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Hypoglossal nerve injury as a complication of anterior surgery to the upper cervical spine

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Abstract Injury to the hypoglossal nerve is a recognised complication after soft tissue surgery in the upper part of the anterior aspect of the neck, e.g. branchial cyst or carotid body tumour excision. However, this complication has been rarely reported following surgery of the upper cervical spine. We report the case of a 35-year-old woman with tuberculosis of C2–3. She underwent corpectomy and fusion from C2 to C5 using iliac crest bone graft, through a left anterior oblique incision. She developed hypoglossal nerve palsy in the immediate postoperative period, with dysphagia and dysarthria. It was thought to be due to traction neur-

apraxia with possible spontaneous recovery. At 18 months' follow-up, she had a solid fusion and tuberculosis was controlled. The hypoglossal palsy persisted, although with minimal functional disability. The only other reported case of hypoglossal lesion after anterior cervical spine surgery in the literature also failed to recover. It is concluded that hypoglossal nerve palsy following anterior cervical spine surgery is unlikely to recover spontaneously and it should be carefully identified.

Key words Cervical spine · Surgery · Neurologic complication · Hypoglossal nerve

Introduction

Neurologic complications following cervical spine surgery are not uncommon. Injury to the hypoglossal nerve, which is often reported following soft tissue surgery of the neck [1, 2, 10], is extremely rare following surgery of the upper cervical spine. To the authors' knowledge, only two such cases have been reported in the literature; one of them was following an anterior approach. We report one such complication following anterior approach to the upper cervical spine.

Case report

A 35-year-old woman presented with 12 months' history of neck pain, stiffness, weight loss and night sweats. She had grade IV weakness of both deltoid muscles with absent scapulo-deltoid reflexes, but no long tract signs. X-ray revealed destruction of the

bodies of C3 and C4 vertebrae with retropharyngeal soft tissue shadow. MRI scan showed presence of retropharyngeal cold abscess with intracanal extension (Fig. 1). This was aspirated and tuberculosis was diagnosed. Under cover of anti-tubercular drugs for 2 weeks, the abscess was explored through a left anterior oblique approach. C3 and part of the C4 vertebral bodies were removed using rongeurs and dental burr. The spine was stabilised with a tricortical iliac crest bone graft and fixed with a cervical spine locking plate from C2 to C5 (Fig. 2A). Postoperatively the patient developed dysphagia and dysarthria with deviation of the tongue to the left side. This was thought to be due to retraction against the hypoglossal nerve and was expected to have a spontaneous recovery. Failure of fixation was noted on the 5th postoperative day (Fig. 2B) and she was reoperated. A two-stage procedure was performed with posterior lateral mass plating from C2 to C5 followed by removal of the anterior loose plate and application of a small buttress plate at the lower end only (Fig. 3). The ends of the damaged nerve could not be identified in the wound, but no special endeavour was made to explore it further because of soft tissue adhesions secondary to tuberculosis. A barium swallow X-ray ruled out any injury or obstruction to the oesophagus or pharynx. In a follow-up at 18 months, she had good fusion with complete control of the tubercular disease, but her hypoglossal nerve palsy persisted with wast-

Fig. 1 T2-weighted sagittal MRI image showing the retropharyngeal cold abscess with extension inside the spinal canal

Fig. 2 **A** Immediate postoperative lateral roentgenogram showing fusion from C2 to C5 with tricortical iliac crest graft and cervical spine locking plate fixation. **B** Failure of fixation 5 days after operation

Fig. 3 Lateral roentgenograms after the second operation with posterior fixation using lateral mass plates followed by removal of the anterior plate and restabilisation of the graft with a small buttress plate

Fig. 4 Wasting of the paralysed left half of the tongue at 18 months' follow-up. In hypoglossal palsy, the tongue deviates to the paralysed side on an attempt to stick it out; the apparent deviation to the right, as seen here, is due to wasting of the left half of the tongue

ing of the paralysed half (Fig. 4). Functionally, she had complete recovery of dysphagia but only partial recovery of dysarthria.

Discussion

In a survey conducted by the Morbidity and Mortality Committee of the Cervical Spine Research Society, reviewing 5356 cases of cervical spine surgery, Graham [4] reported an overall incidence of neurologic complication of 1.04%. There was no report of hypoglossal nerve palsy. Laus et al. [7] reviewed ten cases of anterior extra-oral surgery to the upper cervical spine and reported four instances of transient paralysis of mandibular branch of the facial nerve. McCleary [8] reported an incidence of spontaneous development of tenth (X) and twelfth (XII) cranial nerve paralysis subsequent to fracture of odontoid process in a 93-year-old woman. She had evidence of retropharyngeal haematoma. Following conservative management her neurologic recovery was complete except for some residual weakness of half of the tongue. One case of transient paralysis of bilateral hypoglossal nerve was reported following posterior fusion of the atlanto-axial joint with transarticular screw fixation [5, 6]. The paralysis occurred 48 h after surgery. There was no evidence of prevertebral haematoma. The cause of hypoglossal palsy was not clear, but one of the screws was too long and was replaced with a shorter one. The paresis resolved completely within 3 months. The only instance of hypoglossal nerve injury following anterior surgery to the upper cervical spine was reported by Saunders et al. [9]. In a review of 40 cases of central corpectomy for cervical spondylotic myelopathy, they found one incidence of hypoglossal palsy as a long-term sequela.

Anatomically, the hypoglossal nerve and, further cranially, the glossopharyngeal and facial nerves are encountered in the dissection of the anterior triangle of the neck. Injury to these nerves is not infrequent in surgical procedures where soft tissue dissection is necessary. In a review of 536 cases of carotid artery operations, the highest rate of injury was observed in the hypoglossal nerve (8.6%), followed by the mandibular branch of the facial nerve (6.2%) and the vagus nerve with its superior and recurrent laryngeal branches (3.7%) [10].

In operative approaches to the upper cervical spine the usual practice is blunt dissection through the soft tissues to find a plane to reach the spine. This avoids the possibility of nerve damage. However, it may be necessary to secure blood vessels crossing the operative field. For a high retropharyngeal approach to the upper cervical spine, the hypoglossal nerve may traverse the field and resemble a large blood vessel; great care should be taken in ligating and dividing any structure in this field [3].

The diagnosis of hypoglossal nerve injury is not always straight forward. Hypoglossal palsy causes dysphagia and dysarthria. Both of these symptoms are common in the immediate postoperative period following anterior

neck surgery. Dysarthria may be difficult to distinguish from a transient hoarseness secondary to retraction of the recurrent laryngeal nerve. Similarly, dysphagia may result either from retraction of the oesophagus or pressure by a haematoma. Hypoglossal nerve injury may be missed unless the deviation of the tongue is noticed carefully. Once diagnosed, it is important not to expect a spontaneous recovery. In our case, as well as the one reported earlier, the paresis did not recover. The functional disability, however, is small. In the case presented here, the dysphagia recovered completely, the dysarthria was mild and speech was acceptable.

Conclusion

The case study presented here, together with a review of literature, allows us to conclude that the hypoglossal nerve should be carefully identified before ligating any large blood vessel in the anterior approach to the upper cervical spine. A spontaneous recovery of hypoglossal palsy may not always be expected.

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