



# **Systematic Review of Literature on the use of Radial Head Prosthesis Versus Fixation in Fracture Head of Radius in Young Adults**

*Essay*

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*Islam Mohamed Mohamed*

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ  
"فَالَمْ يَفْضَلِ اللَّهُ  
يُؤْتِيهِ مَنْ يَخْأَهُ وَاللَّهُ  
فِيهِ الْفَضْلُ الْعَظِيمُ"

صدق الله العظيم  
(سورة الجمعة)  
"إيه (٤)"

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## LIST OF ABBREVIATION

|               |                                                            |
|---------------|------------------------------------------------------------|
| <b>ASES-e</b> | <i>American system shoulder and elbow surgeons scoring</i> |
| <b>AvN</b>    | <i>Avascular necrosis</i>                                  |
| <b>DASH</b>   | <i>Disabilities of the arm, shoulder and Hand score</i>    |
| <b>LCL</b>    | <i>Lateral collateral ligament</i>                         |
| <b>LUCL</b>   | <i>Lateral ulnar collateral ligament</i>                   |
| <b>MCL</b>    | <i>Medial collateral ligament</i>                          |
| <b>MEPI</b>   | <i>Mayo Elbow Performance Index</i>                        |
| <b>No.</b>    | <i>Number</i>                                              |
| <b>ORIF</b>   | <i>Open reduction and internal fixation</i>                |
| <b>RHP</b>    | <i>Radial head prosthesis</i>                              |
| <b>ROM</b>    | <i>Range of motion</i>                                     |
| <b>TFCC</b>   | <i>Triangular fibrocartilage complex</i>                   |
| <b>PMC</b>    | <i>PubMed central</i>                                      |

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# Abstract

Although several treatment options for radial head fractures are available, no clear solutions exist.

In this study we therefore compare open reduction and internal fixation (ORIF) with radial head prosthesis replacement in treatment of radial head fractures of Mason type III.

The mean age of patients mentioned in the studies was 46.4 years old. Mean age of ORIF group of patients was 50.4 years old, while the mean age of radial head replacement group of patients was 42.5 years old. 232 patients underwent ORIF (open reduction and internal fixation) and 287 underwent radial head replacement. 342 males and 177 females. Mean follow up period was 32.3 months (2.89 years).

We concluded that ORIF has no superiority over radial head replacement and vice versa, and still a lot of controversies between two methods of management for fracture head of radius (Mason type 3).

# Keywords

- Radial, head, prosthesis, fixation, adults, young ,  
systematic, review

## **INTRODUCTION**

Radial head fractures represents one third of all elbow fractures, so they are common injuries. Isolated radial head fracture may occur but mostly accompanied with injury to lateral & medial collateral ligaments (LCL and MCL).<sup>(1)</sup>

Most of isolated radial head fractures are stable.<sup>(2)</sup> Open reduction and internal fixation was very impressive, perhaps it was used for stable & minimally displaced radial head fractures which has very good results even with non-operative management.<sup>(3)</sup>

Regarding unstable, multi-fragmented and displaced radial head fractures they are prone to poor forearm rotation and non-union after ORIF.<sup>(4)</sup>

Early failure of fixation is common within 1<sup>st</sup> 3-6 months in fractures including the whole radial head which creates more than 3 articular fragments.<sup>(5)</sup>

Cases of comminuted radial head which will not get benefit from ORIF, excision is used. This alters elbow kinematics, increases laxity and leads to proximal migration of the Radius, which causes weak hand grip and wrist pain.<sup>(6)</sup>

Replacement of the radial head with prosthesis referred to as RHP, helps to restore elbow stability. Patients who have

“Unhappy triad” which is fracture dislocation of radial head combined with coronoid fracture and complete medial collateral ligament disruption, are most likely to benefit from replacement.<sup>(7)</sup>

Many types of materials are used to fabricate radial head prosthesis such as Silicone, Vitallium, Rubber, pyro-carbon and titanium<sup>(8,9)</sup>. The use of Silicone was stopped<sup>(10)</sup> as authors reported that it may lead to inadequate counteracting to valgus and axial loading to at capitulo-radial joint.<sup>(11,12)</sup>

Also, some authors reported inflammatory synovitis due to long term use of implants<sup>(13,14,15)</sup>. Metal implants were reported to be rigid, and may resist the deforming forces.<sup>(15, 16)</sup>

There are two basic designs used for replacement of radial head. First a polished stem with a monopolar or modular head acting as a spacer. The 2<sup>nd</sup> design is a rigid fixed stem with a bipolar or monopolar head.<sup>(17,18)</sup>

Bipolar prosthesis is like monoblock prosthesis having the same advantage to maintain congruency of the radial head with the capitellum and sigmoid notch during the elbow movement. Also restore stability to valgus stress.<sup>(17,19,20)</sup>

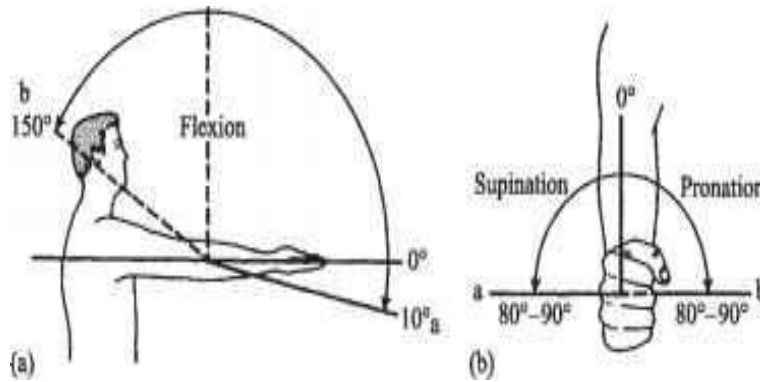
Metallic prosthesis can produce load across elbow joint than silastic prosthesis as reported by biomechanical studies.<sup>(8)</sup>

There is a general agreement regarding Mason's classification that both type 1 will be Managed conservative, type 2 will undergo ORIF.

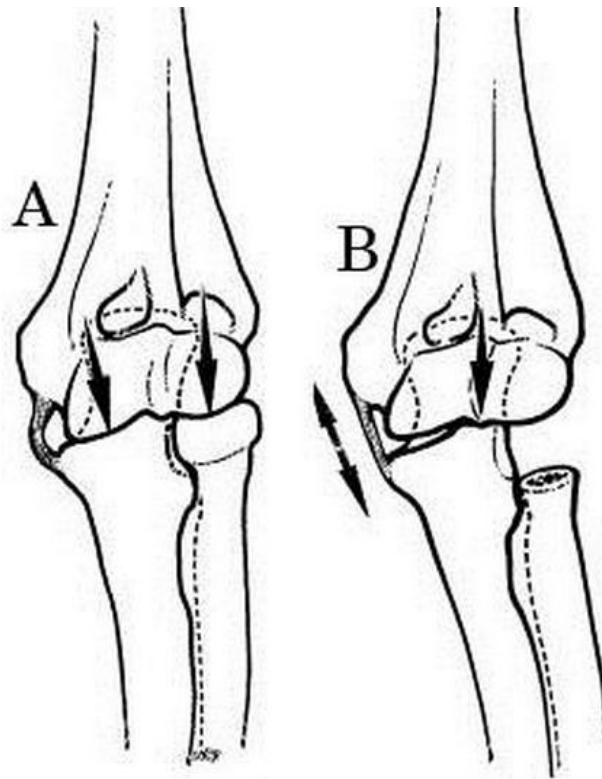
However, Choice between either fixation or replacement for fracture head of radius (Mason type 3) in young adults patients is a big dilemma from practical point of view and also regarding data extracted from literature.<sup>(3)</sup>

The great confusion between choice of fixation and replacement comes from choice between advantage and disadvantage of both methods; roughly speaking fixation may lead to disturbance of elbow joint biomechanics. On the other hand replacement helps to keep elbow biomechanics.<sup>(3)</sup>

The articulation between radial head and radial notch of the ulna leads to radial deviation of the radius shaft during pronation<sup>(22)</sup>. Articulation between radius and capitellum is very important for load transfer and elbow stability, 60 % of the load passing through the elbow is born by radial head <sup>(24)</sup>. About 3 times of body weight can be conducted through the joint between radius and capitellum during stressful activities<sup>(27)</sup>. The forces may reach up to 9 times of the body weight after radial head excision due to increased tension over MCL, where the forces are concentrated on the trochlea and coronoid (Fig.1,2) <sup>(27)</sup>.



*Fig. (1): Normal elbow range of motion (ROM).<sup>(23)</sup>*



*Fig. (2): Forces at elbow during internal rotation A. normal elbow B. excised head radius with valgus instability.<sup>(25)</sup>*