



Editorial

Distal radius fracture: The right treatment for each patient



1. Introduction

Since the introduction of anterior plates, secondary displacement after extra-articular distal radius fracture has become rare. In articular fracture, the quest for optimal reduction has been progressing from generation to generation of surgeons, with modern tools. Distal radius fracture was the focus of several publications in *Orthopaedics & Traumatology: Surgery & Research* (OTSR) in 2018, from France [1–4], Italy [5], Turkey [6], South Korea [7], China [8] and Japan [9], reflecting the frequency of the problem, its impact on the patient and its costs for society. All these publications can be seen from the point of view of personalized medicine, aiming to find the right treatment for the individual patient, taking account of patient demand, medical possibilities and optimization of resource use.

2. Innovations

Especially in young patients and those with high functional demand, a prime objective is to restore anatomy [6], the quality of which matches clinical and functional results as measured on questionnaires [10]. This can now make use of intraoperative imaging (arthroscopy and 2D and 3D imaging), helping and checking the quality of reduction, and of precise and stable methods of internal fixation. Like for most innovations, for arthroscopy, which was introduced by Doi et al. [11] in 1999 for distal radius articular fracture, initial success was followed by doubts [12] before the present mature technique could emerge. This associates internal fixation by plate and visual control of joint reduction, and has been validated on postoperative CT [1]. Arthroscopy has also enabled reduction and stabilization of “die-punch injury” (lunate fossa subsidence) by balloon and calcium phosphate cement injection to be checked in preliminary trials on anatomic specimens, opening up clinical perspectives [2]. These imaging techniques are even combined in new hybrid operating rooms, allowing both arthroscopic visualization of joint lesions, including ligament lesions, and assessment of the position of bone fragments and fixation material by a flat radioscopic detector on a robotic arm, with production of 2D and 3D images [13] (Fig. 1).

Internal fixation by palmar plate and locking screws has become the gold standard in recent years, enabling precise and stable reduction with good functional results [14] and few complications [15]. Stability of the system and of reduction largely depends on the positioning of the screws, which need to be able to support the entire subchondral bone structure. The double-tiered

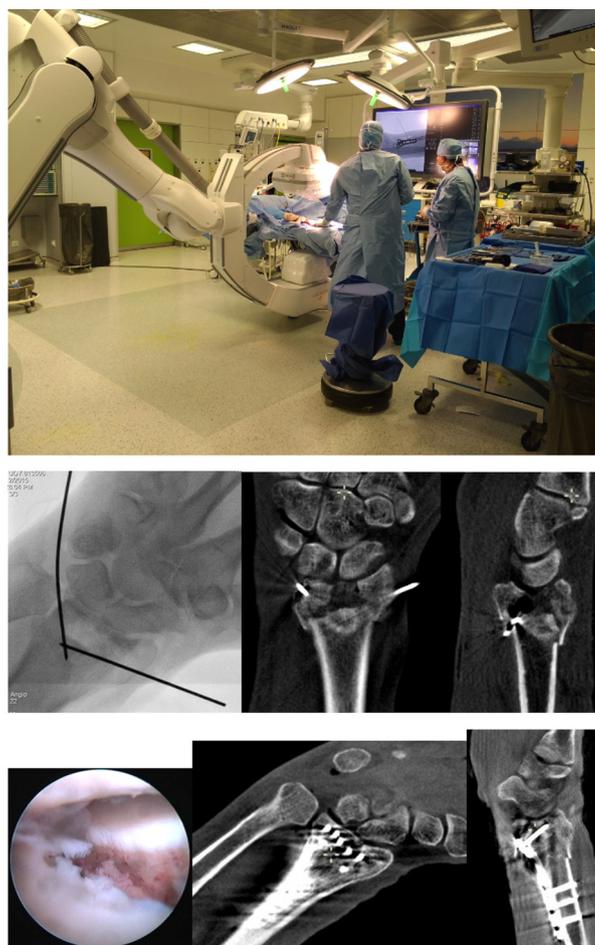


Fig. 1. A. Hybrid operating theater equipped with arthroscopy and a robotic arm supporting a flat detector producing 2D and 3D images (Artis Zeego II (Siemens)). B. AO C3 distal radius fracture. The subsided central fragment is manipulated by pins under 2D and 3D imaging control. C. Arthroscopy provides joint and ligament control. The 3D images control reduction and anterior screwed plate position.

subchondral support technique uses 2 rows of distal screws to support the dorsal subchondral bone, with oblique screws in the proximal holes and screws perpendicular to the radius axis in the distal holes to support the central part of the joint [7] (Fig. 2).

Titanium is the main plate material, followed by stainless steel. Research is nevertheless ongoing to develop new materials such

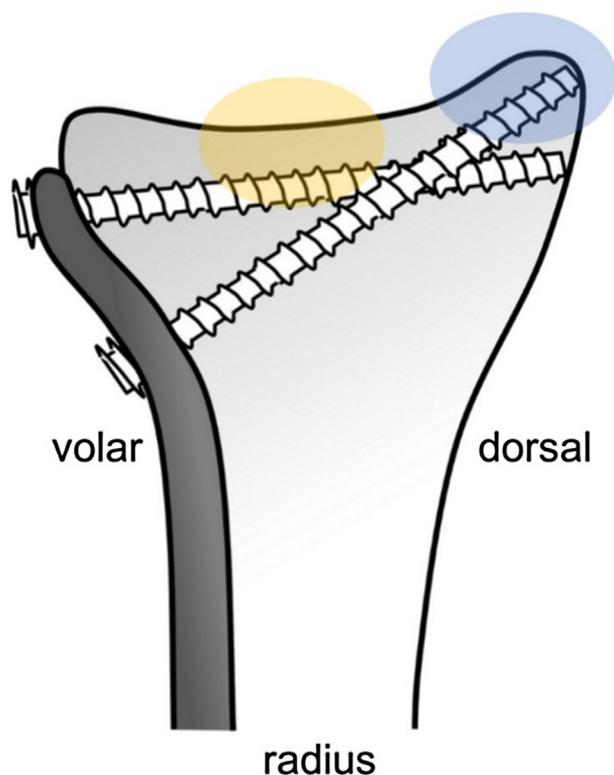


Fig. 2. Orientation of locking screws in the two distal rows of the plate, supporting the central (orange) and dorsal part (blue) of the subchondral bone (from Lee et al. [7]).

as carbon-fiber reinforced (CFR) polymers which may facilitate removal of material by the avoiding the cold-welding phenomenon affecting titanium, with more physiological rigidity, and improving analysis thanks to their radiotransparency. Their relative fragility presently requires caution in use [5]: the right treatment for each patient.

3. Assessment

All innovations and current treatments need to keep on being assessed [10] to validate the specific indications and to inventory complications, causes of prolonged incapacity and major costs. Distal radius fracture generally speaking affects 2 types of patient: young fairly high energy trauma victims, and older women with osteoporosis suffering low energy falls. In the former, all means of reduction and fixation are deployed, to restore anatomy; in the latter, the link between anatomic reduction and function is less direct, and it is generally physiological age that decides between surgery and simple cast immobilization. None of these treatments is free of complications, as shown in the meta-analysis by Yuan et al. [8] comparing external versus internal fixation in an adult population. Open internal fixation generally led to fewer complications, while external fixation had a 10% infection rate and 8.3% malunion rate; and both techniques had 5.5% rates of revision surgery. Neuropathy is frequent (20%), usually spontaneously resolving, as pointed out by Dauzere et al. [4] in 3 rather rare cases of combined median and ulnar nerve palsy. Complex regional pain syndrome is found in 3% of cases treated by external or internal fixation. Tendon tear occurs more often (3%) by friction on plates or screws in internal fixation. A large-scale randomized study [15] in the elderly, with 87% females with a mean age of 68 years, reported similar results for surgical treatment, while also analyzing cast immobilization, which generally resulted in more complications of various sorts, and especially malunion (33.7%). In this population, that does

not necessarily mean that clinical outcome is poor. Moreover, specific surgery to treat associated lesions is not always necessary, so long as the radius is stabilized. This can be seen from the good results reported for conservative treatment with early mobilization in ulnar metaphysis fracture associated with radius fracture stabilized by anterior plate in a population with a mean age of 75 years [9] or long-term results in carpal dislocation fracture reduced and stabilized by radial styloid pinning [3].

4. Conclusion

Treatment of distal radius fracture continues to progress, with diagnostic and therapeutic innovations and assessment of results in terms of function and complications, in a perspective of personalized medicine: the right treatment for each patient.

Disclosure of interest

Olivier Barbier is an associate editor of *Orthopaedics & Traumatology: Surgery & Research*, and declares that he has no competing interest. Laurent Obert receives fees from FX Solutions, Evolutis and Springer.

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