

Introduction:

- Chronic low back pain (CLBP) affected 619 million people worldwide with estimated increase to 843 million cases by 2050. Among common etiologies for CLBP, lumbar facet joint pain prevalence ranges from 4.8 to over 45%.
- Lumbar facet joint sensory innervation is transmitted via branches from the dorsal rami of spinal nerves termed lumbar medial branch nerves (LMBN), and each joint is dually innervated by LMBN at the same level and level above the joint.
- Lumbar medial branch radiofrequency ablation/neurotomy (LRFA) is an effective interventional procedure that may be used to treat CLBP from lumbar facet joint etiology.
- Because the LMBN also innervate the multifidus muscle, LRFA may pose a risk of multifidus atrophy and/or dysfunction, although this association remains unclear.

Rationale and Objective:

- Given the increased utilization of LRFA in the context of the continuously rising global prevalence and disability from CLBP, it is critical to further explore the relationship between LRFA and multifidus atrophy and/or dysfunction, as well as the potential clinical implications that may alter the course of CLBP chronicity and recurrency cycle.
- Our study aimed to address this long-standing debate about the impact of LRFA on the multifidus muscle.

Methods:

- This was a **systematic review** of the literature with the primary outcome of evaluating the presence of multifidus atrophy and/or dysfunction as determined by diagnostic imaging or electromyography (EMG) following LRFA. Assessment of risk of bias was performed utilizing the Newcastle–Ottawa Quality Assessment Scale (NOS), and appraisal of quality of evidence was performed using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) criteria.

Multifidus Atrophy and/or Dysfunction following Lumbar Radiofrequency Ablation: A Systematic Review

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CONCLUSION:

- This is the first study to systematically review the current literature on multifidus atrophy and/or dysfunction following LRFA. The paucity of literature on this topic is substantial and further restricted by small sample sized, absence of control groups or covariate analyses, and lack of blinding.
- However, given the confirmed electromyographic and diagnostic imaging findings from these observational studies, some multifidus atrophy and/or dysfunction is plausible.
- This review emphasizes the lack of standardization in evaluation of multifidus atrophy and/or dysfunction following LRFA and highlights the need for high-quality prospective studies to clarify its relevance in clinical practice

Table 2. Overall Quality of Evidence per the Grading of Recommendations Assessment, Development, and Evaluation (GRADE). The GRADE assessment uses standard criteria to evaluate the certainty of evidence as being of very low, low, moderate, and high utilizing the GRADEpro software (Evidence Prime)⁴

Certainty assessment							№ of patients		Effect		Certainty
№ of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations	lumbar medial branch RFA	control	Relative (95% CI)	Absolute (95% CI)	
Multifidus dysfunction											
5	observational studies	very serious ^a	very serious ^b	very serious ^c	serious ^d	all plausible residual confounding would suggest spurious effect, while no effect was observed	-/115	-/59	not pooled	see comment	⊕○○○ Very low

Results:

- Of 1565 studies that were screened for eligibility, only five cohort studies (two retrospective and three prospective) assessed LFRA and multifidus muscle atrophy and/or dysfunction.
- There was presence of high bias in the comparability domain per the NOS criteria. No study has evaluated the significance of repeat LRFA on multifidus function, atrophy or LMBN recovery.
- Our review found very limited and low-quality GRADE evidence discussing this topic. Significant reduction in shear modulus in certain postures following LRFA has been documented and is suggestive of multifidus dysfunction. Studies assessing fat-subtracted multifidus cross-sectional areas with MRI and EMG demonstrated varying levels of multifidus atrophy but did not reach statistical significance.
- Given the destructive nature of LRFA and the subsequent inherent denervation of multifidus muscle segments, some degree of multifidus atrophy and/or dysfunction is plausible. There are three level 1B and two-level IC studies with a very low level of certainty to support a relationship between LRFA and subsequent multifidus atrophy and/or dysfunction.

Author	Year	Selection	Comparability	Exposure/Outcome
Oswald <i>et al.</i>	2023	****	*	**
Böning <i>et al.</i>	2021	***	—	**
Sadeghi <i>et al.</i>	2020	**	**	**
Smuck <i>et al.</i>	2013	****	**	**
Dreyfuss <i>et al.</i>	2009	**	—	***

Table 3. Cohort Study Quality Rating using the Newcastle-Ottawa scale (NOS), which evaluates three categories: selection (maximum 4 stars), comparability (maximum 2 stars), and outcome (maximum 3 stars).²⁴



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