

The Toggle Pin Method of Coxofemoral Luxation Repair

Introduction

There are a number of popular surgical methods for maintaining reduction of coxofemoral luxations - use of the toggle pin method, ilio-femoral sutures to limit external rotation of the hip, and caudo-distal transposition of the greater trochanter. Each of these methods depends on the joint capsule and associated muscles for acute stability, and especially for long-term stability. If the joint capsule is severely traumatized and not conducive to primary repair, some surgeons elect to perform a capsulorrhaphy or dorsal suture augmentation of the joint capsule. With any of the just mentioned surgical methods for stabilization of hip luxations, it is important to remember that the use of sutures and anchors must be considered temporary solutions until the joint capsule and periarticular soft tissue can heal. As such, patients with poor hip conformation are not good candidates for these methods of repair and should be considered for salvage procedures, such as FHNE or THR.

The toggle pin method of maintenance of coxofemoral luxations has been around many years. Commercially available toggle pins, suture buttons, and the IMEX® universal aiming device have simplified the method and increased its popularity. This method places a strand (or multiple strands) of suture material in a location that mimics the normal origin and insertion of the round ligament of the femoral head, which is torn when the hip is traumatically luxated. This anatomic positioning of suture material is relatively straightforward and visually demarcated in the hip, and is perhaps partially responsible for the logic and popularity of the method.

Different suture material and sizes are used based on the surgeon's preference. IMEX® customers use both monofilament and braided suture material. Braided material is popular with customers who desire strength and knot security and tends to bend acutely around anchors or toggles better than monofilament suture material. Typical sizes include #2 and #5. Monofilaments are popular with customers who desire a relatively inert material; common examples include monofilament fishing leader and Prolene®.

Universal Aiming Device

Part No. 50000

A high quality, adjustable aiming device for pre-drilling and pin placement. While commonly used for coxofemoral luxation repair with the toggle pin method, this instrument can also be used for many other applications including: lag screw repair of condylar fractures, placement of calcaneo-tibial screws for repair of Achilles tendons, and lag screw fixation of femoral neck fractures. A variety of screw-in-place drill guides are available to support many drill bit diameters. One single-hole drill guide of your choice is included with the purchase of the Universal Aiming Device.



Drill Guides for Universal Aiming Device

Screw-in-place drill guides are easily interchanged. Nine drill guide diameters are available and can be purchased independently as needed.

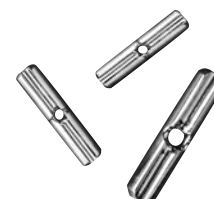
Part No.	Drill Bit Diameter	Part No.	Drill Bit Diameter
50016	1.6mm	50031	3.1mm
50020	2.0mm	50035	3.5mm/3.2mm
50023	2.3mm	50039	3.9mm
50025	2.5mm	50045	4.5mm
50027	2.7mm		



The Toggle Pin Method of Coxofemoral Luxation Repair

Toggle Pins

Toggle pins are placed medial to the acetabular wall to anchor suture. The cross-hole sizes are compatible with most commonly used sizes of monofilament suture material. Depending on the size of suture used, the required acetabular wall drill bit may be approximately the same size as the toggle pin or up to 1-2 millimeters larger (to allow for large suture.) The blunt end of a suture passer can be used to assist with final passage of the toggle pin through the acetabular wall. Femoral neck drill bit diameter should not risk mechanical or biologic damage to the femoral neck. Implant quality stainless steel.



Part No.	Diameter	Length	Cross-hole	Accepted Suture
55027	2.7mm	10mm	1.1mm	40 lb. and #2
55032	3.2mm	14mm	1.1mm	60 lb. and #2
55040	4.0mm	18mm	1.9mm	80 lb. and #5

Polypropylene Suture Button

Part No. 55100S

These two-hole suture buttons are used at the lateral femur to simplify suture tie-off when performing the toggle pin method of coxofemoral reduction. The 2.0mm hole diameter can accommodate virtually all large suture materials. Approximately 6.5mm x 14mm. Pre-packaged sterile.



Titanium Suture Button

Part No. 55200

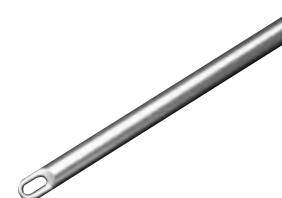
Two-hole titanium suture buttons, like polypropylene suture buttons, are used at the lateral femur to simplify suture tie-off with the toggle pin method of hip luxation repair and find additional uses in other surgical procedures. The paired 1.7mm holes will accommodate virtually all suture material choices. Approximately 3.2mm x 10mm.



Suture Passer

Part No. 55000

Similar to a large sewing needle with an eye, this suture passer is designed to be a very economical method of pulling suture down the femoral neck. The passer diameter is 3.2mm and with suture included, it is necessary to utilize a 3.5mm drill bit. This instrument is most useful when utilizing soft pliable suture material, while stiffer monofilament materials are usually pushed through the femoral hole by hand. The blunt end is also utilized to "pop" the toggle pin through the acetabular wall. With smaller patients and femoral neck tunnels less than 3.5mm, use cerclage wire to pull suture.



Coxofemoral Luxation Starter Kit

Part No. 55SKT

Qty.	Part No.	Description	Qty.	Part No.	Description
1	50000	Universal Aiming Device	3	55200	Titanium Suture Button
1	50035	3.5mm Universal Aiming Device Drill Guide	1	32035	3.5mm StickTite™ Drill Bit
1	55000	3.2mm Suture Passer	1	32039	3.9mm StickTite™ Drill Bit
3	55100S	Polypropylene Suture Button	6	55032	3.2mm Toggle Pin

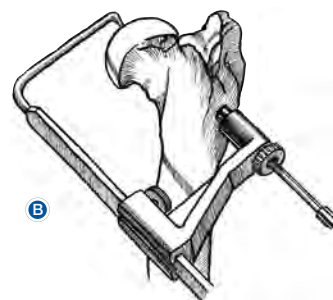
Surgical Procedure

A This method of repair is best accomplished through a craniolateral approach to the hip with caudal retraction of the femur to allow for complete visualization, exploration, and appropriate debridement of the acetabulum. After debridement of impinging tissue, clot, and remaining round ligament, a hole is drilled completely through the medial wall of the acetabulum centered in the acetabular fossa. Use of an A/O type, hand-held drill sleeve will simplify drilling while protecting the femoral head. The diameter of the hole must be large enough for the toggle pin and suture combination chosen.

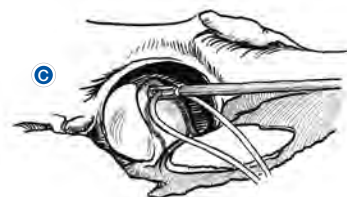
A 3.2mm toggle pin will require at minimum a 3.5mm hole. However, a 4.0mm hole or larger is often needed if using heavy monofilament line. For the 4.0mm toggle pin, a 4.5mm or 5.5mm drill bit is recommended. The toggle pin-suture combination should be easily inserted through the acetabular drill hole. If difficulty is encountered, the acetabular hole may be enlarged with a larger drill bit.



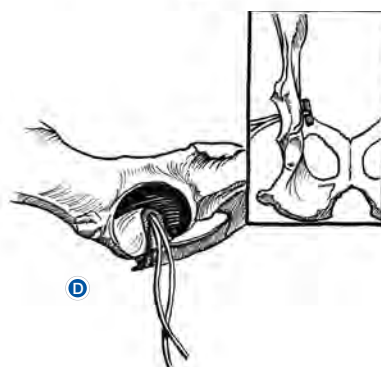
B The aiming device is used to drill a femoral neck tunnel for the suture. The aiming device is placed so the tunnel is drilled from the subtrochanteric area of the lateral femur to the fovea capitis of the femoral head. It is helpful to have a surgical assistant at this time. The 3.5mm drill bit is the most common drill bit utilized in medium to large dogs and also the minimum hole diameter used with the suture passer. When drilling of the femoral tunnel is nearly complete, it is advisable to remove the aiming device and complete the drill hole by hand. This eliminates potential damage to the drill bit. 2.0mm and 2.7mm tunnels should be used in smaller patients.



C The suture used for repair is passed once through the hole in the toggle pin creating a simple loop. The toggle pin is held at one end using large needle holders, Kelly forceps, or a similar instrument. The suture is pulled tight along the sides of the toggle pin so each strand seats within the toggle pin grooves. The toggle pin is then visually started into the acetabular drill hole and inserted as far as the instrument will allow. The instrument is removed, and the blunt end of the suture passer or drill bit is used to push the toggle pin completely through the acetabular drill hole. If this step seems to require excess force, it is likely that the acetabular drill hole is not large enough to accommodate the diameter of the toggle pin and suture combination used.



D The ends of the suture are spread and tensioned to pull the toggle pin tight against the medial wall of the acetabulum. The toggle pin is tested for secure seating within the pelvic canal. The suture is then pushed or pulled through the femoral canal to exit the lateral femur and tensioned while the femoral head is reduced into the acetabulum.



E Appropriate reduction is verified and the ends of the suture are tied over another toggle pin or a suture button as shown in figure E. Alternatively, another small bone tunnel can be drilled in the lateral aspect of the femur to allow one of the suture strands to be passed through and then tied to the opposite strand. The hip should be appropriately reduced and firmly seated; however, do not over tighten the suture by placing excess tension on it. This will adversely effect hip joint range of motion and will cause the suture to fail prematurely.

