ROLE OF ELBOW ARTHROPLASTY IN FRACTURES AND IN POST-TRAUMA CASES

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Indication of elbow arthroplasty

- rheumatoid arthritis
 primary osteoarthritis
- post-traumatic arthritis
- non-union
- instability
- comminuted fracture
- pathological fracture
- stiff elbow
- previous infection
- failed elbow replacement

Contraindications

active sepsis neuropathies diabetes, syringomyelia, etc. nutritional deficiencies Iack of co-operation severe bone deficiency (?) severe soft-tissue deficiency (?)

Surgical options

fusion interposition arthroplasty reconstruction with massive allograft total joint replacement costum made implant oncological total joint implant from shelf

+/- soft-tissue reconstruction

COSTUM-MADE TEA

2008 – Anmin – <u>8 cases</u> for revisions of failed TEA or for complex fracture complications

 at 4 years one failed due to sepsic but 7 satisfactory <u>Unlinked iBP TEA</u> (nonconstrained ?) used for distal humeral fractures

2008 – Kalogrianitis – <u>9 iBP TEA</u>

- at 3.5 years Mayo score 95 (65-100)
- all were stable
- all patients capable for self-care

<u>Hemiarthroplasty</u> used for distal humeral fractures

Burkhart et al. - 2010. ICSES

- at 1 year (0.5-2) 8 excellent, 1 good, 1 fair
- all were stable
- all patients capable for self-care
- But, limited to articular surface shear fractures

Linked arthroplasty used for distal humeral fractures

Indication

(Ali et al. 2010)

- Non RA patients over the age of 75 + fracture
- Patients with OA over the age of 60 + fracture
- RA patients any age + fracture
- Patients with reduced life expectancy + fracture
- Patients with pathologic bone + fracture

COONRAD-MORREY ELBOW (1979)

- sloppy hinge (semiconstrained) with polyethylene bushing with 7 degrees of laxity
- "anterior flange"
- Tivanium (Ti-6Al-4V) alloy
- triangular humeral and quadrangular ulnar component
- 12 humeral and 10 ulnar components
- complete interchangeability
- wide range of indications
- most published data



Linked arthroplasty

used for distal humeral fractures

<u>1997 - Cobb and Morrey - 21 acute fractures</u> 96% excellent and good at 3.3 years no loosening
<u>2005 - Muller at al. - 49 acute fractures</u> 5 revisions performed at 7 years
<u>2008 - Prasad and Dent - 15 acute fractures and 17 post-trauma cases</u> less complications and better survival in acute cases 93% versus 76% at 7 years
<u>2010 - Ali et al. - 20 acute fractures</u> 13 excellent and 7 good at 5 years

71 y.o. woman comminuted fracture

pre-op.



post-op.

71 y.o. woman comminuted fracture function at 5 weeks



51 y.o. woman - comminuted open fracture





pre-op.

stage 1

stage 2 at 10 days

51 y.o. woman - comminuted open fracture

stage 3 at 3 months



51 y.o. woman - comminuted open fracture



function at 12 months

X-ray at 3 years¹⁵

Humeral nonunions

<u>1995 - Morrey and Adams - 36 humeral nonunions</u> 86% excellent and good at 4.2 years no loosening
<u>2008 - Cil at al. - 92 humeral nonunions</u> 85% excellent and good at 5.5 years 44 complications, 32 reoperations, 23 revisions 96% survival at 2 years, 82% survival at 5 years, 65% survival at 15 years



Post-trauma cases

<u>1997 - Schneeberger et al. - 41 post-trauma cases</u> 83% excellent and good at 5.8 years no loosening but 12% ulnar comp. fracture





<u> 1999 - Ramsey et al. - 19 instability cases</u>

84% excellent and good at 6 years, no instability 1 humeral comp. loosening, 2 ulnar comp. fractures 2005 - Mighell et al. – 6 chronic dislocations

no loosening at 5.8 years, no instability 1 periprosthetic fracture, 1 bushing exchange

Pathologic fractures

2005 - Athwal et al. - 20 tumor cases

70% died but 75% had local control of tumor Mayo score improved from 22 to 75 but 35% had early complications and 20% were revised



Fused or ankylosed elbow

2008 – Peden and Morrey - 13 cases

- 7 good and excellent at 12 (2-26) years
- 37 to 118 degrees of flexion
- but high complication rate
 - more than half had been reoperated
 - 2 soft tissue breakdown
 - 1 ulnar comp. fracture
 - 3 deep infections
 - 3 manipulation under anesthesia

Patient positioning







Surgical approach By Bryan-Morrey



Triceps split by Gschwend



Surgical approach Alternative solutions

Triceps turn-down





Triceps insufficiency

Approach	47 studies
V-tenotomy	1.2 ± 3.3 %
Triceps split	1.8 ± 2.6 %
Triceps reflexion By Brian-Morrey	1.2 ± 2.3 %

??? Probably more common

Treatment of tricpes insufficiency

Conservative
 Surgical

 Direct repair
 Anconeus flap
 Achilles tendon allograft
 Harmstring tendon autograft

Celli et al (2005): 16 cases 15 successful





Surgical approach release of the ligaments



Preparation of the humerus opening the humeral canal





Preparation of the humerus bony resection



Preparation of the humerus rasping the humeral canal



Preparation of the ulna opening the ulna



Preparation of the ulna rasping the ulna canal





Trial reduction with trial implants

To assess:
fit
range of motion
stability
soft-tissue cover





<u>Positioning of bone</u> <u>block</u>





Assembly and impaction







Subcutaneous pocket

Ulnar nerve lesion

Anteposition	2.0 ± 3.3 %
Decompression	3.2 ± 3.1 %



Rehabilitation

Compression bandage with cotton-wool
Back slab 24-48 hrs. post-op.
Early passive extension and active flexion
Early active pronation-supination
Early active hand motion
+/- interscalenic blockade or canula

Conclusions

Semiconstrained elbow replacement can provide stability and function when bony and soft-tissue anatomy of the elbow is grossly altered by trauma

 Complications are more common in posttrauma cases than in acute cases

 Total elbow replacement can provide a fast and excellent recovery following complicated elbow fracture

But remember! The total elbow replacement is not the only option





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Thank you for your attention!