腰椎分離症を有する成長期男子における腰部筋断面積の縦断的変化の検討

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【目的】
本研究の目的は、新鮮腰椎分離症を有する成長期の男子において、保存療法前後で多裂筋、大腰筋および脊柱起立筋の筋横断面積の経時的変化があるのかを明らかにすることである。

【方法】
2011年3月から2024年4月までに、新鮮腰椎分離症と診断された中学野球競技者40名（14.1±0.7歳）を対象とした。診断基準はMRIのshort TI inversion recovery像にて椎弓根部に骨髄浮腫を伴うものとし、整形外科専門医が診断した。筋断面積の測定は、MRIのT1画像での第4腰椎と第5腰椎の間の水平断面スライス1枚とし、初診時と骨癒合判定時期である初診から2～3か月後の2時点において計測した。統計学的検討は、患側と健側のそれぞれで筋（多裂筋、大腰筋、脊柱起立筋）と時間（初診時、癒合判定時期）の反復測定二元配置分散分析を実施し、事後検定にはBonferroni法を用いた。

【結果】
患側において、筋と時間に交互作用がみられた（p =0 .02）。事後検定の結果、多裂筋は、初診時（1107.4±280.7mm2）から癒合判定時期（1066.4±264.5mm2）に有意に減少した（p =0 .02）が、大腰筋（p=0 .26）および脊柱起立筋（p=0 .26）は、初診時から癒合判定時期にかけて有意差はなかった。
健側において、交互作用がみられ（p =0 .01）、事後検定の結果、多裂筋は、初診時（1087.0±248.6mm2）から癒合判定時期（1049.8±241.9 mm2）に有意に減少した（p =0 .02）が、大腰筋（p=0 .50）および脊柱起立筋（p=0 .09）は、初診時から癒合判定時期にかけて有意差はなかった。

【結論】
新鮮腰椎分離症を有する成長期の男子において、患側および健側の多裂筋の筋横断面積は保存療法期間中に減少することが明らかとなった。

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英文抄録（Abstract）
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Longitudinal changes in lumbar muscle cross-sectional area in junior boys with lumbar spondylolysis.

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[Purpose]
To determine whether there is a change in the muscle cross-sectional area (CSA) of the multifidus, psoas major, and erector spinae muscles before and after conservative treatment in growing junior boys with fresh lumbar spondylolysis.

[Methods]
From March 2011 to April 2024, 40 junior high school baseball players diagnosed with acute lumbar spondylolysis (aged 14.1 ± 0.7 years) were included in the study. The diagnostic criteria were based on the presence of bone marrow edema in the pedicle on magnetic resonance imaging (MRI) short TI inversion recovery (STIR) images, and the diagnosis was confirmed by an orthopedic specialist. Muscle CSA was measured using a single horizontal slice from T1-weighted MRI images at the level between the fourth and fifth lumbar vertebrae. Measurements were taken at two time points: at the initial consultation and 2–3 months later, corresponding to the timing of the bone healing assessment. Statistical analysis was performed using a two-way repeated measures ANOVA to examine the effects of side (affected vs. unaffected) and time (initial consultation vs. bone healing assessment) on the muscle (multifidus, psoas major, and erector spinae) CSA. Post-hoc tests were conducted using the Bonferroni method.

[Results]
An interaction between muscle and time was observed on the affected side ($p = 0.02$). The post-hoc analysis revealed that the multifidus muscle had a significantly lower CSA at the bone healing assessment (1066.4 ± 264.5 mm^2) compared to the initial consultation (1107.4 ± 280.7 mm^2) ($p = 0.02$); however, no significant differences were observed for the psoas major ($p = 0.26$) or the erector spinae ($p = 0.26$). On the unaffected side, an interaction was observed ($p = 0.01$). The post-hoc analysis showed that the multifidus muscle had a significantly lower CSA at the bone healing assessment (1049.8 ± 241.9 mm^2) compared to the initial consultation (1087.0 ± 248.6 mm^2) ($p = 0.02$); however, no significant differences were observed for the psoas major ($p = 0.50$) or the erector spinae ($p = 0.09$).

[Conclusion]
In growing junior boys with fresh lumbar spondylolysis, the muscle CSA of the affected and healthy pollicis muscles was found to decrease during the period of conservative therapy.