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Lumbar paraspinal muscle atrophy

- Correlation and risk factor analysis of multifidus muscle atrophy in degenerative lumbar spondylolisthesis
- Novel Mini-open Transforaminal Lumbar Interbody Fusion
- Relationship between global muscle atrophy and sagittal imbalance in patients with degenerative lumbar scoliosis: a study based on three-dimensional reconstruction
- Age and activity but not lumbar spinal stenosis and muscle fatigue affect sagittal spinal alignment: A pilot study
- Lumbar Multifidus Dysfunction and Chronic Low Back Pain: Overview, Therapies, and an Update on the Evidence
- Introducing the Paraspinal Muscle Quality (PMQ) Score: A Novel T2 MRI-Based Intensity Parameter for Lean Muscle Assessment in Spine Patients
- The Degeneration of Paraspinal Muscles and Its Correlation with the Postoperative Clinical Outcomes Following Minimally Invasive Transforaminal Lumbar Interbody Fusion (MIS-TLIF)
- Fatty infiltration in the multifidus predicts screw-loosening following short-segment decompression and fusion: proof of why we should protect and rehabilitate the paraspinal muscles

Paraspinal muscles are commonly affected during spine surgery. The purpose of a study was to assess the potential factors that contribute to paraspinal muscle atrophy (PMA) after lumbar spine surgery. A comprehensive review of the available English literature, including relevant abstracts and references of articles selected for review, was conducted to identify studies that reported PMA after spinal surgery. The amount of postoperative PMA was evaluated in (1) lumbar fusion vs nonfusion procedures; (2) posterior lumbar fusion vs anterior lumbar fusion; and (3) Minimally invasive posterior approach to the lumbar spine decompression and/or fusion vs non-MIS equivalent procedures. In total, 12 studies that included 529 patients (262 men and 267 women) were reviewed. Of these, 365 patients had lumbar fusions and 164 had lumbar decompressions. There was a significantly higher mean postoperative volumetric PMA with fusion vs nonfusion procedures (P=.0001), with posterior fusion vs anterior fusion (P=.0001), and with conventional fusions vs MIS fusions (P=.001). There was no significant difference in mean volumetric lumbar PMA with MIS decompression vs non-MIS decompression (P=.56). There was significantly higher postoperative PMA with lumbar spine fusions, posterior procedures, and non-MIS fusions ¹.

Paraspinal muscle fatty

Paraspinal muscle fatty

Treatment

The treatment of atrophy or increased fat infiltration of the lumbar paraspinal muscles of patients with back pain, lumbar radiculopathy, or lumbar degenerative kyphosis is controversial.

Park et al. searched Medline for relevant English-language articles and retrieved 25 articles published from 1993 to 2017 on changes in the lumbar paraspinal muscles; 21 met our study criteria. We categorized each article into three groups: randomized clinical trial, nonrandomized prospective study, or retrospective study.

They found 1 randomized prospective, 3 nonrandomized prospective, and 17 retrospective studies. Atrophies of the multifidus muscle are found at the level of the L5 vertebral body in patients with back pain, lumbar radiculopathy, and lumbar degenerative kyphosis. Increased fat infiltration to the multifidus muscle was found in the patients with lumbar radiculopathy or lumbar degenerative kyphosis. However, there are controversies over fat infiltration to the multifidus muscle in the patients with back pain and the efficiency of a paramedian surgical approach to prevent the atrophy of the multifidus muscle.

Atrophy of the multifidus muscle was found in patients with back pain, lumbar radiculopathy, and lumbar degenerative kyphosis. There was increased fat infiltration to the multifidus muscle in those patients with lumbar radiculopathy or lumbar degenerative kyphosis²⁾.

Case series

2017

A retrospective study was conducted between January 2012 to December 2014. Sixty one patients with unilateral L5 radiculopathy were enrolled: 30 patients had a symptom duration less than 3 months (group A) and 31 patients had a symptom duration of 3 months or more (group B). Axial MRI measured the CSA of the paraspinal and psoas muscles at the middle between the lower margin of the upper vertebra and upper margin of the lower vertebra, and obtained the relative CSA (rCSA) which is the ratio of the CSA of muscles to that of the lower margin of L4 vertebra.

There were no differences in the demographics between the two groups. In group B, rCSA of the erector spinae at the L4-5 level, and that of multifidus at the L4-5 and L5-S1 levels, were significantly smaller on the involved side as compared with the uninvolved side. In contrast, no significant muscle asymmetry was observed in group A. The rCSA of the psoas was not affected in either group.

The atrophy of the multifidus and erector spinae ipsilateral to the lumbar radiculopathy was observed only in patients suffering from unilateral radiculopathy for 3 months or more ³⁾.

2015

In total, 178 patients with unilateral LBP who had lumbar MRI examination were recruited. The data were obtained by a retrospective documentation audit. The CSAs and mean signal intensities of the bilateral paraspinal muscles [psoas major (PM), quadratus lumborum, multifidus (MF) and erector spinae (ES)] were measured, and the percentage of fat infiltration was calculated. The data between the painful side and non-painful side were compared, and between-group comparisons were tested. 42 patients with chronic unilateral LBP could indicate the problem level, and the CSA and mean signal intensity of the MF muscle were analysed at the problem level, and one vertebral above and one vertebral level below the problem level.

The CSAs of the PM and ES muscles were significantly decreased in the acute LBP group, while in the chronic LBP group, significant reduction in CSA was found in the MF and ES muscles on the painful side compared with the non-painful side. The mean signal intensity and fat content of the ES muscle on the painful side in the chronic LBP group was significantly higher than that on the painful side in the acute LBP group. The significant decrease of CSA in the MF muscle was found at multiple levels on the painful side.

The present findings show that there is selective ipsilateral atrophy of paraspinal muscles, specific to the symptomatic side, in patients with acute and chronic LBP. The reduction of the muscle CSA and increased fatty infiltration occurred synchronously, and the extent of change is significantly greater in chronic LBP in the ES muscle. Atrophy of the MF muscle appears to be at multiple levels but side specific in relation to symptoms in patients with chronic LBP, and the decreased muscle CSA may occur prior to fatty infiltration.

There are specific paraspinal muscles undergoing atrophy and fatty infiltration in patients with acute and chronic LBP on the symptomatic side. The CSA of the MF muscle decreased at multiple levels on the symptomatic side in patients with chronic unilateral LBP, which may occur prior to fatty infiltration ⁴.

1)

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