Revision rates and complications following surgery for cervical myelopathy over a 10-year period

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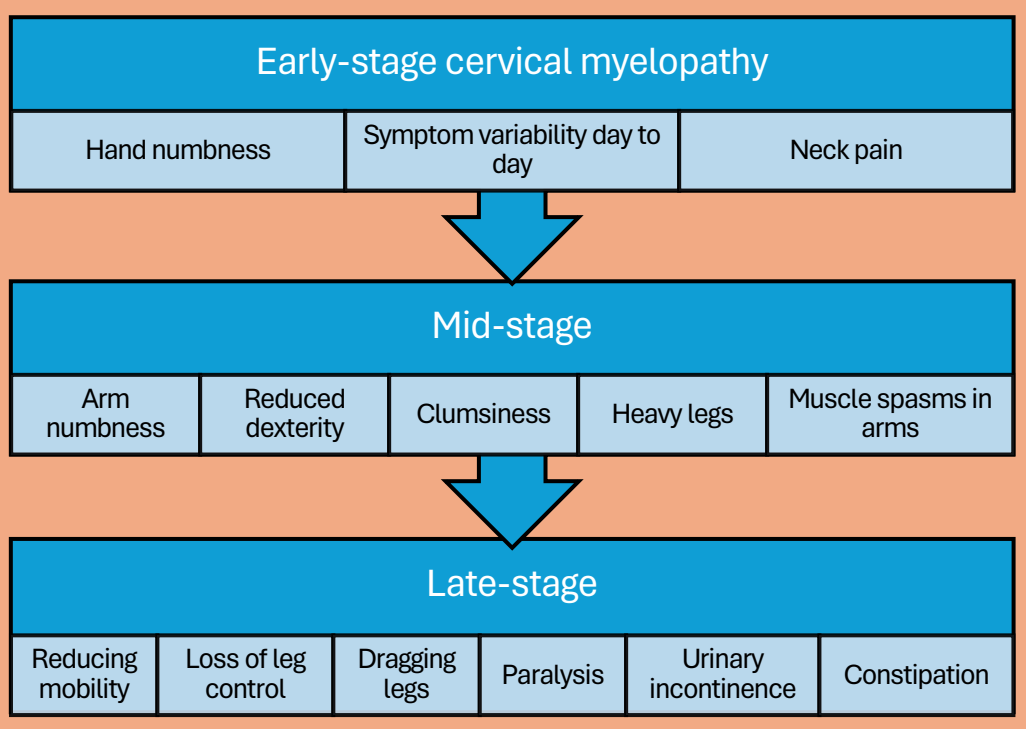
Objectives

To identify all cervical myelopathy operations from January 2013 to December 2022 conducted in University Hospital Wales and identify the revision rates and clinical outcomes, including mortality. Collecting information on:

- The proportion of surgeries which take an anterior, posterior or antero-posterior surgical approach.
- The rate of revisions.
- The proportion of neurological symptoms returning after surgical decompression.
- The rate of adverse events.
- Pre-operative risk factors associated with adverse events, ongoing symptoms and revision surgeries.

Introduction

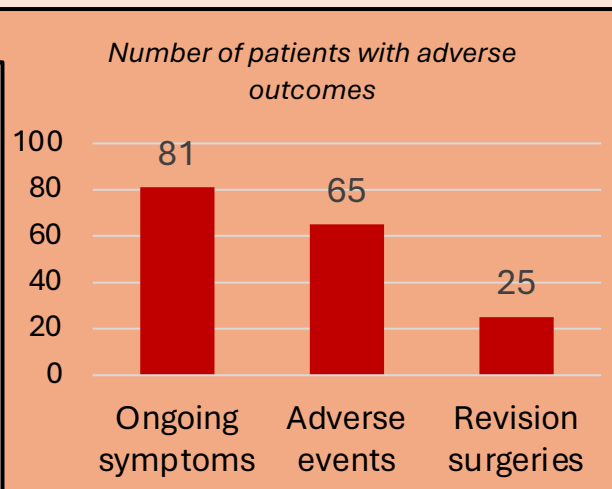
Cervical myelopathy is a condition which describes the compression of the spinal cord in the cervical spine, resulting in symptoms included *below* (1). Cervical myelopathy can be surgically managed, with the aim to decompress the spinal cord, and it is shown to improve patient's quality of life, neurological function and pain (1). Studies have shown varying rates of adverse events occurring after surgery, with some suggesting anterior surgery is associated with fewer adverse events and greater functional improvement (2-5). Several studies have shown that there is no difference in functional outcomes or safety between anterior and posterior (6-9). As a result, the aim of this study was to gather information about the primary cervical myelopathy surgeries conducted and to analyse the rate of adverse events and reoperations in our hospital.



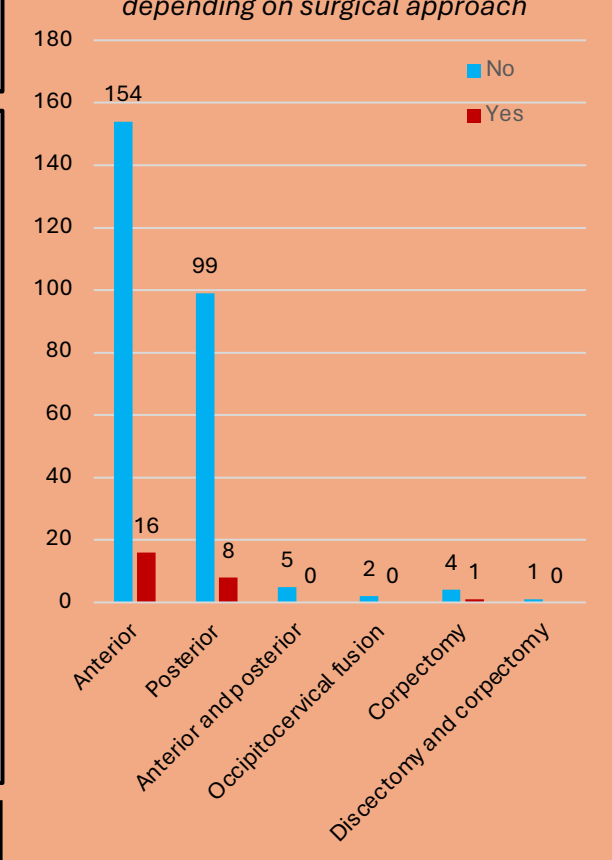
Methods

The hospital BlueSpier Database was used to identify all patients who had primary surgeries for cervical myelopathy between 1st January 2013 and 31st December 2022. Information on each patient's presentation and diagnosis, pre-operative imaging, surgical approach, post-operative complications, and reoperations was collected and analysed using SPSS.

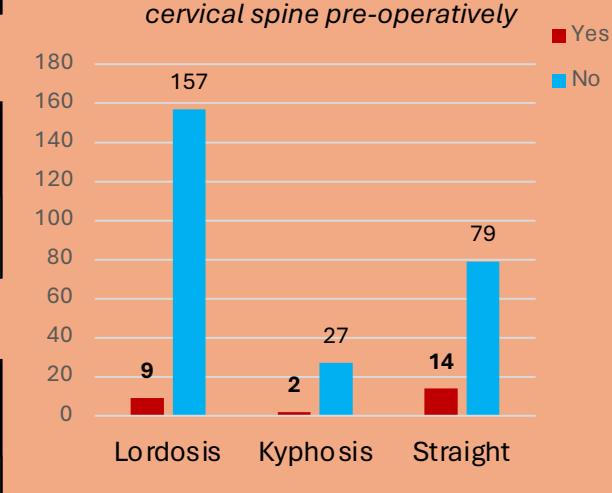
Number of patients with adverse outcomes



Number of patients with revision surgeries depending on surgical approach



Number of patients with revision surgeries depending on shape of cervical spine pre-operatively



Results

Over the 10-year period, 291 patients had primary surgeries for cervical myelopathy. 170 patients (58.4%) had an anterior discectomy and fusion, and 107 (36.8%) had posterior surgery, including laminectomy, foraminotomies, posterior cervical decompression and fusion, and laminoplasty. The remainder includes antero-posterior approaches with 5 patients (1.72%), 2 patients (0.69%) occipitocervical fusion, 6 (2.06%) corpectomy, and 1 (0.34%) discectomy.

The outcomes of surgically managed cervical myelopathy are summarised in the *top graph*. The most common adverse event was swallowing difficulties with 30 patients (10.31%), followed by infection with 11 patients (3.78%). The rate of the remaining adverse events ranges from 0.34% to 1.37%, and includes dural tear, voice change, CSF leak, pneumonia, death, extended admission, haematoma, psychosis, deep vein thrombosis and spinal displacement. The most common reason for revision surgery was return of myelopathic symptoms, occurring in 16 patients (5.50%). There was no statistically significant difference between surgical approaches and their rate of adverse events (p=0.105): 41 of 170 patients (24.12%) with anterior surgery, 17 of 107 (15.89%) posterior, and 6 of 13 other approaches had adverse events. The surgical approach did not have a statistically significant association with rate of revision *(middle graph)* (p=0.864). Revision rate compared to both shape of C-spine pre-operatively and the surgical approach showed that straight spines which underwent an anterior surgical approach had a statistically significant rate of revision, with 11 of 64 (17.19%) patients revised, compared with 5 of 88 (5.38%) patients with anterior decompression on a lordotic spine, and 0% on a kyphotic spine revised (p=0.023) *(bottom graph)*.

A straight cervical spine had a statistically significant association with an increased rate of revision, with 14 of 79 patients (15.05%, p=0.029). We found that 76 patients of 103 (58.46%) who underwent posterior surgery had late-stage disease, compared to 86 of 163 (52.76%) patients with anterior surgery (p=0.010).

Conclusion

Of the 291 patients included, 81 (27.84%) had ongoing symptoms post-operatively, 65 (22.34%) had adverse events and 25 had revision surgeries (8.6%). There was no difference in the rates of adverse events, ongoing symptoms and revision surgeries between anterior and posterior surgical approaches. A straight cervical spine pre-operatively was associated with an increased rate of revision surgeries. Posterior surgery was associated with late-stage cervical myelopathy. There was a statistically significant association between ACDF surgeries conducted on a straight spine and an increased rate of reoperation.

References & Acknowledgements

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Revision rates and complications following surgery for cervical myelopathy over a 10-year period

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BACKGROUND: Cervical myelopathy is a condition which describes the compression of the spinal cord in the cervical spine. The common symptoms are hand numbness, neck pain, hyperreflexia, reduced dexterity, and coordination difficulties. In the later stages patients may have gait disturbances, incontinence of bladder and bowel, and even paralysis. Cervical myelopathy can be surgically managed, with the aim to decompress the spinal cord, and it is shown to improve patient's quality of life, neurological function and pain. Studies have shown varying rates of adverse events occurring after surgery, as well as rates of reoperation. As a result, the aim of this study was to gather information about the primary cervical myelopathy surgeries conducted in our hospital and to analyse the rate of adverse events and reoperations.

METHOD: The hospital BlueSpier Database was used to identify all patients who had primary surgeries for cervical myelopathy between 1st January 2013 and 31st December 2022. Patients with central cord syndrome, or prior surgeries for cervical myelopathy were excluded. Information on each patient’s presentation and diagnosis, pre-operative imaging, surgical approach, post-operative complications, and reoperations was collected and analysed using SPSS.

RESULTS: 291 patients had primary surgeries for cervical myelopathy in the 10-year period. 170 patients (58.4%) had an anterior discectomy and fusion, and 107 (36.8%) had posterior surgery, which includes laminectomy, posterior cervical decompression and fusion, and laminoplasty. The remainder includes antero-posterior approaches with 5 patients (1.72%), 2 patients (0.69%) occipitocervical fusion, 6 (2.06%) corpectomy, and 1 (0.34%) discectomy. 81 patients (27.84%) had ongoing symptoms post-operatively, 65 (22.34%) had adverse events and 25 (8.6%) had revision surgeries. The most prevalent adverse event was swallowing difficulties with 30 patients (10.31%) and infection with 11 patients (3.78%). The most common reason for revision surgery was return of myelopathic symptoms, 16 patients (5.50%). Other reasons were non-union, pull-out of screws and CSF leak each with 2 patients (0.69%), and haematoma, wound infection and unrecorded with 1 patient (0.34%) each. There was no statistically significant difference between surgical approaches and their rate of adverse events (p=0.105): 41 of 170 patients (24.12%) with anterior surgery, 17 of 107 (15.89%) posterior, and 6 of 13 other approaches had adverse events. 48 of 107 patients (28.24%) with anterior surgery had ongoing symptoms (28.24%), compared to 32 of 107 posterior surgeries (29.91%, p=0.628). Overall, 16 of 170 patients (9.47%) with anterior surgeries were revised, 8 of 107 patients (7.62%) with posterior, and none of the antero-posterior approaches (p=0.864). We found that late-stage cervical myelopathy was associated with a posterior surgical approach (p=0.010): 9 of 166 patients (5.42%) with a lordotic spine, 2 of 27 patients (6.90%) with a

kyphotic spine, and 14 of 93 (15.05%) with a straight spine had revision surgeries. There was a statistically significant association between a straight cervical spine pre-operatively and an increased rate of revision surgeries (p=0.029). Revision rate compared to both shape of C-spine pre-operatively and the surgical approach showed that straight spines which underwent an anterior surgical approach had a statistically significant rate of revision, with 11 of 64 (17.19%) patients revised, compared with 5 of 88 (5.38%) patients with anterior decompression on a lordotic spine, and 0% on a kyphotic spine revised (p=0.023).

CONCLUSION: 291 patients had primary surgeries for cervical myelopathy during the 10-year period. The rate of revision surgeries was 8.6%, rate of adverse events was 22.34% and the rate of ongoing symptoms was 27.84%. There was no difference in the rates of adverse events, ongoing symptoms and revision surgeries between anterior and posterior surgical approaches. A straight cervical spine pre-operatively was associated with an increased rate of revision surgeries. Posterior surgery was associated with late-stage cervical myelopathy. Anterior surgery conducted on a straight spine was associated with an increased rate of reoperation.