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A new technique for reduction of a posteriorly dislocated hip joint

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ABSTRACT

Posterior hip dislocation is commonly seen in the emergency department and requires urgent reduction to help avoid complications. Many techniques have been described to perform the reduction, all aimed at helping the physician gain a mechanical advantage to overcome the bony anatomy and large muscles groups involved. We describe a new technique that utilizes a hydraulic patient lift to help provide the traction force necessary to reduce posterior hip dislocations. The patient is secured to the bed with a strap or sheet tied over their pelvis and then a loop is secured under their popliteal region and secured to the hydraulic lift. The lift is engaged to create the desired traction, allowing the provider to manipulate the hip with adduction/abduction and/or internal/external rotation to achieve reduction. In addition, our method may also allow the provider to task switch more easily between other requirements, such as procedural sedation and attention to the patient's airway, especially in the single coverage emergency department.

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Posterior hip dislocation is commonly seen in the emergency department. Causes of this include both high-energy trauma (often in native hips) and atraumatic benign movement (frequently in prosthetic hips). Regardless of mechanism, reduction of this large joint usually requires significant effort. Many techniques have been described to perform the reduction including Captain Morgan, Allis, Bigelow, and others [1,2]. Most of these techniques attempt to gain mechanical advantage to improve the ability of the provider to move the femoral head back into the acetabulum. Despite this, providers with diminutive stature or musculature are at a significant disadvantage in completing the reduction. Some methods require positioning of the patient that may cause considerable pain, and create difficulties if oxygenation or airway management is needed. We describe a new technique that utilizes a hydraulic patient lift to help provide the traction force necessary to reduce a posterior hip dislocation.

To perform the procedure, the patient is positioned supine in bed similar to many other commonly used techniques. Like other reduction techniques, careful consideration and orthopedic surgery consultation should be considered if there are associated pelvis or femur fractures. Analgesia and procedural sedation are used at the discretion of the physician. The pelvis needs to be stabilized either by an assistant pushing posteriorly on the iliac spines or by a strap placed over the patient's anterior superior iliac spines and then around the bed to secure the patient snuggly. A knotted sheet or occupational therapy gait belt can then be

* Corresponding author. *E-mail address*: Michael.d.zwank@healthpartners.com (M.D. Zwank). looped under the patient's flexed knee and attached to the hydraulic lift (Figs. 1, 2 and Video 1).

The foot is held with one hand that the physician uses to internally and externally rotate the hip. The other hand can hold the knee or thigh to adduct and abduct the hip or provide lateral traction of the



Fig. 1. A view from the foot of the bed demonstrating the lift in place and the patient gait belt wrapped around the pelvis and the bed. This stabilizes the pelvis while traction is being applied to the leg.

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Fig. 2. A view from the head of the bed demonstrating the lift in place and the patient gait belt wrapped around the pelvis and the bed. This stabilizes the pelvis while traction is being applied to the leg.

femur. The hydraulic lift is used to provide longitudinal traction as well as adjust the degree of flexion of the affected hip joint. The traction is easily and consistently created by pressing the 'up' button of the hydraulic lift, and the amount of traction can be stopped at the discretion of the physician by releasing the 'up' button. This traction creates a static, consistent pull on the hip until reduced. Meanwhile, the physician can manipulate the hip as noted above, knowing that the mechanical force necessary to create traction is being accomplished with the hydraulic lift.

The obvious advantage of this new technique is the dramatic and consistent traction that can be generated, which is independent of any providers engaged in the procedure. The hydraulic lift will not fatigue or change in consistency. The hydraulic lift increases traction in a gradual, regular manner, which may allow for improved control of how much force is delivered. It can be suggested that the mechanical force provided by the lift could be excessive resulting in a fracture or hardware loosening of the hip, acetabulum, or lower leg. However, until the hip is reduced, there is physiologic ability for the patient's body to adapt (i.e., through the action of reduction) to the force being applied. After reduction of the hip, further force could certainly be detrimental. Fracture and hardware dislodgement are rare but clear risks of hip reduction, regardless of the technique and force being applied. Certainly, physicians should use reasonable clinical judgment when performing any procedure in the emergency department.

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An added benefit is less risk to the provider. Generating the forces needed for reducing a hip dislocation requires the full-effort use of many muscles of the body including legs, back, shoulders, and arms. This is usually accomplished with no time spent "warming up" prior to the reduction. As such, this can lead to injury of the provider, especially those with small stature or older age. Other injuries to the provider could occur if they lose balance and potentially fall when using techniques that require the provider to stand on the bed (e.g., Allis, Waddell).

Shigemura et al., previously reported a case using traction also created by a mechanical device to reduce a posterior hip dislocation [3]. In their report, the patient underwent general anesthesia in an operating room and employed a surgical traction table. A major disadvantage of this technique would be the need to move the patient to the operating room or the cost of acquiring a similar traction table as most EDs are not equipped with them.

In situations of single coverage emergency departments, the emergency physician is responsible for all aspects of the hip reduction, including titrating the procedural sedation medications, airway management, and performing the hip reduction. It stands to reason that when struggling with traction by other methods, the physician may not be able to focus on these other crucial patient care issues. Using the hydraulic lift can offload some of this burden, potentially allowing for more attention to the titration of sedation, airway concerns, and other manipulations of the leg to facilitate the hip reduction.

Until now, we have used this method a total of five times both in a tertiary care center as well as in a single coverage community hospital that has fewer resources. All patients had posterior dislocations of prosthetic hips, and all received procedural sedation using propofol and fentanyl. All attempts were performed or supervised by one of the authors. Several different hydraulic lifts were used but included lifts made by EZ Way, Inc. (EZ Way Smart Lift Model L600PS-03, Clarinda, Iowa). One attempt failed, and this was thought to be due to inadequate sedation. This attempt was switched to the Allis technique based on physician familiarity and was successful after further sedation was given. Brief respiratory depression and mild hypoxia were encountered in two of the cases and managed with oxygen by nasal cannula and/or bag-valve mask ventilation with prompt recovery. There were no traumatic complications such as fracture or hardware dislodgement.

This technique uses a hydraulic lift to assist with longitudinal traction of the leg to aid in hip reduction. Various models of these types of

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lifts are found in most emergency departments to aid in the lifting of patients. The lift and patient positioning can be set up within minutes.

The authors have used this technique successfully on four patients (80% success rate) with no complications. We suggest the adoption of this technique by others. Future research could be directed at comparing the performance of this technique to other more established hip reduction techniques.

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Michael D. Zwank: Writing – original draft, Resources, Conceptualization. **Peter G. Kumasaka:** Writing – original draft, Resources, Methodology, Conceptualization.

Declaration of Competing Interest

The authors of this manuscript entitled 'A New Technique for Reduction of a Posteriorly Dislocated Hip Joint' have no conflicts of interest to report.

Reprints not available from the authors.

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