

# Correlation of Posterior Occipitocervical Angle and Surgical Outcomes for Occipitocervical Fusion

Christopher M. Maulucci<sup>1</sup> George M. Ghobrial<sup>1</sup> Ashwini D. Sharan<sup>1</sup> James S. Harrop<sup>1</sup> Jack I. Jallo<sup>1</sup>  
Alexander R. Vaccaro<sup>2</sup> Srinivas K. Prasad<sup>1</sup>

<sup>1</sup>Department of Neurosurgery, Thomas Jefferson University, Philadelphia, Pennsylvania, United States

<sup>2</sup>Rothman Institute, Philadelphia, Pennsylvania, United States

Address for correspondence Christopher M. Maulucci, MD, 909 Walnut Street, 3rd Floor, Philadelphia, PA 19101, United States (e-mail: cmaulucci@gmail.com).

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## Abstract

**Study Type** Retrospective cohort study.

**Introduction** Craniocervical instability is a surgical disease, most commonly due to rheumatoid arthritis, trauma, erosive pathologies such as tumors and infection, and advanced degeneration. Treatment involves stabilization of the craniovertebral junction by occipitocervical instrumentation and fusion. However, the impact of the fixed occipitocervical angle on surgical outcomes, in particular the need for revision surgery and the incidence of dysphagia, remains unknown. Occipitocervical fusions (OCFs) at a single institution were reviewed to evaluate the relationships between postoperative neck alignment, the need for revision surgery, and dysphagia.

**Objective** The objective of this study is to determine whether an increased posterior occipital cervical angle results in an increase in the need for revision surgery, and secondary, dysphagia.

**Methods** A retrospective review of spinal surgery patients from January 2007 to June 2013 was conducted searching for patients who underwent an occipitocervical instrumented fusion utilizing diagnostic and procedural codes. Specifically, a current procedural code of 22590 (arthrodesis, posterior technique [craniocervical]) was queried, as well those with a description of “craniocervical” or “occipitocervical” arthrodesis. Ideal neck alignment before rod placement was judged by the attending surgeon. A review of all cases for revision surgery or evidence of dysphagia was then conducted.

**Results** From January 2007 to June 2013, 107 patients were identified (31 male, 76 female, mean age 63). Rheumatoid arthritis causing myelopathy was the most common indication for OCF, followed by trauma. Twenty of the patients were lost to follow-up and seven died within the perioperative period. Average follow-up for the remaining 80 patients was 16.4 months. The mean posterior occipitocervical angle (POCA), defined as the angle formed by the intersection of a line drawn tangential to the posterior aspect of the occipital protuberance and a line determined by the posterior aspect of the facets of the third and fourth cervical vertebrae, calculated after stabilization, was 107.1 degrees (range, 72–140 degrees). Reoperation was required in 11 patients (11/107, 10.3%). The

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mean POCA for the reoperation group was 109.5 degrees (range, 72–123) and was not significantly different than patients not requiring reoperation (106.5,  $p > 0.05$ ). However, for all pathologies excluding infection as a cause for reoperation, the mean POCA was significantly higher, 115.14 degrees ( $p = 0.039$ ) (►Table 1). Seven patients (6.5%) complained of dysphagia postoperatively with a significantly higher POCA of 115 degrees ( $p = 0.039$ ). Of these seven patients, six underwent posterior-only procedures. One patient underwent anterior and posterior procedures for a severe kyphotic deformity. The dysphagia resolved in six patients over a mean of 3 weeks (range, 2–4 weeks). One patient, whose surgery was posterior only, required the insertion of a gastrostomy tube.

**Conclusions** An elevated POCA may result in need for reoperation due to increased biomechanical stress upon adjacent segments or the construct itself due to flexion in an attempt to maintain forward gaze. Further, an elevated POCA seems to also correlate with a higher incidence of dysphagia. Further investigation is necessary to determine the ideal craniocervical angle which is likely individualized to a particular patient based on global and regional spinal alignments.

**Table 1** Comparison of occipitocervical fusion patient groups

	Revision	No revision	<i>p</i>
<i>N</i>	11 (10%)	96 (89%)	—
POCA	Mean: 109.5 Range: 72–123	Mean: 107.1 Range: 85–141	0.23
	Revision (excluding infection as indication)	No revision	
Adjacent level disease	2 (1.8%)		
Instrumentation failure	5 (4.7%)		
Total	7 (6.5%)	94 (88%)	
POCA (degrees)	Mean: 115 Range: 80–136	Mean: 107.1 Range: 85–141	0.039

Note: When patients who underwent revision surgery for reasons other than infection (adjacent segment degeneration or instrumentation failure), a significantly higher POCA (115 degrees,  $n = 0.039$ ) was found.

#### Disclosures

Christopher M. Maulucci, none

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#### Note

This study has been approved by the institutional review board (IRB) of Thomas Jefferson University.

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