Orthopaedics & Traumatology: Surgery & Research (2009) **95**, 343—351

Available online at ScienceDirect www.sciencedirect.com

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ORIGINAL ARTICLE

Acute elbow dislocation with arterial rupture. Analysis of nine cases

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Accepted: 8 April 2009

KEYWORDS
Elbow dislocation;
Brachial artery;
Vascular injury;
Ischemia

Summary Elbow dislocations are the most frequently encountered dislocations after shoulder dislocations. In their vast majority these injuries involve only the joint and carry a good prognosis. Close anatomic proximity to the joint of neurovascular structures put them at risk of concomitant injury but this occurrence remains, actually very rare. The objective of this study is to retrospectively analyze the results of nine cases of elbow dislocations with brachial artery complications and to propose coherent therapeutic guidelines derived from this experience.
Materials and methods: From 1999 to 2004, 357 elbow dislocations were treated by the traumatology team at the Purpan University Hospital and 340 at the Rangueil University Hospital in Toulouse, France. These two teaching institutions combined their series, contributing to seven dislocations associated with a brachial artery partial rupture, resulting in ischemia. Between 2001 and 2006 at the Le Mans Regional Hospital Center, 138 dislocations of the elbow were treated, and included two cases involving rupture of the brachial artery. In all these institutions' emergency departments, elbow dislocations were mainly treated on an outpatient basis: closed reduction under ultra short-acting products general anesthesia, with stability evaluation followed by cast immobilization. In the rare instances of ischemia, the artery was repaired in concert with the vascular surgery team. All the nine cases had a similar treatment protocol and were submitted to an identical outcome evaluation method. The patients were all males with a mean age of 37.3 years (range, 18—58 years). The combined injury occurred at sports in two cases, because of a fall in three cases and as a result of a traffic accident in four cases. Ischemia was complete in three cases (no radial or ulnar pulse and devascularized hand). In the six other cases, the clinical presentation was subacute. An arteriogram was obtained in five cases after

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1877-0568/$ - see front matter
doi:10.1016/j.otsr.2009.04.013

reduction of the dislocation, confirming the brachial axis disruption. Median and/or ulnar nerve injury was suspected in six patients. Only five elbows remained stable after reduction allowing plaster cast immobilization. In the other cases, dislocation recurrence or consequential residual varus/valgus laxity required external fixation or a cross-pinning fixation. An autologous vein, brachial artery bypass was performed in eight cases and an end-to-end anastomosis was carried out in one case. Revascularization was reestablished between 4 and 19 h after injury (mean 10.5 h).

Results: All the patients were seen at a minimum of 2 years' follow-up (mean of 4.3 years). On the basis of Mayo Clinic score, the results were considered excellent in three cases, good in four cases, and poor in two cases. No patients complained of elbow instability. The X-rays showed a reduced elbow in all cases and heterotopic ossifications in three cases. No degenerative lesion was observed at the longest follow-up.

Discussion: The incidence of a combined vascular injury with dislocation remains difficult to establish because the literature reports sporadic short series of clinical cases. The prevalence of this association is estimated to be between 0.3 and 1.7% in hospitals. The vascular lesion risk is probably related to the displacement extent and this later as a consequence of the injury intensity. This context calls for a diagnostic warning signal of possibly associated vascular involvement. Assessment of arterial vascularization should be systematic and mandatory with any osteoarticular injury. The slightest vascular status clinical doubt after reducing any dislocation presses for vascular patency work-up: echo-Doppler, angio-scan, arteriography. The multi-parametric nature of these combined injuries explain why their sometimes disappointing outcome remains dependent on the ability to deal with contradictory healing concerns: skin condition, capsular, and ligaments damages, type of revascularization procedure used, joint stability after closed reduction. This last parameter, being a substantial determinant for the period of immobilization, appears crucial to the final functional outcome, particularly in terms of range of motion loss or residual flexion contracture.

Level of evidence: Level IV. Therapeutic retrospective study.

Introduction

Elbow dislocations in the adult account for 25% of this joint's injuries, for an incidence of approximately six per 100,000, often affecting young adults involved in a sports accident [1,2]. This injury responds to orthopaedic reduction, brief immobilization, and active rehabilitation. The prognosis is good other than a slight loss in joint range of movement [3—7]. Rare cases of recurring dislocation, instability, and/or substantial loss of range of movement have occurred in series reviewed over the long term or assessed with more rigorous criteria [8—11]. Current consensus recommends evaluating postreduction stability and repairing the ruptured collateral ligament structure or structures [14].

The anatomic proximity of the periarticular neurovascular structures makes concomitant lesions possible, with the ulnar and radial epiphyses displaced backward rupturing or compressing the blood vessels and nerve trunks. The frequency of these associated lesions, particularly vascular lesions, is very low in the elbow compared to the knee [15]. The cases reported of dislocation with rupture of the elbow's vascular axis are admittedly numerous but most often are not multiple (Table 1).

The French-language literature only reports isolated case studies [17,35].

This article reports two hospital centers that retrospectively combined and analyzed their elbow dislocations complicated by brachial artery lesions, with the objective of assessing the results and proposing a coherent diagnostic and therapeutic procedure for this type of injury.

Patients and method

We report an exclusively male population, whose mean age at the time of injury was 37.3 years (range, 18—58 years). The left elbow was dislocated in seven cases, the dominant limb in one case. Two patients had had a sports-related injury (tackle in rugby or football) and three had fallen (stumbling during acute exogenosis, a fall from a ladder and a fall from a horse). Four patients were involved in a motorcycle (two patients) or an automobile (one patient) accident. Two of them presented other injuries; one had multiple fractures and presented an ipsilateral floating knee fracture of both diaphyseals and a wrist fracture, the other had multiple injuries and also presented contralateral wrist and clavicle fractures, coma from subdural hematoma, and a thoracic contusion. Of the nine patients, four had been in another hospital before being transferred and the five others had been admitted directly.

The dislocations were open in six cases, with the wound centered in the elbow fold or in the medial epicondyle region. The dislocation was posterior in seven patients and posterolateral in two, involving both bones of the forearm symmetrically. The dislocations were pure in seven cases and associated with a fragmented epiphyseal fracture in two cases: a fracture involving less than one-fifth of the radial