of hip flexion, adduction and internal rotation (Fig. 1). Note that this is the opposite of the leg position of a patient with a hip fracture.

The sciatic nerve passes posterior to the hip, and may be injured in up

to 10% of cases of posterior hip dislocation, with an even higher rate when there is a fracture of the acetabulum. The possibility of sciatic nerve injury should be checked for — and documented — in all cases by checking for impairment of dorsiflexion of the ankle and toes. Vascular impairment is uncommon, but injury of the femoral artery can occur in the less common anterior dislocation.[6]

DIAGNOSIS

As mentioned, the diagnosis may be missed if there are concomitant life-threatening injuries or fractures of the ipsilateral leg.

The injury is almost always apparent on the anteroposterior view of a pelvis radiograph. The dislocated femoral head will appear outside and just superior to the acetabulum. The dislocated femoral head will also appear to be smaller than the contralateral femoral head, because it is posterior and thus farther away from the origin of the radiographic beam[2] (Fig. 2).

Fig. 1. The typical appearance of a patient with a posterior dislocation of the right hip.

Fig. 2. Radiograph of a dislocated left hip.

There is a high rate of associated acetabular fracture in posterior hip dislocation (up to 81%).[2] However, as long as there is no sciatic nerve deficit, neither a fracture of the acetabulum nor an isolated, nondisplaced femoral head fracture fundamentally changes the initial, closed reduction technique (see below).

INDICATIONS AND CONTRAINDICATIONS FOR CLOSED REDUCTION

Closed reduction may be attempted for a posterior hip dislocation, with or without a neurologic deficit, as long as no associated fracture is present. Again, if there is an acetabular fracture, or an isolated femoral head fracture, closed reduction may still be attempted, but only if there is no accompanying neurologic deficit.[1,2]

Open reduction is indicated if any of the following are present:

- a posterior hip dislocation with a fracture of the acetabulum or of the femoral head and a neurologic deficit: a bony fragment may be pressing on the sciatic nerve;
- a fracture of the femur or femoral neck, where traction will not be possible;
- an open dislocation.

These patients will need urgent referral for an open reduction. If such is not possible due to weather, distance or other logistical factors, an orthopedic surgeon might be consulted by telephone to assess whether an attempt at closed reduction to decompress the sciatic nerve is indicated.

TECHNIQUE OF CLOSED REDUCTION

Many techniques have been described to reduce this dislocation, some dating back to at least the 19th century. Each method has its own advantages, disadvantages and advocates.

All have in common the basic principle of reduction of a dislocation: manual in-line longitudinal traction, often supplemented with movement in a direction opposite to the displacement — in this case, external rotation because the limb is internally rotated. The methods differ mostly in the position of the physician with respect to how he or she applies longitudinal traction to the femur.

This article will describe 4 methods: the Stimson or gravity method, the Bigelow method, the Captain Morgan method[4] and the Whistler method.[7]

Procedural sedation is generally necessary. Thus, at least 3 people will be required: a physician

to perform the reduction, an assistant to stabilize the patient, and a physician or nurse to supervise the procedural sedation.

In common to all methods:

1. Ensure that the patient does not have a concomitant, more serious injury due to the sustained trauma.
2. Check for, and document, any prereduction sciatic nerve deficit (see "Indications and contraindications for closed reduction").
3. Assemble your team and ensure that all understand the plan of action.
4. Assemble the equipment you will need:
   - oxygen supply and bag-valve mask device
   - airway cart with rescue airway equipment
   - suction apparatus with suction tubing and suction catheter
   - oxygen saturation monitor, plus full electrocardiography and blood pressure monitoring if indicated
   - intravenous catheter
   - your preferred drugs for procedural sedation
   - 0.9% saline solution for "flushes" and treatment of hypotension
5. As always, the best anxiolytic is careful explanation by the physician (Fig. 3).
6. Perform procedural sedation as per your usual technique.

The Stimson or gravity method

This method has the advantage of simplicity and the use of gravity, in addition to physician-applied traction, to achieve reduction. Although the Stimson method has been described as being of "historical interest only,"[2] it may be reasonable in a rural area, especially if the patient is very large or the physician is small. The main disadvantage is that the patient is in the prone position and very difficult to monitor under procedural sedation (Fig. 4).

Procedure (after steps 1–6 as above):

7. Position the patient prone on the table with the hips flexed and the legs hanging over the edge of the table.
8. The assistant presses down over the sacrum and buttock to stabilize the pelvis and prevent the patient falling off the table.
9. The physician keeps the knee flexed to 90°. In conjunction with gravity, the physician then applies steady downward traction to the leg.
10. Gentle rotary motion of the lower limb with the other hand may assist in the reduction[8] (Fig. 4).

The Bigelow method

Procedure[8] (after steps 1–6 as above):

7. Place the patient in a supine position, with the stretcher or table lowered to about the waist level of the physician.
8. The assistant applies downward bilateral pressure on the anterior superior iliac spine (Figs. 5 and 6) to provide countertraction. Alternatively, the patient may be stabilized by tying the pelvis to the table or gurney with a sheet.

Fig. 3. The best anxiolytic is careful explanation by the physician.

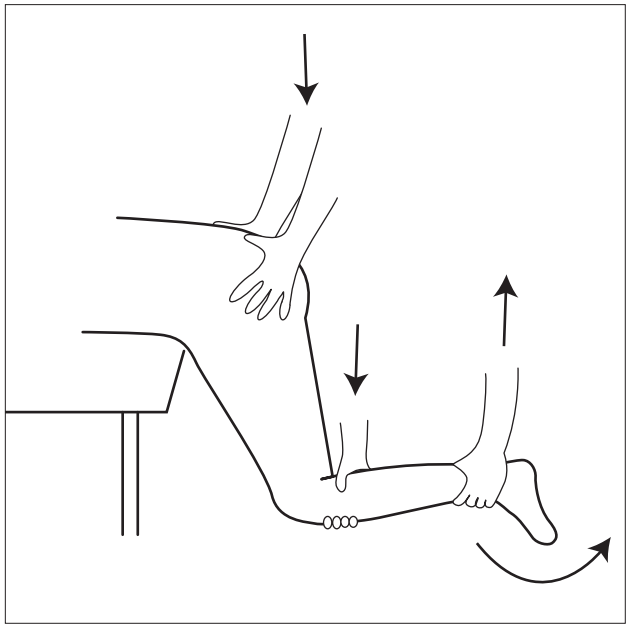

Fig. 4. The Stimson or gravity method.[2]

9. The physician then applies steady longitudinal traction in the line of the deformity, using leverage from his or her arms and back (Fig. 6). While traction is maintained, the femoral head is levered into the acetabulum by abduction, external rotation and extension of the hip.[6]
10. Reduction may be eased by gentle abduction, external rotation and extension of the hip, while traction is maintained.

This method may be difficult if the patient is large or the physician small (or both). The Allis method of reduction is similar, but in this method the physician stands on the gurney or stretcher, straddles the patient and applies longitudinal traction. This method exposes the physician to a risk of a fall or even overturning the gurney, which might not be able to support the weight of 2 people.

Two other methods are available, in which the physician can use the principle of leverage and multiplication of force, with his or her knee (the Captain Morgan method) or arm (the Whistler method) as the fulcrum.

Fig. 5. Stabilizing the pelvis.

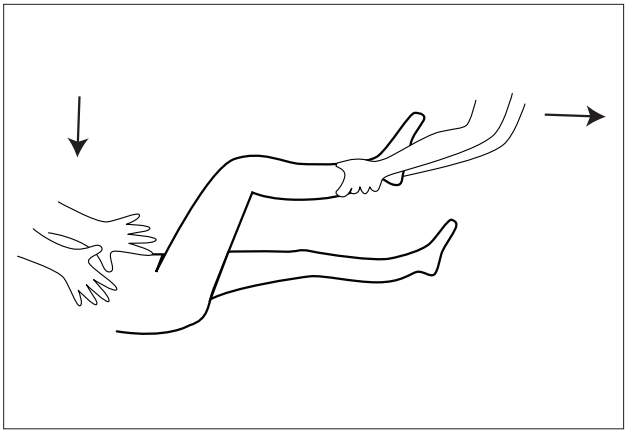

Fig. 6. The Bigelow method of reduction.

The Captain Morgan method

This method was described in 2011 by Hendey and Avila,[4] who reported a 92% success rate, albeit in a small group of 13 patients. It is so-named because the physician places his or her knee in a position similar to that of the pirate pictured with his left knee up on a rum barrel on the label of a well-known rum brand (Fig. 7).

This method has the advantage of safety for the practitioner — the physician is in a stable position

Fig. 7. The Captain Morgan position.

Fig. 8. Physician's flexed knee placed under the patient's knee on the affected side.

on the floor — and also requires less arm strength to accomplish.[4]

Procedure (after steps 1–6 as above):

7. The patient is placed supine on the floor on a stretcher or backboard, and then secured with a sheet or strap, ensuring safe footing for the physician.

Fig. 9. The physician can apply additional anterior traction by plantar-flexing his or her foot.

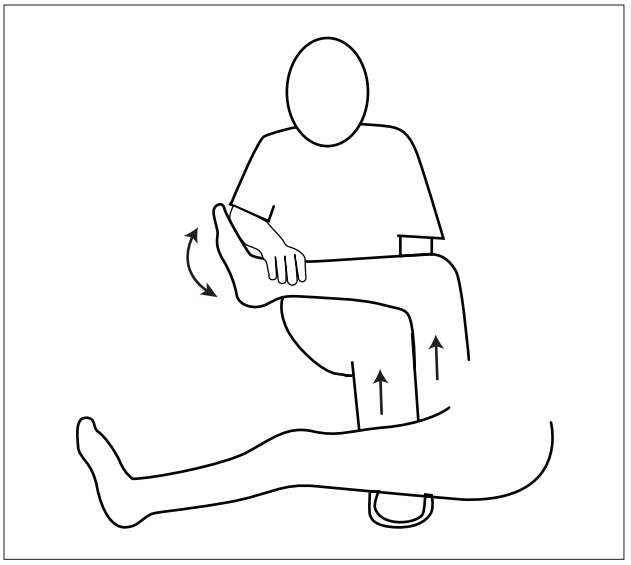

Fig. 10. The Captain Morgan method.

8. The physician places his or her flexed knee under the patient's upper leg on the affected side (Fig. 8).
9. In this method, it is important to keep the patient's knee flexed to 90° by using one hand to hold the ankle down and placing the other hand behind the knee.
10. Anterior-directed traction is applied by the combination of the physician raising his or her hand that is behind the patient's knee, and, at the same time, plantar-flexing his or her foot (i.e., standing on tiptoes) (Figs. 9 and 10).
11. As with the other methods, reduction may be facilitated by gentle internal–external rotation ("rocking") of the ankle.

The Whistler technique

Developed in Whistler, BC, this technique uses the same basic principle as the Captain Morgan method, but instead uses the physician's forearm under the patient's knee as the fulcrum, instead of the physician's knee.[2,7]

Procedure (after steps 1–6 as above):

7. The patient lies supine.
8. The unaffected leg is flexed at the knee, bringing the foot on the unaffected side as close to the patient's buttock as possible, thus raising the knee on that side as high as possible. An assistant can stabilize the pelvis (Fig. 5) or the patient can be secured to the bed with a sheet or a strap.
9. The physician stands at the same side of the bed as the dislocated hip, his or her back toward the patient's head, and body perpendicular to the bed. The physician's forearm is placed under the

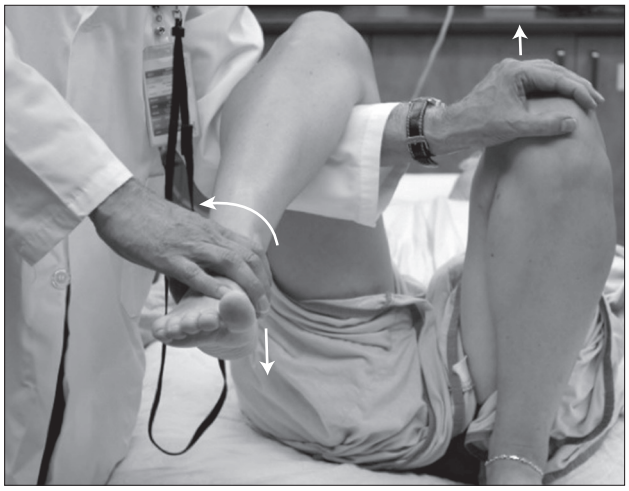

Fig. 11. The Whistler technique.

patient's knee on the dislocated side, and the physician's hand on the opposite knee (Fig. 11).

10. The physician then grasps the ankle or lower leg of the affected side with the other hand.
11. Using the forearm as a fulcrum under the knee and the patient's leg as the lever, the physician raises the patient's knee on the affected side until the hip is flexed to 90°, thus putting traction along the femur (Fig. 11).
12. The process may be aided by internal and external rotation of the affected leg

Upward movement of the physician's forearm is key here. This may be done either by using the physician's shoulder muscles, or by positioning the gurney or stretcher so that the physician's knees are bent. In the latter case, upward movement of the forearm can be effected by the physician extending his or her knees, using the more powerful leg musculature.

GUIDELINES FOR REFERRAL

The patient should be referred for possible open reduction if 2 or 3 attempts at closed reduction are unsuccessful. Too many attempts at reduction risk damage to the sciatic nerve or avascular necrosis of the femoral head.[2,3]

Online videos of these methods are available, and it may be reasonable to review one before the attempt.[9–11]

POSTREDUCTION CARE

A successful reduction may be felt and heard. It should be confirmed by full passive range of motion, while the patient is still sedated, keeping in mind any other fractures or injuries that the patient may have sustained.[2]

After tentative reduction, a recheck should be done for sciatic nerve injury and the leg stabilized in the extended position by pillows and sandbags, as well as postreduction radiographs obtained.[2]

The patient should rest in bed until the pain is relieved, at which time weight-bearing can begin, usually in 2–10 weeks.[3]

One long-term study reported a 9.6% risk of avascular necrosis of the femoral head and 16.1% incidence of late osteoarthritis of the hip joint.[3]

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