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Thoracolumbar Fascia as an Overlooked Diagnosis of Chronic Back Pain: A Case Report of Successful Regenerative Treatments in an Athlete

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Background: Chronic nonspecific low back pain is common in elite athletes, often persisting and significantly affecting training and performance despite conventional therapy.

Case Report: This case report details the management of a 14-year-old triple jumper with a 16-month history of chronic nonspecific low back pain. Magnetic resonance imaging was unremarkable, whereas dynamic ultrasound revealed abnormalities of the thoracolumbar fascia. The patient underwent a tiered regenerative injection strategy guided by biotensegrity principles. Initial ultrasound-guided dextrose hydrodissection was performed for adhesiolysis and analgesia, followed by leukocyte-poor platelet-rich plasma and platelet-poor plasma injections intended to promote tissue remodeling. The athlete reported an overall 85%-90% reduction in pain and returned to full training 4 weeks after the platelet-rich plasma/platelet-poor plasma treatment.

Conclusions: This case illustrates that thoracolumbar fascia dysfunction may warrant consideration as a contributor to chronic nonspecific low back pain in young athletes. In our patient, a tiered regenerative approach resulted in substantial pain reduction and return to full training; however, controlled studies are needed to further establish efficacy of this approach or the causal treatment effect.

Key words: Thoracolumbar fascia; low back pain; regenerative injection therapy

BACKGROUND

Chronic nonspecific low back pain (CNSLBP) represents a significant musculoskeletal burden in the athletic population, particularly among those participating in high-impact field events. In track and field, specifically within the discipline of the triple jump, athletes are subjected to supraphysiological loads involving repetitive hyperextension and extreme compressive forces. Epidemiological data suggest that the lifetime prevalence of low back pain in elite athletes can exceed 85%, with track and field athletes showing a point prevalence ranging between 10% and 60% depending on the specific discipline and training intensity (1). The burden of this condition extends beyond missed training days; it often leads to altered biomechanics, performance regression, and early retirement.

While pathologies such as spondylolysis and disc protrusion are frequently suspected in young jumpers, recent research has shifted focus toward the soft tissue architecture, specifically the thoracolumbar fascia (TLF).

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Historically viewed merely as a passive connective tissue sheath, the TLF is now understood to be a dynamic, innervated structure playing a critical role in load transfer and proprioception.

This case report describes a young triple-jump athlete whose chronic low back pain was suspected to involve thoracolumbar fascia dysfunction and was treated with a tiered regenerative injection approach.

CASE REPORT

A 14-year-old elite triple-jump athlete in Australia sustained a low back sprain during a triple-jump competition 16 months before consultation. He described sudden shooting low back pain during hopping. After the sprain, he experienced persistent deep aching pain with extensive jumping, hopping, and running, which affected training compliance and his ability to compete. He had no prior history of back pain or injury. Baseline pain was 2/10 on the Numeric Rating Scale (NRS-11) at rest and increased to 7/10 with activities such as forward and backward bending, prolonged walking, and training.

Initially, he tried ibuprofen and acetaminophen and underwent months of physical therapy, including dry needling and cupping, as well as chiropractic treatment with manual manipulation. However, these treatments provided minimal benefit. There was no referred pain to the lower extremities, and sphincter function remained normal.

Magnetic resonance imaging of the lumbosacral spine was unremarkable except for minimal disc bulging at L4-5 and L5-S1 without Modic changes. There was no facet hypertrophy or ligamentum flavum thickening.

Another pain specialist recommended a trial of epidural steroid injection or facet nerve block. However, the patient's parents were not convinced by the recommendation and therefore the patient did not proceed to these procedures. They consulted a neurosurgeon, but no surgical intervention could be offered.

Psychosocially, he was frustrated by his inability to return to full training. Otherwise, he did not report symptoms of anxiety or depression and had a supportive family.

On examination at rest, the lower extremity neurological examination was unremarkable. There was no tenderness upon palpation over the lower back and buttock. However, after 15 minutes of running and hopping outside the clinic, his back pain worsened. At this juncture, there was vague bilateral paraspinal tenderness at the L5 level and the upper sacrum. However, facet provocative testing was negative. Sacroiliac joint provocative tests were all negative and both sacroiliac joints were nontender.

Bedside ultrasound examination showed a subtle positive Doppler signal over the posterior thoracolumbar fascia overlying the erector spinae muscles (Fig. 1). Mild tenderness was also present on sonopalpation, with loss of clear fascial delineation in this region.

Based on the clinical and imaging findings, the differential diagnoses included thoracolumbar fascia dysfunction and chronic iliolumbar ligament sprain.

After discussion with the patient and his parents, a diagnostic iliolumbar ligament block was performed bilaterally with 1 mL per side of a mixture containing 10% dextrose and 0.3% lidocaine under real-time ultrasound guidance. The patient reported no benefit 2 weeks later, suggesting that the iliolumbar ligaments were unlikely to be the primary pain generator.

Bilateral interfascial hydrodissection of the thoracolumbar fascia was therefore performed for diagnostic and therapeutic purposes.

Using strict aseptic technique and real-time ultrasound guidance, a 25-gauge, 9-cm Quincke spinal needle was used. A total of 30 mL of a mixture containing 10% dextrose and 0.3% lidocaine was injected along the posterior thoracolumbar fascia at the L5 level (Fig. 2). An ice pack was applied after the procedure for needle-related discomfort. During running and hopping immediately after the procedure, the patient reported pain reduction to 1/10 on the NRS-11. At 2 weeks, he reported a 50% reduction in pain during physical activity and improved sleep.

A second bilateral thoracolumbar fascia hydrodissection was then performed at L5 using 20 mL of platelet-poor plasma, and 3 mL of leukocyte-poor platelet-rich plasma was injected on each side into regions that had previously demonstrated positive Doppler signals. The preparation protocol used 60 mL of venous blood concentrated to 6 mL of platelet-rich plasma with the Apex single-spin system. The 6 mL of platelet-rich plasma was activated with 0.2 mL of 10% calcium chloride before injection. Four weeks later, the patient reported an 85%-90% reduction in exercise-related pain compared with pretreatment status. He no longer reported pain with daily activities or sleep and returned to full training. Pain occurred only after rigorous training and was more manageable. The recovery period required for post-training back pain to resolve, which had previously

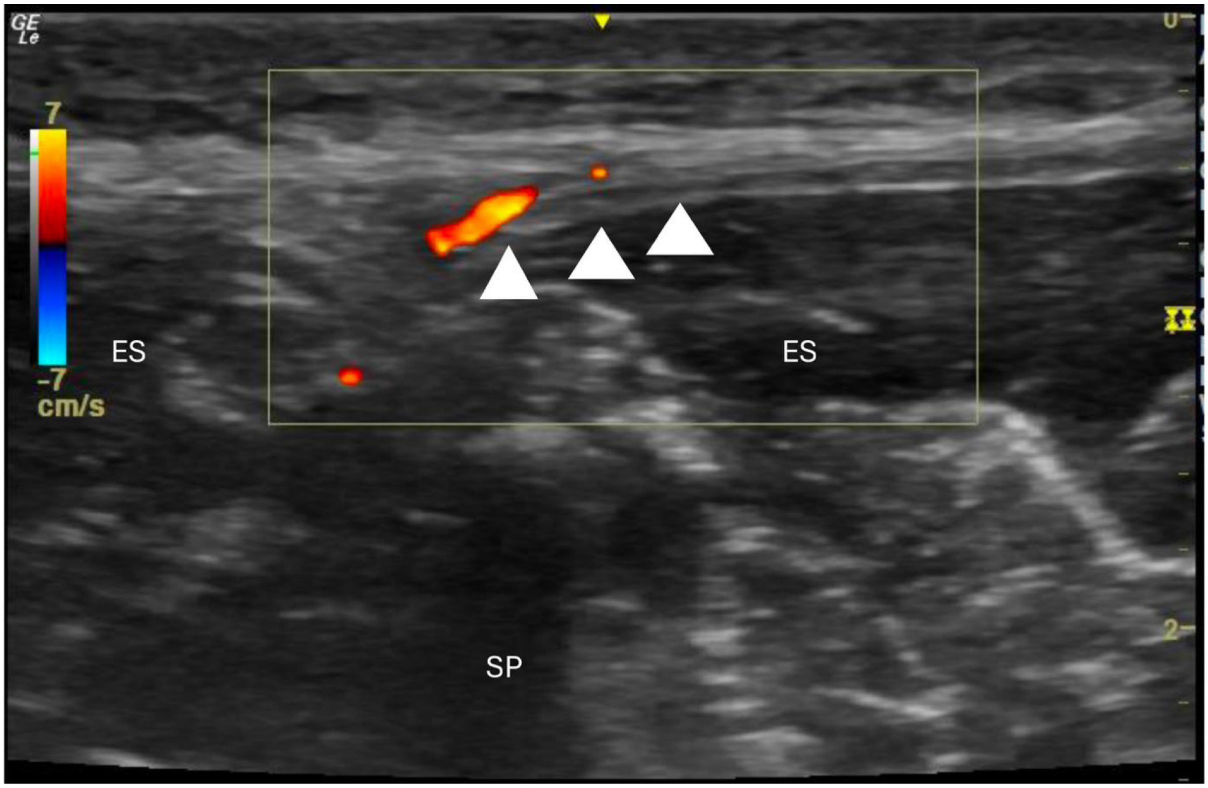

Fig. 1. Colour Power Angiography of the thoracolumbar fascia (TLF) at the L5 level. Subtle Doppler signal was detected over the superficial TLF overlaying the erector spinae muscle. The fascial delineation was not clear. SP: L5 spinous process; ES: erector spinae muscle; white arrowheads: superficial TLF

been 2-3 weeks, decreased to about 2 days following treatment.

Consent for publication was obtained from the patient and his mother.

DISCUSSION

This case report describes the clinical response to a tiered regenerative approach for suspected thoracolumbar fascia dysfunction using dextrose hydrodissection and leukocyte-poor platelet-rich plasma injections guided by the emerging concepts of biotensegrity and fascintegrity (2,3).

The TLF is a complex, multi-layered structure that integrates the lower limbs, pelvis, and spine, acting as a central hub for force transmission during the explosive phases of the triple jump (4,5). It contains anterior, middle and posterior layers (Fig. 3). In young athletes, fascial dysfunction has been proposed as one contributing mechanism in CNSLBP (6,7). The TLF is richly innervated by A- and C-fiber nociceptors and a high density of mechanoreceptors, including muscle spindles and Ruffini corpuscles (8). Chronic loading or acute injury can lead to fascial thickening and the accumulation of densified hyaluronan, which "glues" the layers together. This loss of shear capacity triggers nociceptive signaling, as the fascia cannot adequately distribute the high-velocity tension required for athletic performance (5,9). In the context of a triple jump that is characterized by extreme ground reaction forces and repetitive eccentric loading, the TLF is a plausible nociceptive source under these loading conditions (6,10).

Diagnosing fascia-mediated nonspecific low back pain in young athletes may require dynamic assessment. The patient described a deep ache exacerbated by transition from flexion to extension. Physical examination may reveal positive skin rolling (Maigne test), although this finding was absent in this patient. Dynamic ultrasound supported the clinical impression by demonstrating altered fascial appearance and reduced glide. While no gold-standard imaging test for fascial dysfunction-currently exists, ultrasound has been used to quantify

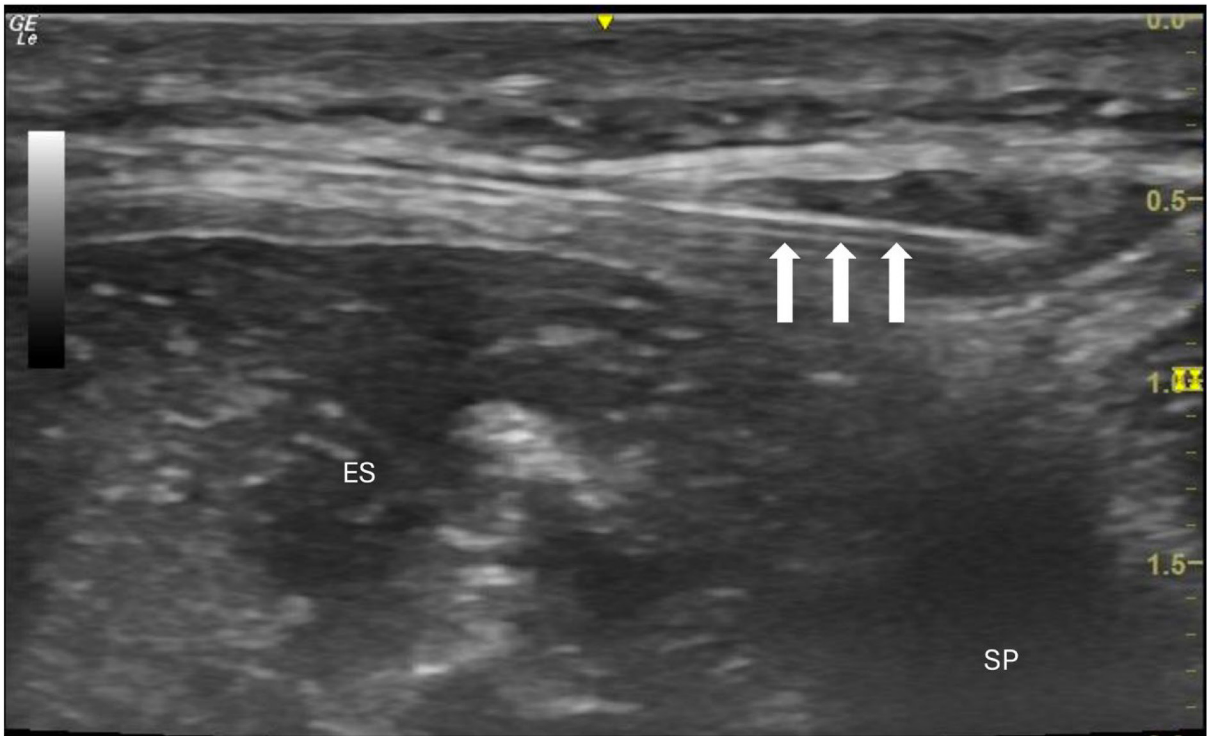

Fig. 2. Hydrodissection of the superficial thoracolumbar fascia superficial to the erector spinae muscle. SP: L5 spinous process, ES: erector spinae muscle; white arrows: needle tip with interfascial hydrodissection by the injectate.

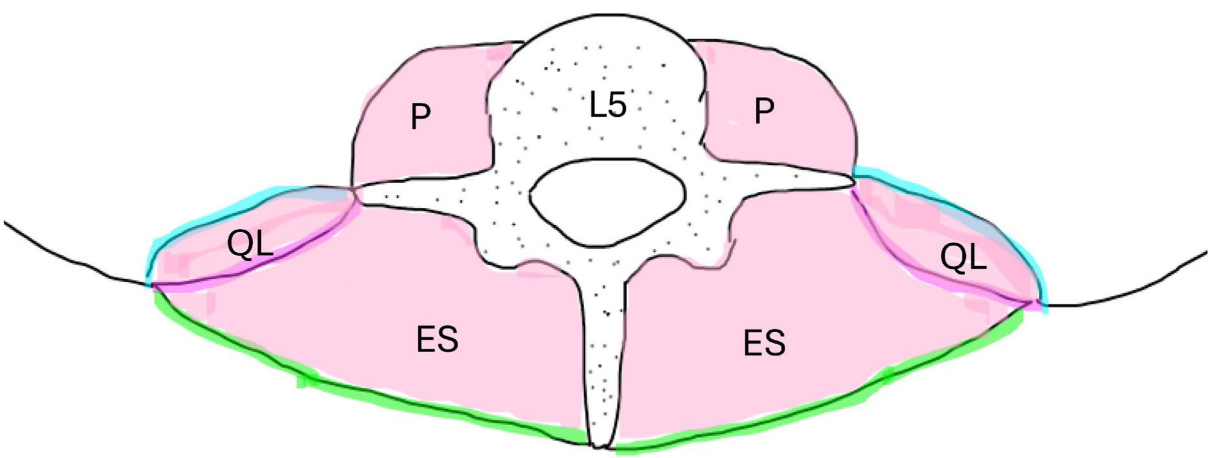

Fig. 3. The schematic cross-sectional anatomical diagram at the L5 level. Green line: posterior layer of thoracolumbar fascia; pink line: middle layer of thoracolumbar fascia; blue line: anterior layer of thoracolumbar fascia; ES: erector spinae muscle; QL: quadratus lumborum muscle; P: psoas muscle. (Drawing from the authors)

abnormal thoracolumbar fascia shear strain and thickness in low back pain (11,12).

The intervention began with ultrasound-guided dextrose hydrodissection. Dextrose solutions at 5%–10% have been used for interfascial hydrodissection and may provide analgesia through combined mechanical adhesiolysis and pharmacological effects, including anti-inflammatory action and modulation of nociceptive signaling (13-15). A dextrose effect on capsaicin sensitive TRPV1-expressing C-fibers has also been proposed (16). The specific mechanism within the thoracolumbar fascia, however, remains uncertain.

Leukocyte-poor platelet-rich plasma (LP-PRP) was subsequently used with the intent of promoting tissue repair. In preclinical tendon and ligament models, the growth factors concentrated in platelet-rich plasma (including PDGF, TGF-β, and VEGF) have been shown to stimulate angiogenesis, fibroblast proliferation, collagen synthesis, and extracellular matrix remodeling, with adhesive proteins such as fibronectin and vitronectin contributing to the provisional scaffold (17,18). Platelet-poor plasma was co-administered primarily as a fibrin-based scaffold rather than as a growth-factor concentrate. These mechanisms are extrapolated from tendon and ligament studies and have not been directly demonstrated in the thoracolumbar fascia.

Although superior cluneal nerve entrapment was considered because of the nerve's course through the thoracolumbar fascia (19,20), there was no tenderness near the posterior superior iliac spine on examination. In addition, the usual superior cluneal nerve entrapment point within the fibro-osseous tunnel of the thoracolumbar fascia was relatively distant from the area identified on ultrasound in this patient.

CONCLUSIONS

This case highlights the importance of considering fascial pathology as a possible contributor to non-specific low back pain in young athletes. The patient experienced substantial pain reduction and returned to full training after dextrose hydrodissection followed by platelet-rich plasma/platelet-poor plasma treatment. Because fascial integrity and biotensegrity were not objectively measured before and after treatment, any inference of restored fascial mechanics remains speculative and is based on symptomatic and functional improvement alone. Further research is warranted to evaluate diagnostic and treatment approaches for thoracolumbar fascia dysfunction.

Author Contributions

TN: Caring physician; writing; conceptual input; literature review; editing; artwork.
JP: Editing and conceptual input.
GCC: Editing and conceptual input.
MT: Editing and caring physician.

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