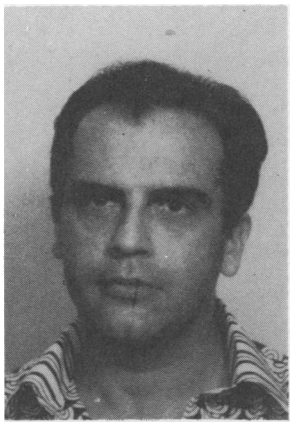
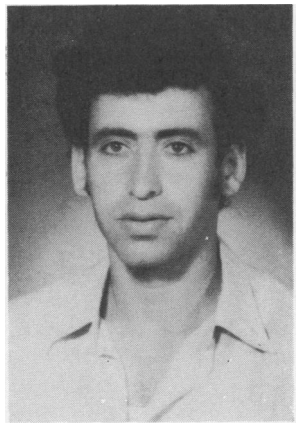
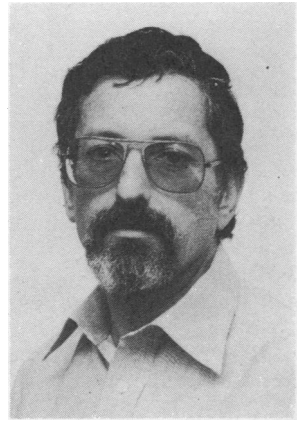
Brit. J. Sports Med. – Vol. 14, No. 4, December 1980, pp. 210-212



Dr. Ganel



A. Israeli



Dr. J. Engel

THE EARLY DIAGNOSIS OF FRACTURES OF THE CARPAL SCAPHOID BONE

A. GANEL, MD,* A. ISRAELI, MD, J. ENGEL, MD

Hand Surgery Unit, Chaim Sheba Medical Centre, Affiliated to the Sackler School of Medicine, Tel Aviv University, Tel Hashomer, Israel

**Address for further communications:*
Dr. A. Ganel,
Orthopaedic Surg. Dept. A,
Chaim Sheba Medical Centre,
Tel Hashomer, Israel

INTRODUCTION

Fractures of the navicular bone are the most common carpal injuries (O'Donoghue, 1976; Thomaidis, 1973). Young males are especially prone to this fracture when falling on the outstretched hand. Various sporting activities are associated with this type of injury, these include football, basketball, rugby, skating, skate-boarding, hang-gliding, etc. (Dobyns, 1978). The vast majority of fractured scaphoids unite without complications. However, some unite slowly; in others, pseudoarthrosis occurs and in some, aseptic necrosis of the proximal fragment (Alho, 1975). Failure to recognise this fracture with resultant delayed immobilisation of the wrist is partially blamed for these complications.

In the presence of suggestive clinical signs, and negative x-rays, wrist sprain is diagnosed and treated either by immobilisation of the wrist in plaster of Paris for two or three weeks (O'Donoghue, 1976), until re-x-rays are performed, or is dismissed with no immobilisation. This routine seems inappropriate for athletes because casts are not permitted in athletic endeavours involving contact sports, and prolonged immobilisation of a joint may hazard its motion (Huene, 1979). Rapid and precise diagnosis of fresh fractures of the carpal navicular bone seems therefore mandatory for correct treatment, and to avoid over-treatment.

DIAGNOSTIC METHODS

The available diagnostic methods applied by us for the early diagnosis of this bone pathology are described.

Clinical Signs and Symptoms: The specific trauma sustained while falling with extended arms, is followed by swelling of the wrist and limitation of movements. Extreme pain can be produced by applying direct pressure in the anatomical snuff-box region. A very distinct pain can be provoked by asking the patient to pronate his arm against resistance or by passive supination, while the patient resists the movement (Verdan, 1960).

Radiography: Radiographs performed routinely consist of postero-anterior, lateral and two oblique views. A view which has proved to be extremely helpful in evaluating navicular injuries is an oblique view in ulnar deviation (Ziger, 1973) which exposes the whole scaphoid with no overlap of other bones.

Direct Magnification Radiography: Macroradiography shows greater detail than conventional radiography. The technique has long been described (Fletcher, 1951) but has never gained wide use possibly due to lack of a suitable microfocus system. The improved imaging capability with magnification technique is at the expense

of slightly increased radiation exposure to the patient, however, the field size is generally reduced (Genant, 1977). Direct magnification has been useful in confirming or excluding fractures of the scaphoid, and may add to the early detection of aseptic necrosis (Sundaram, 1978). This method has been applied by us whenever the clinical signs suggested a fractured scaphoid, and regular x-rays failed to demonstrate a fracture. Fig. 1 demonstrates an undisplaced fracture of the distal end of the scaphoid, in a 21 year old football player, using this technique.

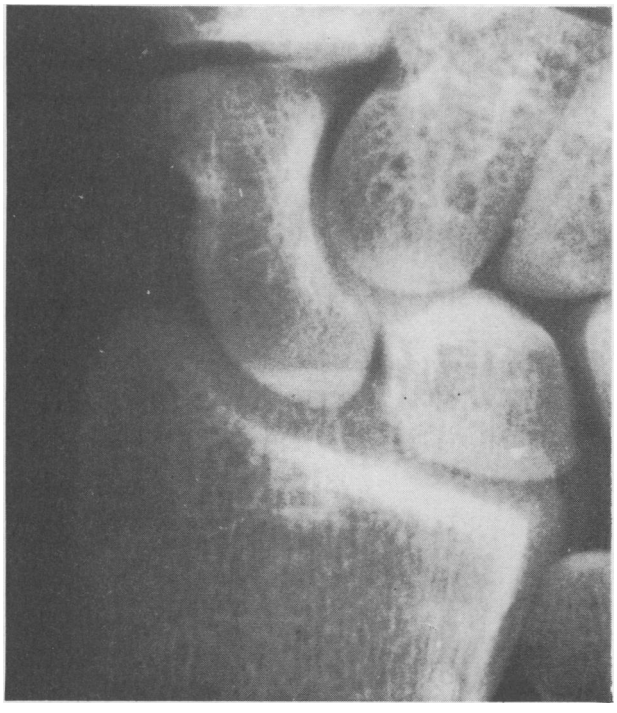


Fig. 1. Direct magnification radiography demonstrating a previously unrecognised fracture of the scaphoid tuberosity.

In the presence of positive clinical signs and negative x-rays, direct magnification radiographs revealed the fracture. Within six weeks of below-elbow wrist thumb immobilisation, complete union resulted, and the patient returned to full-time sporting activities.

Bone Scanning: The use of bone scanning in the assessment of bone trauma, has demonstrated its significant contribution in diagnosing occult fractures several weeks before they were seen on radiographs (Iimori, 1975). In a previous study we have used bone-scanning to distinguish between fresh fractures of the scaphoid bone and wrist contusion. It appeared that increased focal uptake over the fractured scaphoid bone was observed as early as 24 hours following trauma. Contusion of the wrist revealed diffuse increased uptake over the whole wrist (Ganel, 1979). Further studies confirmed the possibility of bone scanning to early detection of scaphoid fractures (Jørgensen, 1979). Fig. 2 demonstrates a 20 year old basketball player, who presented with characteristic clinical symptoms of a fractured scaphoid in his right wrist. Routine radiographs, as well as direct magnification radiography failed to demonstrate his fracture. Bone-scanning with ^{99m}TC-MDP demonstrated increased focal uptake over his right scaphoid bone. The patient was treated by plaster cast immobilisation for six weeks. Follow-up radiographs demonstrated complete bone healing of a fracture at the waist of the scaphoid.

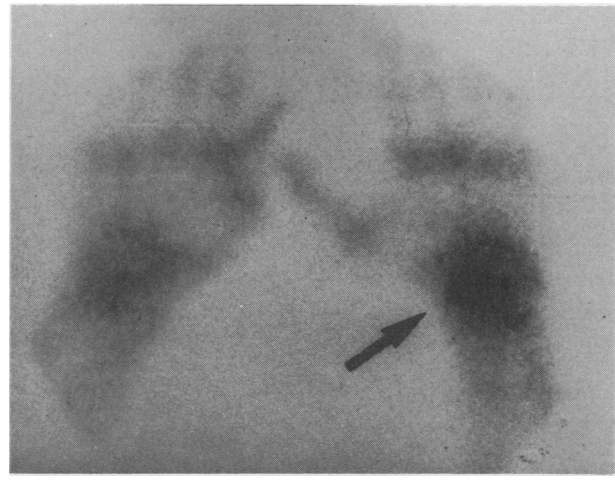


Fig. 2. Bone-scanning with ^{99m}Tc-MDP of both hands. Arrow points towards an increased focal uptake over the right scaphoid bone, suggesting fracture at this site.

In conclusion – the impressive armamentarium available today for the early diagnosis of scaphoid bone fractures, can detect nearly all previously undiagnosed fractures. Thus, the time factor for correct diagnosis can be markedly shortened, and its contribution for navicular fracture complications can be minimalised. The following sequence of diagnostic procedures is suggested, each step added when the previous steps are non-conclusive: detailed history of the traumatic event, clinical examination, antero-posterior, lateral and two oblique view radiographs, direct magnification radiography and finally bone scintingraphy. All these procedures should be performed within the first 24 hours following trauma to decrease the incidence of complications on the one hand and to avoid unnecessary cast immobilisation on the other.

REFERENCES

Alho, A. and Kankaanpaa, U., 1975 "Management of fractured scaphoid bone". Acta.Orthop.Scand. 46: 743-757.

Dobyns, J. H., Sin. F. H. and Linscheid, R. L., 1978 "Sports stress syndromes of the hand and wrist". Amer.J.Sports Med. 6: 236-254.

Fletcher, D. E. and Rowley, K. A., 1951 "Radiographic enlargements in diagnostic radiology". Br.J.Radiol. 24: 598-604.

Ganel, A., Engel, J., Oster, Z. et al., 1979 "Bone scanning in the assessment of fractures of the scaphoid". J.Hand Surg. 4: 540-543.

Genant, H. K., Doi, K., Mall, J. C. et al., 1977 "Direct radiographic magnification for skeletal radiology". Radiology 123: 47-55.

Huene, D. R., 1979 "Primary internal fixation of carpal navicular fractures in the athlete" Amer.J.Sports Med. 7: 175-177.

Iimori, M., Hisada, K. and Suzuki, Y., 1975 "Technetium 99m pyrophosphate bone scanning in evaluation of trauma". J.Nucl.Med. 16: 538.

Jørgensen, T. M., Andresen, J. H., Thommesen, P. et al., 1979 "Scanning and radiology of the carpal scaphoid bone". Acta.Orthop.Scand. 50: 663-665.

O'Donoghue, D. H., 1976 "Injuries of the wrist in treatment of injuries to athletes" 3rd ed., W. B. Saunders, Philadelphia: 311-321.

Sundaram, M., Bordeur, A. E., Burdge, R. E. et al., 1978 "The clinical value of direct magnification radiography in orthopaedics". Skel.Rad. 3: 85-90.

Thomaidis, V. T., 1973 "Elbow-wrist-thumb immobilisation in the treatment of fractures of the carpal scaphoid". Acta.Orthop.Scand. 44: 679-689.

Verdan, C., 1960 "Fractures of the scaphoid". Surg.Clin.N.Amer. 40: 461-464.

Ziter, F. M. H., 1973 "A modified view of the carpal navicular". Radiology 108: 706-707.