EMERGENCY CASEBOOK

Bradycardia in minor trauma: don't be slow on the uptake!

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We report the case of a 13-year-old boy presenting with profound bradycardia following minor trauma.

Our patient had gastroschisis at birth and has moderate learning difficulties but is otherwise fit and well. Whilst playing at home he fell sustaining a minor cervical hyperextension injury. He immediately complained of tetraplegia and hyposensitivity. The ambulance crew noted profound bradycardia with normotension and he was transported to hospital with full spinal immobilisation precautions.

Over the subsequent 2 hours he made a full neurological recovery. Bradycardia persisted with a beat-to-beat variation of 30–60bpm. ECG showed sinus bradycardia with atrial ectopics and he remained haemodynamically normal. Neuroimaging studies revealed hypoplasia of the odontoid peg with a relative narrowing of the spinal canal at this level. There was no evidence of spinal cord contusion or compression. His bradycardia resolved over 36 hours without further intervention. On discharge the patient was advised to wear a cervical hard collar when mobilising.

This association of a craniocervical abnormality with learning difficulties, and gastroschisis has not been previously described. We discuss several other causes of odontoid peg instability, which may lead to severe autonomic effects with relatively insignificant trauma.

Mutations of homeobox genes may be responsible for congenital osseous anomalies of the cervical spine.¹ Most of these are innocuous, isolated anomalies which may go undetected throughout life whereas others may be diagnosed in childhood as part of a more complex syndrome. Although rare, their detection and treatment becomes important in the context of cervical spine injury where these deformities can result in cervical spine instability with the potential for neurological or life-threatening injury with relatively minor trauma. Therefore it is important that indicators of spinal injury within the context of minor trauma should always raise the suspicion of such an anomaly being present and be investigated accordingly.

CASE HISTORY

A 13-year-old boy presented to our children's hospital emergency department (Bristol Royal Hospital for Children, Bristol, UK) with profound bradycardia after minor trauma. While playing at home he had fallen knocking his chin on a bookshelf. After sustaining this minor cervical spine hyperextension injury he complained of weakness and hyposensitivity of his limbs and torso. The ambulance crew noted profound bradycardia with a normal blood pressure and, he was transported to hospital with full spinal immobilisation in place. On examination, he had weakness in all the four limbs (power grade III proximally, IV distally), reduced light touch and pin prick sensation throughout his upper limbs and he was globally areflexic. On log rolling he had midline tenderness at the C1, 2, 3 level. He had a persistent and marked bradycardia with a

beat-to-beat variation of 30–60 bpm. Twelve lead ECG showed a sinus bradycardia with occasional atrial ectopics.

The patient had moderate learning difficulties, with a developmental age of 7–8 years, and he had undergone uncomplicated surgery for gastroschisis at birth. His mother gave a history of previously investigated "vacant episodes" for which no diagnosis had ever been made and for which he was on no medication. He had a normal birth history and the only family history was of an elder brother with Asperger's syndrome.

With observation and serial examination over the subsequent 2 h, he had gradual but full resolution of all his presenting neurological signs. His bradycardia persisted with no haemodynamic compromise.

The clinical diagnosis made was of high cervical cord contusion with autonomic instability and he was investigated for a possible cord injury. He had plain x rays of his cervical spine and a full spinal MRI.

x Ray showed a hypoplastic odontoid with no fractures. On MRI congenital shortening and retroflexion of the odontoid peg was confirmed with a mass of non-ossified tissue lying superior to this which was causing relative narrowing of the spinal canal at the level of foramen magnum (fig 1). There was complete effacement of the cerebrospinal fluid signal anterior to the cord at this point, but no signal change was seen within the cord. The patient was admitted to hospital with the plan that he remains in a hard collar. Neurosurgical review and dynamic imaging of the cervical spine were planned.

The patient remained on continuous cardiac monitoring and his bradycardia resolved over 36 h without intervention. He was poorly compliant with wearing his collar but despite this he had no further neurological compromise. He was discharged from hospital with the advice that he should wear a hard cervical collar when active and be aware of the risk of cervical cord injury with minor trauma.

DISCUSSION

A variety of craniocervical anomalies have previously been reported including: occipitoatlantal fusion, basilar impression and invagination, occipital vertebrae and condylar hypoplasia and occipitoatlantal instability. Atlantoaxial anomalies include aplasia or hypoplasia of the atlas, familial cervical dysplasia, anomalies of the axis and os odontoideum.^{1 2} The anomaly in this case was not typical of any of these although initially it was thought to have possibly been an os odontoideum. All these anomalies may occur in isolation or as part of a recognised syndrome, the most common being Trisomy 21.³ Previous case reports have been published describing the diagnosis of cervical abnormalities presenting with reduced sensation in minor trauma,² and autonomic dysfunction is a recognised consequence of high cervical injury. There is a case report of a similar cervical malformation leading to respiratory failure;⁴ however, no previous reports have documented bradycardia as the prevalent and persisting feature as in this case.

This case shows that any autonomic lability in the context of minor cervical spine trauma should raise the possibility of an osseous anomaly and requires investigation.

The combination of craniocervical abnormality with learning difficulties and gastroschisis has not been described previously, and may be a spontaneous occurrence in this patient.

Figure 1 Illustrates A, unossified tissue superior to dens, B, Spinal cord, C, effacement of CSF signal anterior to spinal cord.

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REFERENCES

- 1 James T, Henry H. Congenital osseous anomalies of the upper and lower cervical spine in children. *J Bone Joint Surg* 2002;**84**:277-88.
- 2 Garg A, et al. Bipartite atlas with os odontoides: case report. *J Spine* 2004;**29**:E35-8.
- 3 Bonetti M, et al. Malformations of the cranio cervical junction in patients with Down's syndrome. *Paediatr Med Chir* 2003;**25**:273-6.
- 4 Ali M, Russell N, Awada A, et al. A cranio-cervical malformation presenting as acute respiratory failure. *J Emerg Med* 1996;**14**:569-72.