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Clinical Quiz

A rare complication after minimally invasive posterior cervical laminoforaminotomy

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Case

A 29-year-old male was referred to our orthopedic department with progressive severe pain in the neck and weakness of the left upper extremity. The onset of the symptoms began 4 months prior to referral including numbness of the upper left extremity accompanied with pain a few days later. On clinical examination, muscle weakness on the upper extremity was observed. More specifically, muscle weakness (MMT) 3/5 on all the muscle groups of the upper extremity with sensory disorders was noticed. The pain was exacerbated with arm movement and the patient had loss of fine movement ipsilateraly. Prior to admission, the patient had received two rounds of non-steroidal anti-inflammatory drugs (NSAIDs) and analgesics followed by physiotherapy. Due to the poor response to the conservative treatment the patient underwent epidural steroid injection with mild and transient improvement of the symptoms. Subsequently, patient's admission was decided in order to receive surgical treatment. The patient's medical history was free.

Imaging assessment with X-ray and magnetic resonance imaging (MRI), showed a left foraminal soft disc herniation C5-6. Due to patient's clinical evaluation and the gradual deterioration of his clinical semiology, it was decided to be treated with minimally invasive posterior cervical "key-hole" laminoforaminotomy and discectomy. After surgery the patient's neck and radicular pain was alleviated and even from the first post-surgical day the muscle strength of his arm was rehabilated.

However, the patient developed a bilateral loss of motor strength in the deltoids with sensory deficit at the second post-operative day. He was initiated corticosteroids and further imaging with MRI was scheduled to exclude any development of hematoma or myelopathy in the cervical spine. According to the MRI results, there was a satisfactory decompression of the herniated level and no lesion of myelopathy or hematoma was found to explain the neurological deterioration of the patient.

Commentary

Cervical Radiculopathy (CR) is one of the most common conditions of spinal medicine, and the majority of cases are cured by conservative treatment. It is well recognized that radicular pain usually resolves in most cases. Surgical intervention is a high success rate method of treatment but this decision should be based on certain parameters such as the persistence or recurrence of the symptoms along with the duration, the presence of a neurological deficit and the severity of pain[1].

Anterior Cervical Decompression and Fusion (ACDF) is the common treatment for the CR and is regarded as a "gold standard" surgery. It is a relatively safe technique with adequate decompression and fusion rates and very high rates of neck and arm pain resolution. Nevertheless, the approach-related risk of neural and vascular injury, especially in revision surgeries, should not be disregarded. The pseudarthrosis rate is relatively low and is increased in poor host fusion candidates as well as in multi-level procedures. One of the main issues of ACDF is the symptomatic or radiographic adjacent segment degeneration as a result of fusion. This is estimated around 3% per year[1].

Posterior foraminotomy is a popular proven alternative treatment of cervical radiculopathy. This technique is

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a motion preserving procedure without the need for fusion and avoiding the need for immobilization, grafting or instrumentation. The key-hole foraminotomy technique was first described by Scoville in 1966. Failure of the conservative treatment, including the epidural steroid injection, directed our therapeutic approach to a posterior decompression procedure combined with MIS technique. This minimal invasive modification of this technique is equivalent to the open posterior option concerning the safe nerve decompression and symptoms relief[2].

Our patient developed a C5 palsy. One of the most usual causes of C5 palsy is pathology and intervention of the C4-5 segment. To our knowledge, very few cases are reported, with a non-degerative disc herniation of the adjacent level of C5-C6 which have developed a C5 palsy[3]. C5 palsy is a serious postoperative complication which is characterized by muscle weakness of the deltoid muscle with or without involvement of the biceps brachii muscle and/or accompanied with pain and numbness after posterior or anterior decompression procedures of cervical spine. The overall incidence of C5 palsy is reported to be 4.6%[4] and depends on the type of the surgery. Specifically, the incidence rises to 8.6% in posterior approaches whereas in C4-5 foraminotomies it rises to 11.6%[5].

The exact etiology of this palsy remains unclear. Several hypotheses are reported for this complication. The main risk factors for the occurrence of this palsy include: male gender, laminectomy and/or laminoplasty, spinal cord drift after decompression with tethering of the nerve root, reperfusion aspects of the blood flow after decompression, pro-existing disorders of the cervical spinal cord, patient positioning during surgery or traumatic handling of neural tissue and specific anatomic characteristics of the cervical spine[3,4]. Even though the etiology of this complication has not been completely established yet, most plausible, and relatively common, cause of the occurrence of C5 palsy in our patient is the drift of the spinal cord after the decompression from the large herniated disc but none of the others well-known risk factors cannot be excluded.

The time of recovery depends on the severity of the symptoms. Approximately half of all patients (47,8%) recover in 3 months while in 52% of the severe cases the symptoms are being improved at 6 months[4]. Our patient was discharged few days after with slight ovement and followed an intensive program of physical therapy while the C5 palsy recovered 1 month after with no residual symptoms.

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Questions

1. In which case (or pathology) posterior laminoforaminotomy is probably the most suitable choice?

A. Central osteophytic stenosis
B. Axial pain without radiculopathy
C. Lateral soft disc herniation
D. Broad-based central herniation

Critique

Foraminal or lateral soft disc herniation is one of the main indications of minimally invasive cervical laminoforaminotomy. The correct answer is C.

2. Myelopathic patients have:

A. Increased incidence of C5 palsy
B. Decreased incidence of C5 palsy

Critique

It seems that the average incidence of C5 palsy in myelopathic patients is increased in relation to those with cervical degenerative disease. The correct answer is A.