



# Abdominal oblique muscle injury at its junction with the thoracolumbar fascia in a high school baseball player presenting with unilateral low back pain

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[Case report]



## Abdominal oblique muscle injury at its junction with the thoracolumbar fascia in a high school baseball player presenting with unilateral low back pain

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### Abstract

Abdominal oblique muscle injury is characterized by acute pain and localized tenderness over the lateral trunk. This injury is particularly common among throwing athletes, and usually presents as anterolateral abdominal wall pain. Imaging evidence is scarce in regard to whether oblique muscle injury at its junction with the thoracolumbar fascia can instead present with low back pain. A high school baseball player with unilateral low back pain was referred to us with a different diagnosis. Careful palpation and magnetic resonance imaging guided our care, and the patient returned to high-level competition after 7 weeks of conservative treatment, with no report of recurrence in the subsequent 12 months. Oblique muscle injury at its junction with the thoracolumbar fascia should be added to the differential diagnosis for throwing athletes with unilateral low back pain following a torque movement.

**Key words :** low back pain, oblique muscle injury, thoracolumbar fascia, athletes, baseball

### Introduction

Low back pain is relatively common among adolescent athletes, particularly baseball players<sup>1,2)</sup>. Lumbar stress fracture in the pars interarticularis (spondylolysis) is the most crucial differential diagnosis in this population<sup>3)</sup>. Such stress fractures usually start contralateral to the dominant arm, appearing as unilateral low back pain at onset<sup>4,5)</sup>.

Abdominal oblique muscle injury, usually referred to as “side” strain, is characterized by acute pain and localized tenderness over the lateral trunk near the rib cage<sup>6,7)</sup>. This injury is most commonly reported in athletes who require unilateral, asymmetrical, explosive movements, such as baseball players<sup>8-10)</sup>, cricket fast bowlers<sup>6,11-14)</sup>, and javelin throwers<sup>6)</sup>. This injury is almost always contralateral to the dominant arm, similar to lumbar stress fractures of the pars interarticularis, but usually presents as lateral chest or abdominal wall

pain, not low back pain<sup>6-11,14,15)</sup>.

Here, we report a rare case involving a high school baseball player with unilateral low back pain due to internal oblique muscle injury at its junction with the thoracolumbar fascia, overlooked on initial medical evaluation.

### Case presentation

This case involved a 17-year-old, left-handed, male, high school baseball pitcher. He trained six times a week at a top regional level. Six months before the season started, he experienced occasional mild discomfort in the right lower back, but continued to train, including throwing. Two months after the season started, he complained of acute-onset, right unilateral, severe and sharp low back pain during a game and stopped further play. He experienced aggravation of the pain on right lateral bending, bilateral rotation, and extension of the trunk ;

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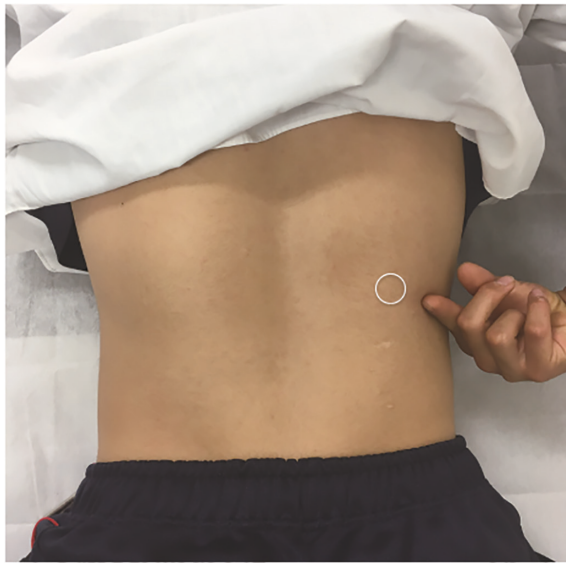


Figure 1. Appearance of the patient's back. White circle indicates area of local tenderness.

coughing and sneezing were also painful. He was referred to a local hospital on suspicion of acute onset stress fracture of the pars interarticularis or lumbar disc herniation. However, lumbar x-ray, computed tomography (CT), and magnetic resonance imaging (MRI) ruled out these injuries, and a tentative diagnosis of lumbar facet pain syndrome combined with back muscle strain was made. Five days after onset, he was referred to our institution for a second opinion.

On physical examination, the patient presented with pain on palpation of the lower edge of the right 12th rib in the lower back (Figure 1). Right lateral flexion, right and left rotation, and extension of the trunk reproduced the pain, as did eccentric-phase trunk rotation exercises and muscle contractions against resistance maneuvers. Low back pain originated at the point of tenderness and spread to the right side of the lower back from almost the L1 to the L4 level, along with the lateral edge of the iliocostal muscle. Neurological examinations all yielded normal results. Oblique muscle injury was thus suspected. This suspicion was confirmed by review of the previous MRI, focusing on the affected site, revealing internal oblique muscle injury at the junction of the thoracolumbar fascia and the costal cartilage interface of the right 12th rib on axial- and coronal-section short tau inversion recovery (STIR) sequences (Figure 2A, B, C). Hematoma was thus identified tracking along muscle fibers of the internal oblique muscle and middle and posterior layers of the thoracolumbar fascia. No disc degeneration/herniation or bone marrow edema of the lumbar

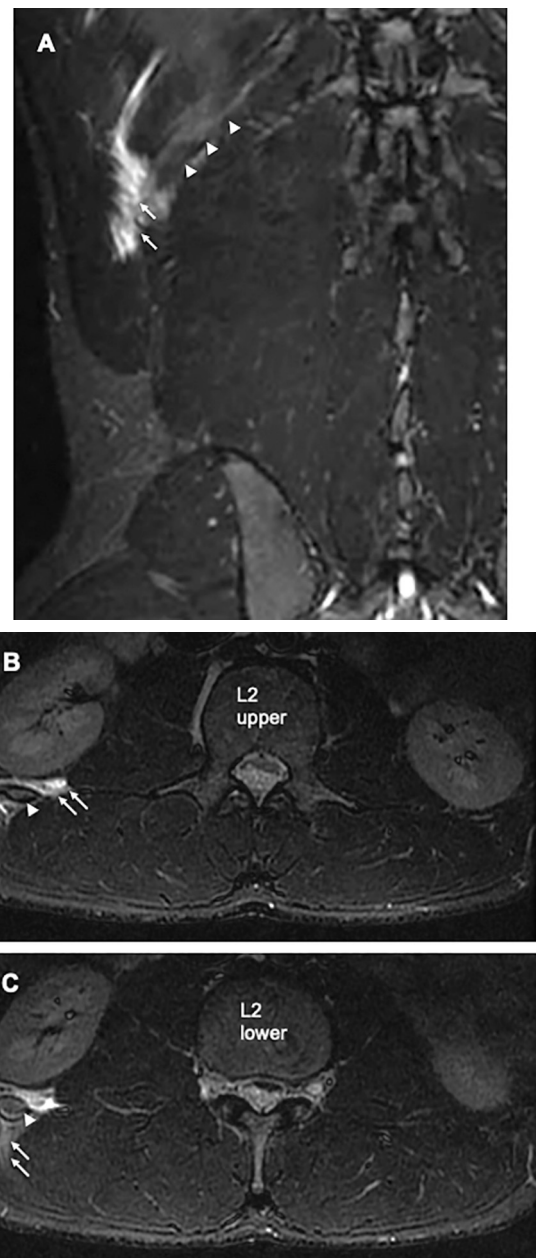


Figure 2. Short tau inversion recovery (STIR) magnetic resonance imaging. Hematoma is seen tracking along fibers of the internal oblique muscle (A) and middle (B) and posterior (C) layers of the thoracolumbar fascia (white arrows). Arrowheads indicate the 12th rib.

pedicle or pars interarticularis was identified.

Initial treatment consisted of rest and physiotherapy. On day 7, isometric strengthening together with light stretching was indicated, and the patient was taught the abdominal draw-in maneuver to reestablish neuromuscular control of deep core muscles such as the transverse abdominal muscles. On day 14, concentric strengthening exercises were initiated along with aerobic conditioning. Four weeks

after the diagnosis, the patient was without pain on lateral bending, bilateral rotation, or extension of the trunk. The final stage of rehabilitation emphasized the transition from concentric actions to the eccentric and dynamic actions required for the propulsion phases of throwing. The patient returned to high-level competition after 7 weeks and did not report any recurrence in the subsequent 12 months.

## Discussion

This rare case of unilateral low back pain due to internal oblique muscle injury at its junction with the thoracolumbar fascia raises two important clinical issues. First, the injury can result in unilateral low back pain in throwing athletes, such as this high school baseball pitcher. Second, careful palpation and examination of areas of tenderness and attention to those sites on MRI are both useful for diagnosing this condition.

Our case revealed that internal oblique muscle injury can cause unilateral low back pain, depending on the site of injury. Internal oblique muscle injuries have been reported in sports including baseball, cricket, javelin, tennis, ice hockey, golf, and even rowing<sup>6,8-16</sup>. Most cases involving baseball players present with pain anterior to the lateral abdominal wall and show injuries involving the anterolateral fibers of the internal oblique muscle inserting into the 9th to 11th ribs<sup>8-10</sup>. A previous study suggested that detachment of muscle fibers from the cartilaginous cap or adjacent costal cartilage is common, suggesting that this may be a weak point for attachment<sup>6</sup>. In our case, muscle injury occurred at the junction of the thoracolumbar fascia and the costal cartilage interface of the right 12th rib (the floating rib) and hematoma tracked along the middle and posterior layers of the thoracolumbar fascia. Since the thoracolumbar fascia shows extensive innervation with nociceptors and has been recognized as a possible cause of low back pain<sup>17</sup>, the pain may spread more inferiorly and posteriorly compared with usual oblique muscle injury, which presents with lateral abdominal pain.

Careful physical examination, including palpation and assessment of tender areas, along with confirmation by MRI, focusing on the lesion site, are useful for diagnosing this condition. The clinical findings in this case mimicked a lumbar stress fracture of the pars interarticularis, except for local tenderness of the apical cartilaginous portion of the 12th rib, which might be one of the reasons the correct diagnosis was missed on initial medical

evaluation. One of the lessons from this case was that palpation should always be performed on patients with low back pain.

Prompt MRI and/or ultrasound evaluation could be indicated to identify injured abdominal core muscles in elite athletes for whom minimizing the time spent in recovery is crucial<sup>6,8,13,18</sup>. Since MRI protocols for the evaluation of core muscles differ from the protocol for evaluating the lumbar spine, coronal and axial sections of STIR MRI focused on the injury site should be considered for athletes complaining of local tenderness around the attachment of the internal oblique muscle, especially among those performing torque maneuvers.

Ultrasound could also be useful to demonstrate internal oblique muscle tears that typically appear as a hypoechoic area with fibrillar disruption reflecting fluid collection, hematoma, and surrounding edema<sup>10,13</sup>. These imaging modalities can be used to determine the extent of the injury and establish an accurate diagnosis, and have helped predict the time of return to the sport<sup>8-11,15</sup>.

Re-injuries of oblique muscles are problematic in sports, with a recurrence rate of 12% among baseball players, most commonly in the same or following season<sup>8</sup>. Although few studies have outlined the management and prevention of oblique muscle injury in athletes, we favor carefully stepping-up the quantity and intensity of athletic rehabilitation as a first-line strategy. Injury in this case might have involved dysfunction of local core muscles, inducing overload of the global core muscle complex, including the internal oblique muscle. Specific rehabilitation for activating local core muscles, including transverse abdominal and multifidus muscles, might help athletes to return to play<sup>19</sup>.

## Conclusion

Internal oblique muscle injury at its junction with the thoracolumbar fascia belongs in the differential diagnoses for throwing athletes presenting with unilateral low back pain following a torque maneuver. Careful palpation to assess tenderness and confirmation by MRI are of great value for diagnosing this condition.

## Conflicts of interest

The authors declare no conflicts of interest pertaining to this paper.

## Consent

The patient and his family consented to submission and publication of data from this case.

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