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Factors associated with removal of a radial head prosthesis placed for acute trauma

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ABSTRACT

Purpose: This study tests the hypothesis that there are no factors associated with removal or revision of a radial head prosthesis. A secondary analysis addressed the time to removal or revision.
Methods: We reviewed the database of two large hospitals from 2000 to 2014 and identified 278 patients that had radial head replacement after an acute fracture or fracture dislocation of the elbow: 19 had removal and 3 had revision of the radial head implant within the study period. Explanatory variables including demographics, the type of injury, prosthesis type, surgeon, medical centre, and associated injuries were evaluated. Survival analysis using Kaplan-Meier curves evaluated time to removal/revision.
Results: After adjustment for potential confounders using Cox regression multivariable analysis, hospital was the only factor independently associated with removal or revision (Hazard ratio = 2.4, Confidence interval: 1.03–5.8, *P* value = 0.043). The highest proportion of removal/revision was during the first year after implantation and decreased by half each year over the second to fourth years. The most common reason for removal of the prosthesis was to facilitate removal of heterotopic ossification (the majority with proximal radioulnar synostosis) rather than technical error or problems with the prostheses.
Conclusion: These findings suggest that the decision to remove a radial head prosthesis may depend more on surgeon or hospital preferences than on objective problems with the prosthesis. Until clarified by additional study, removal of a prosthesis should not be considered an objective outcome in research. In addition, patients offered removal of a radial head prosthesis, might get the opinion of more than one surgeon at more than one hospital before deciding whether or not to proceed.
Level of evidence: Level III Prognostic

Introduction

Restoration of radiocapitellar contact helps prevent subluxation or dislocation after a fracture-dislocation of the elbow or forearm [1–3]. When fixation of a fracture of the radial head is tenuous, there are missing or irreparable fragments, or the potential for nonunion or malunion is high (more than 3 fragments), radiocapitellar contact can be restored by removing the radial head and replacing it with a prosthesis [4–9]. Prosthetic replacement of the radial head may have more in common with silicone rubber replacement of the metacarpophalangeal joints of the hand than with prosthetic replacement of the knee, hip or shoulder [10]. A radial head prosthesis is used to help stabilize the elbow while the collateral ligaments heal [2,11]. Once the ligaments are healed it is safe to remove the prosthesis as subluxation or dislocation of

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Table 1
Characteristics of the patients underwent removal or revision of the radial head prosthesis.

Patient	Age	Sex	Race	Side of injury	Type of injury	Associated injuries	Implanting surgeon	Removing surgeon	Prosthesis type	Subjective reason of removal	Objective reason of removal	Secondary surgery	Months to removal or revision
1	58	Female	White	Right	Monteggia	Coronoid fx, ulna shaft fx, LCL rupture	Hand Surgeon	Hand Surgeon	Wright	Limited ROM	HO	Removed	1
2	60	Female	White	Left	Olecranon Fx-Dx		Hand Surgeon	Hand Surgeon	Wright	Pain	Instability of the PRUJ/radiocapitellar articulations	Removed	1
3	36	Male	Other	Left	Radial head Fx w/o Dx		Hand Surgeon	Hand Surgeon	Wright	Limited ROM	HO	Removed	3
4	23	Male	White	Right	Olecranon Fx-Dx	Proximal ulna fx, LCL rupture	Trauma Surgeon	Hand Surgeon	Wright	Pain	Instability of the head/ulnar malalignment	Revision	3
5	54	Female	White	Right	Terrible triad	Coronoid fx, LCL rupture	Hand Surgeon	Hand Surgeon	Wright	Pain	Loosening	Revision	3
6	59	Female	Other	Right	Radial head Fx w/o Dx		Trauma Surgeon	Hand Surgeon	Wright	Limited ROM	HO	Removed	6
7	37	Male	Other	Right	Terrible triad	Coronoid fx, LCL rupture	Trauma Surgeon	Hand Surgeon	Wright	Limited ROM	HO	Revision	6
8	64	Male	White	Right	Terrible triad	Coronoid fx, olecranon fx, LCL rupture	Hand Surgeon	Hand Surgeon	Wright		Infection	Removed	6
9	27	Male	Other	Right	Terrible triad	Coronoid fx, LCL rupture	Hand Surgeon	Hand Surgeon	Wright	Limited ROM	HO	Removed	8
10	55	Female	Other	Right	Monteggia	Olecranon fx, corocoid fx, LCL rupture	Trauma Surgeon	Hand Surgeon	Wright	Pain	Loosening	Removed	11
11	26	Male	White	Right	Olecranon Fx-Dx	Olecranon fx, distal humerus fx	Hand Surgeon	Hand Surgeon	Wright	Limited ROM	HO	Removed	11
12	60	Female	White	Right	Radial head Fx w/o Dx		Hand Surgeon	Hand Surgeon	Biomet	Pain	Loosening	Removed	14
13	54	Female	White	Left	Radial head Fx without Dx		Hand Surgeon	Hand Surgeon	Biomet	Limited ROM	HO	Removed	15
14	48	Male	White	Right	Radial head Fx w/o Dx	Olecranon fx	Hand Surgeon	Hand Surgeon	Biomet		Infection	Removed	19
15	44	Male	White	Left	Terrible triad	Coronoid fx, LCL rupture	Hand Surgeon	Hand Surgeon	Biomet	Pain	HO	Removed	20
16	50	Female	White	Right	Olecranon Fx-Dx	LCL rupture	Hand Surgeon	Hand Surgeon	Wright	Pain	Capitellar wear	Removed	21
17	57	Female	White	Left	Terrible triad	Coronoid fx, LCL rupture	Hand Surgeon	Hand Surgeon	Wright	Limited ROM	HO	Removed	21
18	57	Male	White	Left	Terrible triad	Olecranon fx	Trauma Surgeon	Trauma	Wright	Pain	Capitellar wear	Removed	32
19	49	Female	White	Left	Terrible triad	Coronoid fx, LCL rupture, olecranon fx	Trauma Surgeon	Hand Surgeon	Wright	Pain	Capitellar wear	Removed	35
20	62	Female	White	Left	Terrible triad	Distal radius fx, Distal humerus fx, coronoid fx, LCL rupture	Trauma Surgeon	Hand Surgeon	Wright	Pain	Capitellar wear	Removed	46
21	62	Male	White	Right	Terrible triad	Coronoid fx, LCL rupture	Hand Surgeon	Hand Surgeon	Biomet	Pain	Loosening	Removed	68
22	49	Male	White	Right	Olecranon Fx-Dx	Olecranon fx	Trauma Surgeon	Hand Surgeon	Wright	Pain	Capitellar wear	Removed	135