

Changing Patterns in Surgical Management of OPLL in the United States: Comorbidities, Complications, and Cost

Hesham Tanbour BSME¹, Sean Taylor BS¹, Zuhair J. Mohammad BS¹, Saurabh Rawall MD¹, Gerald McGwin PhD¹, Sakthivel M. Rajaram MD¹
¹Department of Orthopaedic Surgery, University of Alabama at Birmingham, Birmingham, AL, USA

Email of Presenting Author: htanbo2@uic.edu

Disclosures: All the authors do not have financial disclosures or conflicts of interest, except for Sakthivel Rajaram discloses that he has previously received grant funding from K2M and AOSpine North America, and previously received consulting fees from Cerapedics.

INTRODUCTION: Ossification of the posterior longitudinal ligament (OPLL) is a rare spinal condition that can lead to significant neurological deficits. While prior research has focused predominantly on Asian populations, contemporary data on OPLL surgical management in the United States remains limited.

METHODS: Using the National Inpatient Sample (NIS) from 2016 to 2021, we identified patients undergoing surgery for OPLL. Hospitalization records for patients with an OPLL diagnosis were identified by International Classification of Diseases, 10th revision (ICD-10) coding in NIS between 2016 and 2021. Diagnosis and surgical procedures were identified using ICD-10 diagnostic codes (ICD-10-CM) and ICD-10 procedure codes (ICD-10-PCS), respectively. Patients were stratified by surgical approach: anterior decompression/fusion (AF), posterior decompression/fusion (PF), decompression only, and combined anterior-posterior decompression/fusion. Demographics, hospital characteristics, postoperative complications, length of stay, and hospital charges were compared using weighted analyses. Analysis of variance (ANOVA) and Rao-Scott adjusted Chi-squared tests were used to assess differences among categorical variables. Continuous variables (e.g. age, length of stay, and total hospital charges) were analyzed using survey-weighted linear regression model to account for complex sampling design of the NIS database. Linear regression was used to evaluate OPLL surgical management trends over designated study period.

RESULTS SECTION: A total of 3450 patients between 2016 and 2021 were hospitalized and received surgical intervention for a diagnosis of OPLL with the mean age of 59 years and 60/40 male/female ratio. Our trend analysis indicated OPLL cases in the US have risen significantly in recent year ($p < 0.01$) and, specifically, AF cases. PF (44%) was the most common procedure among the surgical approaches. Significant differences in dysphagia, neurological and surgical site infections (SSI) complication rates were found among the four approaches ($p < 0.05$). Liver disease was associated with an increase in dysphagia complications in the Combined cohort ($p < 0.05$). Higher neurological complication rates were observed in patients with CHF in the AF group, liver disease in the Combined group, and AIDS, CVA, or hemiplegia in the Decompression group (all $p < 0.05$). SSI were significantly higher in patients with liver disease, chronic kidney disease (CKD) and diabetes mellitus (DM) in the Combined group (all $p < 0.05$). The Combined approach was least frequent (8.8%) but was associated with the longest hospital stay (7.23 days) and highest total charges (\$248,953 $p < 0.001$). Lastly, we found the optimal approach for OPLL surgery in terms of cost, complication and comorbidity-burden to be the AF approach which explains its increase in prevalence in recent years

DISCUSSION: Regarding trends, our analysis found that PF cases are in decrease since 2020 while AF cases continue to increase with overall trend. Trends prior to 2016 noted higher overall complication rates with AF compared to PF, while our study show any complication rates for AF (36%) versus PF (42%). A key difference between studies lies in the reporting of neurological complications. While Bernstein et al. documented higher neurological complication rates with AF (2.1%) compared to PF (1.2%), while Table 1 below shows AF cases having 16% neurological complication rate vs PF at 17.6%. In terms of hospital resource utilization, our findings align with those of Bernstein et al. combined procedures were associated with the highest total charges and the longest hospital stays, whereas AF had the shortest length of stay and decompression alone was the least costly approach shown in Table 2. Our study is the first to find associations between comorbidities and complication rates under each approach group. A high number of statistically significant associations between liver disease and complications ($n=6$), with CKD ($n=3$) and DM ($n=3$) tied for second, across approaches shed light on the importance to account for comorbidity burden in perioperative planning, anticipate heightened risks, and incorporate liver disease into risk stratification models when managing OPLL patients.

SIGNIFICANCE/CLINICAL RELEVANCE: (1-2 sentences): To our knowledge, this is the largest study, in the last decade, examining the surgical treatment of OPLL in the United States. These findings highlight that liver disease is a consistent and significant predictor of perioperative complications across surgical approaches for OPLL, underscoring the need for targeted risk stratification, tailored perioperative optimization, and careful surgical decision-making in this high-risk subgroup.

IMAGES AND TABLES: (Right- Table 1: OPLL Complications rate across the four surgical approaches. Left- Table 2: LOS, Cost and Mortality rates for each approach)

Complication Type	AF (n=1025)	Combined (n=310)	Decompression (n=645)	PF (n=1560)	P-value	Approach	Length of Stay (days)	Total Charges (\$)	Mortality (%)
Dysphagia (%)	105 (10.2)	50 (16.1)	5 (0.8)	50 (3.2)	<.0001	AF	4.77	146,614.41	0
Neurological (%)	75 (7.3)	20 (6.5)	80 (12.4)	275 (17.6)	0.002	Combined	7.23	248,953.01	5 (0.02%)
Durotomy (%)	45 (4.4)	15 (4.8)	10 (1.6)	35 (2.2)	0.247	Decompression	5.26	108,497.09	5 (0.77%)
DVT (%)	5 (0.5)	0	10 (1.5)	50 (3.2)	0.088*	PF	7.19	189,546.62	15 (0.96%)
PE (%)	10 (1.0)	0	0	10 (0.6)	0.670*	P-value	0.059	<.0001	0.857*
SSI (%)	0	10 (3.2)	5 (0.8)	5 (0.3)	0.043*	AF—Anterior decompression and fusion; PF—posterior decompression and fusion Data are presented as mean values. Values in bold are statistically significant. *Statistical significance value only for non-zero values.			