Cervicothoracic Pin Migration Following Open Reduction and Pinning of a Clavicular Fracture: a case report

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Fractures of the clavicle are amongst the most common bony injuries and on the whole represent around 10-12% of all fractures. The majority of these fractures result from a direct impact injury. Conservative management results in a higher incidence of union with a fewer complications than by open reduction. Neer, on reviewing 2235 fractures of the clavicle, treated closed, noted a 0.1% non-union rate (1). Complications of open reduction have been repeatedly reported in the literature, and these include tears of the subclavian vein, pneumothorax, air embolism, and brachial plexus injury (2). In addition, scattered reports of wires and pins migrating to other distant sites, have been published. These include, the abdominal aorta (3), the ascending aorta (4), the pulmonary artery (5), the aorta and pericardium, causing fatal tamponade (6), the mediastinum (7), the heart (8), the lung on either side (9-13) and five cases in which the pin migrated to the spinal canal (14).

Finally, a Steinman pin was reported to be expectorated 1 month following fixation of a medial clavicular fracture (15).

The authors report an additional case, where a pin migrated through the lower cervical spinal canal, following open reduction of a fracture dislocation of the acromioclavicularjoint, that presented with quadriparesis.

Case report

Patient, K.A., a 22 years old Lebanese white male, was involved in a car accident and sustained a displaced fracture of the outer third of the left clavicle on 15/6/98 (Fig. 1). An open reduction and internal fixation using two steinman pins was performed in a local private hospital (Fig. 2). The patient's postoperative period was uneventful.

The patient presented to our institution, complaining of dizziness, vomiting, and paresthesia in both upper and lower extremities, generalized weakness, urinary incontinence and impotence for the last two days. This occurred shortly after playing tennis.

On physical examination, the patient was noted to have hyper-reflexia of the lower limbs, marked weakness in the right upper extremity and scattered weakness of the lower extremities, clonus, with bilateral Babinski.

Laboratory investigation was insignificant.

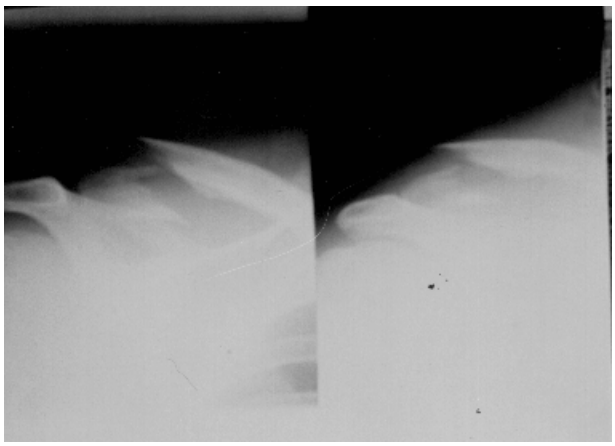

Figure 1. Displaced fracture of outer end of left clavicle.

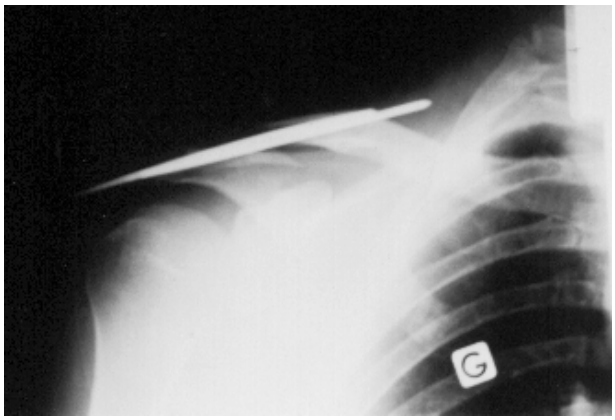

Figure 2.Open reduction and insertion of two pins. Note that the outher tips of the pins were not bent (PA view).

An x-ray of the cervical spine, revealed a Steinman pin that had migrated through the left intervertebral foramen of C7-T1 into the canal and was resting on the right pedicle of C7 (Figs. 3,4).

An emergency surgical procedure was performed during which the pin was extracted, its outer tip was retrieved from within the muscle belly of the supraspinatus muscle.

He continued to vomit postoperatively for a period of two weeks and his temperature never exceeded 38 ^{0}C.

The neurological status gradually improved, but till the present, the patient complained of weakness of the

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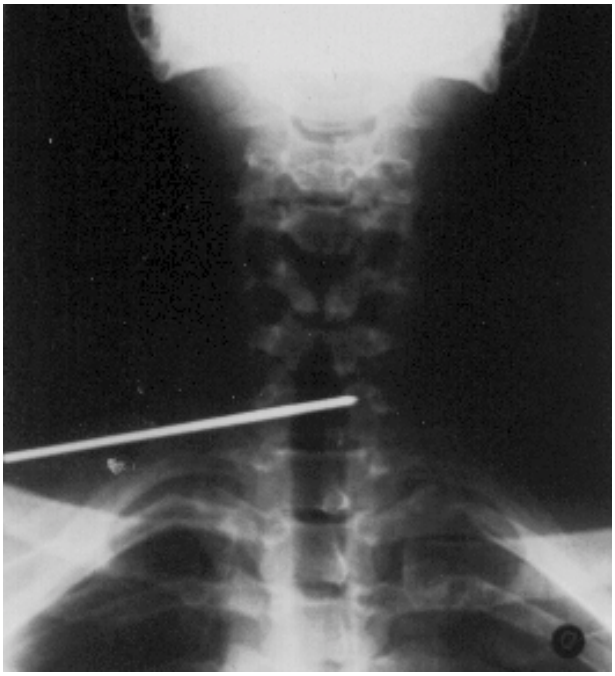

Figure 3. An anterior-posterior view of the cervical spine. The medial tip has penetrated the intervertebral foramen of C7-T1 and is resting on the right pedicle of C7.

Figure 4. An oblique view of the cervical spine. The pin is within the spinal canal.

intrinsic muscles of his right hand, paresthesia of the left lower limb and impotence.

Discussion

Lyon's et al reported a few cases in which five pins (collected from the literature) had migrated to the cervicothoracic junction of the spine (16-18), where the tips passed through the intervertebral foramen into the spinal canal. Some of these pins came out through the intervertebral foramen on the contralateral side (19), which was similar to the situation in our case. Pins migrated from the site of insertion about the shoulder girdle to a variety of anatomical locations (5).

The first case reported of any pin migration was in 1943.

Lyon's et al (19) reviewed 37 pin migrations following surgery on the shoulder girdle. On reviewing the literature till 1990 these authors were able to collect 47 cases among which 37 were well documented. The highest incidence of migration was when pins were used to fix, anterior sterno-clavicular joint dislocations (21 cases), followed by the acromioclavicular joint in 8 cases.

No adequate explanation has been given why there is a higher pin migration in this region of body, when compared to other locations. Muscular activity, respiratory excursion, capillary action, electrolysis, regional resorption of bone, gravitational forces, and the great freedom of motion of the upper extremities have all been included, as possible causes, for the high incidence of pin migration in the region. In our case, the pin migrated presumably, following the shoulder overuse while playing tennis. Here one may expect excessive muscular activity to be the prime cause.

One might expect that a smooth pin, with an unbent end, is the most likely to migrate, but other variety of pins such as, Hagie pins (20), threaded Kirschner wires (21), and Kirschner wires (in three patients) that had a bent end, migrated and caused serious complications. Two of the bent wires, one of which had been placed across the stemoclavicular joint and the other which had been placed across the acromioclavicular joint broke and the distal fragments subsequently migrated to the breast on the contralateral side and to the base of the neck (22). Tlıe third bent wire was dislodged from the left acromioclavicular joint by a direct blow to the shoulder (23). This wire was extracted from the contralateral paraspinal muscles. Seventeen pins migrated to a major vascular structure and caused serious complications. These structures were the heart (four pins), the subclavian artery (two pins), the ascending aorta (six pins), and the pulmonary artery (five pins). Eight pins migrated to the lung and ten, to the lung and mediastinum, without vascular involvement. One pin was removed from the mediastinum that had involved the lung bilaterally, in a patient who had had an arthrodesis of the shoulder (19).

One Steinmann pin migrated to the trachea after a medial clavicular fracture had been intemally fixed with two short pins. Four weeks after the operation, the patient felt a sticking sensation in the base of the neck, and then coughed up the pin (15).

Two reports documented the passage of a pin from the shoulder, through the thoracic cavity, to the abdomen. One of these pins traveled from the right acromioclavicular joint

through the right lung, producing a moderate pneumothorax. It was extracted from the post-hepatic retroperitoneal space during a laparotomy (24). A long pin that had been used for stabilization of a posterior dislocation of the glenohumeral joint migrated from the right shoulder to the spleen, seven days following the procedure (25).

A pin that had been used to fix a fracture of the shaft of the left clavicle traveled through the pharyngeal tissues to the right orbit, resulting in the onset of an acute, painful exophthalmos (26).

The overall mortality resulting from pm migration as reported by Lyon's et al. (19) has been 8 out of 37 cases.

The majority of clavicular fractures should be treated conservatively with a few exceptions which include nonunion, neurovascular involvement, and fractures that involve the distal end with tom coracoclavicular ligaments in the adult.

If one should decide to perform an open reduction and internal fixation, the better choice would be by using a plate. Should one decide to use a pin, a threaded pin, would be a preferable choice, and avoid penetrating the cortex medially and not forget to bend the pin laterally.

A record of the number of pins inserted should be always available, to avoid missing one that already migrated at time of extraction.

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