ABSTRACT

We present a 52-year-old man with congenital absence of the posterior arch of the atlas and concomitant fusion of the posterior tubercle of the atlas to the spinal process of the axis. He had normal reflexes and no motor deficit. He underwent C3-C7 laminoplasty and achieved good outcome.

Key words: atlanto-axial joint; axis; cervical atlas

INTRODUCTION

Congenital absence of the posterior arch of the atlas is rare. It is usually asymptomatic and is diagnosed incidentally. Patients may present with some neurological symptoms following minor head or neck trauma.1,2 We present a 52-year-old man with congenital absence of the posterior arch of the atlas and concomitant fusion of the posterior tubercle of the atlas to the spinal process of the axis.

CASE REPORT

In June 2013, a 52-year-old man presented with a one-year history of non-dermatomal neuropathy in his right hand. He had no previous neck trauma or surgery. On physical examination, no motor deficit was noted. All reflexes were normal and plantar reflexes were down going. Cranial nerve examination was unremarkable. The Lhermitte sign and Romberg test were negative. Radiographs revealed bilateral defects in the posterior arch of the atlas with fusion of the posterior tubercle to the spinous process of the axis secondary to cervical spondylosis (Fig. a). Flexion and extension radiographs showed no compromise of the spinal canal by the posterior tubercle of the atlas (Fig. b). Magnetic resonance imaging revealed no spinal cord compression at the atlas level but moderate-to-severe cervical spondylosis at C3 to C7 (Fig. c). The patient underwent C3-C7 laminoplasty and achieved good outcome.
Embryological origins of the atlas and axis are separate. The axis forms from 5 primary ossification centres, whereas the atlas develops from 3 centres of ossification: one for the anterior tubercle and 2 for the lateral masses. The lateral masses unite posteriorly, giving rise to the posterior arch at 3 to 5 years of age. The anterior arch usually unites with the 2 lateral centres at 5 to 9 years of age. Defects in the posterior arch have been attributed to absence or defective development of cartilaginous preformation, rather than disturbances of the ossification of the arch.

There are 5 types of congenital anomalies of the posterior arch of the atlas: type A, failure of posterior midline fusion with a small gap remaining; type B, unilateral cleft; type C, bilateral cleft with preservation of the most dorsal part of the arch; type D, complete absence of the posterior arch with a persistent isolated tubercle; and type E, complete absence of the entire posterior arch. Type A anomaly occurs in 90% of all posterior arch defects.

There are 3 types of atlantoaxial congenital fusion: (1) fusion of a separated odontoid process with the anterior atlantal arch, (2) complete (bilateral) fusion of the atlas and axis, and (3) incomplete (unilateral) fusion with or without some degree of assimilation.

A case of a non-separated odontoid process fused with the anterior arch of the atlas associated with an anterior arch cleft has been described.

Our patient had a complete absence of the posterior arch of the atlas with a persistent isolated tubercle (type D anomaly), but concomitant fusion of the tubercle with the spinous process of the axis has not been reported.

There are 5 groups of clinical presentation for posterior arch defects of the atlas: (1) asymptomatic with the anomaly found incidentally, (2) neck pain or stiffness after trauma to neck or head, (3) sudden neurological symptoms after neck or head trauma, (4) various neurological symptoms for some time before the diagnosis, and (5) chronic symptoms referable to the neck. The presence of a posterior tubercle can cause transient quadriplegia by impinging on the spinal cord during neck extension or following minor trauma to the neck or head.

An isolated posterior bony fragment is the potential cause of neurological morbidity. The cumulative effects of trauma may cause myelopathy. Surgical removal of the tubercle and ligament between C1 and C2 is suggested if there is no evidence of atlantoaxial instability. Such patients should avoid contact sports.

### DISCUSSION

Embryological origins of the atlas and axis are separate. The axis forms from 5 primary ossification centres, whereas the atlas develops from 3 centres of ossification: one for the anterior tubercle and 2 for the lateral masses. The lateral masses unite posteriorly, giving rise to the posterior arch at 3 to 5 years of age. The anterior arch usually unites with the 2 lateral centres at 5 to 9 years of age. Defects in the posterior arch have been attributed to absence or defective development of cartilaginous preformation, rather than disturbances of the ossification of the arch.

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An isolated posterior bony fragment is the potential cause of neurological morbidity. The cumulative effects of trauma may cause myelopathy. Surgical removal of the tubercle and ligament between C1 and C2 is suggested if there is no evidence of atlantoaxial instability. Such patients should avoid contact sports.

### DISCLOSURE

No conflicts of interest were declared by the authors.
REFERENCES