Comparative Analysis of ACDF and PCDF for Traumatic Cervical Facet Fractures/Dislocations: 90-Day Medical Complications, Surgical Outcomes, and Trends Over the Last Decade

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INTRODUCTION: The preferred treatment for traumatic cervical facet fracture and/or dislocation, with or without spinal cord injury, remains controversial. Recent trends for surgical treatment with anterior cervical discectomy and fusion (ACDF) versus posterior cervical decompression and fusion (PCDF) have not been well described over the past decade. The present study aims to evaluate the current trends for usage of ACDF versus PCDF for the treatment of traumatic cervical facet fracture and/or dislocations, along with comparing outcomes following each approach. METHODS:

The PearlDiver database was queried to identify patients that sustained a traumatic cervical facet fracture and/or dislocation, with and without spinal cord injury, who underwent ACDF or PCDF between 2010 and 2020. Patients were then matched 1:1 based on age, gender, and Charlson comorbidity index (CCI). Comparative analyses were performed on the entire cohort and a sub analysis was performed to compare outcomes of the procedures in patients with spinal cord injury (SCI). Variables compared included demographics, comorbidities, 90-day medical complications, and surgical outcomes from 90 days to 2-years. Finally, epidemiologic yearly trends in the procedure choice for cervical trauma were identified and significance of change was assessed with Mann-Kendall testing.

RESULTS: The overall cohort included 5,010 matched patients with the same age (54.3 ± 17.0) , CCI (1.6 ± 1.9) , and proportion of females (35.2%). PCDF patients had a greater proportion of chronic pulmonary disease, congestive heart failure, depression, and hypertension. At 90-days PCDF patients had more wound dehiscence (RR 3.3, 95% CI 2.3-4.5), surgical site infection (RR 3.0, 95% CI 2.3-3.9), hematoma (RR 2.0, 95% CI 1.3-3.1), instrument failure (RR 1.5, 95% CI 1.0-2.1), and nerve injury (RR 3.2, 95% CI 1.2-8.8), p<0.05. At 1-year, instrument failure (RR 1.9, 95% CI 1.2-2.9), hardware removal (RR 1.9, 95% CI 1.1-3.1), and SCI sequelae (RR 1.7, 95% CI 1.3-2.3) were higher in PCDF patients and instrument failure (RR 2.6, 95% CI 1.3-5.2) and SCI sequelae (RR 1.7, 95% CI 1.2-2.3) continued to be higher at 2-years, p<0.05. Sub analysis of the 1,939 matched patients with SCI, revealed a similar age (47.6\pm17.8), CCI (1.7\pm2.1), and proportion of females (27.6%), p>0.05. In addition, medical and surgical complications not statistically different between ACDF and PCDF with exception of irrigation and debridement. Finally, Mann-Kendall testing revealed increased usage of both ACDF and PCDF techniques within the last decade with PCDF demonstrating a greater rise recently, p<0.001.

DISCUSSION AND CONCLUSION:

Surgery for cervical facet fractures and/or dislocations has increased over the past decade reflecting the more aggressive proclivity for surgeons to operate on these injuries, with an oscillating preference for ACDF and PCDF. Despite similar baseline characteristics, patients who underwent PCDF experienced higher rates of 90-day medical complications and instrument failure at all time points. However, when stratified by fractures associated with spinal cord injury, ACDF and PCDF and PCDF and PCDF and PCDF and proceed on the set of t

	Dislocation or Fracture N = 5010			Dislocation or Fracture with Spinal Cord Injury N = 1939		
	ACDF	PCDF	P-value	ACDF	PCDF	P-value
1 Day to 90 Day Compli	ications					
Wound Dehiscence	48 (0.96)	153 (3.05)	<0.001	46 (2.37)	50 (2.58)	>0.05
SSI	73 (1.46)	214 (4.27)	<0.001	47 (2.42)	54 (2.78)	>0.05
Hematoma	29 (0.58)	57 (1.14)	0.003	15 (0.77)	17 (0.88)	>0.05
Instrument Failure	48 (0.96)	71 (1.42)	0.042	12 (0.62)	10 (0.52)	>0.05
Hardware Removal	56 (1.12)	75 (1.50)	>0.05	17 (0.88)	13 (0.67)	>0.05
Irrigation and Debridement	65 (1.30)	100 (2.00)	0.008	50 (2.58)	61 (3.15)	>0.05
Anterior Reoperation	55 (1.10)	53 (1.06)	>0.05	15 (0.77)	18 (0.93)	>0.05
Posterior Reoperation	145 (2.89)	114 (2.28)	>0.05	62 (3.20)	47 (2.42)	>0.05
Dural Tear	5 (0.10)	6 (0.12)	>0.05	3 (0.15)	2 (0.10)	>0.05
Nerve Injury	5 (0.10)	16 (0.32)	0.029	4 (0.21)	4 (0.21)	>0.05
SCI Sequelae	31 (0.62)	59 (1.18)	>0.05	55 (2.84)	57 (2.94)	>0.05
1 Year Complications						
Instrument Failure	32 (0.64)	59 (1.18)	0.006	10 (0.52)	11 (0.57)	>0.05
Pseudoarthrosis	43 (0.86)	56 (1.12)	>0.05	4 (0.21)	5 (0.26)	>0.05
Hardware Removal	24 (0.48)	45 (0.90)	0.016	6 (0.31)	9 (0.46)	>0.05
Irrigation and Debridement	79 (1.58)	146 (2.91)	<0.001	81 (4.18)	101 (5.21)	0.044
Anterior Revision	26 (0.52)	34 (0.68)	>0.05	5 (0.26)	9 (0.46)	>0.05
Posterior Revision	39 (0.78)	50 (1.00)	>0.05	17 (0.88)	14 (0.72)	>0.05
Dural Tear	6 (0.12)	6 (0.12)	>0.05	0 (0.00)	0 (0.00)	>0.05
Nerve Injury	7 (0.14)	18 (0.36)	0.045	5 (0.26)	5 (0.26)	>0.05
SCI Sequelae	83 (1.66)	145 (2.89)	<0.001	105 (5.42)	121 (6.24)	>0.05
2 Year Complications						
Implant Complications	32 (0.64)	36 (0.72)	>0.05	15 (0.77)	15 (0.77)	>0.05
Instrument Failure	12 (0.24)	32 (0.64)	0.004	2 (0.10)	7 (0.36)	>0.05
Pseudoarthrosis	73 (1.46)	130 (2.59)	<0.001	17 (0.88)	17 (0.88)	>0.05
Hardware Removal	17 (0.34)	31 (0.62)	>0.05	5 (0.26)	6 (0.31)	>0.05
Irrigation and Debridement	76 (1.52)	114 (2.28)	0.007	65 (3.35)	69 (3.56)	>0.05
Anterior Revision	19 (0.38)	17 (0.34)	>0.05	6 (0.31)	8 (0.41)	>0.05
Posterior Revision	16 (0.32)	19 (0.38)	>0.05	7 (0.36)	6 (0.31)	>0.05
Dural Tear	6 (0.12)	6 (0.12)	>0.05	3 (0.15)	2 (0.10)	>0.05
Nerve Injury	8 (0.16)	18 (0.36)	>0.05	9 (0.46)	9 (0.46)	>0.05
SCI Sequelae	108 (2.16)	188 (3.75)	<0.001	152 (7.84)	173 (8.92)	>0.05