

Evidence Discussion (CMM-609: Lumbar Fusion - Arthrodesis)

Risks of lumbar fusion surgery include but are not limited to infection, neurovascular injury, persistent or incomplete relief of symptoms, pseudarthrosis, hardware failure, possible need for more surgery, dural tear, deep vein thrombosis, pulmonary embolus, paralysis and death. [4, 5, 6, 7, 8] Given the potential possibility for significant complications, proper patient selection is critical to minimize the risk benefit ratio. As recommended by the North American Spine Society (NASS) Coverage Policy Recommendations: *Lumbar Fusion* (Revised 2019), there are multiple indications for fusion, including **Infection; Tumor, Traumatic Injuries; Deformity; Stenosis; Disc Herniations; Synovial facet cysts; Discogenic low back pain, Pseudarthrosis.** [1] In the cases of infection, tumor and traumatic injuries there will be underlying instability or anticipated instability from the appropriate debridement, resection or decompression. In the cases of stenosis, disc herniation and synovial cysts there needs to be documented instability or anticipated iatrogenic instability from the approach or need for removal of greater than 50 percent of facets. [13, 14]

For discogenic low back pain and pseudarthrosis, there is need for a longer presence of pain and failed conservative measures. More complex revision surgeries are required for the treatment of pseudarthrosis and persistent pseudarthrosis is not uncommon. [15] Regarding fusion surgery for discogenic low back pain, studies have noted no significant differences in outcomes between fusion and non-surgical conservative measures. [16, 17]

Multiple studies support spinal fusion for spinal stenosis associated with degenerative spondylolisthesis graded of at least Myerding grade II. [8, 9, 10, 11, 12]

It has been shown in the literature that patients with psychosocial disorders or with a smoking history undergoing fusion have poorer outcomes and higher complication rates. [2, 18]. Proper identification and treatment of these conditions prior to surgery may significantly improve many outcome measures.

1. NASS Coverage Policy Recommendations: *Lumbar Discectomy*. Revised 2019. North American Spine Society (NASS) Coverage Committee. Burr Ridge, IL. ISBN 1-929988-65-6

2. James R. Daniell and Orso L. Osti. Failed Back Surgery Syndrome: A Review Article. *Asian Spine J.* 2018 Apr; 12(2): 372–379.

3. Salvador A Brau, Rick B Delamarter, Michael L Schiffman, Lytton A Williams, Robert G Watkins; Vascular injury during anterior lumbar surgery; *Spine J.* 2004 Jul-Aug;4(4):409-12.

4. Fineberg, Steven J. MD; Oglesby, Matthew BA; Patel, Alpesh A. MD; Pelton, Miguel A. BS; Singh, Kern MD. *Spine* 38(13): p 1154-1159, June 01, 2013.

5. Chang R, Reddy RP, Coutinho DV, Chang YF, Anetakis KM, Crammond DJ, Balzer JR, Thirumala PD. Diagnostic Accuracy of SSEP Changes During Lumbar Spine Surgery for Predicting Postoperative

Neurological Deficit: A Systematic Review and Meta-Analysis. *Spine (Phila., Pa 1976)*. 2021 Dec 15; 46(24).

6. Gregory Wyatt Poorman, John Y Moon, et al, Rates of Mortality in Lumbar Spine Surgery and Factors Associated With Its Occurrence Over a 10-Year Period: A Study of 803,949 Patients in the Nationwide Inpatient Sample; *Int J Spine Surg*. 2018 Oct 15;12(5):617-623.

7. Scoliosis Research Society Morbidity and Mortality Database; *Spine (Phila., Pa 1976)*. 2012 Nov 1; 37(23):1975-82.

8. Herkowitz, HN; Kurz LT. Degenerative lumbar spondylolisthesis with spinal stenosis. A prospective study comparing decompression with decompression and intertransverse process arthrodesis. *J Bone Joint Surg Am* 1991 Jul; 73(6):802-8

9. NASS Evidence-Based Clinical Guidelines Committee. Evidence-Based Clinical Guidelines on Degenerative Spondylolisthesis. North American Spine Society; 2014

10. Weinstein JN, et al. Surgical versus nonsurgical treatment for lumbar degenerative spondylolisthesis. *N Engl J Med*. 2007 May 31; 356(22):2257- 70

11. Försth P, Ólafsson G, Carlsson T, et al. A Randomized, Controlled Trial of Fusion Surgery for Lumbar Spinal Stenosis. *N Engl J Med*. 2016; 374(15):1413- 1423.

12. Ghogawala Z, Dziura J, Butler WE, et al. Laminectomy plus Fusion versus Laminectomy Alone for Lumbar Spondylolisthesis. *N Engl J Med*. 2016;374(15):1424-1434.

13. Yue Zhou, et al. The biomechanical change of lumbar unilateral graded facetectomy and strategies of its microsurgical reconstruction: report of 23 cases. *Zhonghua Yi Xue Za Zhi*; 2007 May 22; 87(19):1334-8.

14. K.K Lee, E.C. Teo. Effects of laminectomy and facetectomy on the stability of the lumbar motion segment. Medical Engineering & Physics. Volume 26, Issue 3, April 2004, Pages 183-192

15. Peter B. Derman, MD, MBA and Kern Singh, MD. Surgical Strategies for the Treatment of Lumbar Pseudarthrosis in Degenerative Spine Surgery: A Literature Review and Case Study. *HSS Journal*; 2020 Jul; 16(2): 183–187.

16. Brox, Jens IvarNygaard, Øystein PHolm, IngerKeller, AnneIngebrigtsen, TorReikerås, Olav. Four-year follow-up of surgical versus non-surgical therapy for chronic low back pain. *Annals of the Rheumatic Diseases*; September 2010 , Volume 69 (9), p 1643 – 1648

17. Brox, Jens Ivar, et al. Lumbar instrumented fusion compared with cognitive intervention and exercises in patients with chronic back pain after previous surgery for disc herniation: A prospective randomized controlled study. *Pain* 122(1): p 145-155, May 2006.

18. Jackson KL, Rumley J, Griffith M, Agochukwu U, DeVine J. Correlating Psychological Comorbidities and Outcomes After Spine Surgery. *Global Spine J*. 2020 Oct;10(7):