

Surgical treatment of 35 volar Barton fractures

No need for routine decompression of the median nerve

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35 patients with volar Barton fractures were treated operatively from 1985–1994. The injury was due to a high velocity motor vehicle accident in 20 patients. All fractures were closed without major carpal injuries. 11 fractures were type B3.1, 21 type B3.2 and 3 type B3.3, according to the AO classification. All fractures were openly reduced and internally fixated by small buttress plates and screws. In 31 cases, the median nerve was unaffected by the injury and was not explored or decompressed during surgery.

The patients were assessed clinically and radiographically after mean 6 (2–10) years. According to the criteria of Pattee and Thompson (1988), 23 patients had excellent results, 10 good and 2 fair. Posttraumatic arthrosis was found in 12 patients and was related to the congruency of the articular surface achieved at surgery. We conclude that the median nerve, when not damaged or compressed, should not be explored or decompressed during surgery.

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The first description of the posterior intraarticular marginal fracture of the distal radius associated with dorsal dislocation of the carpus was attributed to Barton in 1838 (Peltier 1953). Barton also described the anterior intraarticular marginal fracture with volar dislocation. Since then, there has been considerable confusion as to what should be called a "Barton" fracture. The European literature refers to Barton fractures as anterior fractures, while the American literature refers to Barton fractures as posterior fractures, in agreement with what Barton first described. Thompson and Grand (1977) suggested a solution to the problem by proposing that these fractures should be described in anatomical terms, i.e., volar or dorsal Barton fracture.

Volar Barton fractures were earlier treated by closed reduction, but recently open reduction and internal fixation has been shown to give better results (Pattee and Thompson 1988, Mehara et al. 1993). In this a retrospective study, we present the long term results of surgical treatment of 35 volar Barton fractures.

Patients and methods

35 patients (mean age 31 (17–68) years, 26 men) with anterior intraarticular marginal fractures of the distal radius with volar carpal dislocation (volar Barton fracture) were treated operatively at the Orthopaedic

Department of Athens University from 1985 to 1994. In 20 patients the injury was due to a high velocity motor vehicle accident (MVA) and in 15 patients the fractures were due to a fall on an outstretched hand. All fractures were closed without major carpal injuries. Other associated injuries were found in all the patients who were involved in a high velocity MVA, including femoral shaft fractures, facial lacerations, head trauma and chest injuries. The fractures were classified according to AO (Müller et al. 1991). The partial articular fractures of the volar rim were classified as B3 fractures. The subgroups were: simple fractures with a small fragment (B3.1), simple fractures with a large fragment (B3.2.) or multifragmentary (B3.3). 11 of the fractures were of type B3.1, 21 type B3.2 and 3 type B3.3.

Treatment: The fracture was exposed through an anterior approach, reduced and fixed in place using the small fragment AO buttress plate. The plates were fixed to the proximal fragment and when possible, to the distal one. Preoperatively the median nerve functioned normally in 31 patients and was not explored or decompressed. A back-slab was applied for an average of 1 week followed by physiotherapy.

Patients were assessed clinically and radiographically after a mean of 6 (2–10) years. The results were evaluated according to Pattee and Thompson (1988) (Table 1). Posttraumatic arthrosis was evaluated by AP and lateral radiographs also according to Pattee and Thompson (1988) (Table 2).

Table 1. The overall functional criteria of Pattee and Thompson (1988)

Result	Pain	Loss of motion	Disability
Excellent	no	< 5°	no
Good	mild	< 15°	no
Fair	moderate	< 25°	modification of previous activities
Poor	severe	>25°	change of occupation

Table 2. The radiographic criteria Pattee and Thompson (1988)

Post-traumatic arthrosis	
Mild	subchondral sclerosis marginal osteophyte
Moderate	cartilage space narrowing scalloping of articular surface
Severe	loss of joint space carpal collapse subchondral cyst formation

Results

Excellent results were found in 23 patients, good in 10 and fair in 2 patients (Figure 1.) Posttraumatic arthrosis was found in 12 patients. 10 patients had mild and 2 moderate arthrosis (Figure 2). In the latter, post-operative radiographs showed 1–2 mm residual displacement of the articular surface.

No complications occurred. The median nerve, although not decompressed during operation in 31 cases, had normal function postoperatively. In 4 cases with mild preoperative symptoms of median nerve compression, the incision was enlarged and a complete exploration and decompression of the nerve was performed with excellent results.

Discussion

Volar Barton fractures are uncommon injuries comprising only 1–3% of all the fractures of the distal radius (King 1975, Thompson and Grant 1977, Pattee and Thompson 1988). In a recent study, however, Mehara et al. (1993) found an incidence of 11%. This may be due, in part, to an increase of high velocity MVA in developing countries. We found that volar Barton fractures comprised 4% of distal radius fractures; our hospital referral center for high velocity MVA trauma.

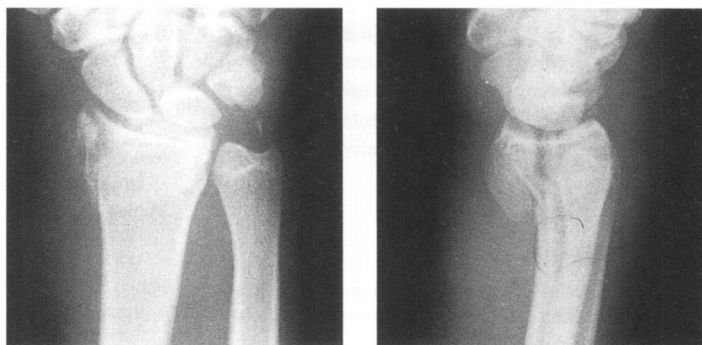
Various treatments have been proposed for volar Barton fractures. Closed reduction, following the recommendations of King (1975) was widely used in the



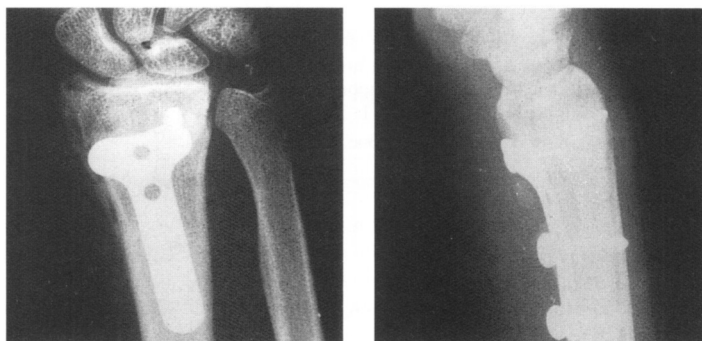
Figure 1. Preoperative radiograph of a 35-year-old man with a type B3.3 volar Barton fracture.

5-year postoperative radiograph showing good results after ORIF with buttress plate and screws.

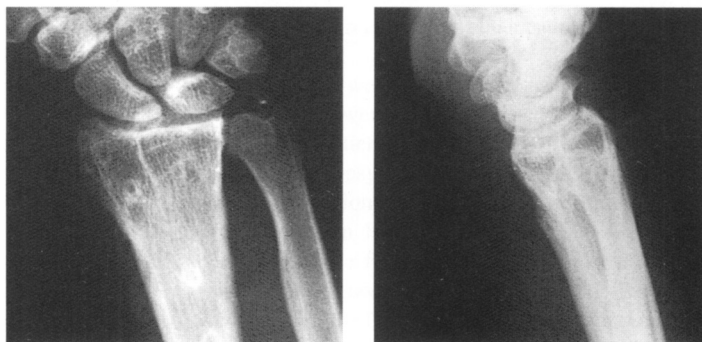
Figure 2. Preoperative radiograph of an 18-year-old man with a B3.2 volar Barton fracture.



Postoperative radiograph taken immediately after fixation using ORIF with buttress plate and screws.



Radiographic result 10 years later after removal of the implants. Mild arthritic changes (sclerosis) but excellent functional result.



past. In an experimental study of the mechanics of these fractures, King found that the stability of reduction depended on an intact dorsal radiocarpal ligament. He proposed that the fracture should be immobilized with the wrist in volar flexion. Although King did not report poor results, all of his patients had mild pain, loss of movement and dysfunction.

De-Oliveira (1973) reported four fifths excellent or good results in patients treated by ORIF, and recently Mehara et al. (1993) reported satisfactory results in nine tenths of their patients treated surgically, similar to our results. These good results can be attributed, in part, to the increased experience that has been gained using ORIF. Other factors which may have affected our results is that a hand surgeon (ABZ) with experience in these injuries managed most cases, that there

were no carpal injuries and that none of the fractures were open.

Accurate reduction remains a primary goal of ORIF for these fractures. Pattee and Thompson (1988) suggested that a step less than 1 mm in the articular surface is acceptable, but Mehara et al. (1993) found that in cases treated nonoperatively the result was worse only if a step greater than 2 mm was present. In the 2 patients with moderate arthrosis, there was a 1–2 mm displacement in the articular surface. 10 patients showed mild arthrosis, even though the reduction was almost perfect. This mild arthrosis was of no clinical consequence in our series, a finding which is consistent with other reports (Melone et al. 1986).

A noteworthy observation of our study, was that although we did not decompress the median nerve dur-

ing surgery, no postoperative dysfunction of the nerve was encountered. These observations suggest that there is no need for exploration and release of the median nerve during operative treatment of volar Barton fractures, provided normal preoperative function..

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