Revision Rate Following Anterior and Posterior Lumbar Fusion Based on Age

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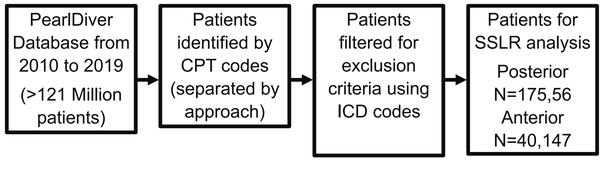
Purpose

- Spinal arthrodesis is the fusion of two or more vertebrae for the purpose of immobilizing the joint(s) of the adjacent vertebrae
- Our study looks at creating stratum-specific likelihood ratios (SSLR) to determine an age range, if one exists where the risk of requiring a revision surgery for lumbar fusion and the associated morbidity may impact perioperative planning or even outweigh the benefit of the surgery itself

Methods

- Data was collected using the Mariner dataset of the PearlDiver Patient Records Database from 2010 to 2019. Current Procedural Terminology (CPT) codes identified surgical procedures
- Patients who underwent anterior or posterior lumbar fusion were identified using CPT codes
- We defined a revision procedure as another lumbar fusion performed after 30 days from the initial procedure.
- Stratum specific likelihood ratio (SSLR) analysis was performed within each cohort to determine age intervals corresponding to increased revision rates.
- Analysis was performed using the PearlDiver Patient Records Database



Flow chart showing how sample population was identified

	PLF Ages 41-62				PLF Ages 63-80			
	Odds Ratio	5%	95%	P-value	Odds Ratio	5%	95%	P-value
1-year Revision	0.726	0.649	0.813	<0.001	0.512	0.446	0.587	<0.001
2-year Revision	0.731	0.665	0.803	<0.001	0.476	0.425	0.534	<0.001
All Complications	1.085	1.028	1.144	0.003	1.302	1.229	1.379	<0.001
SSI	0.731	0.660	0.811	<0.001	0.571	0.508	0.643	<0.001
Renal Failure	1.536	1.206	1.986	0.001	1.998	1.565	2.588	<0.001
Anemia	1.406	1.287	1.540	<0.001	1.625	1.478	1.789	<0.001
Blood Transfusion	1.154	1.006	1.328	0.043	1.279	1.105	1.485	0.001
Pneumonia	0.934	0.794	1.105	0.420	1.001	0.841	1.196	0.995
Stroke	1.466	1.076	2.049	0.020	2.448	1.792	3.427	<0.001
DVT	1.188	0.968	1.472	0.107	1.200	0.966	1.503	0.106
Heart Failure	1.127	0.832	1.559	0.453	1.621	1.202	2.231	0.002
Respiratory Complications	0.870	0.701	1.090	0.217	1.047	0.834	1.326	0.696
Readmission	0.970	0.896	1.050	0.447	0.961	0.880	1.050	0.377

Multivariate Analysis of 1-Year and 2-Year Revision as well as 90-Day Postoperative Complications in Patients Undergoing Posterior Lumbar Fusion (PLF) Between the Ages of 41-62 and 63-80 Years Compared to the 18-40 Years Old Cohort

	ALF Ages 45-50				ALF Ages 51-80			
	Odds Ratio	5%	95%	P-value	Odds Ratio	5%	95%	P-value
1-year Revision	1.164	1.024	1.323	0.020	2.388	2.176	2.624	<0.001
2-year Revision	1.183	1.051	1.332	0.005	2.188	2.005	2.391	<0.001
All Complications	1.110	1.002	1.229	0.045	1.439	1.332	1.556	<0.001
SSI	1.042	0.834	1.298	0.714	1.047	0.881	1.248	0.603
Renal Failure	1.392	0.908	2.134	0.128	2.484	1.827	3.453	<0.001
Anemia	1.217	1.021	1.447	0.027	1.817	1.597	2.073	<0.001
Blood Transfusion	1.359	1.000	1.839	0.048	1.281	1.010	1.636	0.044
Pneumonia	1.135	0.856	1.502	0.375	1.195	0.960	1.498	0.116
Stroke	1.213	0.568	2.581	0.614	3.516	2.092	6.350	<0.001
DVT	1.072	0.790	1.448	0.652	1.074	0.851	1.365	0.551
Heart Failure	1.073	0.603	1.931	0.812	1.931	1.268	3.060	0.003
Respiratory Complication	1.064	0.712	1.580	0.760	2.030	1.534	2.729	<0.001
Readmission	1.176	1.031	1.340	0.015	1.649	1.493	1.823	<0.001

Multivariate Analysis of 1-Year and 2-Year Revision as well as 90-Day Postoperative Complications in Patients Undergoing Anterior Lumbar Fusion (ALF) Between the Ages of 45-50 and 51-80 Years Compared to the 18-44 Years Old Cohort

Results

- In identifying those undergoing posterior lumbar fusion, 175,567 patients were identified
  - 13,947 patients (7.94%) between the ages of 18 and 40
  - 73,434 (41.83%) between the ages of 41 and 62
  - 88,186 (50.23%) between the ages of 63 and 80
- In identifying those undergoing anterior lumbar fusion, 40,147 patients were identified
  - 9,859 patients (24.56%) between the ages of 18 and 44
  - 5,611 (13.98%) between the ages of 45 and 50
  - 24,677 (61.47%) between the ages of 51 and 80
- For both approaches, older patients had a increased risk for 90-day postoperative complications

Take Home Points

- **Older patients undergoing posterior fusion surgery were found to have a lower likelihood of needing revision surgery following the initial procedure**
- **Older patients undergoing anterior lumbar fusion had a higher likelihood of needing revision surgery**
- **Further investigation should be done to determine reasons for differences in revision rates**