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Mohamed Sidibé
Orthopedic-Traumatology Department of the Tambacounda Regional Hospital in Senegal

Corresponding Author:
Mohamed Sidibé
Orthopedic-Traumatology Department of the Tambacounda Regional Hospital in Senegal

Traumatic Avulsion of the Abdominal Muscles from the Iliac Crest: A Case Report

Mohamed Sidibé

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Abstract
Traumatic avulsion injuries of the abdominal wall musculature from the iliac crest are extremely rare. We report the case of a 28-year-old male who sustained a near- complete avulsion of the abdominal muscles from the left iliac crest following a motor vehicle accident. Diagnosis was confirmed by computed tomography (CT), and the patient underwent successful surgical reattachment using suture anchors. To our knowledge, very few cases with a similar mechanism and surgical approach have been described. This case highlights the importance of prompt recognition and the role of early surgical repair in selected patients.

Keywords: Lumbar hernia, abdominal wall, iliac crest, suture anchors, mesh

Introduction
Lumbar hernias may be either congenital or acquired. Acquired lumbar hernias are further subdivided into primary (spontaneous) or secondary forms, the latter resulting from trauma or previous abdominal wall surgery. Traumatic lumbar hernias (TLH) account for approximately 25% of acquired cases and represent a rare type of abdominal wall defect, occurring in less than 1% of trauma cases [1]. The anatomical region involved—bounded superiorly by the 12th rib, inferiorly by the iliac crest, medially by the erector spinae muscle group, and laterally by the posterior border of the external oblique—makes these injuries especially relevant in trauma patients and athletes [1-3].
Avulsion of the abdominal wall musculature from the iliac crest requires significant shear force and is therefore infrequently reported. With an incidence of 0.2%, these injuries typically result from blunt abdominal trauma, most commonly in restrained occupants of motor vehicle accidents [2, 3].
Such injuries may present without overt signs of herniation, making early diagnosis challenging without imaging. CT scan is the gold standard for diagnosing lumbar hernias and identifying associated intra-abdominal injuries [4]. The optimal timing and preferred technique for TLH repair remain subjects of debate. Söderlund et al. (2013) described a mesh-free repair technique using suture anchors in the acute setting, emphasizing the benefit of early intervention to prevent muscle retraction [5]. More recently, Lohrer and Höferlin (2023) reported successful anatomical repair of internal oblique avulsions in professional soccer players, underscoring the value of anatomical restoration and functional recovery in high-demand individuals [6]. Suture anchors are metallic or bioabsorbable devices commonly used in orthopedic surgery to reattach tendons and ligaments to bone. They have also been used in lumbar hernia repair to affix mesh to the iliac bone. These anchors feature a loop that carries the suture, which is passed through the muscle or tendon tissue and secured to the bone by tying the suture at the anchor site [7].
We present a case of traumatic lumbar hernia acutely managed using a mesh-free technique with suture anchors to reattach the avulsed abdominal wall musculature to the iliac crest.

Case Presentation
A 28-year-old healthy male presented to the emergency department following a single-vehicle collision at approximately 50 km/h. He was wearing a seatbelt, did not lose consciousness, exited the vehicle independently, and was transported to a local emergency facility. Upon arrival, he reported localized pain in the left flank.
The primary survey revealed a hemodynamically stable patient with a Glasgow Coma Scale (GCS) score of 15. Secondary survey identified longitudinal abrasions and a hematoma along the seatbelt trajectory, as well as tenderness in the left lumbar region

without signs of abdominal rigidity or peritonitis.
Laboratory tests showed leukocytosis (19,500/mm³), elevated creatine phosphokinase (CPK 1084 U/L), lactate dehydrogenase (LDH 281 U/L), and myoglobin (579 ng/mL). A contrast-enhanced CT scan of the thorax, abdomen and pelvis revealed a near-complete avulsion of the external oblique, internal oblique, and transversus abdominis muscles from the left iliac crest, in correlation with the clinical site of hematoma (fig 1).

Fig 1: Initial CT scan showing avulsion of the abdominal wall musculature from the left iliac crest, with corresponding subcutaneous hematoma (white circle)

Surgical repair was performed on the day of admission. The patient was positioned in a right semi-lateral position. A skin incision was made along the iliac crest from anterior superior iliac spine to the lateral border of latissimus dorsi muscle (fig 2.1 and 2.2). Through this direct approach to the left iliac crest, the avulsed abdominal wall muscles were reattached using three soft tissue suture anchors (fig 3). The suture anchors were inserted into the bone and the suture ends from the anchor were run through the abdominal muscle fascia. When all the three suture anchors and sutures were in place, the abdominal muscles were reduced to the iliac crest by pulling from the suture end of each one of the suture anchors until the abdominal muscles were in contact with the iliac crest. The muscle fascia was then sutured to iliac periosteum by running suture. A layered closure was finally performed (fig 4). The patient reported effective postoperative pain control and was able to ambulate with partial weight-bearing on the left lower limb, avoiding abdominal muscle contraction. He was discharged on postoperative day two. After three months, the patient had no complaints, was able to walk with weight bearing on both limbs, and had resumed his professional activity and daily routines.

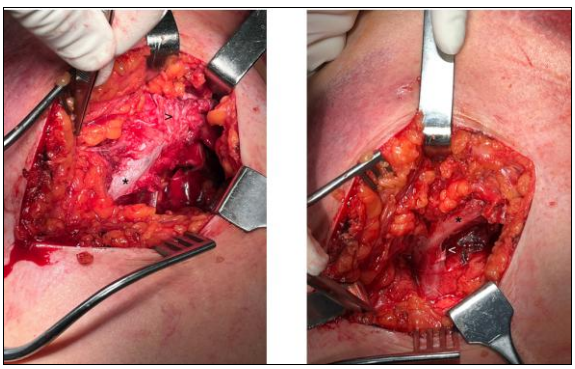

Fig 2.1 e 2.2: Intraoperative view of the avulsed abdominal muscles (black arrow) prior to reinsertion, demonstrating clear detachment from the iliac crest (black asterisk)

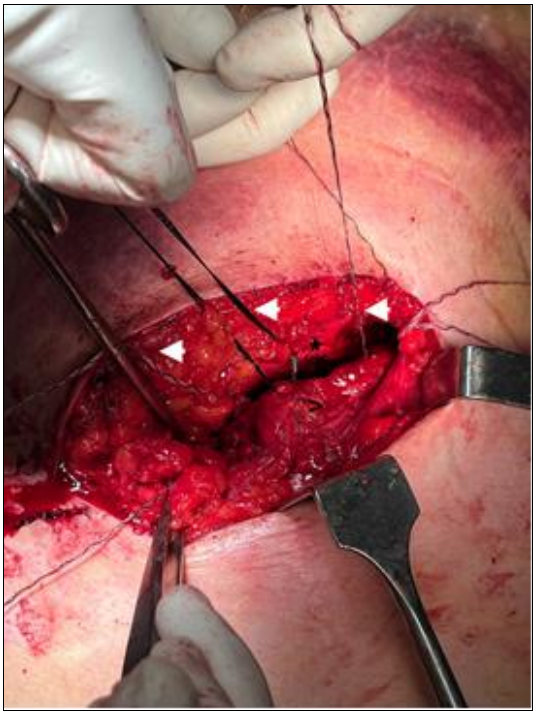

Fig 3: Reinsertion of the abdominal muscles (white arrow) - external oblique, internal oblique, and transversus abdominis- to the iliac crest (black asterisk) using suture anchors (white arrows)

Fig 4: Layered closure after muscle (white arrow) reattachment to the iliac crest (black

Discussion

Traumatic lumbar hernias (TLHs) may extend beyond classical anatomical boundaries due to the unpredictable forces involved in high-energy trauma [3]. In such injuries, muscle avulsion and potential herniation often result from the combined effect of tangential shearing forces and a sudden rise in intra-abdominal pressure. During a motor vehicle crash, deceleration forces cause the patient to move forward while restrained by a seatbelt. This restraint, particularly when acting across the iliac crest, can generate

anterior pelvic rotation and shearing that disrupts the abdominal wall musculature [3, 4]. This mechanism may also produce associated intra-abdominal injuries, although no such injuries were identified in our case.

In the acute phase, diagnosis can be challenging. CT scanning remains the gold standard with over 95% accuracy, providing detailed anatomical visualization of the muscle layers, the avulsion site, and any associated intra-abdominal lesions [4].

If left untreated, TLHs often enlarge over time, leading to discomfort, back pain, and limited mobility [4]. Additionally, delayed presentation complicates repair due to muscle retraction or lack of fascia for reattachment. Therefore, several authors recommend early surgical intervention. The decision between acute and delayed repair remains a subject of debate [1, 5].

Various repair methods have been proposed, including primary suture-based approximation and tension-free repairs using mesh or biologic grafts. The primary indication for surgery is often the treatment of associated intra-abdominal injuries, which may be present in up to 80% of TLH cases [2]. While mesh-free repairs in the acute phase have reported recurrence rates ranging from 5.3% to 20%, mesh-based techniques may have recurrence rates of up to 50% [5].

Considering this, primary suture repair may be preferable in the acute setting—when tissue approximation is possible without excessive tension. Delayed repairs, in contrast, often require mesh implantation, particularly when musculofascial retraction precludes direct closure [5].

The surgical technique used in our case closely resembles the one described by Söderlund et al., who reported successful acute repair using suture anchors without mesh [5]. Their rationale for early intervention to prevent muscle retraction is consistent with our strategy. Likewise, Lohrer and Höferlin achieved reliable recovery in elite athletes through direct anatomical repair of internal oblique avulsions [6].

Although long-term outcome data are limited, early repair offers the benefits of anatomical restoration and potentially superior functional outcomes. The use of suture anchors ensures secure reattachment and may reduce the need for synthetic materials in young or active patients.

Conclusion

Traumatic avulsion of the abdominal wall musculature from the iliac crest is a rare injury, often associated with high-energy mechanisms such as motor vehicle collisions. Early recognition using CT imaging is essential, and prompt surgical repair may prevent muscle retraction and optimize outcomes. Suture anchor-based anatomical reattachment, as illustrated in this case, appears to be a viable mesh-free option in the acute setting. This technique may be particularly beneficial in young, active patients, and warrants further investigation in larger series.

Disclosures

All authors declare no conflicts of interests.

Conflict of Interest

Not available

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Not available

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