



Lumbar stress fractures or lumbar bone stress injury in cricket fast bowlers: Risk factors, diagnosis, management, and rehabilitation.

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Introduction: Fast bowling is a distinct and high-powered movement pattern used in the sport of cricket that is characterized by vigorous trunk actions, strong vertical ground reaction forces, and high workloads. Due to their intense play, fast bowlers are more vulnerable than other players to suffer significant injuries. lumbar stress fracture (LSF) is the type of such injuries that occurs as a result of such vigorous activity. LSF accounts for 3% to 12% of all cricket injuries. These injuries develop as a result of overuse injuries caused by microdamage accumulation and propagation in bone, and their severity varies according to the bone stress continuum, resulting in stress responses to partial and complete lumbar stress fractures (LSF). In a study by Alway et al., the incidence of lumbar stress fractures among English county cricket fast bowlers was 1.67% (57 lumbar stress fractures) all over the entire squad of 368 fast bowlers, with match incidence of 0.13 per 10,000 balls, yearly incidence of 2.46 per 100 fast bowlers, and match incidence of 0.13 per 10,000 balls between 2010 and 2016. They further, found that fast bowling has been linked to an asymmetrical bone stress response, with injuries occurring more frequently on the bowling arm's contralateral side (93% of injuries), in the pedicle (23%), the pars inter articularis (77%), and the L4 (35% and L5 (32%)¹¹. Another study found that fast bowlers had significant lumbar bone mineral despite the high frequency of Lumbar bone stress injuries (LBSI), with up to 14.6% and 18.1% more bone mineral density (BMD) and bone mineral content (BMC) on the side opposite and the bowling arm, respectively. Such an injury usually results in pain, time loss from sporting events, and activity constraints.

Risk factors

Age has a key role in bone stress injury in athletes under the age of 25. The lumbar spine does not fully develop until the age of 25. With an annual incidence of 4.90 stress fractures per 100 fast bowlers, individuals aged 18-22 are most at risk of lumbar stress fracture. There may also be a metabolic problem causing insufficient calcium and vitamin D synthesis and absorption, which affects bone density. The bowler may have tightness and decreased mobility, strength, or control in his hips, ankles, upper back, or shoulders, and he substitutes through that area of the spine¹⁵. Specific biomechanical aspects of the bowling technique, such as increased shoulder counter-rotation and trunk lateral flexion, are suggested risk factors for LBSI. Compared to bowlers who use side on and front on bowling actions, bowlers with mixed bowling actions are at greater risk. It has been hypothesized that bowlers with a high workload during their first 90 days and a low workload throughout their careers are far more likely to experience LSF. It is vital to understand the relationship between workload and injury risk so that workload recommendations may be developed to reduce injury risk.

Symptoms of lumbar bone stress injury

- localized back pain on the side opposite the bowling arm that develops gradually.
- The pain usually gets worse with activity and improves with rest.
- Bowling aggravates pain due to hyperextension of the lumbar spine.

Diagnosis

A diagnosis of LBSI or LSF typically involves obtaining a complete history and physical examination by the team's medical doctor or a physical therapist. Imaging tests such as X-rays, Magnetic resonance Imaging (MRI) Computed tomography (CT), and bone scans may also be ordered to confirm the diagnosis.

In some cases, LBSI may be asymptomatic. This means that the athlete does not have any symptoms, but the fracture is still present. Asymptomatic LBSI is more common in young athletes, and it can be difficult to diagnose. In these asymptomatic cases, the presence of bone marrow oedema (BMO) on MRI scans at the posterior vertebral arch of pars interarticularis indicates the presence of acute bone stress in the corresponding lumbar vertebral segment²⁰. The severity of the LBSI increases with the severity and extent of BMO observed at the posterior vertebral arch. On the other hand, in fast bowlers, symptomatic lumbar pars interarticular lesions at L4 and L5 are clinically significant overuse injuries. Furthermore, 11% of a cohort of young adult fast bowlers examined with CT scans over the course of a 12-month study reported having symptomatic pars lesions. In fast bowlers' development of symptomatic lumbar pars lesions, in particular unilateral L4 stress lesions, are strongly correlated with fast bowling. Stress lesions of the L1-L3 pars have also been identified by isotope bone scans in bowlers presenting with low-back pain.

Management

The recommended standard care for an acute stress fracture is a period of rest, review of bowling technique, and rehabilitation, usually extending over a period of 4 to 6 months. Return to play before the recovery period is completed increases the likelihood of the athlete developing recurrent injury in the same location as a result of inadequate bone strength. Consequently, the possibility of a subsequent rehabilitation phase and another repeated cycle of conservative treatments will jeopardize their professional career. Many cricketers with chronic, well-established pars defects may be asymptomatic, allowing for maximum performance with little restrictions. In some cases, hypermobility of the posterior vertebral segments can cause pain and limit the athlete's activity. These athletes are often managed symptomatically, which requires a brief period of rest until symptoms vanish and then a gradual return to play with pain persists sometimes. However, in these acute or symptomatic cases of chronic spondylolysis recurrence, surgical intervention may be required to facilitate a more robust and long-lasting recovery. Conservative treatment of pars lesions produces excellent clinical outcomes in the majority of athletes, with sports resumed within 6 months after injury. Surgery is recommended when an athlete presents with pain and a history of lumbar pars/pedicle stress fractures which is limiting the ability to bowl at a professional level.

Rehabilitation

Here is a broad summary of the rehabilitation process of lumbar stress fractures in cricket fast bowlers:

- Pain management and rest: The first phase of rehabilitation focuses on managing pain and rest. This could involve using cold, heat, or over-the-counter medications for pain relief.

- Core muscle strengthening: Once the pain has decreased, the next phase of therapy focuses on strengthening the core muscles. Exercises like planks, bridges, and bird dogs can help with this.
- Reintroduction of activities: As the fracture heals, the bowler can begin to gradually reintroduce more strenuous activities like light bowling and running.
- Return to Sport: The final phase of rehabilitation focuses on returning to full bowling. This can include progressively increasing the intensity and duration of bowling sessions.

It is important to work with a physical therapist who is experienced in treating lumbar stress fractures in cricket fast bowlers. The physical therapist can help to create a personalized rehabilitation program that will help to recover from injury and return to full bowling.

Conclusion

Lumbar stress fractures are an injury that can significantly impact the careers of fast bowlers in cricket. Early identification and proper management are essential to prevent long-term complications and improve the athlete's quality of life. The combination of proper diagnosis, treatment, and rehabilitation can improve an athlete's chances of returning to their pre-injury level of performance.

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