

Mini-open Incision Sports Hernia Repair: A Surgical Technique for Core Muscle Injury

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Abstract: One cause of groin pain in highly active patients may be a core muscle injury, commonly referred to as sports hernia. When patients fail nonoperative management, there are a number of surgical options that may be pursued. Typically, they will involve the direct repair of the rectus abdominis back to the pubis. However, we believe that this repair can be further strengthened by the appropriate lengthening of the adductor longus from the conjoined tendon. Therefore, we present a surgical technique that involves both rectus abdominis repair and adductor longus lengthening in those who show a core muscle injury that is refractory to conservative management. We believe that this technique can be easily replicated by practitioners reading this Technical Note.

One cause of groin pain in athletic patients may be a core muscle injury, commonly referred to as sports hernia. During resisted hip flexion and adduction, there may be tearing at the insertion point of the adductor longus and the rectus abdominis at the conjoined tendon, thus causing a core muscle injury.^{1,2} This injury most often affects male athletes between 20 and 30 years of age who engage in repetitive kicking and twisting motions during their activity such as soccer, basketball, and football players.^{3,4} A good number of patients may get better using nonoperative management consisting of nonsteroidal anti-inflammatories, activity modification, physical

therapy, and cortisone injections.^{5,6} Despite this, as many as 26% of patients may not be able to return to previous levels of play using conservative treatment mortalities.⁶ Therefore, to ensure a quick return to play and relief of pain, surgical intervention may be required.⁷

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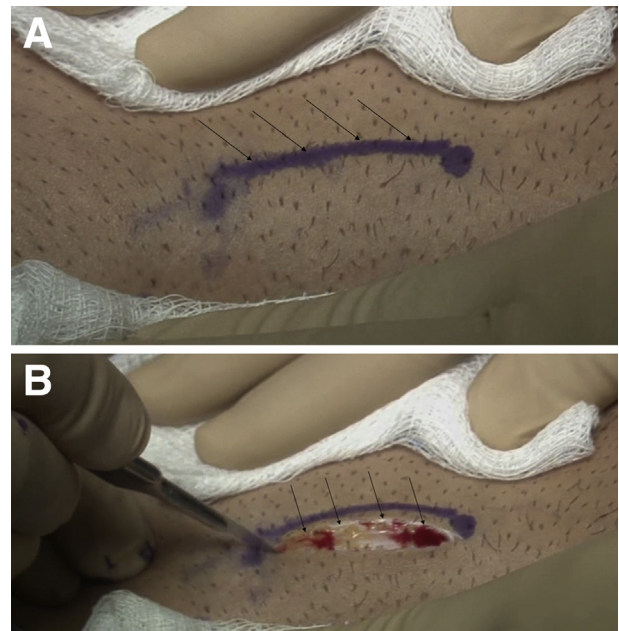


Fig 1. (A) The pubic symphysis is marked using a surgical marker (arrows). (B) A 5-cm Pfannenstiel incision is being made using a 12-blade scalpel (arrows). Hemostatic control is ensured using electrocautery (Smith & Nephew, London, England).

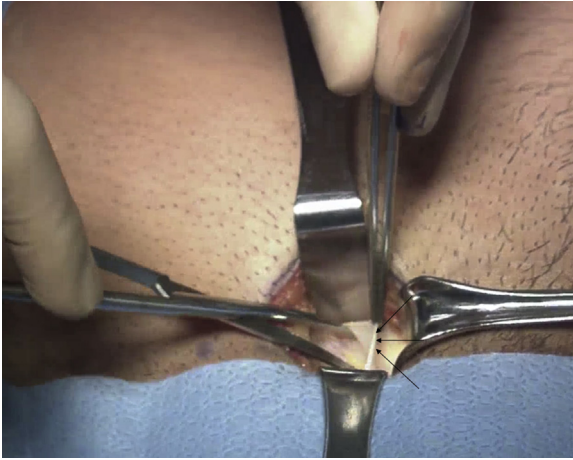


Fig 2. Dissection of the surrounding fascia (arrows) is continued using Metzenbaum scissors (Smith & Nephew, London, England) to identify the right spermatic cord.

There have been many surgical techniques that have shown excellent functional and patient-reported outcomes after repair of the rectus abdominis to the pubis.^{3,8,9} Surgical correction often involves the direct repair of the rectus abdominis to the pubis. However, in our practice, we find it imperative to ensure the integrity of the repair by lengthening the adductor longus due to its direct relationship with the conjoined tendon. Therefore, we aim to describe a surgical technique that involves both the open direct repair of the rectus abdominis and the lengthening of the adductor longus in those who have core muscle injuries refractory to conservative management.

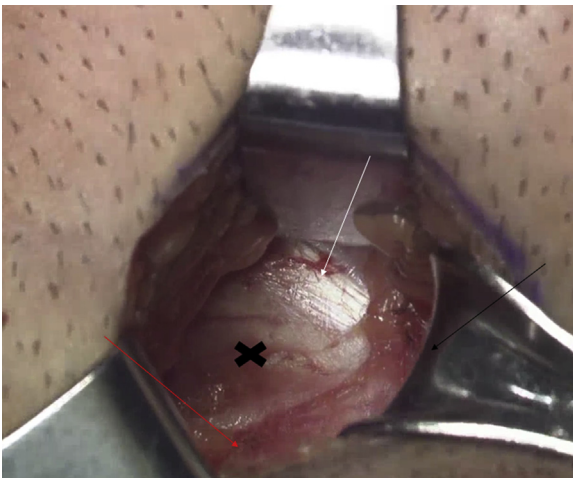


Fig 3. Once the right spermatic cord has been identified, it is retracted (black arrow) using army-navy retractors (Smith & Nephew, London, England) with the goal of protecting all underlying neurovascular structures. The right conjoined tendon (black X), adductor longus (red arrow), and rectus abdominis (white arrow) are identified.

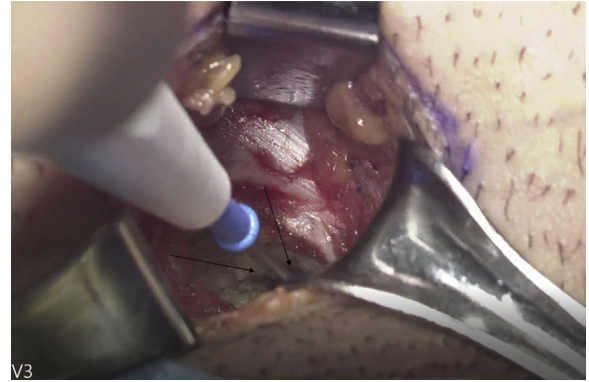


Fig 4. A complete lengthening of the right adductor longus off its conjoined insertion on the pubis is performed using electrocautery (arrows) (Smith & Nephew, London, England) with the spermatic cord remaining retracted.

Surgical Technique

Step 1: Patient Preparation

The patient is placed in the supine position, and is then prepped and draped in a sterile fashion. The hip on the right side is flexed and abducted to put the right adductor longus on tension. At that time, a surgical marker is used to mark the pubic symphysis (Fig 1A).

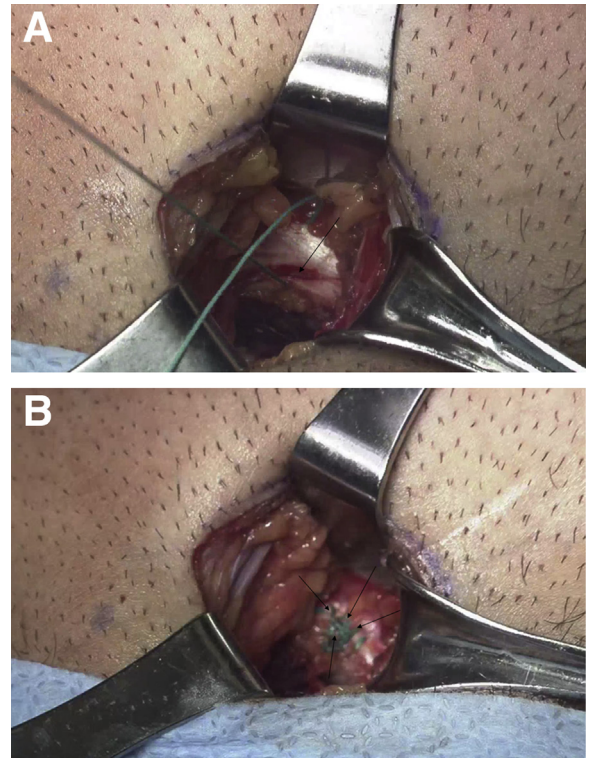


Fig 5. (A) A direct repair of the right rectus abdominis tear (arrow) is performed using No. 2 Ethibond sutures (Johnson & Johnson, New Brunswick, NJ) with a tapered needle. (B) A figure of eight is carried out with the spermatic cord remaining retracted until repair is completed (arrow showing completed repair).

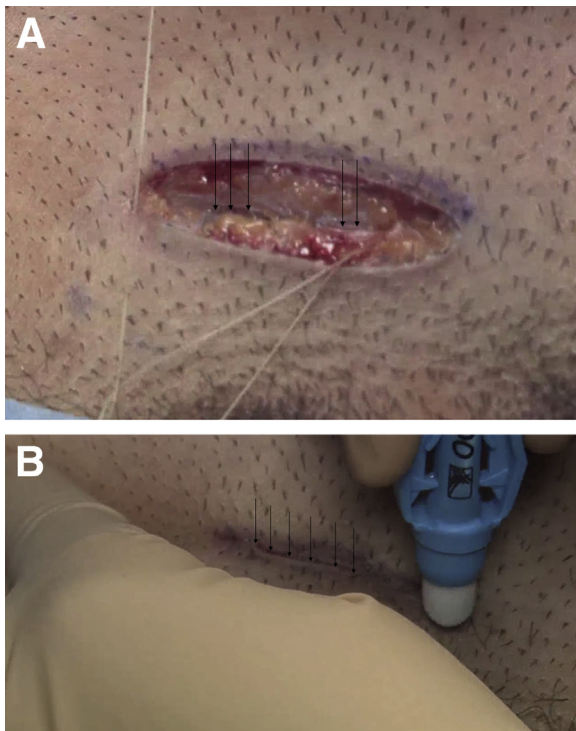


Fig 6. (A) After the wound is irrigated, at the subcutaneous layer (arrows), 3-0 Vicryl (Johnson & Johnson, New Brunswick, NJ) is used to close the incision. (B) Epidermal repair is completed using a running 4-0 Monocryl suture (Johnson & Johnson) and Dermabond (Johnson & Johnson) is applied (arrows showing closed incision).

Step 2: Incision and Dissection

A 5-cm midline Pfannenstiel incision is then made using a 12-blade scalpel (Fig 1B). The dissection is continued down to the fascia surrounding the rectus abdominis with care taken to ensure hemostatic control throughout the dissection using electrocautery (Smith & Nephew, London, England). The incision may be extended by 1 cm if the injury is bilateral.

Step 3: Identification and Protection of the Spermatic Cord

Metzenbaum scissors (Smith & Nephew) are used to carry the dissection down to the right spermatic cord (Fig 2). Once identified, care was taken to identify the spermatic cord and protect all underlying neurovascular structures using army-navy retractors (Smith & Nephew) (Fig 3A).

Step 4: Identification of the Conjoined Tendon and Its Muscular Insertions

Once the spermatic cord is retracted, the right conjoined tendon, adductor longus, and rectus abdominis are then identified (Fig 3B).

Step 5: Lengthening of the Adductor Longus

The lengthening of the right adductor longus is performed using electrocautery (Smith & Nephew), releasing the tendinous portion of the adductor from its conjoined insertion on the pubis (Fig 4). Care is taken to perform a complete release to ensure that the injury does not recur.

Step 6: Rectus Abdominis Repair

The undersurface tear on the right side of the rectus abdominis is then identified and reattached back to the periosteum of the pubis using No. 2 Ethibond sutures (Johnson & Johnson, New Brunswick, NJ) with a tapered needle as a figure of eight (Fig 5).

Step 7: Wound Closure

Once repair is completed, the wound is irrigated, and closure is obtained at the subcutaneous layer using 3-0 Vicryl (Johnson & Johnson) (Fig 6A). Epidermal repair is completed using a running 4-0 Monocryl suture (Johnson & Johnson) (Fig 6B). See Table 1 for pearls and pitfalls of each step (see Video 1).

Table 1. Pearls and Pitfalls

Step	Pearl	Pitfall
1. Positioning	Flexing and abducting the hips puts the adductors on tension	Inappropriate positioning can lead to an incomplete lengthening
2. Incision and dissection	If the injury is bilateral, you may need to extend the incision by 1 cm	Hemostatic control is imperative to appropriately visualize the spermatic cord
3. Identification and protection of the spermatic cord	Army-navy retractors (Smith & Nephew, London, England) are typically sufficient to protect the spermatic cord	Vas deferens, genital branch of the genitofemoral nerve, and testicular artery can be damaged without retraction
4. Identification of the conjoined tendon and Its Muscular Insertions	Muscle bellies of the rectus abdominis and adductor longus should meet at the conjoined tendon	Must ensure that the spermatic cord remains retracted
5. Adductor longus lengthening	Use electrocautery (Smith & Nephew)	If the release is not complete, there is a chance of recurrence
6. Rectus repair	Use No. 2 Ethibond (Johnson & Johnson, New Brunswick, NJ)	Repair should be performed as a figure of eight to prevent recurrence
7. Wound closure	Use 4-0 running Monocryl (Johnson & Johnson) to close the epidermal layer	Bury Vicryl (Johnson & Johnson) to prevent stitch abscess

Table 2. Advantages and Disadvantages of Open Versus Laparoscopic Sports Hernia Repair

Technique	Advantage	Disadvantage
Our mini-open technique	<ul style="list-style-type: none"> • Direct visualization of the muscle tear • Addressing both rectus and adductor • Decreased risk of repair failure or reinjury 	<ul style="list-style-type: none"> • Theoretically greater pain • Potentially greater blood loss
Laparoscopic techniques	<ul style="list-style-type: none"> • Potentially less blood loss • Theoretically less pain 	<ul style="list-style-type: none"> • Decreased visualization of pathology • Repair is often not direct and involves mesh • Mesh may become infected • Increased risk of repair failure

Discussion

Core muscle injury, commonly referred to as sports hernia, is one cause of groin pain. In the event that nonoperative treatment course fails, it may be addressed using surgical repair.⁶ However, given the mechanism of this injury, we find it important to address both the injury to the rectus abdominis via repair and the adductor longus via lengthening. We present a surgical technique to correct each of these concerns that we believe can be easily replicated by practitioners reading this Technical Note. Unlike laparoscopic techniques that often involve the use of mesh, we believe that our technique allows for direct visualization and repair of the core muscle while minimizing the risk of recurrence by performing a complete adductor lengthening (Table 2).

There are multiple surgical techniques for the treatment of core muscle injury that have been reported to result in satisfactory outcomes and a quick return to the preinjury activity level.^{3,8-11} Messaoudi et al.⁹ assessed the outcomes of a series of professional soccer players who underwent a procedure similar to ours—direct rectus repair with adductor lengthening (n = 71). After a mean follow-up of 4 years (range, 1-7 years), 68% (n = 48) of the patients returned to the preinjury level of sport with 27% (n = 19) returning to their sport at a lower level. Similarly, Meyers et al.³ evaluated the outcomes of a surgical technique similar to ours in a cohort of 157 high-performing athletes (n = 160 procedures). Among these, 36 (23%) required an adductor longus lengthening. For the purposes of this study, the authors defined a successful outcome as athletes reporting minimal or no pain and they had a return to their preinjury activity level. After a mean follow-up of 4 years (range, 2-12 years), among those who underwent the repair and lengthening, 89% (n = 32) had successful outcomes. Therefore, the authors from both of these studies concluded that high-performance athletes with a sports hernia can benefit from surgical repair and lengthening. Our surgical technique most closely resembles the technique used in the Meyers study.³

In conclusion, we present a technique for direct repair of the rectus abdominis to the pubis and complete

lengthening of the adductor longus. Given that the mechanism of these core muscle injuries often involves resisted hip flexion and adduction, we believe that this is the best possible procedure to ensure pain relief, a quick return to play, and minimal risk of injury recurrence. Future studies should consider the long-term outcomes of these procedures as well as the risk of recurrence in high-performance athletes.

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