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Radial Nerve Paralysis Recovery Prognostic Factors In Fractures of the Humeral Shaft

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Abstract: The achievement of the radial nerve in the humeral shaft fractures is a common complication. Recovery of nerve paralysis is often the rule. We conducted a retrospective study of 26 cases, to support the prognostic factors for recovery from paralysis of the radial nerve accompanying fractures of the humeral shaft. According to our study, lack of motor recovery in the radial territory is correlated with the existence of wounds on the nerve, the degree of skin opening, the high-energy trauma. In addition, the systematic control of the radial nerve in the initial management has allowed us to observe, besides the existence of nerve wounds, nerve incarceration presence in the fracture site, making it desirable nervous systematic exploration of a humeral shaft fractures. Paralysis of the radial nerve complicates the management of humeral shaft fractures and sets the functional prognosis of upper limb game, the prognosis factors represented mainly by nerve contusion.
Keywords: Paralysis, radial nerve, humeral shaft fracture, wound exploration, prognosis.

INTRODUCTION

Paralysis of the radial nerve during fractures of the humeral shaft are frequent, involve the functional prognosis of the upper limb. Spontaneous recovery from nerve palsy is often possible, which depends on several factors.

METHODS

This is a retrospective study spread over 5 years from January 2012 to December 2016, including 26 patients.

The case studies of the 26 cases made it possible to identify the different elements included in our study: the age, the seat of the fracture, the type of fracture line, skin opening, and nerve condition during their exploration intraoperatively. Motor recovery was assessed by rating Medical Research Council and a DASH score was calculated for all our patients.

RESULTS

The average age of our series was 38 (24-57) with Male predominance 20M/6F. The average decline was 10 months (4-18 months). Different mechanisms were counted, 8 at low and 18 at high energy.

Most fractures were spiroidal and localized at junction of the lower and mid third of the upper arm which 8 were open fractures. There were 20 preoperative and 6 postoperative paralyzes. Twenty-two patients benefited from DCP plate osteosynthesis by external approach with systematic identification of radial nerve. Intramedullary nailing was performed in two cases. Two patients have been treated by setting up an external fixator.

The radial nerve was continuous in 22 cases, of which ten were contused, six were incarcerated and ten were intact. Of the four patients who had an open fracture, two had a total nerve section radial, so the nerve was contused and dilacerated in the other two.

Patients were immobilized in a Brachio-antebrachio-palmar splint or in a bandage type scarf for 3 weeks. All patients were seen in consultation at 3 weeks, at 6 weeks and then every 3 months.

The functional evaluation was made according to the DASH functional score

Recovery was complete on twenty patients, incomplete on two patients, and there was no recovery on four patients. The average DASH score was 28.8 (3, 3-95.8). Recovery neurological average was 7 months (2-14). Patients with poor results had an open fracture type II and III according to the classification of

CAUCHOIX and DUPARC, caused by a high energy trauma, with a nerve appeared continuous but dilacerated in two cases, while the other two cases had a sectioned nerve.

Of the six patients who had postoperative paralysis, there was complete recovery in all our patients except for one whose recovery was partial in view of the postoperative occurrence of pseudarthrosis. Two cases of total rupture of the radial nerve benefited from nerve sutures, however, they didn't recover at the last follow-up, for which a palliative surgery was proposed.

Table-1: Clinical and radiological results in our series

Number Of Cases	26
The Average Age (years)	**38 ; [24-57]**
Predominance	**Male** 20M/6F
Side Reached	Right : 10 cases Left : 16 cases
Etiologies	Road Accidents : **18 cases** Work Accidents : 5 cases Fall : 3 cases
Cutaneous lesions according to Couchoix and Duparc	Class 1 : 4 cases Class 2 : 4 cases Class 3 : None
Fracture Line	Spiral : 12 cases Transversal : 6 cases Third Fragment : 6 cases Comminuted : 2 cases
Fracture Site	Middle Third : **18 cases** Lower Third : 8 cases
Type Of Paralysis	Iatrogenic : 6 cases Initial : **20 cases**

Table-2: Identified Factors and Recovery Time

Cases	State of the nerve	Pré/post operative paralysis	Fracture line	Start of recovery (Months)	DASH score	Recovery time
1	Intact	Postoperative	Transversal	1	3,3	2
2	Intact	Postoperative	Oblique	2	4.6	3
3	Intact	Initial	Spiral	1	6.6	4
4	Intact	Initial	Oblique	2	9,1	6
5	Contus	Initial	Transversal	2	12,5	7
6	Sectioned	Initial	Comminuted	-	83,3	-
7	contus	Initial	Spiral	2	25	9
8	contus	Initial	Spiral	3	25,8	10
9	contus	Initial	Spiral	3	29	11
10	Intact	Postoperative	Transversal	3	5,2	14
11	Intact	Initial	Oblique	1	5	5
12	Contus	Initial	Spiral	2	16,6	8
13	Dilacerated	Initial	spiral	-	95,8	-
14	contus	initial	Spiral	2	15,5	8
15	Dilacerated	Initial	Spiral	-	91,1	-
16	Intact	Initial	Oblique	1	5,2	5
17	Intact	Postoperative	Transversal	3	4,5	13
18	Contus	Initial	Spiral	3	26	12
19	Intact	Initial	Oblique	2	8,7	6
20	Contus	Initial	Spiral	2	25,2	9
21	Sectioned	Initial	Comminuted	-	87,6	-
22	Contus	Initial	Transversal	2	13,1	7
23	Intact	Initial	Spiral	1	6	4
24	Intact	Postoperative	Oblique	2	4,9	3
25	Intact	Postoperative	Transversal	1	4,1	2
26	Contus	initial	spiral	3	28,7	10

Table-3: Identified factors and recovery time continued

Case	Mechanism	Pre or Postoperative paralysis	Fracture Line	Start of recovery (Months)	DASH Score	Recovery time
1	High energy	Postoperative	Transversal	1	3 ,3	2
2	High energy	Postoperative	Oblique	2	4,6	3
3	Low energy	Preoperative	Spiral	1	6,6	4
4	Low energy	Preoperative	Oblique	2	9,1	6
5	High energy	Preoperative	Transversal	2	12,5	7
6	High energy	Preoperative	Comminuted	-	83,3	-
7	High energy	Preoperative	Spiral	2	25	9
8	High energy	Preoperative	Spiral	3	25,8	10
9	High energy	Preoperative	Spiral	3	29	11
10	High energy	Postoperative	Transversal	3	5,2	14
11	Low energy	Preoperative	Oblique	1	5	5
12	High energy	Preoperative	Spiral	2	16,6	8
13	Low energy	Preoperative	Spiral	-	95,8	-
14	High energy	Preoperative	Spiral	2	15,5	8
15	Low energy	Preoperative	Spiral	-	91,2	-
16	Low energy	Preoperative	Oblique	1	5,2	5
17	High energy	Postoperative	Transversal	3	4,5	13
18	High energy	Preoperative	Spiral	3	26	12
19	Low energy	Preoperative	Oblique	2	8,7	6
20	High energy	Preoperative	Spiral	2	25,2	9
21	High energy	Preoperative	Comminuted	-	87,6	-
22	High energy	Preoperative	Transversal	2	13,1	7
23	Low energy	Preoperative	Spiral	1	6	4
24	High energy	Postoperative	Oblique	2	4,9	3
25	High energy	Postoperative	Transversal	1	4,1	2
26	High energy	Preoperative	Spiral	3	28,7	10

DISCUSSION

Radial nerve palsy complicates 2-17% of fractures of the humeral shaft [4, 7, 8, 9]. The radial nerve, with its intimate relations with the humeral shaft especially during his passage in his groove, is exposed to potentially serious lesions related to the vulnerable forces whose humerus suffered during its fracture, is directly responsible for a contusion or laceration; or by stretch-pulling at the separation of the two bone fragments [5].

Analysis of the data in our study shows that high-energy trauma is associated with initial radial paralysis whose recovery time is extended [2, 3, 10]. The presence of a spiral fracture line appears to be a factor in achieving radial nerve. All postoperative paralysis in our series recovered in a variable delay of 2 to 14 months, of which one case benefited from a removal of the plaque screwed and neurolysis of the nerve that was engulfed with fibrosis adhered to the plate [11].

It has been noted that a spiral fracture line has often been associated with a contusion of nerve during surgical exploration and prolonged recovery time. The functional score was satisfactory less than 12.5% for all patients with intact nerve during the exploration. Our results are comparable with those of the literature especially the work of AERON and Nachef N [1, 6].

According to our study, the absence of motor recovery in the radial territory is correlated with the existence of wounds on the nerve, the degree of skin opening, the high-energy trauma. The systematic control of the radial nerve at initial management allowed us to observe, in addition to the existence of nerve wounds, the presence of incarceration of the nerve in the fracture site, making systematic nerve exploration desirable in the fractures of the humeral shaft.

CONCLUSION

The radial nerve damage during fractures of the humerus shaft represents a serious complication that involves the functional prognosis of the limb and whose

factors prognosis: nerve wounds, degree of skin opening, high-energy trauma, non-union, worsen clinical outcomes.

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