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Research Article

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Complications Associated With Anterior Cervical Discectomy and Fusion (ACDF) and Cervical Disc Arthroplasty (CDA): A Five-Year Analysis in a Single Neurosurgical Department in New Zealand

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Introduction

Anterior cervical discectomy and fusion (ACDF) is a commonly performed spinal procedure used to manage a variety of cervical spine disorders. It is often considered the gold standard treatment for cervical radiculopathy or myelopathy secondary to prolapsed intervertebral disc, spondylosis, degenerative disc disease and trauma [1,2]. Generally, this procedure is effective and associated with satisfactory outcomes. There are however potential risks and post-operative complications that may be associated with this procedure and need to be taken into consideration, as if they remain undetected may lead to permanent neurological deficit or even death [3]. Cervical disc arthroplasty (CDA) is an alternative surgical approach which emerged to maintain cervical biomechanics whilst trying to reduce the complications associated with ACDF such as dysphagia and adjacent segment degeneration [4,5]. Many studies have been performed comparing outcomes of ACDF to CDA; however the findings are not consistent, with many reporting a difference and others reporting no difference between the two procedures [6,7]. We performed a five-year analysis of complications associated with both ACDF and CDA in our neurosurgical department.

Aims

The objective of this study was to determine the complications of anterior cervical discectomy and fusion (ACDF) and cervical disc arthroplasty (CDA) in a single Neurosurgical department in New Zealand over a five-year period, and to identify any predisposing factors.

Methods

A retrospective, case control study was conducted by the neurosurgical unit at Waikato Hospital, New Zealand. Inclusion criteria included all adult patients admitted under the neurosurgical team in our hospital between February 2013 and February 2018 that underwent single or multilevel ACDF or CDA with or without decompression. All other patients not meeting this criterion were excluded. Statistical analysis was performed using data obtained by two reviewers independently, from operation and anaesthetic records, clinical notes, discharge summaries, radiology and imaging reports. A total of 118 patients were analysed. Data extracted included the age at time of surgery, sex, diagnosis, and number of levels fused, to assess their potential role as risk factors for developing complications.

Characteristics

Our cohort included 118 patients in total of which 74 were males and 44 females. The breakdown of procedures included 109 ACDF, 1 revision ACDF, 5 cervical disc arthroplasty and 3 ACDF with partial corpectomy. This consisted of 57 single spinal level, 45 two-level, 14 three-level and 2 four-level surgeries. Patient's age ranged between 25 to 76 years of age, with a mean age of 54.13 years. The majority of patients had spinal pathology of degenerative aetiology, accounting for 94.92%. Traumatic aetiology accounted for the remainder 5.1% (6/118) of patients.

Results

The average length of hospital stay was 3.78 days for patients without complications, compared to 5.24 days in the group with complications. There was only 1 complication in the cervical disc arthroplasty group, which was C5 palsy, which resolved completely by routine follow up. The mortality rate in our cohort series was 0%.

Of the 29 patients with complications, some had more than one complication. Dysphagia was the most common post-operative complication being 16.95% followed by dysphonia at 8.47%. At time of discharge or on routine follow up, 95% of patients with post-operative dysphagia and 90% of patients with post-operative dysphonia were recorded to have resolved completely or had significant improvement in symptoms.

Post-operative superficial wound infection accounted for 2.54% of the cohort and all were treated with IV antibiotics. Post-operative haematoma occurred in only 1.69% of all patients and none required surgical intervention. Dural penetration with CSF leak also occurred in 1.69% of patients and all were repaired intraoperatively. There were no deep wound infections in this cohort.

Much rarer complications such as inadvertent lateral pharyngeal wall injury occurred in 1 patient (0.85%) and this was repaired intraoperatively. Symptomatic recurrent laryngeal nerve injury also

occurred in 1 patient (0.85%). Horner's syndrome did not occur in any of the patients in this cohort. Only 1 patient required a revision ACDF due to a displaced cage.

Table 1: Spinal levels operated

Numbers of spinal levels operated:	Complications	Total	Percentage
1-level	10	57	17.54%
2-level	13	45	28.89%
3-level	5	14	35.71%
4-level	1	2	50%

Table 2: Hospital stay

	Group without complications	Group with complications
Length of hospital stay (days)	3.78	5.24

Table 3: Post-operative complications

Post-Operative complications	Complication rate	Complete resolution or symptomatic improvement on discharge
Dysphagia	16.95% (20/118)	95% (19/20)
Dysphonia	8.47% (10/118)	90% (9/10)
Wound infection	2.54% (3/118)	100% (3/3)
CSF Leak	1.69% (2/118)	100% (2/2)
Haematoma	1.69% (2/118)	100% (2/2)
Pharyngeal wall injury	0.85% (1/118)	100% (1/1)
C5 palsy	0.85% (1/118)	100% (1/1)
Recurrent laryngeal nerve injury	0.85% (1/118)	0% (0/1)

Limitations

Our hospitals health district has two separate units (Neurosurgery and Orthopaedics) that can perform ACDF and CDA procedures. The orthopaedics unit is generally on call for all acute spinal traumas. This study only captured the cohort of patients operated on by the Neurosurgical team.

This study also has the limitations associated with a retrospective study. A small sample size may affect the statistical power of our results and a larger cohort size would have reduced the sampling bias. Further, all elective patients in our unit are generally admitted one day prior to surgery for anaesthetic review and surgical consent, and this would affect our hospital length of stay.

Conclusion

ACDF and CDA are generally a safe procedure with significant complications being quite rare. Complications at the early post-operative period are more common and tend to be self-limiting without requiring further intervention. We concluded from this study that the greater number of levels operated on, the higher the risk of complications. We were unable to identify any other preoperative risk factors that could be modified to prevent or delay complications. Early recognition of complications and prompt management is most important to improving post-operative outcomes.

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