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CASE REPORTS

Diagnosis of Oblique Fractures of the Distal Ulna Using an Extended Pronated View of the Wrist

George W. Balfour, MD

Pain about the distal ulna at the wrist is a common complaint and can be caused by a variety of disorders.[1-5] I report three patients with painful wrists in whom identification and diagnosis of a fracture of the distal ulna were best made by use of an extended pronated roentgenographic view of the wrist. Standard AP and lateral views either failed to reveal the pathology or poorly demonstrated the fracture. A variety of other roentgenographic views, including different oblique views, were tried; however, only on an extended pronated view of the wrist did the oblique fracture of the distal ulnar head become apparent.

The extended pronated view is obtained by placing the forearm flat on the x-ray plate and pronating it until the thumbnail bed is flat on the plate. This brings the patient's shoulder well forward and medial to the forearm. The wrist is then brought up into maximal dorsiflexion (Fig 1). In this position, if the x-ray tube is oriented vertical to the x-ray plate, a well-defined oblique view of the distal ulnar head styloid is obtained. The extended pronated view reliably demonstrated the oblique fracture of the distal ulnar head described in the following three patients.

Fig 1(Balfour): Case 1: standard AP view, no fracture is identified (A); lateral view, no fracture is identified (B); extended pronated view, fracture of distal ulna is identified (C).

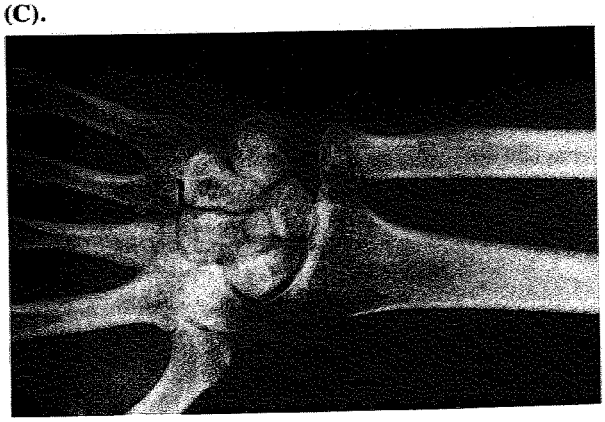


Fig. 1A.

Fig. 1B.

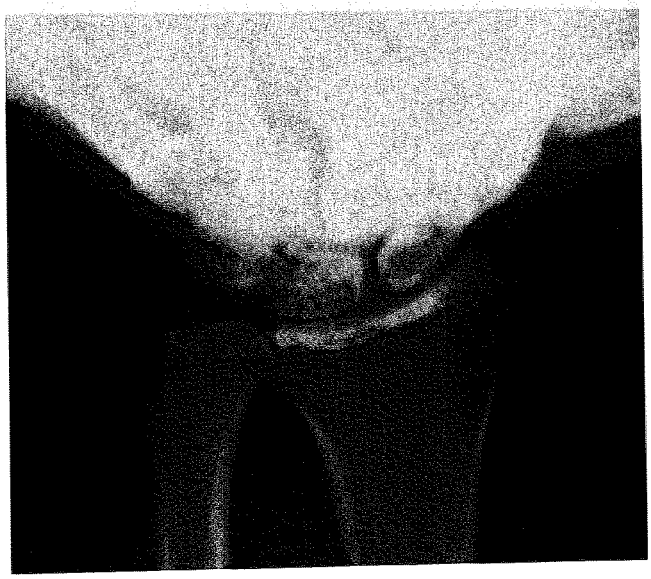


Fig. 1C.

Case Reports

Case 1. A 27-year-old man injured his extended left wrist and shoulder when he fell into a pothole. The patient was treated conservatively with an elastic bandage, heat, and local injection of corticosteroids, with no relief.

I first saw the patient 2 months after the injury. He had persistent left wrist pain. On examination, the pain was on the ulnar side of the wrist, over the ulnar styloid and

Fig 2(Balfour): Case 2: standard AP view, fracture is not well seen (A); oblique view, fracture seen only a little more clearly (B); extended pronated view, fracture seen more clearly (C).

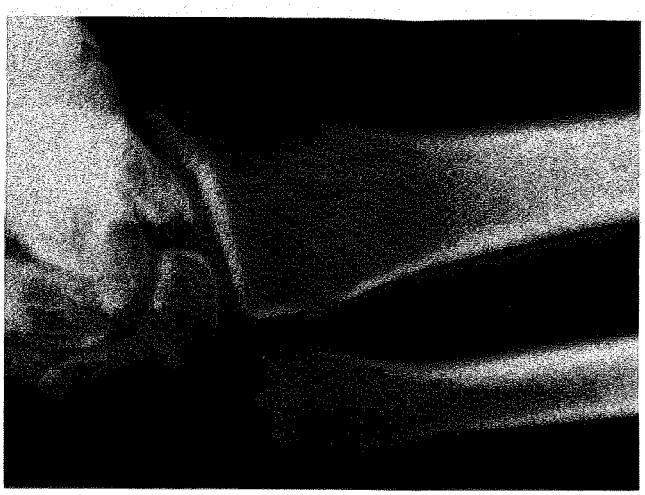


Fig 2A.

Fig 2B.

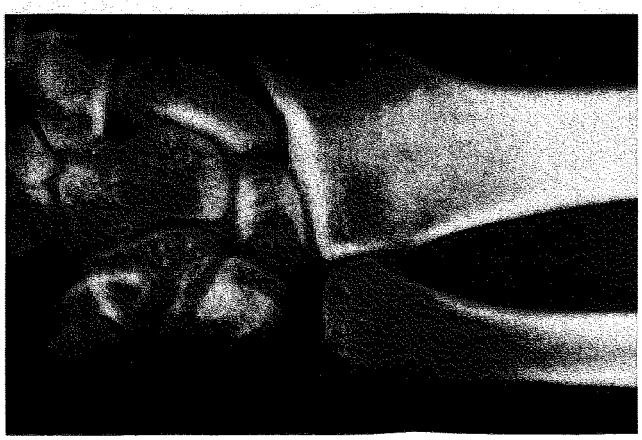


Fig 2C.

distal ulnar head. He had 1.5 cm of forearm atrophy. Standard AP and lateral views did not reveal any bony abnormalities. Multiple special views, including clenched fist views, supinated and pronated deviation views, and carpal tunnel views, were obtained in an effort to establish a diagnosis. Again, no fracture was noted. The extended pronated view demonstrated a fracture of the distal ulna (delayed union). The fracture was spiral and extended from the distal ulna, 2 mm radially from the origin of the styloid, obliquely to the medial cortex. This fracture was significantly larger than the typical tip-of-the-styloid fracture seen in a Colles' fracture. The patient was placed in a short-arm cast and remained in that cast for 5 1/2 months until the fracture showed radiologic evidence of union (Fig 2).

Case 2. A 25-year-old female physician injured her right wrist in a fall. Radiologic examination failed to reveal any fracture. The diagnosis of a wrist sprain was made, and the wrist was immobilized. Eight months previously, she had fractured the same distal radius and ulna and been treated with immobilization. That fracture had healed uneventfully.

The patient was examined 5 weeks after the second fracture. She complained of persistent pain in her wrist. The cast was removed, and there was tenderness about the distal ulna. AP and lateral radiographs of the wrist were repeated and, again, no fracture was identified. As with the patient in case 1, multiple special views failed to demonstrate the fracture. Only on an extended pronated view and oblique wrist views was the oblique fracture of the distal ulna readily apparent. The fracture extended from the distal end of the ulna (slightly radial to the origin of the styloid), obliquely to the medial cortex. Again, this fracture was larger than the usual small avulsion of the tip of the ulnar styloid seen in Colles' fractures. The patient's wrist was, again, immobilized in a cast. The patient was lost to follow up (Fig 3).

Case 3. A 37-year-old woman fell while getting out of a swimming pool, sustaining a blow to the side of her left wrist. Physical examination revealed exquisite tenderness over the area of the distal ulna. AP, oblique, and lateral views of her wrist failed to demonstrate a fracture. An extended pronated view was obtained, revealing a fine, nondisplaced fracture of the distal ulna, essentially the same as the ones described in the first two cases. The left upper extremity was immobilized in a short-arm cast for 4 weeks. After 4 weeks, physical examination revealed no tenderness and radiographs showed consolidation and union of the fracture. The patient had no further problem with the wrist (Fig 4).

Discussion

Review of the medical literature failed to reveal specific mention of the oblique fracture of the distal ulna

Fig 3(Balfour): Case 3: standard AP view, fracture not seen (A); lateral view, fracture not seen (B); extended pronated view, fracture now seen as a fine defect (C).

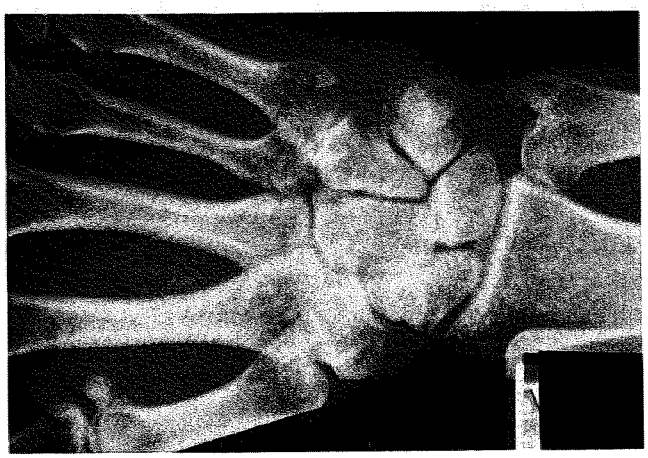


Fig 3A.

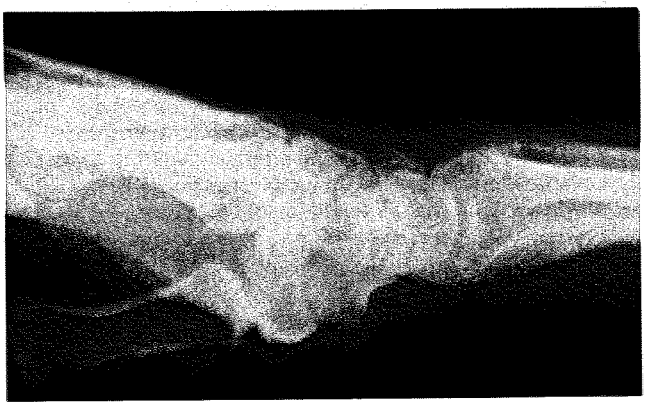


Fig 3B.

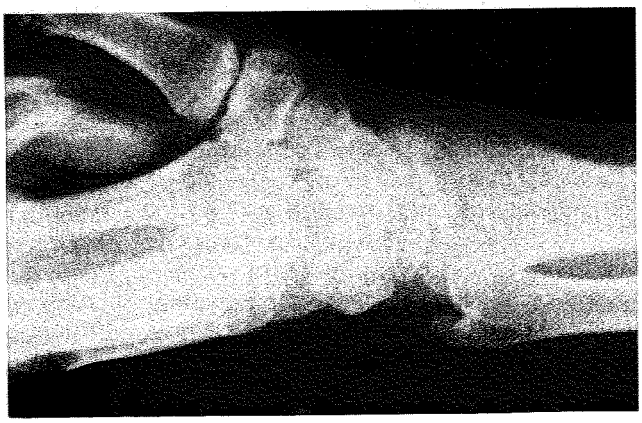
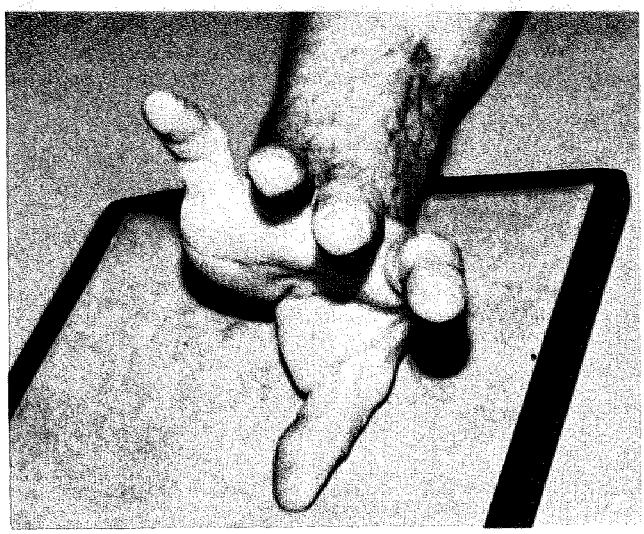


Fig 3C.

Fig 4(Balfour): Hand position for the extended pronated view.



described earlier. Rockwood and Green[6] and Wilson[7] dismiss fractures of the distal ulna with little specific comment. I have noted three cases of spiral fractures of the distal ulna involving the base of the styloid and the prominence of the distal end of the ulna, which were not apparent on standard AP, lateral, and oblique views of the wrist. A view of the wrist taken in maximal extension and forearm pronation with the x-ray tube oriented vertically yielded an oblique view of the ulna, without obscuring overlying structures. The degree of pronation is correct if the thumbnail lies flat on the x-ray plate (Fig 4). Burman described positioning the hand in a similar manner with the x-ray tube centered over the thumb for examination of the carpo-metacarpal joint.[8,9]

Three cases of fractures of the distal ulna not apparent on standard radiographic views were revealed using the extended pronated view. Two of the patients (seen well after the initial trauma) had tender wrists and radiologic evidence of fracture at 5 and 8 weeks, by which time many wrist fractures have healed. One patient required 5 1/2 months of immobilization to obtain union.

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The author thanks Dr Charles Ashworth for his comments and encouragement, and would like to acknowledge the contribution of Gilbert Hernandez, RPT.

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Cervical Spondylolysis

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Spondylolysis, with or without accompanying spondylolisthesis, is a relatively common entity in the lumbar spine, occurring in approximately 5% of the general population.[1] It is, however, a distinctly unusual finding in the cervical spine. First reported by Perlman and Hawes in 1951,[2] cervical spondylolysis appears to be one of a spectrum of congenital developmental defects of the posterior arch,[3] including elongation of the pedicles,[4] absence of a pedicle,[2] and spina bifida occulta.[3] Discovery of cervical spondylolysis is often incidental to radiographic evaluation of neck trauma or chronic pain, and this disorder can be difficult to differentiate from fracture or tumor on routine cervical spine films. The advent of computed tomography (CT) as a tool for imaging of the cervical spine has brought clarity to the diagnosis and interpretation of posterior arch defects.

We report a case of cervical spondylolysis and spondylolisthesis with accompanying spina bifida occulta at the C-6 vertebra discovered incidentally in an individual evaluated for neck pain resulting from trauma. The diagnosis, etiology, and potential treatment of cervical spondylolysis are reviewed, and the value of CT scan imaging in obtaining the diagnosis is emphasized.

Case Report

A 24-year-old woman presented at the emergency room with chief complaints of headache and neck pain without radiation. She had been an unrestrained passenger in a vehicle struck from behind and had sustained a blow to her right forehead when thrown against the windshield. She denied loss of consciousness nor did she report any paresthesias, paresis, or radicular pain.

Physical examination revealed the patient to be alert, maintained in a Philadelphia collar, and in mild acute distress. Multiple abrasions of the extremities and a small laceration over the right eye were noted. Neurologic findings were normal. Palpation of the neck was significant for diffuse paraspinal tenderness. No range of motion evaluation of the cervical spine was attempted prior to roentgenographic examination. No other physical findings were noted.

Roentgenographic examination of the cervical spine demonstrated a posterior arch defect of the C-6 vertebra with spondylolisthesis of C-6 anteriorly on C-7 of 3 mm (Figs 1-2). Computed tomographic scanning of the cervical spine revealed bilateral spondylolysis of C-6 with spina bifida occulta of the C-6 spinous process. Hypoplastic pedicles were noted bilaterally (Fig 3).

The patient was admitted for observation and a further history was obtained, during which she reported a similar episode of transient neck pain following trauma, which had been evaluated 2 years previously at another institution. Examination of films from the previous episode demonstrated identical findings on roentgenogram and CT scan studies, with no instability appreciated on flexion/extension views of the cervical spine. The patient's pain resolved rapidly over 48 hours, range of motion of the cervical spine was full without tenderness, and she was subsequently discharged wearing a soft collar. Arrangements for prophylactic posterior spinal fusion of C-5 to C-7 were made to protect against potential future traumatic injury, but the patient was lost to follow up.

Discussion

Cervical spondylolysis is a rare clinical entity usually discovered as an incidental finding on roentgenographic examination of the cervical spine in the evaluation of neck pain. The paucity of symptoms associated with cervical spondylolysis may obscure the actual incidence in the general population because many asymptomatic cases are not diagnosed. Shinoda et al reviewed 49 cases of cervical spondylolysis reported in the literature.[5] Collectively, a 2.5:1 male to female ratio was noted. The chief complaint of neck pain or headache was present in 70% of patients, but in only 33% was radiculopathic pain or sensory disturbances in the upper extremities noted. The majority of cases occurred at C-6 (70%), although C-2, C-3, C-4, and C-5 were also represented. In 73% of cases, a spina bifida occulta accompanied the spondylolytic defect. Often, there was no history of trauma. In a review of the literature, Rowe and Steiman identified a 50% incidence of associated spondylolisthesis.[6] A familial incidence has not been associated with the spondylolysis defect, although one instance in identical twins has been reported.[4]