Degenerative cervical spondylosis and cervical compression myelopathy are common causes of morbidity in middle-aged and elderly individuals. Clinical presentations include progressive spastic quadriplegia, sensory loss at or below the neck, and urinary incontinence. Although nonoperative treatment is acceptable in mild nonprogressive myelopathy, surgical decompression or stabilization is indicated for severe or progressive myelopathy with radiographic evidence of spinal cord compression. The number of patients that require surgery has increased as the population has aged. Decompression of the spinal cord can be achieved through either an anterior or posterior approach. The choice of the surgical approach depends on the etiology of the myelopathy, cervical alignment, and familiarity of the surgeon with a given technique.

C5 palsy is a well-known complication of cervical spine decompression surgery. The complication develops regardless of whether a posterior or anterior approach is used. The incidence of C5 palsy ranges from 0% to 30%, depending on how the condition is defined and the patient population. Affected patients suffer from paresis of the deltoid muscle with/without involvement of the biceps brachii muscle and/or brachialgia and numbness. Palsy is typically unilateral but may be bilateral in 5–7% of cases. The initial onset of symptoms ranges from immediately after surgery to 2 months after surgery. Patients with postoperative C5 palsy generally have a good prognosis, with approximately 70% of patients recovering completely within an average of 4–5 months. Pain also generally resolves, but residual pain has been reported in around 20% of cases. Recovery is spontaneous, and no treatment has been shown to improve recovery. However, a worse recovery and a longer recovery period may occur if the patient is severely paralyzed preoperatively.

The exact pathogenesis of postoperative C5 palsy remains unknown, and it is likely to be a complex and multifactorial process. Numerous etiologies have been proposed, including direct injury to the nerve root due to the surgical procedure, ischemia and reperfusion injury of the spinal cord, and iatrogenic foraminal stenosis after cervical alignment rearrangement. Increased posterior spinal cord drift due to an increased laminctomy trough width has been reported to be associated with C5 palsy. Furthermore, tethering of the nerve root from the posterior shifting of the spinal cord in association with anchoring of the nerve root at the edge of the uncovertebral joint and/or the superior facet has been hypothesized to cause C5 palsy. C4–5 is usually the apex of any cervical lordosis, which prompts the hypothesis that maximal posterior spinal cord drift occurs at C5. In addition, the C5 root is shorter and the angle from the cord is more obtuse than at other levels; therefore, palsy more frequently occurs at C5 than at other nerve roots.

Many risk factors for C5 palsy have been reported, including age, male gender, severe preoperative myelopathy, and ossification of the posterior longitudinal ligament. Stenosis of the C4–5 intervertebral foramen on preoperative computed tomography scans has been proposed as a predictive factor. In addition, prophylactic foraminotomy for pre-existing subclinical C5 radiculopathy was found to reduce the occurrence of C5 palsy after cervical laminoplasty (0.6% vs. 4.0%, p < 0.05).

To prevent C5 palsy, intraoperative monitoring has been advised, including electromyography (EMG), somatosensory-evoked potentials (SEPs), and motor-evoked potentials (MEPs) recorded from the hand and leg muscles. Neurotonic discharges on EMG and a decrease in amplitude of the MEPs might be detected intraoperatively in patients who develop postoperative C5 palsy. However, not all cases of C5 palsy are detected intraoperatively with monitoring, which supports the theory that C5 palsy could occur during the early postoperative recovery period.

In this issue of the Journal of the Chinese Medical Association, Chang et al report quantitative measurements of functional outcomes and quality of life in patients with postoperative C5 palsy. Demographic data, incidence, and risk factors were analyzed retrospectively in 364 patients. The overall incidence of C5 palsy after cervical spine decompression surgery was 3.3%. The incidence of C5 palsy was highest in the combined approach group (36.4%), followed by the posterior approach group (8.8%), and the anterior approach group (0.7%). However, the relatively small number of cases in this paper and the contradictory results of previous reports warrant further study to compare the risk of C5 palsy after different surgical approaches. In this current study, risk factors of C5 palsy included increasing age, the number of decompression levels, and the etiology of cervical decompression. Female gender and fewer decompression levels were predictive factors for complete recovery.

In the majority of earlier studies, the severity of muscle weakness in patients with C5 palsy has usually been evaluated...
by the manual muscle test (MMT) grade or Japanese Orthopaedic Association (JOA) scores. The MMT grade is based on a system of grading movement against examiner or gravity resistance (Grade 0–5). The JOA score is based on the rating of motor function (fingers, 0–4 points; shoulder and elbows, –2 to 0 points; and lower extremities, 0–4 points), sensory function (upper extremity, 0–2 points; lower extremity, 0–2 points; and trunk, 0–2 points) and urinary bladder function (0–3 points). The MMT grade and the JOA score do not represent actual functional capacity in daily activities. Therefore, the action research arm test (ARAT) and the Jebsen-Taylor test of hand function (JTHF) have been proposed as quantitative measurement tools of functional recovery. Both have been widely used to evaluate upper extremity function and dexterity in various conditions, including stroke and spinal cord injury. The authors demonstrated moderate-to-high correlations between the ARAT, JTHF, and MMT scores in patients with C5 palsy. Thus, ARAT and JTHF could provide valuable measures of functional recovery and may help clinicians to arrange optimal rehabilitation for patients.

Cervical decompression surgery is generally considered to be safe and effective for cervical compressive myelopathy. Although the prevalence of postoperative C5 palsy is low, it remains a serious complication and causes patients to be dissatisfied with their surgery. Well-defined and large-scale prospective trials are needed to elucidate the exact etiology, risk factors, and potential preventive strategies for C5 palsy in the future.

References


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