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Minimally invasive cervical laminectomy for spondylotic myelopathy in medically fragile patients

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ABSTRACT

Background: Cervical spondylotic myelopathy often affects elderly and fragile patients who are not optimal candidates for major surgical procedures. Here, we report patients previously judged not suitable for cervical surgery, who were successfully treated with minimally invasive (MI) cervical decompressions without complications.

Methods: Retrospectively, we reviewed medically fragile patients (e.g., too many comorbidities), previously deemed unsuitable for surgery who successfully tolerated MI cervical decompressions. The accompanying preoperative comorbidities, surgical risks, complications, and neurological outcomes were assessed.

Results: Three male patients, with a mean age of 73 years, exhibited an average preoperative modified Japanese Orthopedic Association (mJOA) score of 8. The preoperative Charlson comorbidity indices, the Elixhauser comorbidity indices (respectively averaging 5.7 and 5.7 points, the preoperative Edmonton fragility index (average 12 points), and national surgical quality improvement program risks were calculated. Surgical times averaged 185 min and patients were followed for an average of 11.3 months. No patient had any immediate or delayed postoperative complications. The length of hospital stay was 1 day for each patient. The postoperative mJOA scores averaged 11, which was clinically significant. Further, the postoperative magnetic resonance imaging obtained approximately 3 months postoperative demonstrated adequate cord decompression.

Conclusion: Medically fragile patients with significant cervical spondylotic myelopathy but major comorbidities precluding major surgery successfully underwent MI cervical decompressions.

Keywords: Cervical spondylotic myelopathy, Elderly, Medically fragile, Minimally invasive cervical decompression

INTRODUCTION

In the elderly with cervical spondylotic myeloradiculopathy, data demonstrate relatively high posterior cervical fusion (10.5%) or combined anterior and posterior cervical surgery (9.02%) complication rates. Furthermore, many elderly patients are medically fragile with other major comorbidities which increase the risk of major cervical surgery. For example, inadequate bone density potentiates higher pseudarthrosis rates, whereas compromised nutrition may result in poor healing, wound breakdown, and infection. Here, however, minimally invasive (MI) cervical laminectomy may prove beneficial. To better evaluate this, we studied three high-risk elderly patients for whom we performed MI cervical laminectomies for myelopathy due to cord compression.

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METHODS

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. For this type of study, formal consent is not required, the study was approved by the institutional review board with a waiver of authorization.

The senior author performed all three MI spine decompressive procedures through an 18 mm tubular retractor using a 5 mm smooth diamond drill for bone removal. Pre- and postoperative modified Japanese Orthopedic Association (mJOA) were reviewed.^[7] Patients were assigned Charlson comorbidity index (CCI) scores,^[2] Elixhauser comorbidity index (ECI) scores,^[3] and Edmonton frailty scale (EFS) scores^[8] based on the review of electronic medical records. In addition, National Surgical Quality Improvement Program (NSQIP) scores were calculated to estimate surgical risks (American College of Surgeons NSQIP).^[1] Patients were followed postoperatively and underwent postoperative cervical magnetic resonance imaging (MRI) approximately 3 months after surgery. The characteristics of the three identified cases are shown in Table 1. The mean age of the three males was 73 years. The mean preoperative mJOA score was 8, CCI was 5.7, ECI was 5.7, and EFS was 12. NSQIP risk calculations are shown in Figure 1.

RESULTS

No patient had any immediate or delayed postoperative complications. The length of stay was 1 day for each patient. Two patients returned to the skilled nursing facility in which they were living preoperatively and one went home.

Post-operative mJOA scores averaged 11, a statistically significant improvement, and patients were followed for a

mean interval of 11.3 months. Three-month postoperative MRI scans showed good cord decompression and no need for further surgery [Figure 1].

DISCUSSION

The postoperative courses for the three cases presented were less complicated than predicted by the CCI, the ECI, the EFS,



Figure 1: Case #1, pre (a) and postoperative (b) cervical sagittal T2-weighted magnetic resonance imaging (MRI) scans show good decompression at C5-C6. Case #2, pre (c) and postoperative (d) cervical sagittal T2-weighted MRI scans show good decompression at C4-C5. Case #3, pre (e) and postoperative (f) cervical axial T2-weighted MRI scans show good decompression at C2-C3.

Table 1: Three case mean demographic (all male), pre- and postoperative indices and scores, and risk, operative and examination data.											
Preoperative indices and scores								Risk data			
Age (years)	mJOA	CCI	ECI	EFS	Frailty		BMI (kg/m ²)	NSQIP	Estimated 10-year survival (%)		↑Inhospital mortality (%)
73	8	5.7	5.7	12^{\dagger}	2 [†] moderate-severe		28.61	above average	14.67		46.23
Operative data				Examination Data					Postoperative data		
Time (min)	BP (BP (mmHg)		Pulse (Pulse (bpm) O_2 (%)		BMI (kg/m ²)		mJOA Follow-		up (months)
185	1.	131/80		87.67		95	28.61	11		11.3	
†Extrapolated from available information. ↑Increased. mJOA: Modified Japanese Orthopedic Association, CCI: Charlson comorbidity index,											

ECI: Elixhauser comorbidity index, EFS: Edmonton frailty score, BMI: Body mass index, NSQIP: National surgical quality improvement scores, BP: Blood pressure

and NSQIP risk calculators. Therefore, MI decompression may result in better than predicted outcomes than the presumably open surgeries used to calibrate currently available risk assessment tools.

MI laminectomy is performed through a 2 cm incision resulting in minimal blood loss, less postoperative pain than open surgery, fewer wound complications vs. open procedures (e.g., such as no infection or cerebrospinal fluid leaks),^[6] and less systemic stress than open surgery.^[4] MIS surgery is associated with lower infection rates vs. open surgery as reported in several studies.^[5,6]

CONCLUSION

We conclude that the three medically fragile patients we presented here with major comorbidities, who were not candidates for larger cervical procedures, benefitted from MI cervical laminectomy. Current surgical risk assessment tools may not be appropriate for MI spine procedures.

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Conflicts of interest

There are no conflict of interest.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms.

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