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Volar locking plate vs epibloc system for distal radius fractures in the elderly

Giuseppe Solarino, MD[a], Giovanni Vicenti, MD[a,*], Antonella Abate, MD[b], Massimiliano Carrozzo, MD[a], Girolamo Picca, MD[a], Antonio Colella, MD[c], Biagio Moretti, MD[a]

[a] Department of Neuroscience and Organs of Sense, Orthopaedics Section, Faculty of Medicine and Surgery, University of Bari, Bari, Italy
[b] Department of Orthopaedics and Traumatology, Monsignor Raffaele Dimiccoli Hospital, Barletta, Italy
[c] Department of Orthopaedics and Traumatology, Dario Camberlingo Hospital, Francavilla Fontana, Italy

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ABSTRACT

Purpose: To compare clinical outcomes of ORIF with volar locking plates and the Epibloc system (ES) in the treatment of distal radius fractures (DRFs) in patients aged over 65 years.
Methods: We retrospectively examined a consecutive series of 100 patients with intra-articular or extra-articular DRF who were admitted to our Department of Orthopaedics and Traumatology between January 2007 and January 2013. Fifty patients were treated using the Epibloc System; and the other 50 patients using ORIF with volar locking plates. In all patients, functional evaluation (wrist range of motion [ROM], grip strength and Disability of the Arm, Shoulder and Hand [DASH] Score) and radiographic assessment (radial inclination, volar tilt, ulnar variance and articular congruity) were performed at 2 and 6 weeks, and 3, 6 and 12 months postoperatively; then every 12 months thereafter.
Results: ORIF with volar locking plates was associated with better outcome than ES in the intra-articular and extra-articular DRF groups, generating higher average ROM, DASH and visual analogue scale (VAS) scores. Grip strength mean values, however, were quantified over the minimum level for a functional wrist (> 60%) in both groups. There were no differences between the two techniques in X-ray parameters, and no further correlation was found with functional outcome and ROM.
Conclusions: In a low-functioning patient with multiple medical comorbidities, minimally-invasive surgery with the ES is a safe option, enables early mobilisation of the wrist and is likely to produce acceptable clinical outcomes.

Introduction

Distal Radius Fractures (DRFs) represent 16% of all fractures and are the most prevalent treated by trauma surgeons [1,2]. Conservative treatment is the optimal choice in stable and non-displaced fractures, with good functional outcomes [3–5]. Management of displaced DRFs remains controversial and there is considerable disagreement about the need for strict anatomical restoration of the joint surface [4,6–9].

This lack of consensus may result from the heterogeneous composition of study samples, particularly the wide age range of the patients included in the studies [3,10–12].

In a recent study, Grewal et al. demonstrated that patients with malalignment of the distal radius who are aged at least 65 years have less risk of adverse outcomes compared with those aged under 65 years [9]. Conversely, Nesbitt et al. found that the risk for displacement, with unacceptable radiographic results, increases with age because of lower bone density [13]. Comorbidities, such as depression, smoking, diabetes and hypertension, have been historically associated with an increased risk of healing problems [14,15].

The patient's functional requests and comorbidities must be seriously considered when choosing the DRF treatment for the patient as these factors have a great impact on residual pain and functional and clinical outcomes.

ORIF with plate and screws through a volar approach has been widely used during the last decades. This procedure enables the anatomical restoration of the fracture surfaces generally associated with articular fractures, and provides stable fixation and early

* Corresponding author at: Department of Neuroscience and Organs of Sense, Orthopaedics Section, Faculty of Medicine and Surgery, University of Bari, Policlinico, Piazza Giulio Cesare 11, 70124 Bari, Italy.
E-mail address: dott.gvicenti@gmail.com (G. Vicenti).

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mobilisation [16]. However, complications, such as tendon ruptures and irritation, loss of fixation, delay in wound healing, and superficial and deep infections, can occur with this technique. Restoration of normal anatomy and an "acceptable" radiological alignment are not always achieved. Furthermore, a perfect anatomical reduction is not always necessary to obtain satisfactory results [17], particularly in elderly patients [4,18–21]. Only in patients who are likely to have high functional demands is it recommended that articular reconstruction be achieved with less than 2 mm of gap or step-off, the radius be restored to within 2 mm of its normal length and that carpal alignment be restored [22].

For these reasons, percutaneous techniques still represent a valid alternative for DRF treatment, particularly in elderly patients with low functional demands; moreover, these procedures are cost-effective and are not considered technically demanding.

The Epibloc System (ES) of percutaneous intramedullary fixation was developed in Italy for the treatment of distal meta-epiphyseal radius fractures [23]. This system includes pins that can be inserted into the radius medullary canal and advanced without breaking through the second cortex; this fixation is stabilised by an external plate that ensures dynamicity to the implant through the elasticity of the pins, which compress the fractured surfaces [23]. The ES is reliable, simple to perform and cost-effective and also guarantees stable fixation, which enables early mobilisation of the wrist [23].

The purpose of this retrospective study was to compare the results of displaced intra-articular and extra-articular DRFs treated with percutaneous ES versus that following ORIF with volar locking plates in terms of functional outcomes, residual pain, Disability of the Arm, Shoulder and Hand (DASH) score and radiographic assessments.

Materials and methods

Selection of study population; Inclusion/Exclusion criteria

We retrospectively examined a consecutive series of 124 patients with intra-articular or extra-articular DRF who were admitted to our Department of Orthopaedics and Traumatology between January 2007 and January 2013. Patients were identified from our trauma database and data were accumulated from case notes, operative records and radiographs. Inclusion criteria were the presence of an intra-articular or extra-articular DRF (23-A2-A3/C1-C2-C3 according to the AO/OTA classification), age over 65 years and no previous dysfunction of the injured wrist. Patients with bilateral fractures, any other concomitant limb fractures or open fractures and patients treated with other techniques were excluded from the study.

After the chart review, nine patients were excluded. Of the remaining 115 patients, eleven refused to return for clinical evaluation or were lost to follow-up. Four died because of unrelated causes [Fig. 1].

The final sample included 100 patients (67 female, 33 male) with a mean age of 71 years at the time of trauma (range 65–82 years). According to the AO/OTA classification, fractures were classified as type A2 in 36 patients, type A3 in 10 patients, type C1 in 44 patients, type C2 in two patients and type C3 in eight patients. Fifty patients were treated using the ES (28-A2; 1-A3; 21-C1); and the other 50 patients were treated using ORIF with volar locking plates (8-A2; 9-A3; 23-C1; 2-C2; 8-C3) (Table 1; Graphics 1 and 2).

All 100 patients were available for final assessment with a mean follow-up of 46 months (range 24–72 months). Two surgeons who were not involved in the initial management of the patient performed the final evaluation.

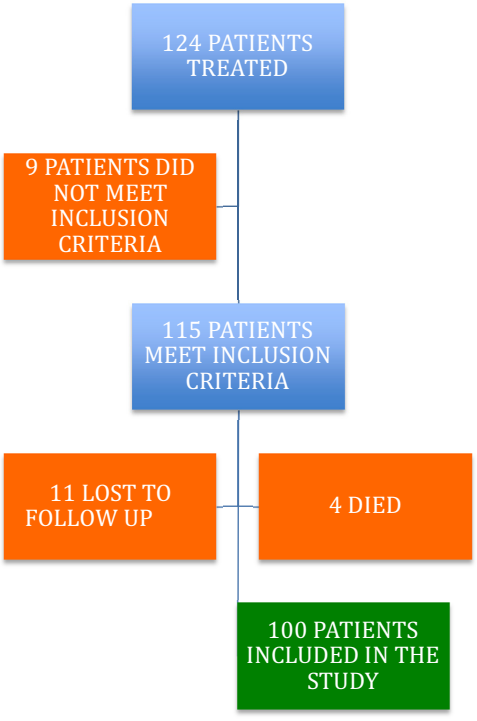
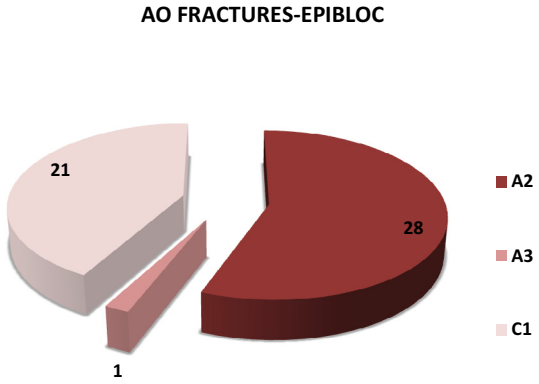


Fig. 1. Flow chart of patients included in the study.

Table 1
Distribution of fractures by AO classification.

	Epibloc	Plate
A2	28	8
A3	1	9
C1	21	23
C2		2
C3		8
	50	50



Graphic 1. Fractures treated with ES.