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Lesson of the Week

Don't twist my child's head off: iatrogenic cervical dislocation

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"Wry neck" in children may be due to atlantoaxial rotatory subluxation and should be promptly evaluated by detailed cervical spine radiography

Excessive rotation of two children's necks while they were undergoing cervical lymph node biopsy probably resulted in their dislocation; delayed diagnosis necessitated complex spinal surgery to correct the deformity. "Wry" neck, a synonym for atlantoaxial rotatory subluxation, is a relatively common condition in young children often associated with tonsillitis. It usually resolves spontaneously,¹ because the joint surfaces remain in contact. A rotation injury is another possible cause, often following an apparently minor trauma such as heading a football. Iatrogenic torticollis is rarely reported. A complete dislocation of the atlantoaxial joint will not resolve spontaneously and may have important long term effects on the child's facial development. We have treated two otherwise normal children whose necks were dislocated under general anaesthesia while they were undergoing cervical lymph node biopsy. The injury was not appreciated at once and definitive treatment was inevitably delayed.

Case reports

CASE 1

A 10 year old girl underwent lymph node biopsy from the posterior triangle of her neck. After surgery she awoke with a torticollis, a painful neck, and occipital dysaesthesiae. These symptoms ultimately subsided on conservative treatment but the torticollis persisted. Radiography at that stage showed atlantoaxial rotatory dislocation. This failed to reduce following manipulation under anaesthesia and a period of traction performed three months later. At that stage, an upper cervical laminectomy was inappropriately performed in the mistaken belief that spinal cord compression played an important part in the patho-

logical cause. There was no change in the deformity or neurological status. She was subsequently referred to this neurosurgical unit 15 months after the original injury, at which stage minor facial asymmetry was apparent. The atlantoaxial dislocation was explored and reduced successfully via an open operative (the "extreme lateral") approach.²

CASE 2

A 6 year old girl underwent lymph node excision biopsy from the right side of her neck for persistent lymphadenopathy of unknown cause. On return from theatre she was reported as having a torticollis (fig 1) and neck pain, which was attributed initially to focal pain at the site of the incision. When this did not improve over the next few months further investigations, including electromyography (which showed that this was not a spasmodic torticollis), and, later, computed tomography with 2D and 3D reconstructions, were performed. These showed an atlantoaxial rotatory dislocation which, not surprisingly, failed to reduce by closed methods eight months after the lymph node excisional biopsy. One year after the original injury she was referred to our neurosurgical unit for further evaluation and treatment. The atlantoaxial complex was again exposed by the "extreme lateral" approach and reduction was achieved, with postoperative immobilisation achieved by the use of a halo jacket for 10 weeks.

Discussion

Around 70% of all paediatric spinal injuries affect the upper cervical spine.³ This is due to a combination of factors including ligamentous laxity, poorly

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FIG 1—Case 2. Preoperative picture showing typical cock-robin position. Photograph reproduced by permission of the patient's parent

FIG 2—Axial computed tomogram showing rotary atlantoaxial dislocation. C1 and C2 indicated by arrows

developed cervical musculature in association with a large head, horizontally oriented facet joints, and wedge shaped cervical vertebrae. If excessive axial torque is applied to this region and the resultant angular rotation exceeds 65° , then complete bilateral C1-C2 facet dislocation with ligamentous rupture may occur,⁴⁵ as experienced by our patients during positioning of the head under anaesthesia. The most likely mechanism is that the child was supine on the operating table and, to gain access, the surgical and anaesthetic team rotated and held the head to one side to expose the posterior triangle of the neck. Atlantoaxial dislocation resulted in a torticollis in these two cases, but potential compromise of the vertebral artery or the spinal cord can occur in this type of injury.

The torticollis makes interpreting the lateral cervical spine radiographs difficult, with the mandible often obscuring the atlas and axis. Computed tomography with multiplanar reconstructions are therefore invaluable aids to the diagnosis and surgical planning (fig 2).

If dealt with at an early stage this injury can usually be managed by conservative means consisting of traction, manipulation, and subsequent immobilisation by a collar. When treatment is delayed, however, reduction is unlikely to be successful, and complex spinal surgery, with the attendant risks of spinal cord or vertebral artery injury, will be required.

What are the lessons to be learnt from these two cases? Firstly, extreme care must be taken in the positioning of the anaesthetised and paralysed child where the normal protection from cervical musculature is lost: extremes of neck rotation in children are dangerous. Furthermore, a wry neck following surgery should be promptly evaluated by cervical spine radiographs including an open mouth view supplemented by computed tomography through the relevant area.

Secondly, as in all dislocations, successful reduction is a time related phenomenon, and prompt treatment is vital. This point is well accepted in orthopaedic circles

for dislocations of the elbow and injuries to the wrist and hand. However, the hard lessons learnt there do not appear to have carried themselves across to the atlantoaxial joint. Moreover, if reduction fails one should consider the possibility that there may be soft tissue interposition impeding successful reduction, or cross union may have occurred. This was the case in both our patients, where at operation, owing to the delays in treatment, osseous union had occurred between the odontoid process, anterior arch of the atlas, and the medial aspect of the lateral mass of the axis (case 1) and, in case 2, where there was ligamentous tissue preventing reduction.

Finally, long delays in treatment may result in asymmetry of facial growth, as was seen in our first case,¹⁵ and long term concerns must exist about the late development of spinal cord damage from an inadequate spinal canal at the level of injury.

Conclusion

The surgeon and anaesthetist must ensure that overvigorous positioning of the child's head and neck does not occur or the atlantoaxial joint may dislocate. When it does, prompt treatment is mandatory as delays in management will compromise the chances of successful reduction to correct the deformity by closed methods and increase the necessity of complex spinal surgery with all its attendant risks.

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Treatment for children with brain tumours

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The overall survival for children with malignant brain tumours has not greatly improved in recent years, so that apparently innovative treatments may seem attractive, especially in cases with a poor prognosis. Problems associated with treating such children include balancing the need to provide optimum treatment for individual patients with the need to properly evaluate advances in treatment in clinical trials and determining who should be responsible for decisions about funding such treatments. Treatment abroad is rarely justified when judged on the basis of whether the treatment is available in Britain (or European Community) and whether there is accepted evidence for its clinical benefit. However, referral to specialist paediatric centres is essential. The range of daily experience in such centres allows an educated choice between established and new treatments. Close collaboration between these centres is essential for clinical trials.

Although the aim of this approach is ultimately to improve overall survival for all children with a specific diagnosis, individual families need to seek the best possible outcome for their own child. Moreover, while clinical trials are evaluating newer, and hopefully better, forms of therapy, the emergence of apparently innovative treatments may pose an attractive alternative to some families, particularly those of children with a disease with a poor prognosis. This area has recently attracted media interest, specifically in relation to the treatment of children with brain tumours, with the possibility that treatment offering better prospects for cure may be available outside the United Kingdom.

Three main tensions underlie this debate. Firstly, how do clinicians balance the responsibility they carry for an individual patient (their primary duty) with their responsibility to ensure that advances in treatment are carefully evaluated in a statistically valid manner—usually in the context of a clinical trial? Secondly, under what circumstances is it justified to develop and promote innovative forms of therapy, and what rules govern the recruitment of patients into such studies? And thirdly, who is responsible for decisions about funding such treatment, particularly if it is sought at overseas centres?

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Most progress in the treatment of childhood cancer has been due to incremental improvement in survival resulting from carefully planned clinical trials.¹²