The Impact Of Osteobiologic Type On The Rate Of Pseudarthrosis In Single-Level And Multi-Level Lumbar Fusion

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Poster #2067
Disclosures

- There are no conflicts of interest in this study. No patient identifiers were collected.

Disclosures outside of submitted work:
- ZB-consultancy: Cerapedics, Xenco Medical (past), AO Spine (past); Research Support: SeaSpine (past, paid to the institution), Next Science (paid directly to institution); North American Spine Society: committee member; Lumbar Spine Society: Co-chair Research committee, AOSpine Knowledge Forum Degenerative: Associate member; AOSNA Research committee- committee member
- JCW- Royalties – Biomet, Seaspine, Amedica, DePuy Synthes; Investments/Options – Bone Biologics, Pearldiver, Electrocore, Surgitech; Board of Directors - North American Spine Society, AO Foundation (20,000 honorariums for board position, plus travel for board meetings), Cervical Spine Research Society; Editorial Boards - Spine, The Spine Journal, Clinical Spine Surgery, Global Spine Journal; Fellowship Funding (paid directly to institution): AO Foundation
Introduction

• Over the last several decades, various biologics including allograft, synthetics, growth factors and cell based have been used for lumbar spinal fusion surgery.

• However, the data on these biologic products remains controversial with conflicting evidence in the literature.

• This study evaluates the effect of biologic type selection on inpatient pseudarthrosis complications in one-level and multi-level lumbar fusion.
Methods

- Using the 2016 National Inpatient Sample (NIS) database, we conducted a retrospective cohort analysis of 17,496 patients who received lumbar fusion with either autologous tissue substitute, nonautologous tissue substitute, or synthetic substitute.
- The database was further subdivided between patients receiving biologics following single-level lumbar fusion versus fusion at two or more vertebral levels.
- Statistical analysis was conducted in R, and odds ratios and Fisher’s Exact Test were used to compare pseudarthrosis rates in groups receiving different types of biologics.
Results

• Within all patients, the rate of pseudarthrosis during the post-fusion inpatient stay was found to be 5.96%.
• Pseudarthrosis was reported in 4.28% of patients following fusion with autologous graft material at only one vertebral joint which was a significant decrease compared to average rates (OR: 0.550, 95% CI: 0.482, 0.626, p < 0.0001).
• Conversely, autologous fusion at two or more levels was associated with pseudarthrosis in 7.26% of patients, was a significant increase compared to average (OR: 1.427, 95% CI: 1.258, 1.619, p < 0.0001).
• One level fusion with a nonautologous graft was associated with a pseudarthrosis rate of 6.78% but was not statistically significant (OR: 1.164, 95% CI: 0.919, 1.456, p = 0.194).
On the other hand, fusion of two or more levels with a nonautologous graft showed a strong association with pseudarthrosis with a 11.05% rate (OR: 2.072, 95% CI: 1.666, 2.553, p < 0.0001).

Inpatient pseudarthrosis occurred in 6.00% of patients receiving synthetic fusion at one level and 5.44% of those receiving synthetic fusion on two or more levels, but there were no significant differences (One level: OR: 1.021, 95% CI: 0.536, 1.747, p = 0.881; Two or more levels: OR: 0.925, 95% CI: 0.413, 1.773, p = 1.000).
Discussion

• Autologous single-level lumbar fusion was associated with the lowest rates of postoperative inpatient pseudarthrosis.

• Both autologous and nonautologous fusion of two or more levels were associated with increased risk of inpatient pseudarthrosis.
Key Points

• Different osteobiologics may have different rates of pseudarthrosis.

• As the field of biologics continues to expand, it is important for spine surgeons to continually evaluate the safety and efficacy of these novel materials and techniques.