



Impact of Low-Density Lipoprotein Levels on Rates of Pseudarthrosis After Anterior Cervical Discectomy and Fusion

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Background

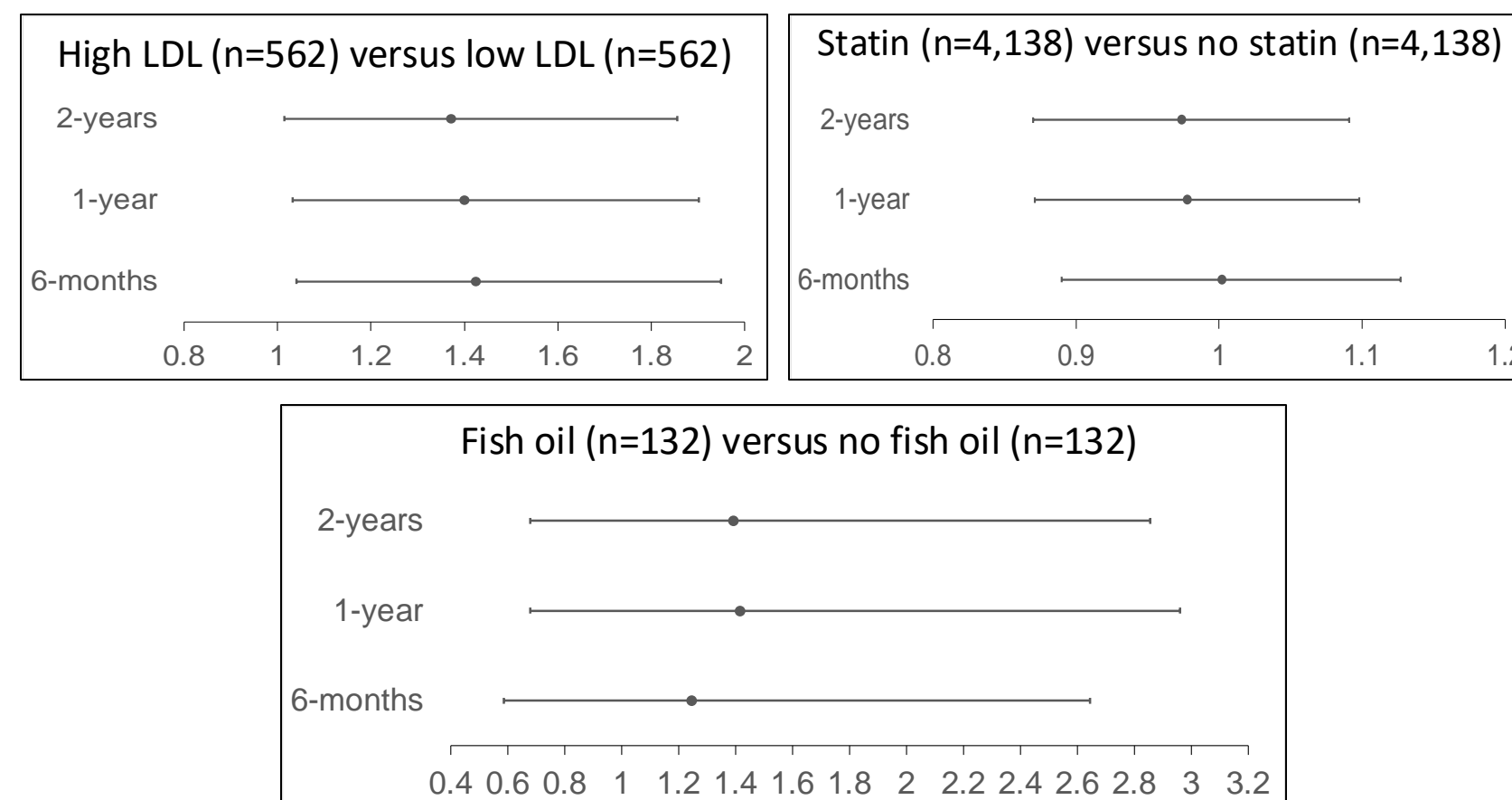
- ACDF is performed to treat degenerative diseases of the cervical spine or injuries causing neck pain, myelopathy, and radiculopathy.
- Hyperlipidemia may affect pseudarthrosis rates via blood flow restriction, systemic inflammation, increased osteoclast activity, and attenuated signaling of parathyroid hormone and bone morphogenetic protein-2 (BMP-2).
- Statins and fish oil both play a role in lipid homeostasis and oxidation, systemic inflammation, and osteoblast function.
- The purpose of this study is to understand whether pre-operative levels of LDL or intake of statins or fish oil are associated with pseudarthrosis following single-level and multi-level ACDF.

Methods

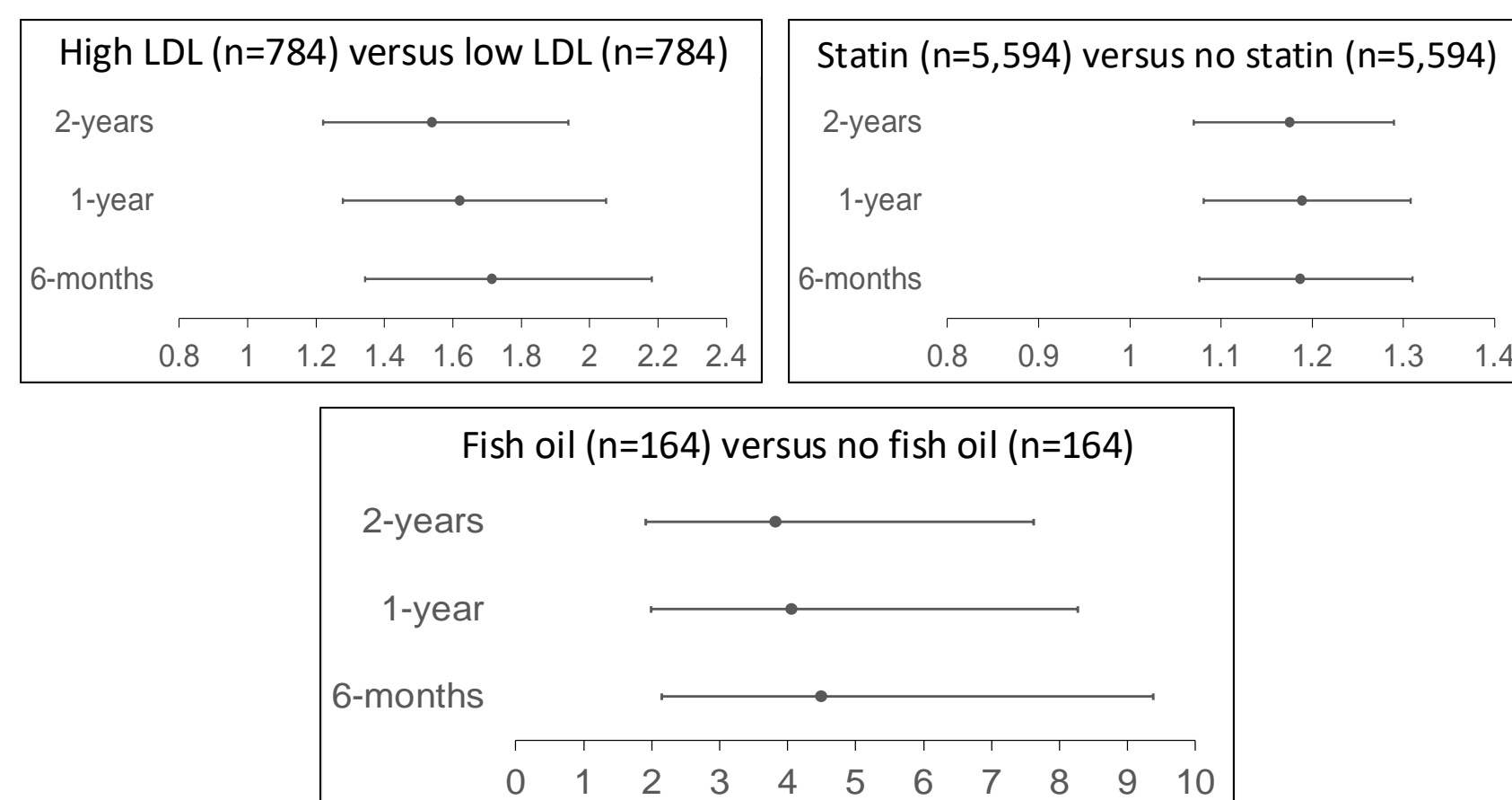
- Data were collected using TriNetX, a healthcare database with over 100 million patients.
- Patients were excluded if they were under 18-years-old, if the surgery did not involve anterior instrumentation, or if they had simultaneous posterior instrumentation.
- Patients with high LDL (142 mg/dL) were compared to patients with low LDL (66 mg/dL). Patients taking versus not taking a statin or fish oil within six months before surgery were also compared.
- For all analyses, patients underwent propensity score matching in a 1:1 ratio based on relevant comorbidities.
- All statistical analysis was conducted on the TriNetX platform, which calculates p-values using t-tests for continuous variables and z-tests for categorical variables.

Results

Odds Ratios for Pseudarthrosis Rates After Single-level ACDF:



Odds Ratios for Pseudarthrosis Rates After Multi-level ACDF:



Discussion

- Atherosclerosis may limit angiogenesis and the osteoconductive properties of the graft used in ACDF, thereby contributing to pseudarthrosis.
- BMP-2 is an osteoinductive growth factor and driver of mesenchymal differentiation into osteoblasts, making it critical for healing after fusion. Its activity is modulated by statins and lipids.
- Given that pseudarthrosis rates and inflammation increase according to the number of levels fused, patients undergoing multi-level ACDF may be physiologically more sensitive to additional inflammatory stressors or anti-inflammatory agents.
- Fish oil is a source of eicosapentaenoic acid, which leads to vasodilation and improved perfusion of the spine. Docosahexaenoic acid is also included in fish oil supplements and plays a synergistic role.

Conclusions

- Low LDL is associated with reduced rates of pseudarthrosis after single- and multi-level ACDF.
- Statin and fish oil intake are associated with reduced rates of pseudarthrosis after multi-level, but not single-level, ACDF.
- Providers may use this information to optimize cholesterol levels prior to surgery.
- Higher-level, prospective studies are needed to better understand the impact of statins and fish oil on pseudarthrosis rates. Such studies may support the use of these agents in the pre-operative setting to improve fusion rates after ACDF.