ANTERIOR CERVICAL SUBLUXATION

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Anterior subluxation of the cervical spine from flexion-rotational violence is often overlooked. Either radiography is omitted or the slight displacement visible on the films is not recognised. A method for recognising these injuries is suggested. Five cases are described showing that in these subluxations the soft-tissue damage is severe, that late increasing displacement can occur, with varying neurological sequelae, and that instability can persist indefinitely. Four of the patients required stabilisation by operation, in contrast with complete dislocations in which 80 to 90 per cent fuse spontaneously.

Dislocation of the cervical spine from flexion-rotational violence is well recognised. The radiographic appearance produced by dislocation of one facet and of two facets has been well described by Beatson (1963).

Certain rules should be followed so that these unstable injuries are not overlooked. 1) Every patient who has suffered a head injury severe enough to render him or her unconscious should have radiographs taken of the cervical spine. Such violence applied to the head may easily cause injury to the neck. 2) The cervical spine should be radiographed in every patient who complains of pain or stiffness in the neck after injury. 3) The whole cervical spine should be shown on the lateral projection. In the heavily built or bull-necked patient this may involve steadying the head with a halter and pulling the shoulders downwards by traction on the arms.

Even when these rules are observed certain unstable injuries are still missed. The purpose of this paper is to describe such injuries, to suggest how they may be recognised, and to show that their behaviour does not always follow the pattern of the more usual unilateral and bilateral facet dislocations.

The injuries in question were called anterior subluxations by Stringa (1964), and further details of their behaviour were reported by Cheshire (1969). The soft-tissue damage is in no way different from that which occurs in the more common anterior dislocation. The anterior subluxation is just as unstable and considerable neurological damage may be associated with it.

CASE REPORTS

Case 1—In March 1973 a man aged thirty-nine was knocked down by a heavy compressor which fell on top of him. He fell backwards and suffered abrasions on his occiput. He suffered immediate complete tetraplegia below the sixth cervical level. The first lateral radiograph was a poor one in so far as it only showed the top of the body of the sixth cervical vertebra (Fig. 1). Further films of the fifth and sixth segments were obtained and it was noted that the intervertebral space was narrowed anteriorly (Fig. 2). The quite obvious subluxation of the posterior joints was not recognised. It was thought that there was acute prolapse of a cervical disc, and myelography was performed. This showed a complete block at the sixth cervical level. Laminectomy was done. Immediately the posterior cervical muscles were reflected a complete rupture of the interspinous ligaments and of the ligamentum flavum was seen. The dura mater was exposed and a small cerebro-spinal fluid leak was seen. There was no disc prolapse but a probe could be passed directly into the empty disc space. This segment of the spine was very unstable. The wound was closed and the injury treated conservatively. Spontaneous fusion eventually occurred (Fig. 3).

Comment—The nature of the injury was easily recognisable on the first radiograph. The intervertebral disc had been damaged, the intervertebral space was narrowed, and the facets were subluxated. The lesion of the cord proved irrecoverable: this suggests that considerably greater displacement had occurred at the time of impact than was seen on the radiographs. The true nature of the injury should have been recognised in this case because the radiological abnormality was easily visible. It is possible, however, for the initial bony displacement to be reduced spontaneously by muscle spasm. The radiographs may then appear normal.

Case 2—A man aged twenty-four was admitted in May 1969, having been injured in a road traffic accident. He had struck his head and was said to have been unconscious for fifteen minutes. There were no other injuries. Radiographs of the head and of the cervical spine showed no abnormality (Fig. 4). He was admitted overnight for observation and discharged the next day, having recovered fully from the concussion. He was taken home by car and found the ride very uncomfortable: indeed, he had to hold his head in his hands because of pain in the neck. He returned to hospital the same day and a further radiograph showed anterior subluxation of the fourth cervical vertebra on the fifth (Figs. 5 and 6). There were no abnormal neurological signs.

The subluxation was easily reduced under general anaesthesia and the cervical spine was stabilised by skull traction. Fusion of the unstable segment was performed in June 1969.

Comment—The management of cervical injuries should be in no way different from that of injuries to other large

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joints. When clinical signs suggest a fracture and no fracture is seen on the radiograph, the suspicion of major ligamentous injury must be confirmed or denied by radiographs of the joint taken under strain. In the case of the cervical spine special care has to be taken in immobilisation of the neck essential. The following case shows that serious consequences can occur if these injuries are not recognised.

Case 3—A man aged seventy-three fell backwards in a cupboard in March 1974 striking the back of his head and forcibly flexing his neck. He suffered immediate pain in his neck but no other symptoms. His neck continued to be stiff and painful. Two weeks later the left deltid muscle suddenly became paralysed. Radiographs then showed forward subluxation of the fourth cervical vertebra on the fifth (Fig. 7). The displacement was reduced easily by extending

this procedure in order to avoid serious neurological consequences. A general anaesthetic is given to relax muscle spasm and the neck is gently flexed under vision on the image intensifier. The slightest abnormal movement indicates ligamentous damage and makes immediate

FIG. 1
Case 1—Initial radiograph. The narrowing of the space between the fifth cervical vertebra and the sixth can just be recognised.

FIG. 2
Case 1. Figure 2—A “coned” view of the unstable segment. The anterior narrowing is more easily seen and the subluxation of the posterior facets is obvious. Figure 3—Early bony fusion after treatment by skull traction.

FIG. 3
Case 2. Figure 4—Initial radiograph. No bony injury or displacement. Figure 5—The following day. Anterior subluxation of fourth cervical vertebra on fifth. Figure 6—Oblique radiograph. The posterior facets are shown tip to tip.

Case 3. Figure 7—One month after injury. Anterior subluxation of fourth cervical vertebra on fifth. Figure 8—The subluxation reduced.

Case 4. Figure 9—Anterior subluxation of fourth cervical vertebra on fifth. Figure 10—The instability revealed on forced flexion. Figure 11—Instability persisting ten months later: anterior fusion performed. Figure 12—Final fusion with slight subluxation.
the spine under a general anaesthetic, and skull calipers were applied (Fig. 8). The deltoid rapidly regained power and two weeks later anterior fusion of the unstable segment was performed. The patient made an uneventful recovery.

Comment—The injury was sustained at the time of the fall; further slight displacement two weeks later produced increasing neurological signs. The case also illustrates the persistently unstable nature of these subluxations. That this instability may persist indefinitely is shown by the following case.

Case 4—A woman aged twenty-one was injured in a road traffic accident in 1970. She was unconscious after the accident and there was a long period of post-traumatic amnesia. She remained in hospital for ten days. She suffered pain in the neck after the accident but it was not until June 1971, when she was examined in connection with compensation proceedings, that radiographs of the neck were taken. They showed a subluxation of the fourth cervical vertebra on the fifth (Fig. 9). Although there was partial bridging of the gap, instability of the segment was seen on a flexion radiograph (Fig. 10). Her admission for fusion of the unstable segment was planned but owing to an oversight it was ten months before she was admitted to hospital. Further radiographs in flexion showed that the instability had persisted. An anterior fusion was done but incorporation of the graft was slow, and union occurred with slight residual subluxation (Fig. 12).

Case 5—A twenty-one-year-old man suffered anterior cervical subluxation while playing rugby football. There was instant almost complete tetraplegia. Traction through skull calipers realigned the spine, and the patient made a rapid recovery from the cord lesion. Traction was maintained for nine weeks, after which a polythene collar was fitted. Three weeks later he was readmitted with weakness and paraesthesia in the hands, and radiographs showed redisplacement at the level of damage. After a further period of traction anterior fusion was done.

DISCUSSION

Anterior subluxations are flexion-rotation injuries which have not moved far enough to allow the facets to disengage. Recognition of the injury is not usually difficult. In most cases there is obvious malalignment of the cervical spine. It is of course essential to recognise those cervical spines which might have been injured, so that radiographic examination is not omitted.

The subluxation may be shown by narrowing of the anterior part of the intervertebral space. This narrowing is always accompanied by displacement of the posterior facets.

In Case 2 the first radiographs certainly showed normal appearances. Examination of the neck by the intensifier and gentle flexion strain would have revealed the diagnosis immediately. It was fortunate that in the event damage to the cord was avoided. The pathological anatomy is exactly the same as that in cervical dislocation. Both lesions are unstable but in subluxation the original displacement is not so gross, and there is less chance of immediate damage to the cord or nerves. Three of these five patients showed no evidence of damage to cord or nerves at the time of injury.

The instability can increase and lead to progressive neurological damage (Case 3). Early recognition and treatment is therefore essential. It has been our practice in cervical dislocations to reduce the displacement by manipulation and then to immobilise the neck by skull traction for four weeks (Evans 1961). Radiographs at this time usually show early bony union across the front of the intervertebral space. After a further two weeks on traction, the patient can then safely be got up with his neck protected by a surgical collar. The 10 to 20 per cent of necks not showing evidence of bony union at four weeks are stabilised by an anterior bone graft. There is little risk of further displacement (or of further significant neurological damage) in those patients who have an irrecoverable tetraplegia. Fusion is not therefore done in these patients, even if spontaneous fusion does not occur.

Radiological evidence of stability of the damaged spinal segment is essential in the case of subluxations, because there is less tendency to spontaneous fusion (one out of five cases) than in the case of dislocation (80 to 90 per cent). Persisting instability is a continuing hazard to the spinal cord and roots if further injury is sustained.

REFERENCES