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紹介｜Introduction

腰部脊椎症を外科治療した後の学生アスリートの復帰

A Student-Athlete's Return-to-Play after Surgical Treatment of Lumbar Spondylolysis

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紹　介

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Introduction

A Student-Athlete's Return-to-Play after Surgical Treatment of Lumbar Spondylolysis

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Abstract

Lumbar spondylolysis from constant loading of the lumbar spine during sports is a frequent cause of low back pain in a student-athlete. Conservative management, avoiding certain activities, and core strengthening exercises have proven to be helpful. The surgical intervention with psychological support can help athletes with the condition to return-to-play early when the other measures fail.

要　旨

学生アスリートが運動をしている際、腰椎に一定の負荷がかかることがある。それによって起こる腰部脊椎症は、腰痛のよくある原因である。保存療法、ある一定の動きの回避、そして体幹を鍛えるエクササイズを行うことが有効であると分かっている。他に手立てがない場合、精神面でのサポートを伴う手術で早期復帰まで症状を改善させることができる。

キーワード

腰椎（Lumbar）／ 脊椎（Spine）
復帰（Return-to-play）／ 脊椎症（Spondylolysis）
学生アスリート（Student-athlete）

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1. Background

Lumbar spondylolysis (LS) is a common cause of low back pain (LBP) in a young or student-athlete (SA) [(1)]. The defect or a fracture of the pars interarticularis (PI) can occur both unilaterally and bilaterally from constant micro-trauma [(2)]. It mostly happens at lumbar vertebrae due to the increased forces in this region and as the facets are further coronal [(2)]. Bilateral LS can lead to the displacement of the vertebra over the one below it (Spondylolisthesis) [(2)-(3)].

LS occurs in around 5% of the population, but with significantly higher prevalence in baseball players, soccer players and dancers [(1)]. The incomplete ossification of the lumbar vertebra's neural arch until the mid-20s and the mammillary process to which the multifidi muscles are attached to stabilise the vertebral joints are not fully formed to similar age, thus increasing the incidence of the condition in younger individuals [(4)]. Constant axial loading, particularly in an extended lumbar spine when rotating and landing, can lead to micro-trauma and fracture of the PI [(5)].

2. Diagnosis

LS can usually be asymptomatic; yet, in some individuals, it can present as insidious recurrent dull aching LBP which worsens with activity, especially with lumbar hyperextension [(6)]. The presence of spondylolisthesis can lead to neurologic symptoms [(2)-(3)]. An examination may show increased lumbar lordosis, reduced range of movement, tenderness over the fracture site, the pain worsening with hyperextension, decreased flexibility of the hamstrings and a positive stork test [(6)].

The utilisation of various imaging modalities can help to detect LS [(7)]. Plain radiographs are useful in detecting the spondylolysis and ruling out other acute pathology. However, radiographs tend to have a low sensitivity resulting in the patient requiring more advanced imaging to investigate the cause of their symptoms [(7)]. Computed tomography (CT) scans are the best modality for visualising a PI fracture; though, they are insufficient as compared to a magnetic resonance imaging (MRI) in evaluating the effect on adjacent soft tissues such as nerve roots and disc material [(6)-(7)]. Single-photon emission computed tomography (SPECT) can identify areas of metabolically active bone which may indicate a recent fracture not detected by radiograph or indicative of a stress reaction phase that has not yet progressed to fracture [(7)]. The disadvantage with CT and SPECT is they have a substantial dose of radiation attached which is much more of a concern in a SA; therefore MRI is an accepted modality, especially in the context of LBP without exposure [(6)-(7)].

3. Management

Activity modification is an essential first step to improve symptoms and help with recovery. As part of the conservative treatment the SA should avoid hyperextension and activities which cause pain [(5)]. A prescription of a stabilisation program to strengthen the local muscles, i.e. multifidi and transversus abdominis helps to stabilise the increased compressive load on the lumbar spine [(5)]. Bracing can sometimes

improve recovery [8].

If other methods have failed to provide relief after six months or if neurological symptoms are present, then a surgical intervention known as pars repair (PR) will stabilise the fractured portion of the vertebra [9]. In PR, a metallic fixation by Scott procedure or Buck procedure is used to join both sides of the fractured bone and secure the vertebra in place [8],[10]-[11]. This stabilisation of the bone can then lead to bone healing, and with a stabilisation programme, the SA can return-to-play much early and remain asymptomatic during practices and competitions [9].

Scott procedure

In Scott's method (Fig. 1), a wire loop is inserted on both sides around the transverse processes of the vertebra, passed caudally of its spinous process and tightened together with the wire of the contralateral side [10].

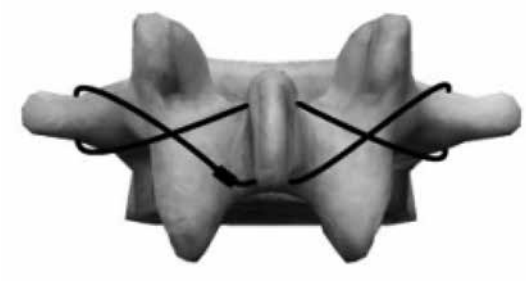

Fig. 1　Scott procedure (Panteliadis et al., 2016)

Buck procedure

Buck's method (Fig. 2) is the direct repair of damaged pars with the use of screws situated on the lower edge of the lamina into the defect and moved upward, in the direction of the upper facet joint [11].

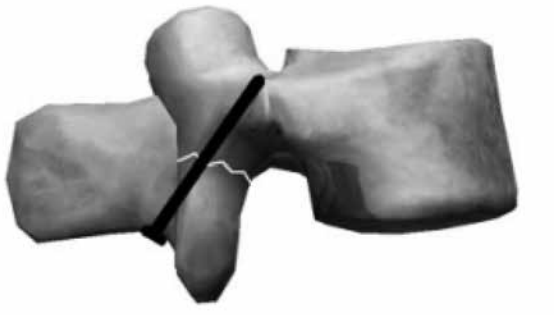

Fig. 2　Buck procedure (Panteliadis et al., 2016)

A SA might also feel anxious about participation in sports after the condition has resolved and would require some psychological support [12]. The support will also help in preventing "athlete burnout" in the young athlete, which can occur when the physiologic and psychological stress of sport participation results in a combination of physical/emotional exhaustion [13]-[14]. A SA's psychological response to LS would in part result from the severity of the injury and the length of the rehabilitation process [14]. The personality of a SA is important in the way they react to injury, as stable introverts and extraverts are emotionally stable

and can cope with their injuries and rehabilitation with ease [15].

4. Conclusion

LS in sports can cause LBP in a SA. Rest and core strengthening exercises to stabilise the spine can help to some extent. For some SAs, surgical stabilisation of the lumbar vertebra together with mental preparation is becoming increasingly important for an early return-to-play.

References

（1） Ball, J. R., Harris, C. B. Lee, J., Vives, M. J. (2019) Lumbar Spine Injuries in Sports: Review of the Literature and Current Treatment Recommendations. Sports Medicine - Open 5(1): p26.

（2） Don A.S., Robertson P.A. (2006). Is multilevel coronal facet joint orientation of the lumbar spine the phenotypic explanation for familial aspects of the aetiology of spondylolysis and isthmic spondylolisthesis? Orthopaedic Proceedings 88-B(Supp_III): pp449-449.

（3） Wiltse, L. L., Newman, P. H., Macnab, I. (1976). Classification of spondylolisis and spondylolisthesis. Clinical orthopaedics and related research (117): pp23-29.

（4） Cyron, B. M., Hutton, W.C. (1978). The fatigue strength of the lumbar neural arch in spondylolysis. The Journal of bone and joint surgery. British volume 60-b(2): pp234-238.

（5） Brumitt, J., Matheson, J. W., Meira, Erik P. (2013). Core stabilization exercise prescription, part I: current concepts in assessment and intervention. Sports health 5(6): pp504-509.

（6） Masci, L., Pike, J., Malara, F., Phillips, B., Bennell, K., Brukner, P. (2006). Use of the one-legged hyperextension test and magnetic resonance imaging in the diagnosis of active spondylolysis. British journal of sports medicine 40(11): pp940-946.

（7） Leone, A., Cianfoni, A., Cerase, A., Magarelli, N., Bonomo, L. (2011). Lumbar spondylolysis: a review. Skeletal radiology 40(6): pp683-700.

（8） Panteliadis, P., Nagra, N. S., Edwards, K. L., Behrbalk, E., Boszczyk, B. (2016). Athletic Population with Spondylolysis: Review of Outcomes following Surgical Repair or Conservative Management. Global Spine Journal 6(6): pp615-625.

（9） Kolcun, J. P. G., Chieng, L. O., Madhavan, K., Wang, M. Y. (2017). Minimally-Invasive versus Conventional Repair of Spondylolysis in Athletes: A Review of Outcomes and Return to Play. Asian spine journal 11(5): pp832-842.

（10） Scott, J.H.S. (1987). The Edinburgh repair of isthmic (Group II) spondylolysis. The Journal of bone and joint surgery. British volume 69: p491

（11） Buck, J. E. (1970). Direct repair of the defect in spondylolisthesis. Preliminary report. The Journal of bone and joint surgery. British volume 52(3): pp432-437.

（12） Rollo, I., Carter, J. M., Close, G. L., Yangüas, J., Gomez-Diaz, A., Medina Leal, D., Duda, J. L., Holohan, D., Erith, S. J., Podlog, L (2020). Role of sports psychology and sports nutrition in return to play from musculoskeletal injuries in professional soccer: an interdisciplinary approach. European Journal of Sport Science: pp1-10.

（13） Sorkkila, M., Ryba, T. V., Aunola, K., Selanne, H., Salmela-Aro, K. (2020). Sport burnout inventory-Dual career form for student-athletes: Assessing validity and reliability in a Finnish sample of adolescent athletes. Journal of Sport and Health Science 9(4): pp358-366.

（14）14. Ford, I. W., Eklund, R. C., Gordon, S. (2000). An examination of psychosocial variables moderating the relationship between life stress and injury time-loss among athletes of a high standard. Journal of Sports Sciences 18(5): pp301-312.

（15）15. Revelle, W. (2016). Hans Eysenck: Personality theorist. Personality and Individual Differences 103: pp32-39.