



A Review of Postoperative Delayed Cervical Palsies: Understanding the Etiology

Ryan Planchard BE; Patrick R. Maloney MD; Grant William Mallory MD; Ross Puffer MD; Robert J. Spinner MD; Ahmad Nassr MD; Jeremy Lee Fogelson MD; Michelle J. Clarke MD

Mayo Clinic
Rochester, MN



Introduction

Delayed cervical palsy (DCP) is a recognized complication of cervical spine surgery, most commonly noted at the C5 level. Various theories, such as mechanical stretch or inflammatory responses have been proposed, but the true etiology is unknown. Here we assess the incidence and presence of medical and procedural risk factors correlated with the development of a DCP following cervical spine surgery.

Methods

We retrospectively reviewed 6-years of consecutive cervical decompressions with and without instrumented fusion. In addition to baseline demographics and procedural information, autoimmune risk factors for post-surgical inflammatory neuropathy such as history of autoimmune disease, diabetes, smoking, and blood transfusions were also collected. Univariate and multivariate analysis was performed to identify significant predictors of DCP.

Significant Variables on Univariate and Multivariate Analysis

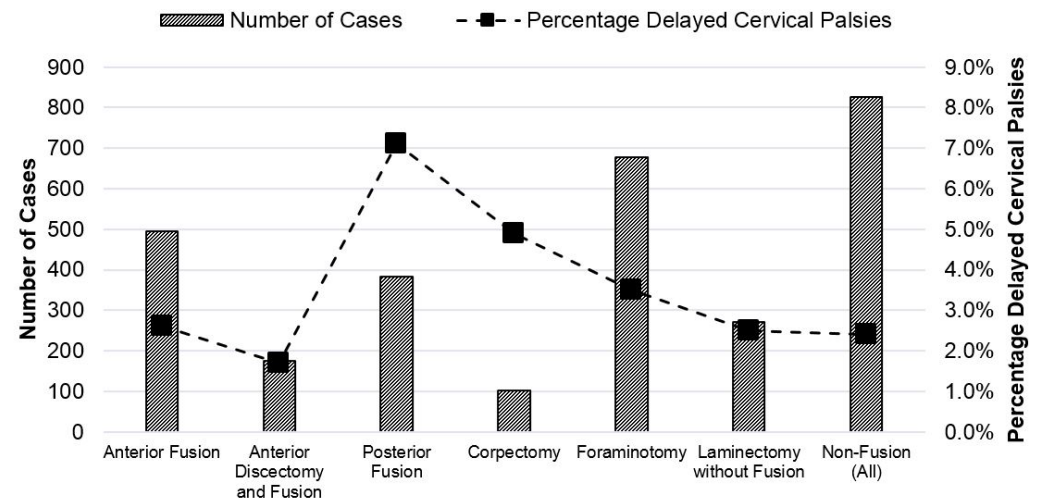
Variable	Univariate Analysis			Multivariate Analysis		
	OR	95% CI	p-Value	OR	95% CI	p-Value
Age (Per Year)	1.07	1.008-1.050	0.0061*	1.01	0.993-1.037	0.1815
History of Autoimmune Disease - Other	3.83	1.418-8.730	0.0107*	2.95	1.047-7.092	0.0416*
Intraoperative Transfusion	2.57	1.152-5.132	0.0231*	0.85	0.346-1.890	0.6966
Number of Levels (Per Level)	1.42	1.247-1.605	<0.0001*	1.27	1.075-1.496	0.0053*
Posterior Fusion	3.30	1.920-5.653	<0.0001*	1.54	0.781-3.020	0.2133
Sitting	0.28	0.084-0.689	0.0036*	0.42	0.123-1.103	0.0816

* p<0.05

Results

Of 1669 patients, 56 (3.4%) developed a DCP. While the majority of palsies involved C5 (71%), 55% of palsies involved more than one myotome and 18% were bilateral. On univariate analysis, increased risk of DCP was significantly correlated with age ($p=0.0061$, OR=1.07, 95% CI 1.008-1.050), posterior instrumented fusion ($p<0.0001$, OR=3.30, 95% CI 1.920-5.653), prone vs. semi-sitting/sitting position ($p=0.0036$, OR=3.58, 95% CI 1.451-11.881), number of levels ($p<0.0001$, OR=1.42, 95% CI 1.247-1.605), transfusion ($p=0.0231$, OR=2.57, 95% CI 1.152-5.132), and non-specific autoimmune disease ($p=0.0107$, OR=3.83, 95% CI 1.418-8.730). On multivariate analysis, number of operative levels ($p=0.0053$, OR=1.27, 95% CI 1.075-1.496) and non-specific autoimmune disease ($p=0.0416$, OR 2.95, 95% CI 1.047-7.092) remained significant. Risk factor analysis was also performed for prevalent procedure categories.

Delayed Cervical Palsies by Procedure Category



Conclusions

The incidence of DCP is higher in patients undergoing more extensive procedures. While a mechanical etiology is partially supported as a cause for DCP, notable correlations with autoimmune risk factors as well as bilateral and multi-myotomal involvement supports the hypothesis that some DCPs may result from an autoimmune response. The present series suggests that the etiology of DCPs is multifactorial.

Learning Objectives

- 1) Delayed cervical palsy is a recognized complication of cervical spine surgery with uncertain etiology
- 2) The overall incidence of delayed cervical palsy was 3.4%
- 3) Age, posterior fusion, prone vs. sitting position, number of operative levels, intraoperative transfusion, and non-specific autoimmune disease were all significantly correlated with increased risk of delayed cervical palsy on univariate analysis

References

- Currier BL: Neurological complications of cervical spine surgery: C5 palsy and intraoperative monitoring Spine (Phila Pa 1976). Mar 1 2012;37(5):E328-334, 2012.
- Hasegawa K, Homma T, Chiba Y: Upper extremity palsy following cervical decompression surgery results from a transient spinal cord lesion Spine (Phila Pa 1976). Mar 15 2007;32(6):E197-202, 2007.
- Hayter SM, Cook MC: Updated assessment of the prevalence, spectrum and case definition of autoimmune disease Autoimmun Rev. Aug 2012;11(10):754-765, 2012.