



Hinged external fixation for complex fracture-dislocation of the elbow in elderly people



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ARTICLE INFO

Keywords:

Hinged external fixator
Elbow fracture in elderly
Complex elbow fracture-dislocation

ABSTRACT

The authors report their experience of treating complex elbow fracture-dislocations in elderly people, using a minimally-invasive approach with a new articulated external fixator that is associated with minimal internal fixation. The clinical results for 19 patients are presented according to outcome factors, such as range of motion, pain and function, rate and type of complications, and reoperation rate. The results indicate that this treatment strategy should be considered as a good alternative to other treatment options reported in the literature, including conservative treatment, ORIF with angular stable plates and total elbow arthroplasty.

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Introduction

The treatment and the risk–benefit evaluation of traumatic lesions of the elbow are based on a correct preoperative assessment of bone and/or soft tissue lesions to distinguish the different patterns of instability, and on the type of patient to be treated. The term “complex lesion of the elbow” identifies a possible clinical scenario of articular and periarticular mechanical instability because of bone, ligament and/or soft tissue lesions that is difficult to assess with the ordinary classifications [1,2].

Elbow dislocation is the second most common dislocation in adults, after the shoulder, with an annual estimated incidence of six in 100,000 [3]. Dislocation of the elbow can be simple, with no fractures, or complex, with bone structure involvement [4]. The most common elbow fracture sites are the olecranon, the coronoid process and the radial head. The latter two structures are the major bone stabilisers of the elbow. The incidence of fracture of these sites in patients with elbow dislocation is 36% for the radial head, 13% for the coronoid process and 4% for the olecranon [3]. The most common treatment of complex elbow fracture-dislocations is ORIF [5] and ligament repair (particularly lateral collateral ligaments [LCL]) with the aim to restore bone-articular surface and joint stability. Radial

head prosthesis is sometimes necessary when it is not possible to reconstruct this structure. A clinical examination at the end of surgery is mandatory to assess capsular and ligament structures and final stability. Instability or re-dislocation after surgery indicates the use of a hinged external elbow fixator [6–8] to enable early joint movement and prevent residual instability or stiffness.

Although open surgery and ligament reconstruction have produced good results in common lesions, these procedures are often difficult and are sometimes associated with major complications, such as septic arthritis, wound failure or bone fragment necrosis, particularly in highly comminuted fractures and weak bone, like that in elderly people [8,9]. Elderly patients also often present with local or general risk factors that can be associated with increased complication rates when undergoing a standard approach, such as arthroplasty or ORIF. In these situations, a minimally-invasive surgery associated with an articulated external fixator should be considered as a possible alternative to other treatment options reported in the literature, including conservative treatment, ORIF with angular stable plates, and total elbow arthroplasty (TEA) [10,11]. The purpose of this prospective study is to evaluate whether the above strategy can guarantee early joint motion and good long-term function in elderly patients who often live alone and ask to be independent, and whether it minimises the risk of major complications.

Materials and methods

A total of 19 patients (13 women and 6 men) with an average age of 74.5 years were evaluated (Table 1). The inclusion criteria

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Table 1

General data relative to the patients, their lesions and their treatments.

No.	Patient	Sex	Age	Kind of lesion	Treatment
1	BA	Woman	80	Open fracture AO 1.3 C2	F4 external fixator and cannulated screws
2	FM	Woman	70	AO 1.3 C2	F4 external fixator, Kirschner wires and cannulated screws
3	BL	Woman	67	AO 1.3 C2	F4 external fixator and cannulated screws
4	MM	Woman	76	AO 1.3 C2	F4 external fixator and cannulated screws
5	GB	Woman	72	AO 2.1 C3 terrible triad	F4 external fixator and capitellotomy
6	BA	Woman	69	AO 1.3 C2	F4 external fixator and cannulated screws
7	RV	Woman	79	AO 1.3 C2	F4 external fixator and cannulated screws
8	CD	Woman	68	Unstable postero-lateral elbow dislocation	F4 external fixator and capsular-internal ligament reconstruction
9	SV	Woman	78	AO 2.1 C3 + elbow posterior dislocation	F4 external fixator and olecranon plate
10	ME	Woman	77	AO 1.3 C3	F4 external fixator and cannulated screws
11	CF	Man	76	AO 1.3 B1 + dislocation	F4 external fixator and cannulated screws
12	SI	Man	83	Terrible triad	F4 external fixator and capitellotomy
13	LM	Woman	78	AO 1.3 B1 + elbow posterior dislocation	F4 external fixator and cannulated screws
14	MG	Man	65	Open dislocation + neurovascular lesion	F4 external fixator
15	RF	Man	81	Monteggia's fracture	F4 external fixator and radial plate
16	GT	Man	79	Coronoid fracture and elbow posterior dislocation	F4 external fixator
17	HA	Man	82	Open dislocation + coronoid + N/V lesion	F4 external fixator
18	TD	Woman	66	AO 1.3 C2	F4 external fixator and cannulated screws
19	EG	Man	71	AO 2.1 C3	F4 external fixator and cannulated screws

were age over 65 years with no previous dysfunction of the injured elbow, and the clinical indication to use an articulated external fixator for a posttraumatic bone and/or ligament instability.

All patients were treated with a new, radiolucent, hinged external fixator (F4 Motion Citieffe®), which was designed to allow full range of motion (ROM) and joint distraction with minimal fixation, at Mantua and Piacenza Hospitals from 2008 to 2011. When necessary, joint distraction was applied using the fixator itself.

According to the postoperative protocol, almost all patients were permitted to move their elbow in flexion–extension and pronation–supination, as far as tolerated, the day after surgery. Passive mobilisation was made twice daily by a physiotherapist until

discharge. Articular ROM was limited to between 70° and 110° in two patients because of the complexity of the fracture and soft tissue lesions. Three weeks after surgery the hinged external fixator was unlocked, and full elbow flexion–extension was permitted in all patients. The rehabilitation programme, including active and passive mobilisation, was continued to achieve full ROM and to enable complete healing of the soft tissues involved in the injury. The duration and intensity of the programme were customised according to the specific needs of the patients.

Patients were evaluated with a dedicated form that included items relating to the classification of the different types of bone and soft tissue lesions, the type of operation performed (Table 1), and the radiological and clinical outcomes at 3, 6, 9 and 12 weeks

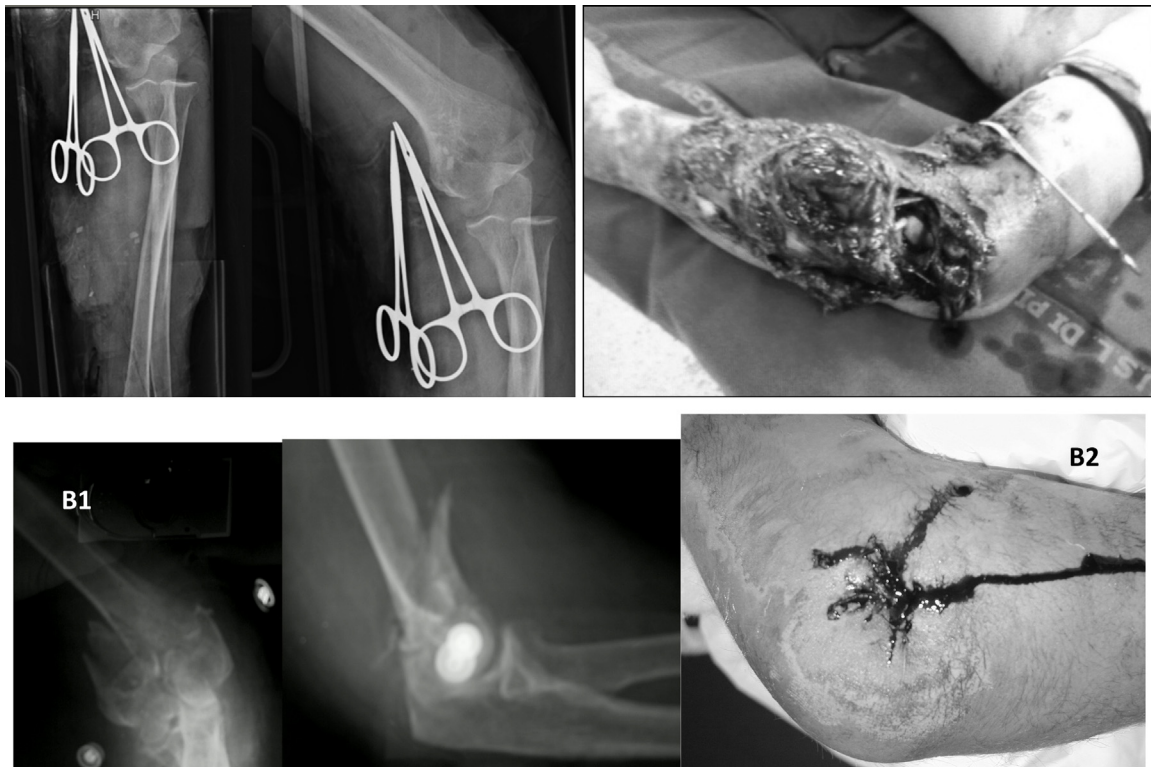


Fig. 1. Case 14: AP and lateral radiographs (A1), and the clinical picture (A2) of a patient with coronoid fracture and open grade 3C elbow dislocation (neurovascular lesion). Case 1: AP and lateral radiographs (B1), and the clinical picture (B2) of a patient with a distal humeral AO 1.3 C2 grade 2 open fracture.

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