COMPLEX ELBOW INSTABILITY
ROLE OF THE CORONOID

A.G. Schneeberger
Endoclinic Zurich,
Klinik Hirslanden

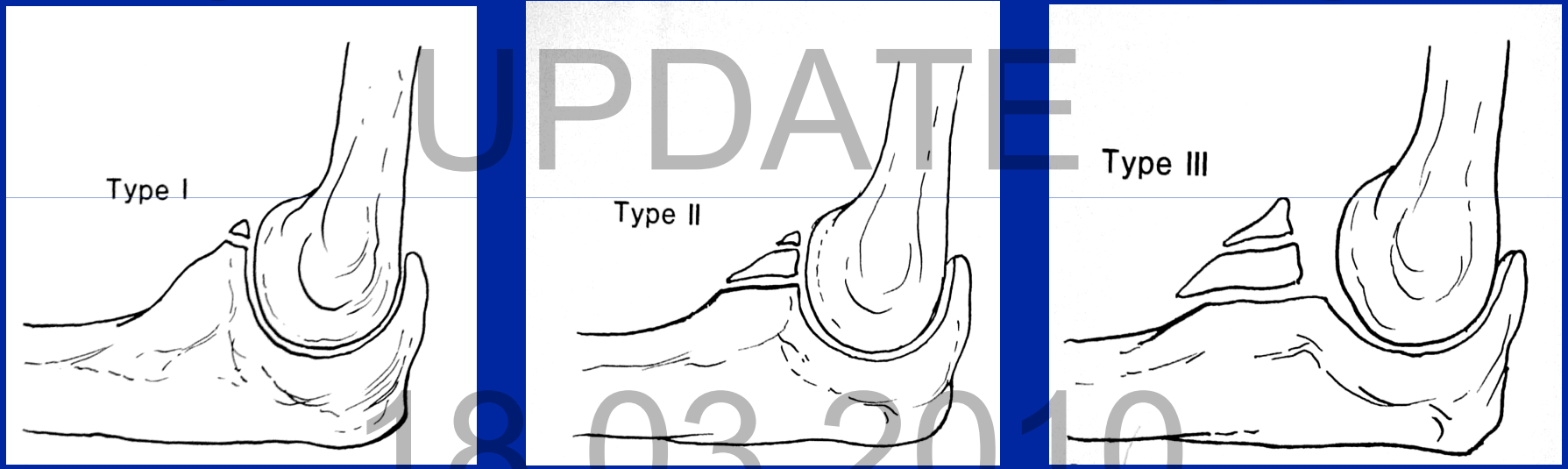
AGS

ROLE OF THE CORONOID ?

ORTHOPEDICS
UPDATE
18.03.2010

CLASSIFICATION

ORTHOPEDICS
UPDATE
18.03.2010



Regan, Morrey, JBJS 71-A, 1989

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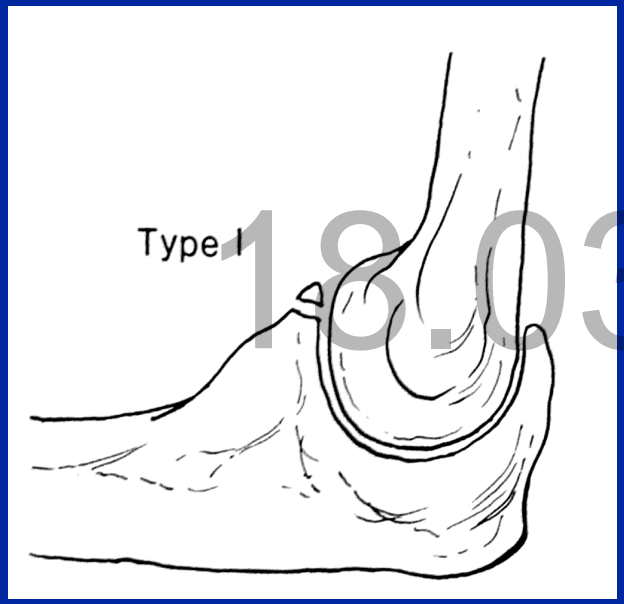
CLASSIFICATION

Type I (tip of coronoid):

ORTHOPEDICS UPDATE



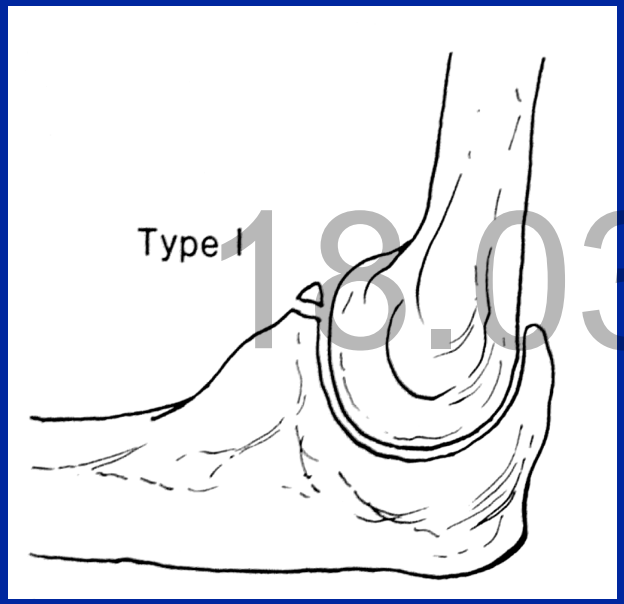
18.03.2010

CLASSIFICATION

ORTHOPEDICS UPDATE

Type I (tip of coronoid):

= elbow stable

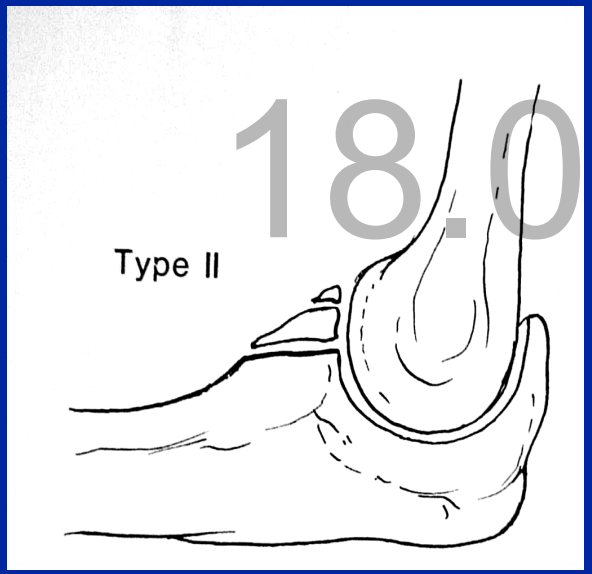


18.03.2010

CLASSIFICATION

Type II (50 % or less):

- **intermediate condition**
- **certain fractures unstable**
- **trial conservative therapy for 2 – 4 weeks**



Regan, Morrey, JBJS 71-A,

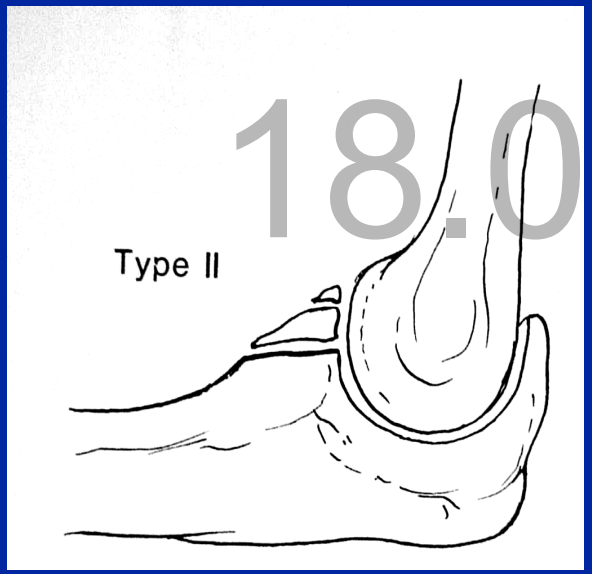
ORTHOPEDICS UPDATE 18.03.2010

CLASSIFICATION

Type II (50 % or less):

- **intermediate condition**
- **certain fractures unstable**
- **trial conservative therapy for 2 – 4 weeks**

ORTHOPEDICS UPDATE
18.03.2010

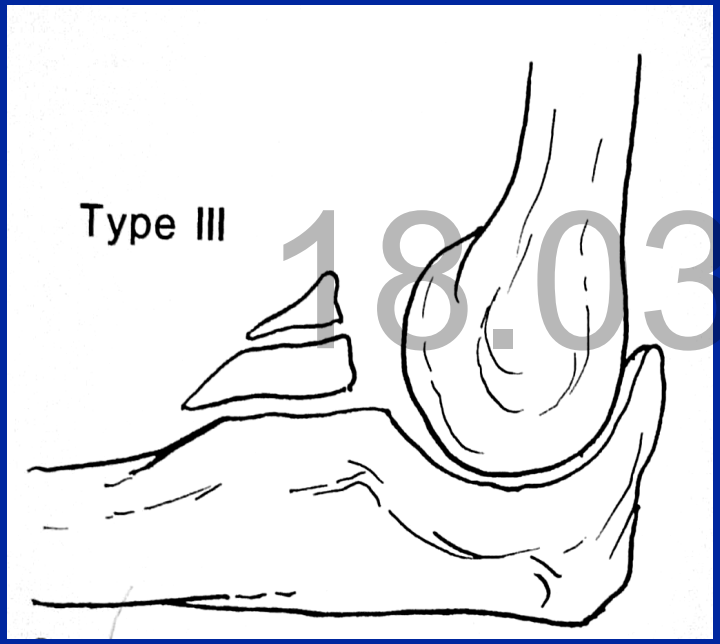


CLASSIFICATION

ORTHOPEDICS UPDATE

Type III (> 50 %):

= elbow unstable



18.03.2010

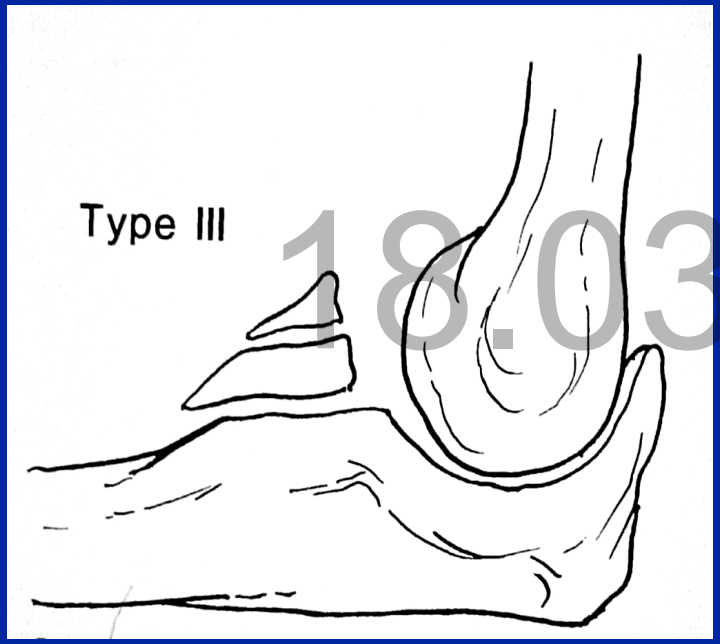
Regan, Morrey, JBJS 71-A, 1989

CLASSIFICATION

ORTHOPEDICS UPDATE

Type III (> 50 %):

= elbow unstable



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TERRIBLE TRIAD INJURY

ORTHOPEDICS UPDATE 18.03.2010

1) fracture coronoid

2) fracture radial head

3) dislocation

Hotchkiss, in Rockwood and Green's *Fractures in Adults*, 1996

TERRIBLE TRIAD INJURY

ORTHOPEDICS UPDATE

Poor prognosis

- **persistent instability**
  (postero-lateral rotatory)
- **early arthrosis**

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Hotchkiss, in Rockwood and Green's *Fractures in Adults*, 1996

TERRIBLE TRIAD INJURY

ORTHOPEDICS UPDATE 18.03.2010

TERRIBLE TRIAD INJURY

ORTHOPEDICS UPDATE
18.03.2010

1997

1997

1997

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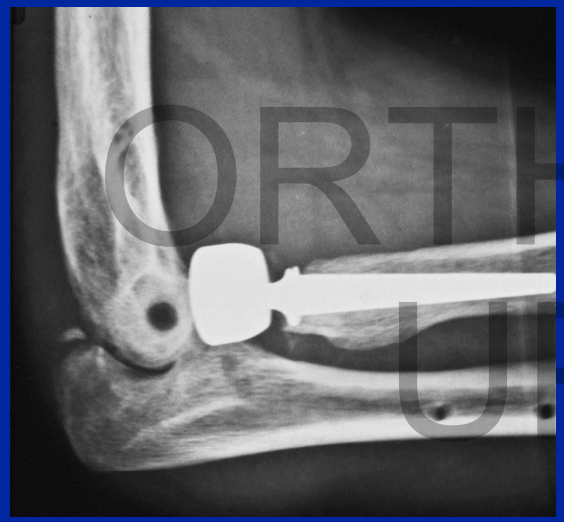
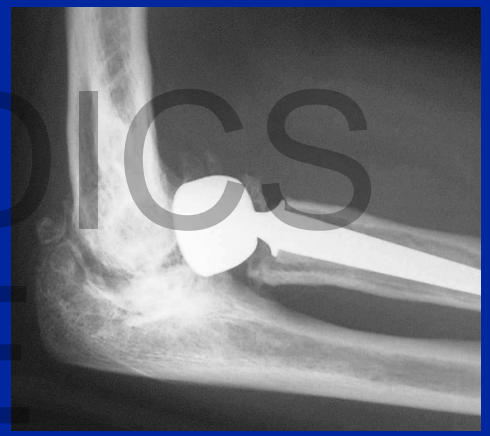
TERRIBLE TRIAD INJURY





1997

2001

ORTHOPEDICS UPDATE
18.03.2010

TERRIBLE TRIAD

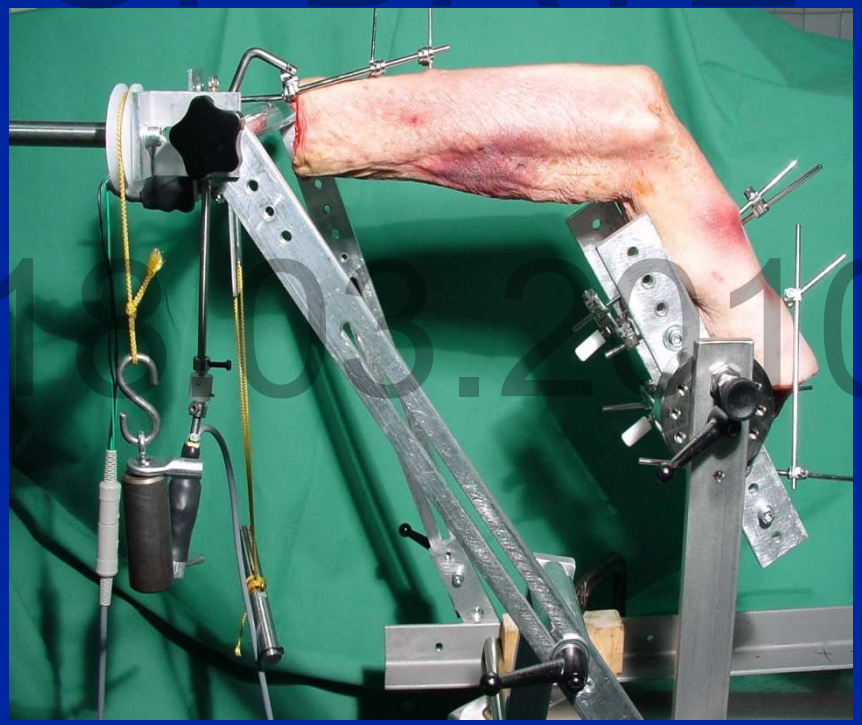
often causes posterolateral rotatory instability

ORTHOPEDICS UPDATE 18.03.2010

IN-VITRO STUDY

- 7 fresh frozen cadaveric elbows
- tested postero-lateral rotatory laxity

ORTHOPEDICS UPDATE 18.03.2010



Coronoid Process and Radial Head as Posterolateral Rotatory Stabilizers of the Elbow

In-vitro Study

ORTHOPEDICS UPDATE

Schneeberger AG, Sadowski MM, Jacob HA.

J Bone Joint Surg Am. 2004 May;86-A(5):975-82

18.03.2010

Determine role of

- **coronoid**
- **radial head**

in postero-lateral rotatory instability

PROTOCOL

- normal elbow
- radial head resection

ORTHOPEDICS UPDATE

- removal of 30 %, 50 %, 70% of coronoid

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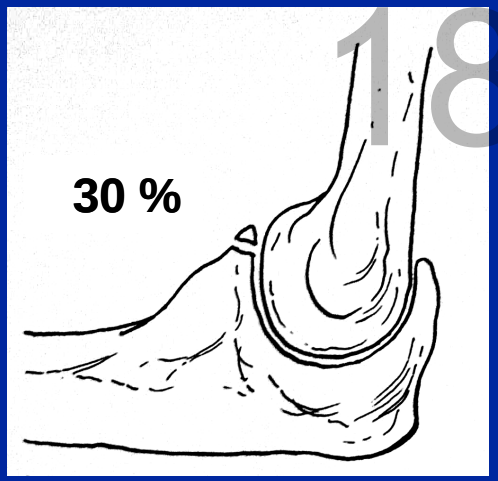
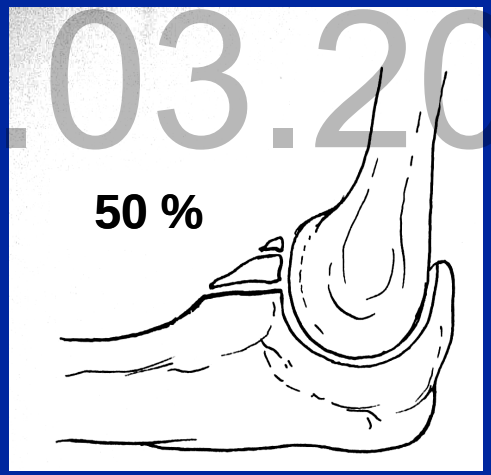
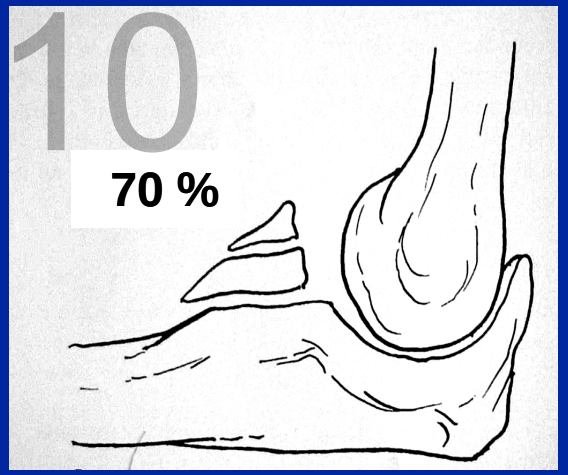






PROTOCOL

- radial head prostheses
- rigid
- bipolar

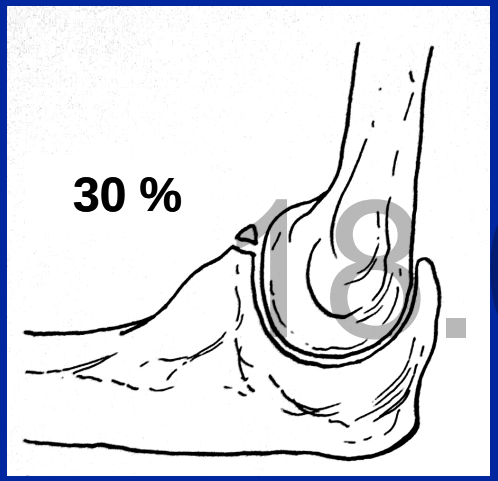
ORTHOPEDICS UPDATE 18.03.2010

IN-VITRO STUDY

ORTHOPEDICS UPDATE 18.03.2010

Defect of:

- **30% coronoid (= isolated coronoid Type I fracture)**



→ elbow stable

IN-VITRO STUDY

ORTHOPEDICS UPDATE 18.03.2010

Defect of:

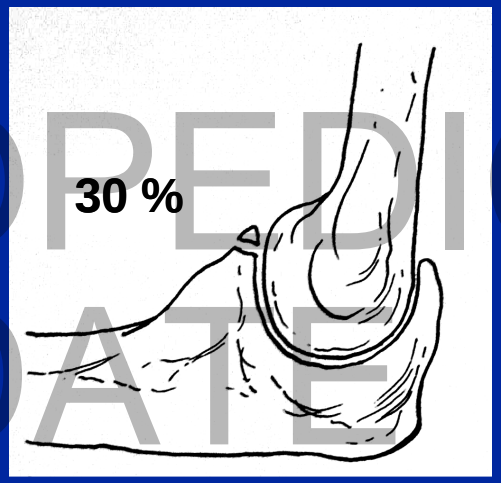
- **radial head**

→ elbow stable

IN-VITRO STUDY

Defect of:

- **30% coronoid**
- **radial head**



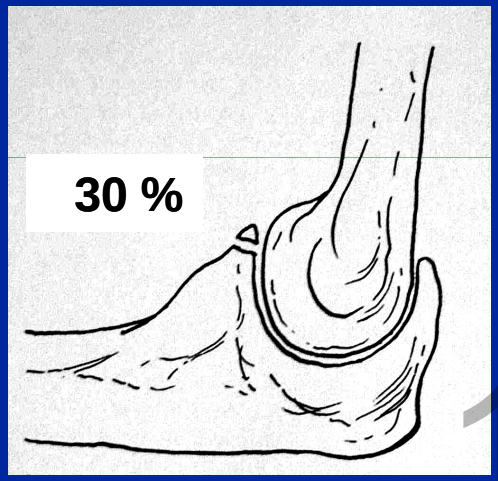
ORTHOPEDICS UPDATE
18.03.2010

→ **causes significant postero-lateral rotatory instability**

→ **ulnohumeral dislocation of all elbows**

INSERTION
RADIAL HEAD PROSTHESIS

ORTHOPEDICS UPDATE 18.03.2010



increase of PLRL	2°	8°
	n.s.	p < 0.0001

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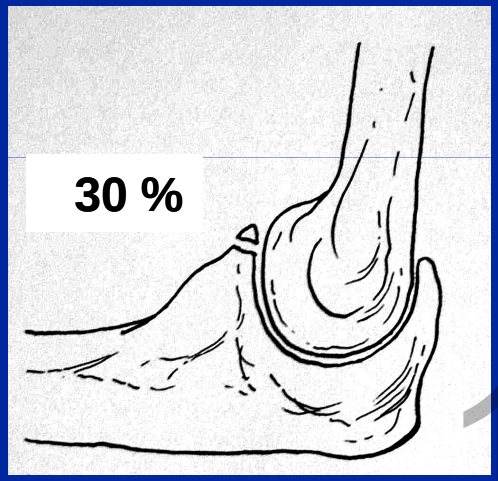
INSERTION
RADIAL HEAD PROSTHESIS

ORTHOPEDICS UPDATE 18.03.2010



increase of PLRL	2°	8°
	n.s.	p < 0.0001

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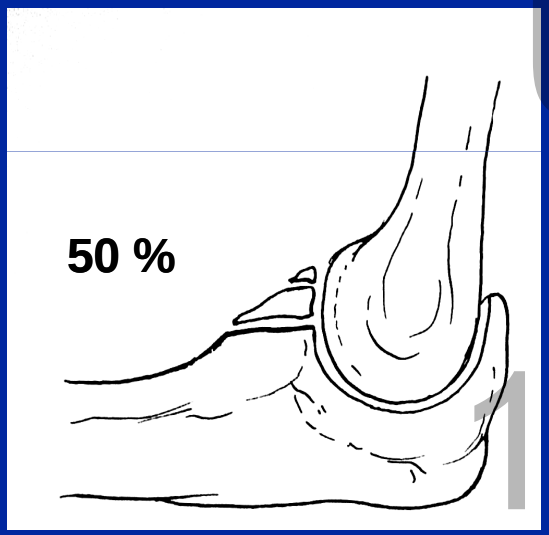
INSERTION
RADIAL HEAD PROSTHESIS

ORTHOPEDICS UPDATE 18.03.2010



increase of PLRL	7°	11°
	p < 0.0001	p < 0.0001

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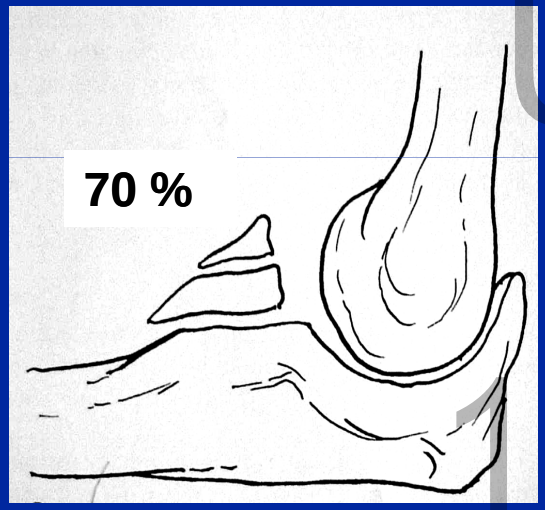
INSERTION
RADIAL HEAD PROSTHESIS

ORTHOPEDICS
UPDATE
18.03.2010



increase of PLRL	13°	17°
	p < 0.0001	p < 0.0001

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TREATMENT OF TERRIBLE TRIAD INJURIES

ORTHOPEDICS UPDATE

18.03.2010

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TREATMENT OF TERRIBLE TRIAD INJURIES

ORTHOPEDICS UPDATE

Open reduction / internal fixation

- **coronoid process**
- **radial head**

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ANTEROLATERAL APPROACH

- **Kocher's approach**

ORTHOPEDICS UPDATE
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ANTEROLATERAL APPROACH
CORONOID

ORTHOPEDICS
UPDATE
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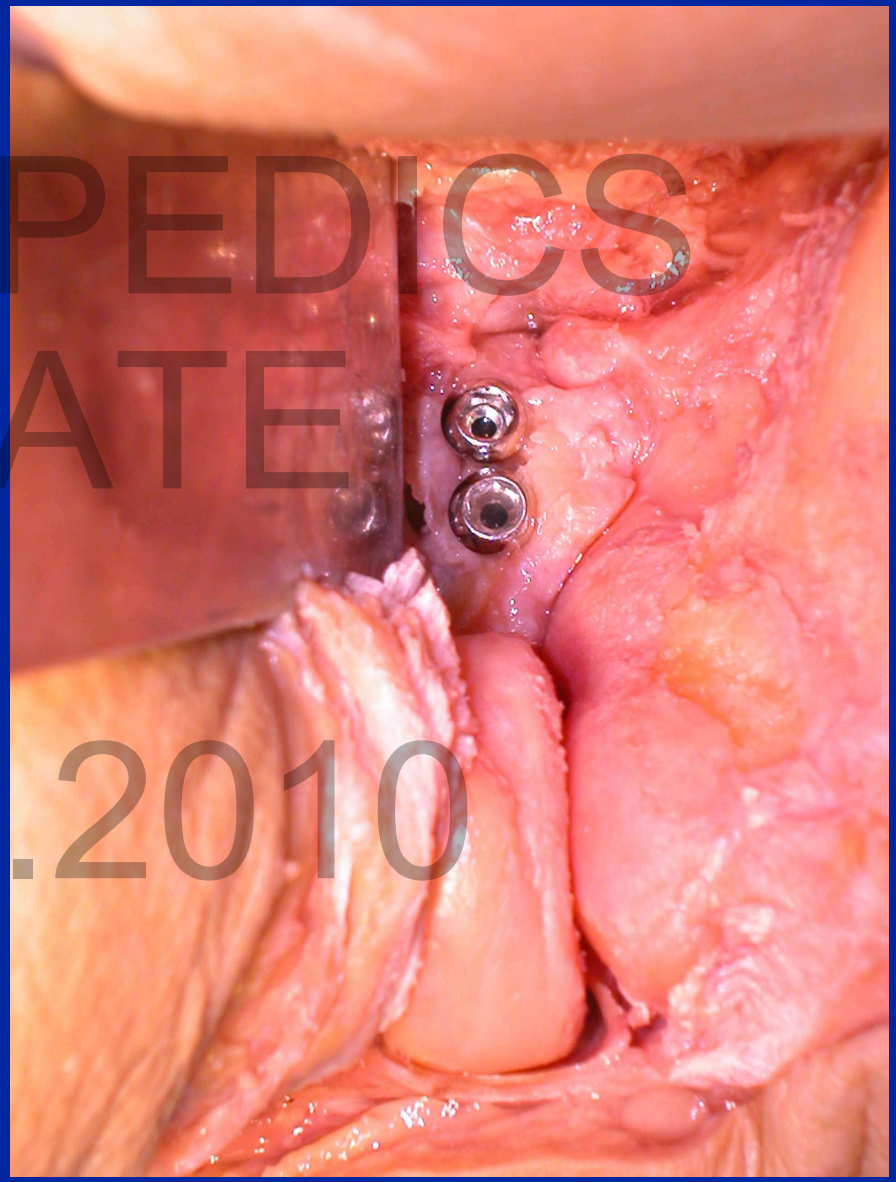
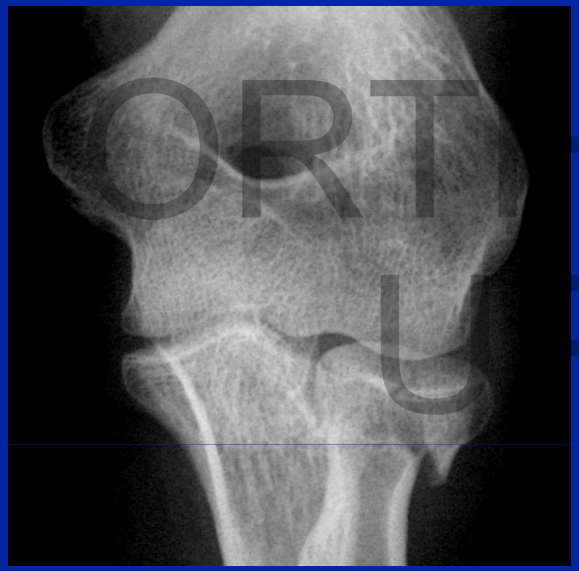
TECHNIQUE

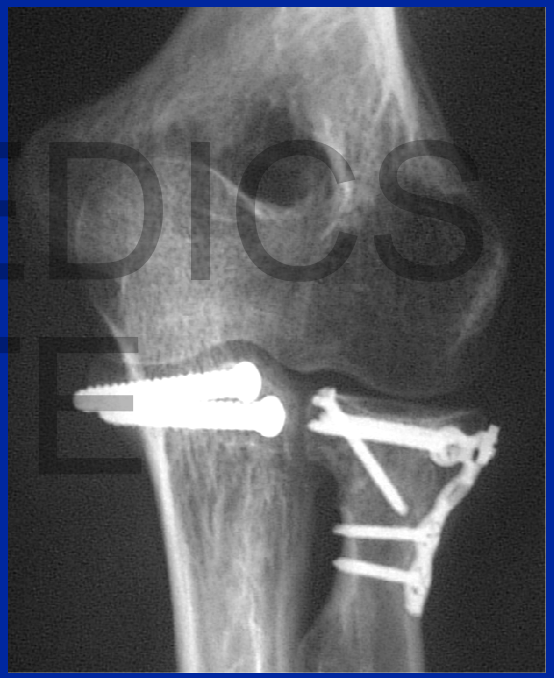
- **2 x 3.5 mm canulated screws**

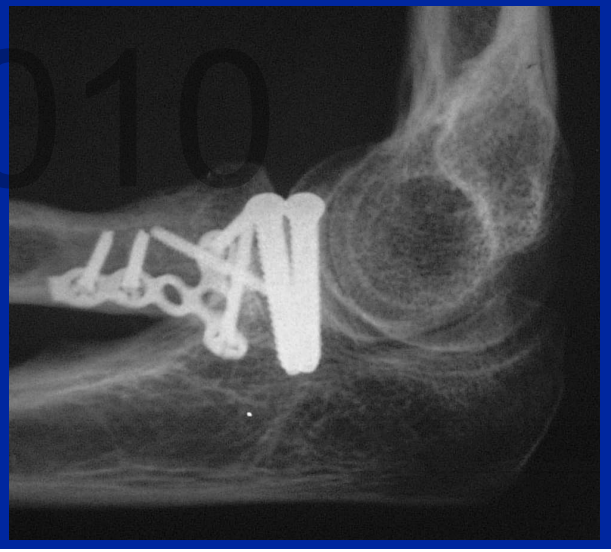


ORTHOPEDICS UPDATE
18.03.2010

30 year old man







ORTHOPEDICS UPDATE
18.03.2010

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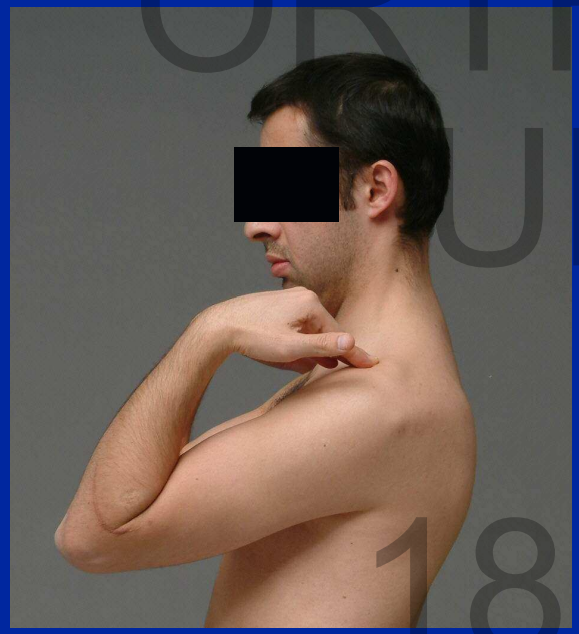
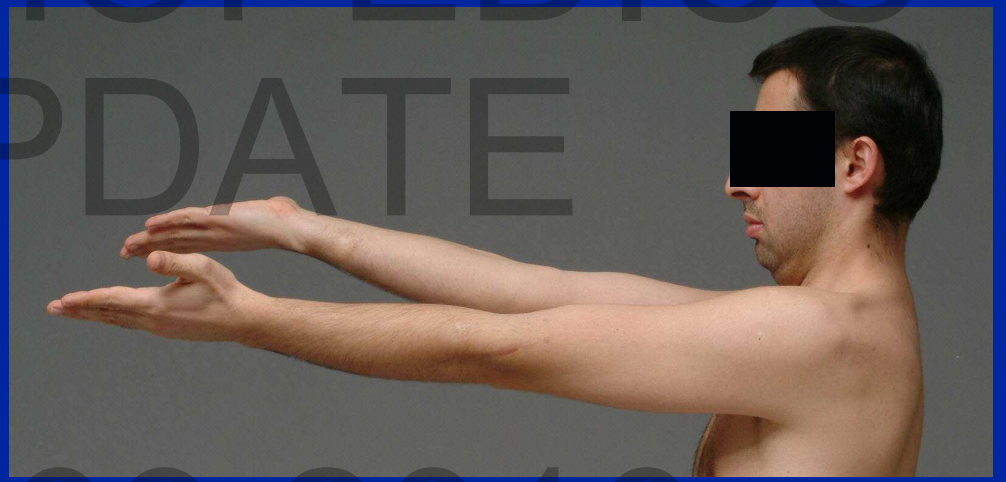
30 year old man





ORTHOPEDICS UPDATE 18.03.2010

FRACTURE OF CORONOID PROCESS

ORTHOPEDICS UPDATE 18.03.2010

- fixation even of small fragments

INTEGRITY OF CORONOID IMPORTANT

ORTHOPEDICS UPDATE
18.03.2010

- late radiocapitellar arthrosis
- late removal radial head prosthesis

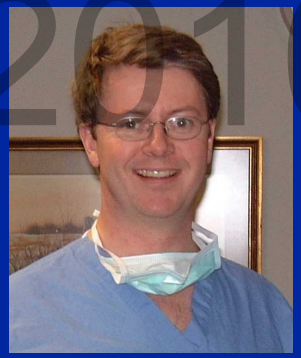
NEW CLASSIFICATION

ORTHOPEDICS UPDATE

- tip
- anteromedial
- basal

O'Driscoll, Jupiter, Cohen, Ring, McKee, AAOS
Instr. Course Lect. 52, 2003

18.03.2010



NEW CLASSIFICATION

ORTHOPEDICS UPDATE 18.03.2010

- tip ~ Type I
- anteromedial
- basal ~ Type III

O'Driscoll, Jupiter, Cohen,
Ring, McKee, AAOS
Instr. Course Lect. 52, 2003

Regan, Morrey,
JBJS 71-A, 1989

ANTEROMEDIAL FRACTURES

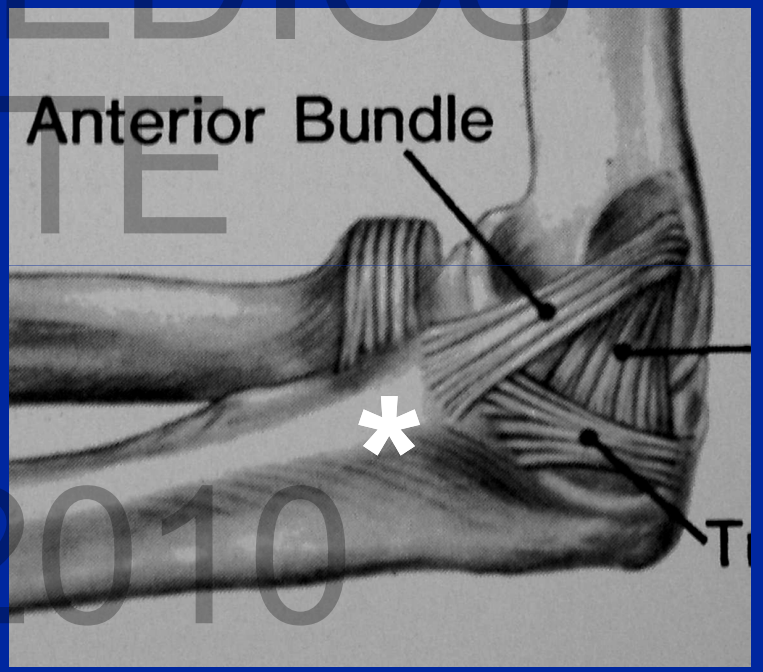
ORTHOPEDICS UPDATE 18.03.2010

- **sublime tubercle** *

ANTEROMEDIAL FRACTURES

ORTHOPEDICS UPDATE 18.03.2010

- **sublime tubercle** *



NEW CLASSIFICATION

ORTHOPEDICS UPDATE 18.03.2010

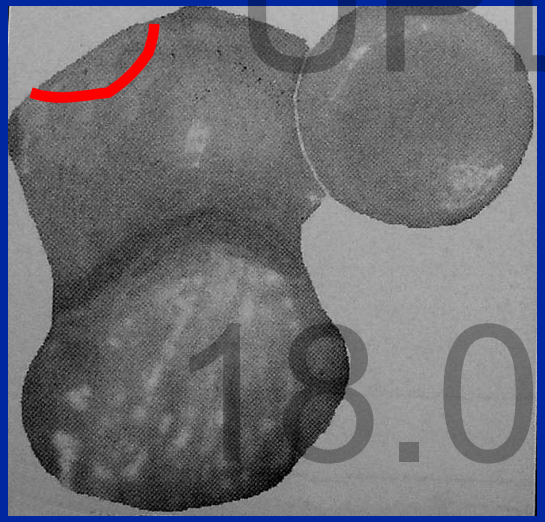
- tip
- anteromedial
  - subtype 1
  - subtype 2
  - subtype 3
- basal

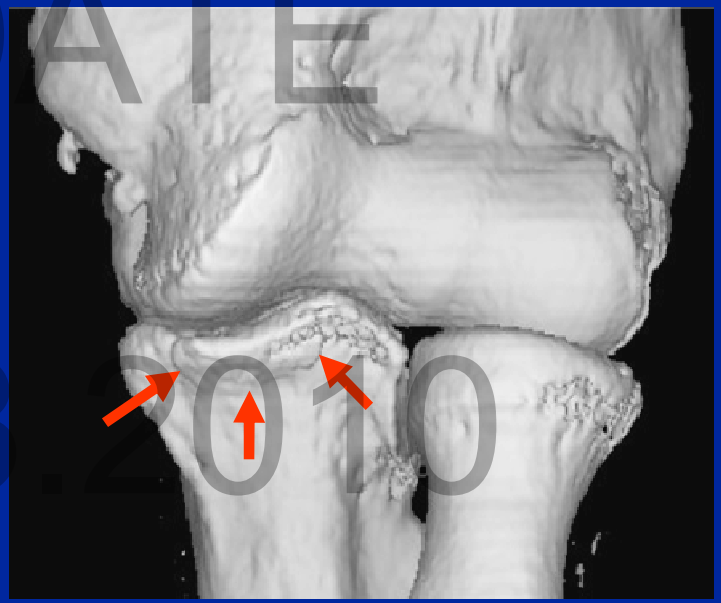
O'Driscoll, Jupiter, Cohen,
Ring, McKee, AAOS
Instr. Course Lect. 52, 2003

ANTEROMEDIAL

ORTHOPEDICS UPDATE 13.03.2010

- **Subtype 1: anteromedial rim**



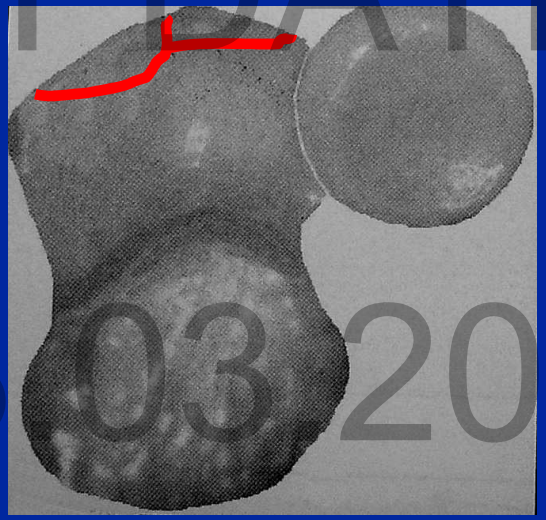


O'Driscoll, AAOS Instr. Course Lect. 52, 2003

ANTEROMEDIAL

- **Subtype**
  - **1: anteromedial rim**
  - **2: anteromedial rim + tip**

ORTHOPEDICS UPDATE 18.03.2010

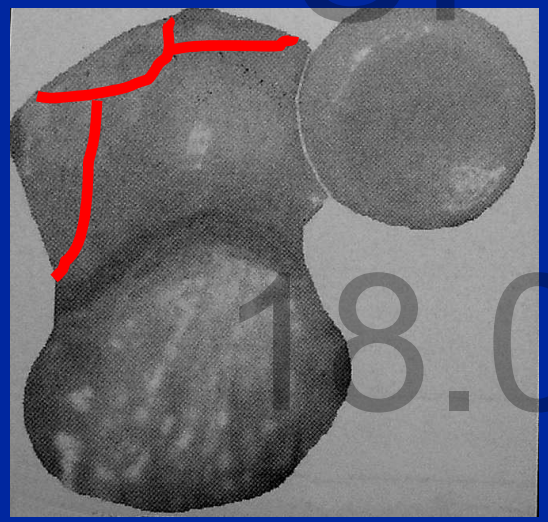


O'Driscoll, AAOS Instr. Course Lect. 52, 2003

ANTEROMEDIAL

- **Subtype**

1: anteromedial rim
2: anteromedial rim + tip
3: anteromedial rim + sublime tubercle (± tip)



ORTHOPEDICS UPDATE 18.03.2010

O'Driscoll, AAOS Instr. Course Lect. 52, 2003

Anteromedial coronoid fracture causes posteromedial rotatory instability

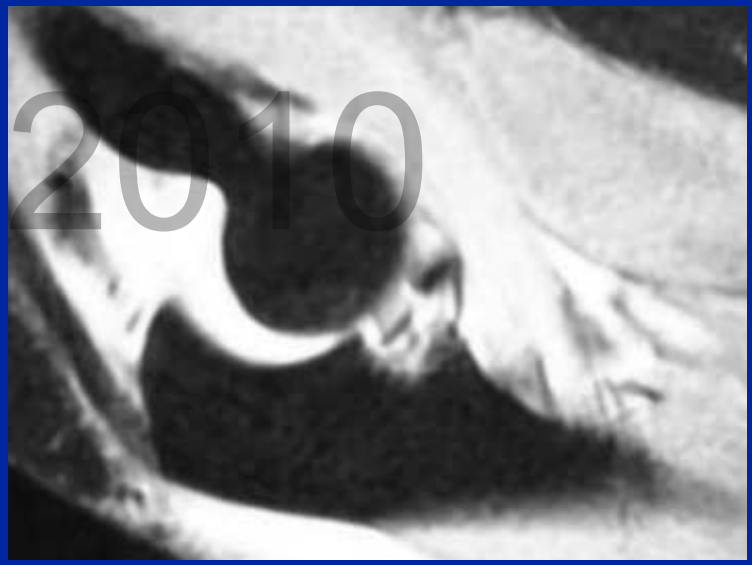
ORTHOPEDICS UPDATE
18.03.2010

DEFINITION

Postero Medial Rotatory Instability PMRI

- **postero-medial rotatory subluxation of the ulna underneath the trochlea**

ORTHOPEDICS UPDATE
18.03.2010



PMRI

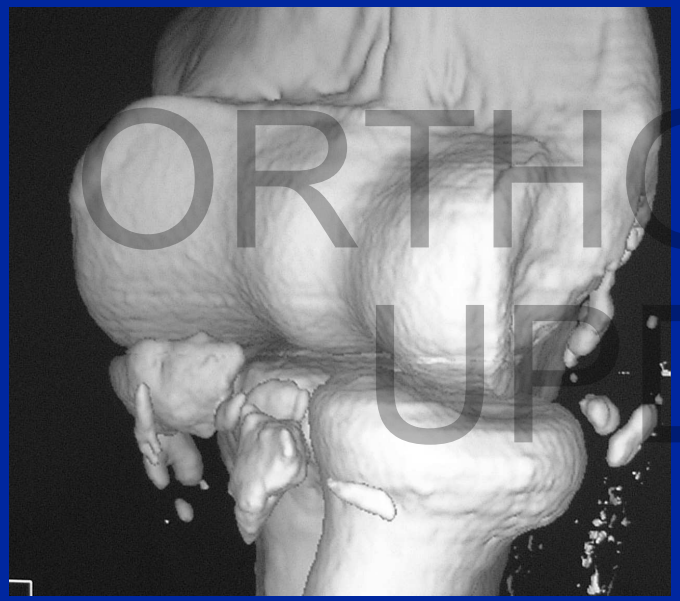
- severe injury
- joint incongruency
- early arthrosis

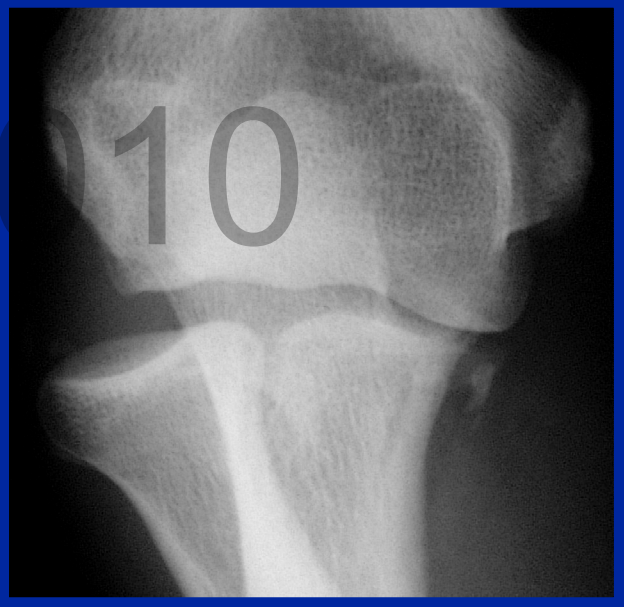
ORTHOPEDICS UPDATE
18.03.2010

TREATMENT PMRI

ORTHOPEDICS UPDATE 18.03.2010

- surgical
- open reduction internal fixation





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18.03.2010

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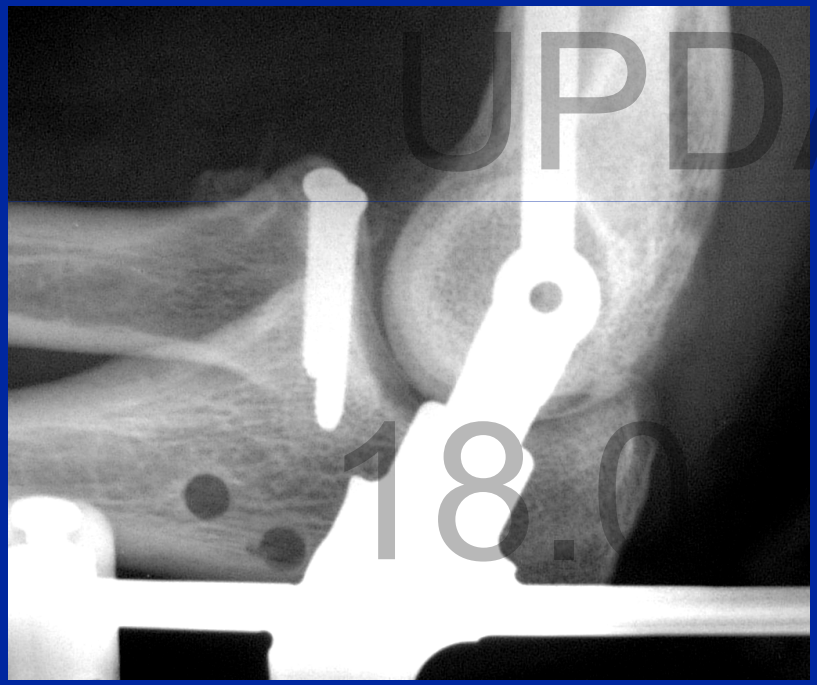
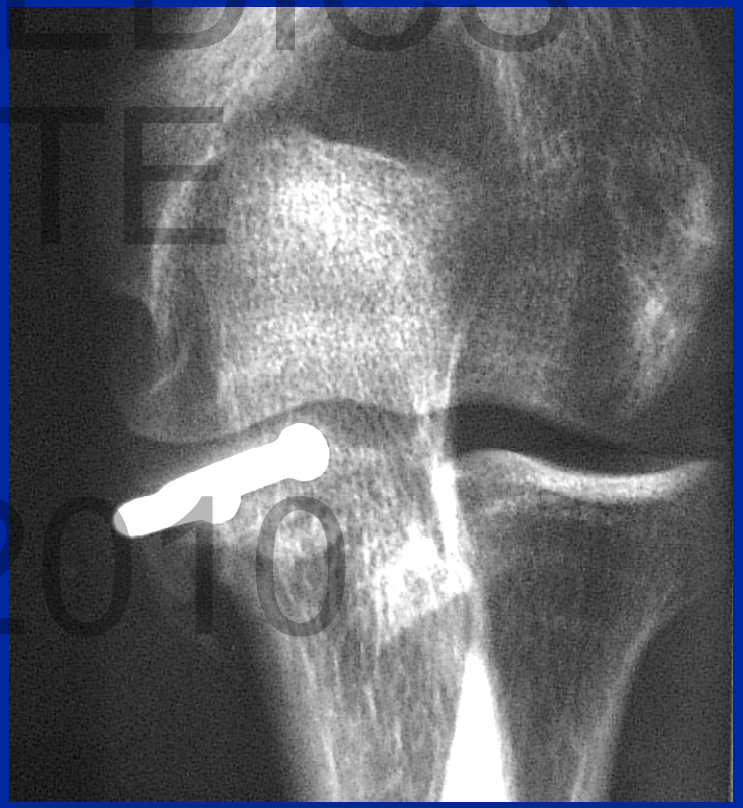
ORTHOPEDICS UPDATE

18.01.2010





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HINGED EXTERNAL FIXATOR

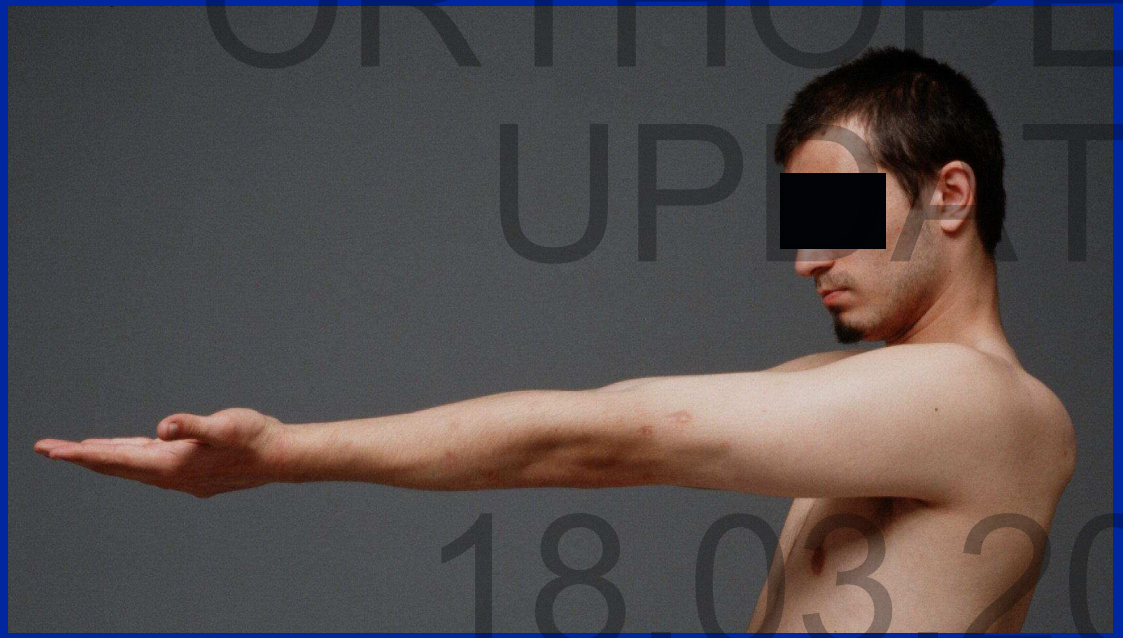
- **Dynamic Joint Distractor DJD II**

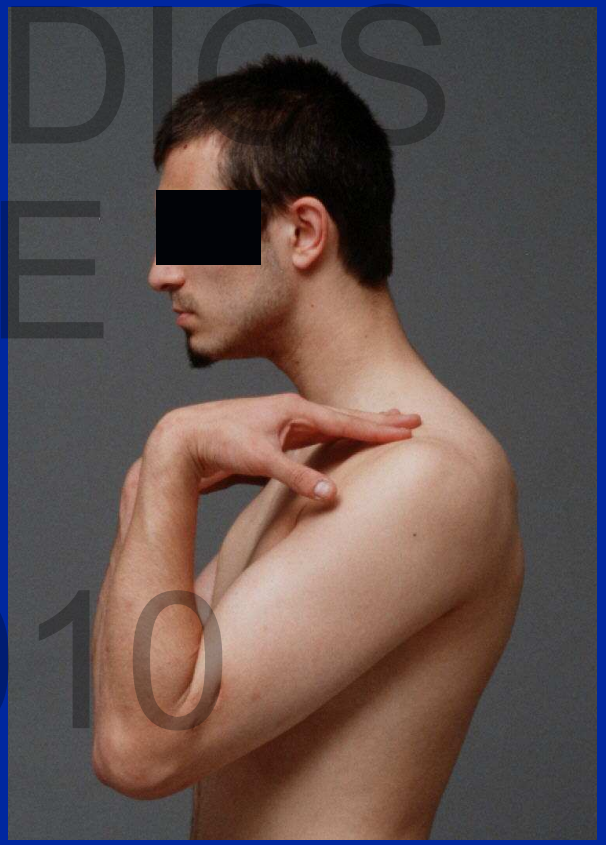
~ 6 – 8 weeks

ORTHOPEDICS UPDATE

18.03.2010

ORTHOPEDICS UPDATE 18.03.2010





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ORTHOPEDICS UPDATE

18.03.2010

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MEDIAL APPROACH CORONOID

(Scham-Taylor)

ORTHOPEDICS UPDATE 18.03.2010

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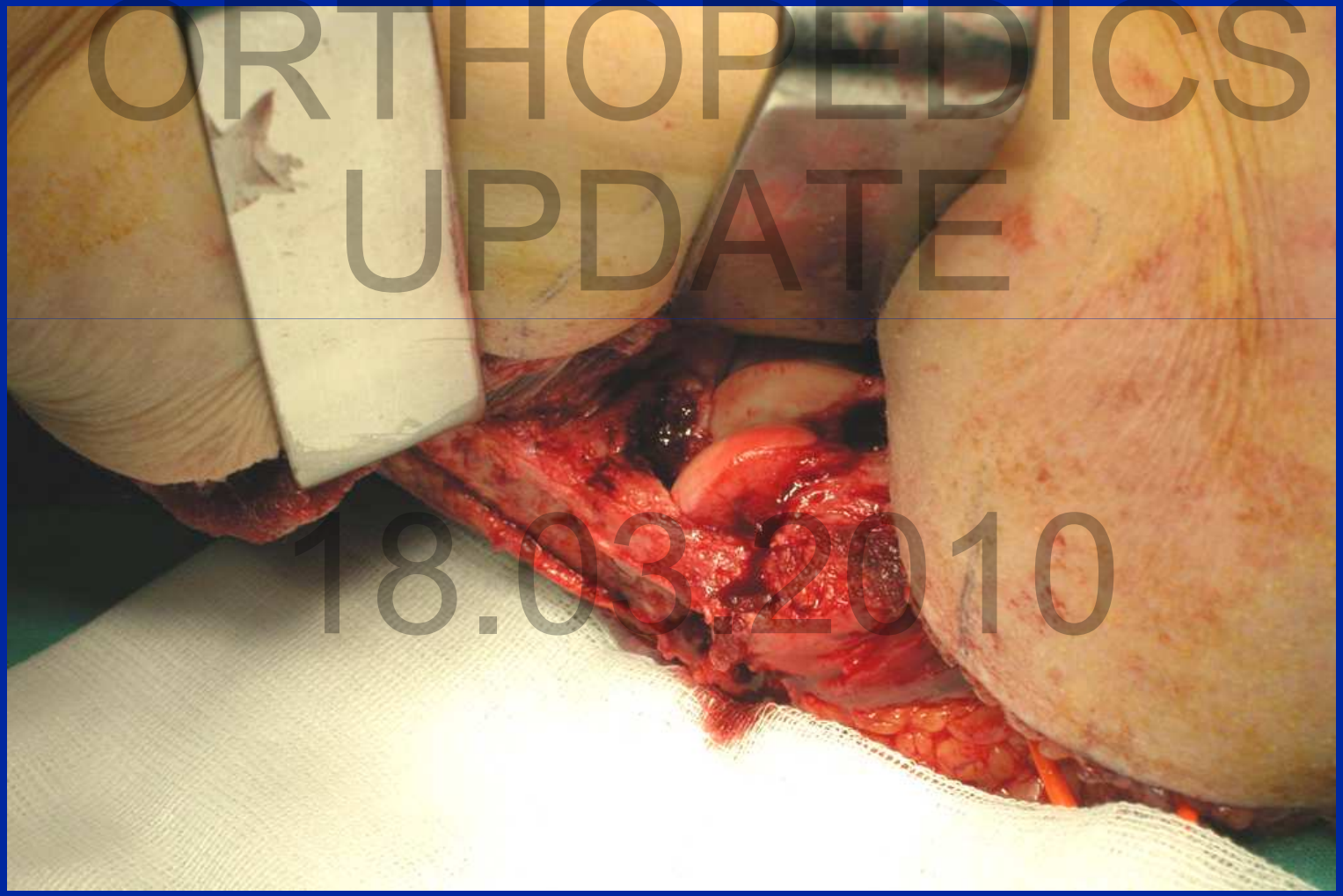
MEDIAL APPROACH CORONOID

(Scham-Taylor)



ORTHOPEDICS UPDATE
18.03.2010

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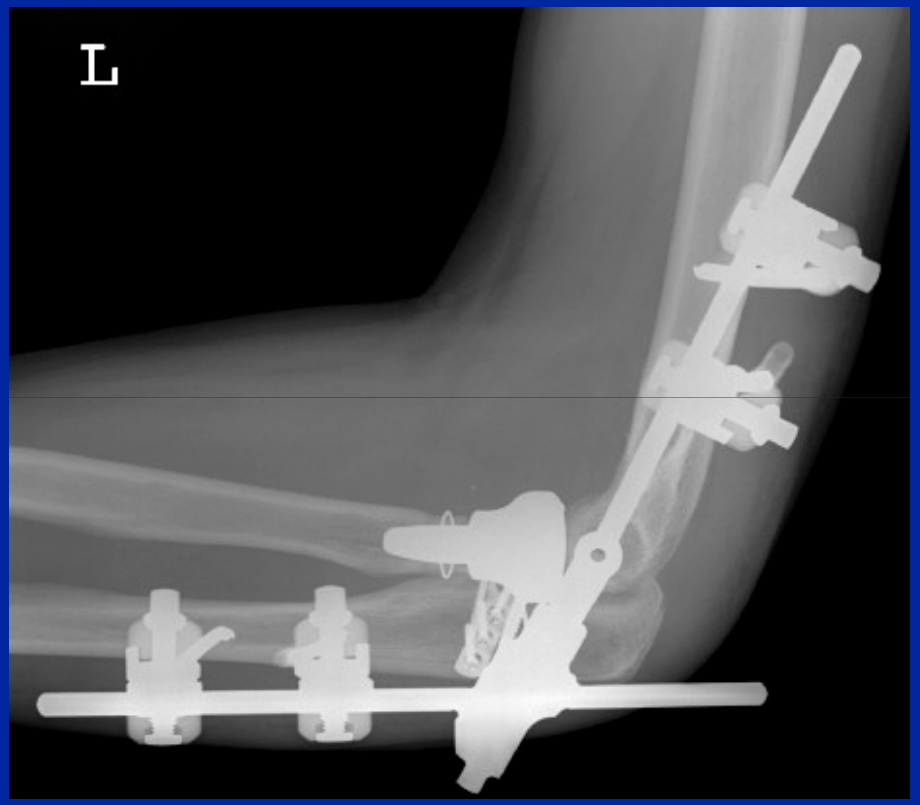
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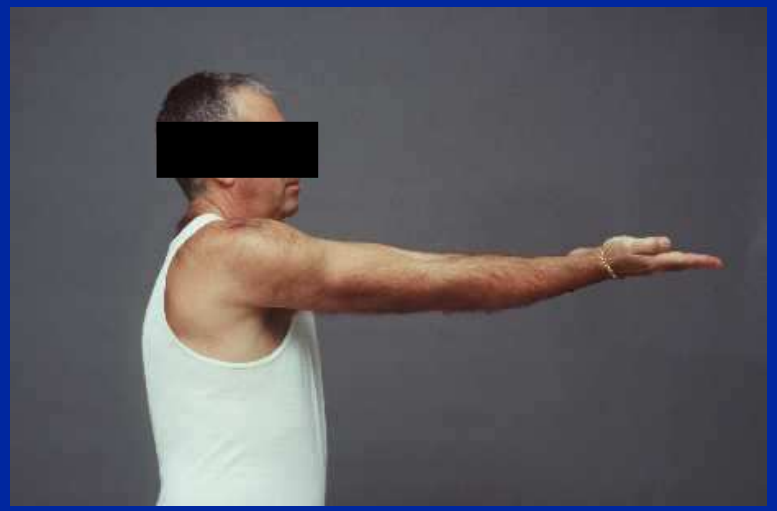
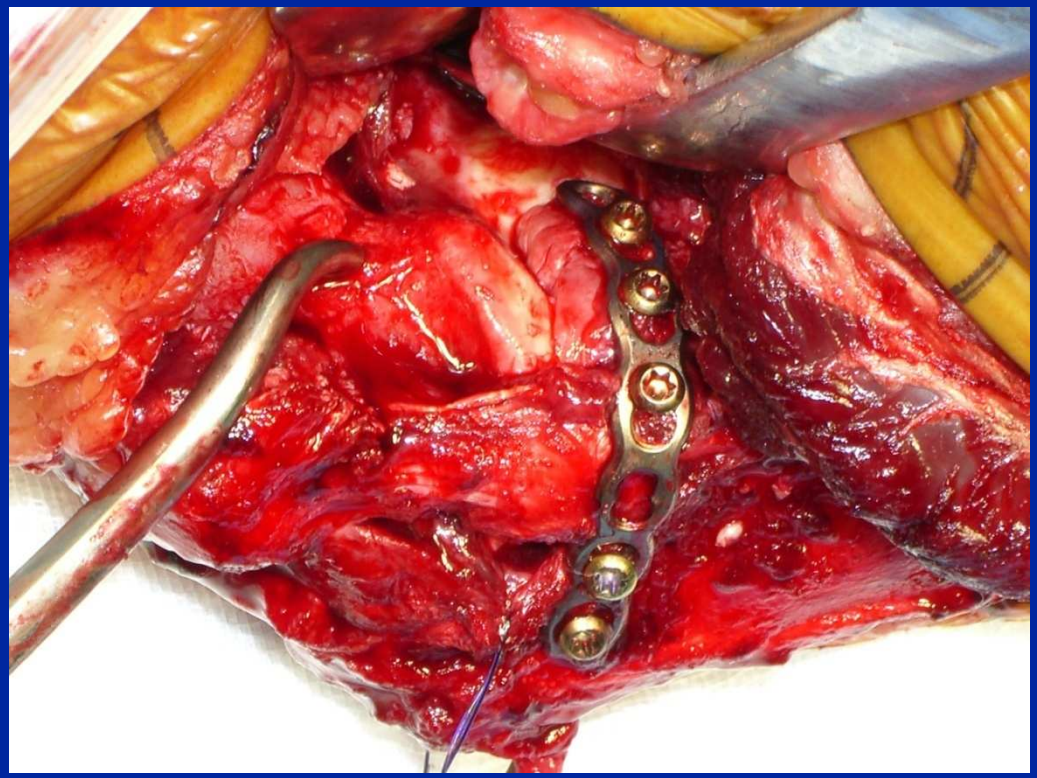



Philips Bri
29 Jan 2007
120


953
53y
Philips Brilliance 16
Jan 2007 15:43:21.0
120kV, 151mAs
SC 189.0 mm
Z 1.00
19 Jun 1953
10754 M/53y
2
P
L
Philip
29 Jan



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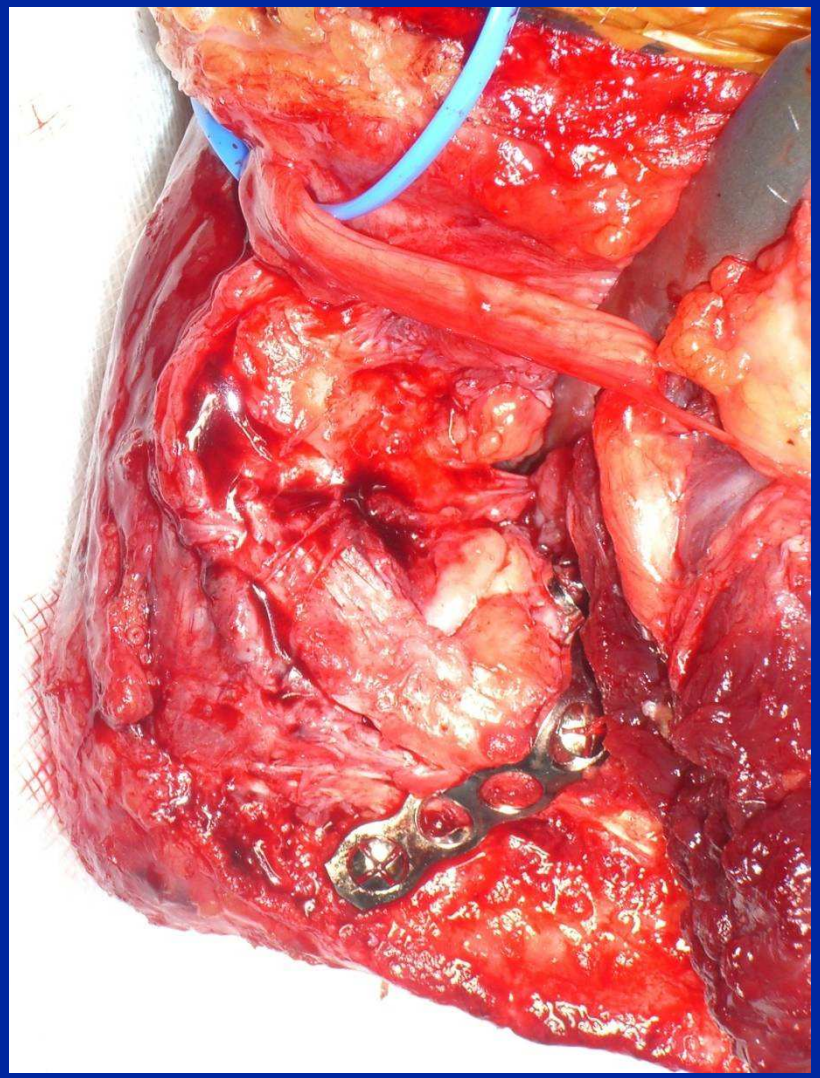
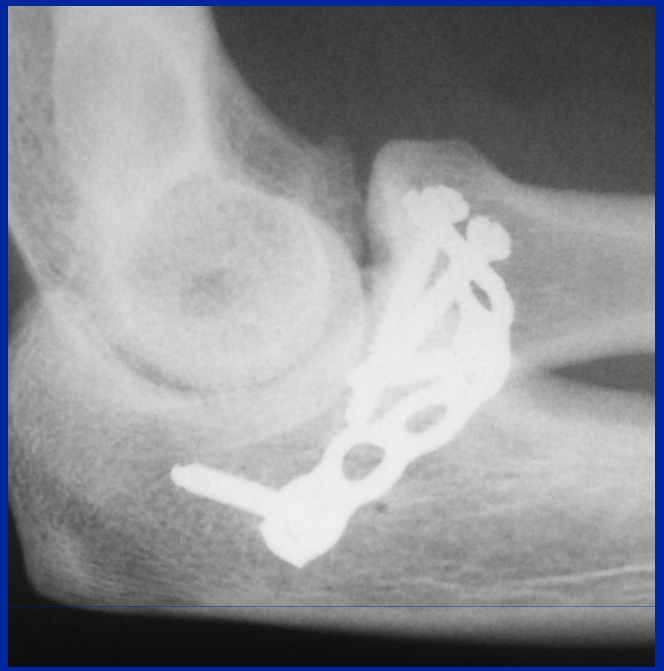
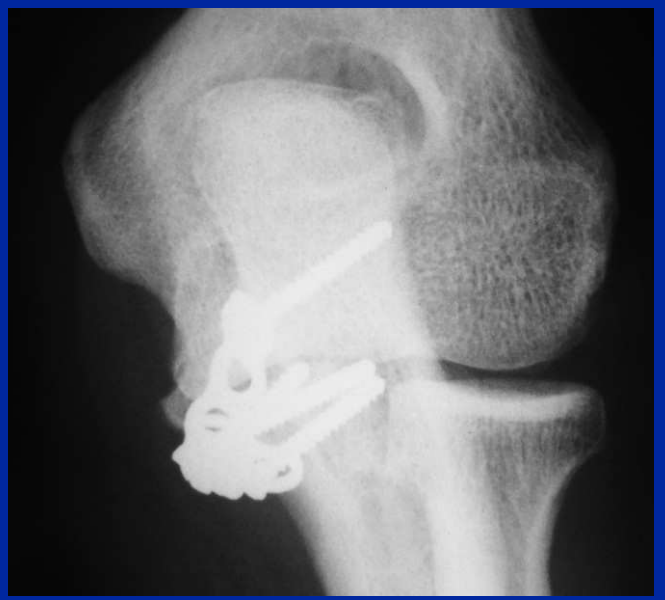
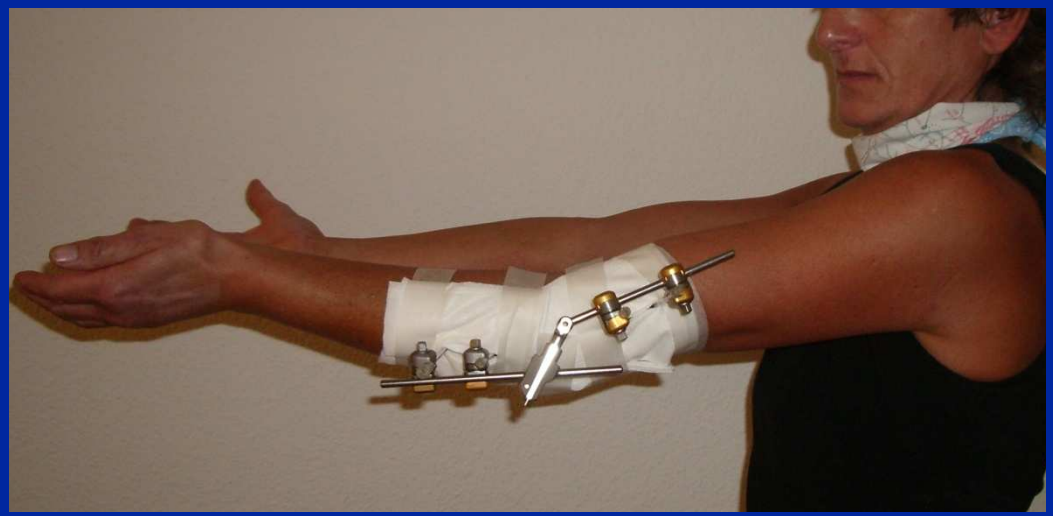
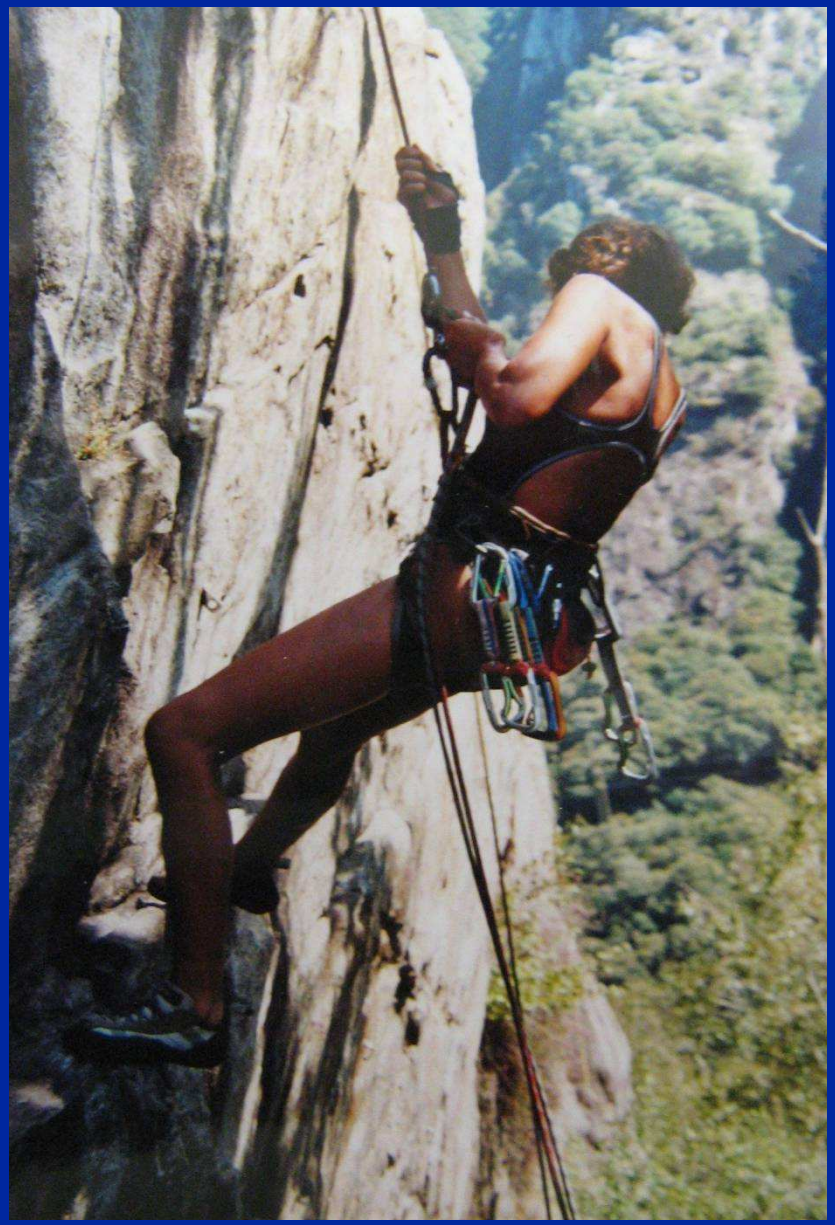
Philips Brilliance 16 11 Dec 1950
9 Nov 2006 09:34:47.0 7613 F/55y
I 2.30 24.00 mm
IM 1.00
RP
2 cm
20373-9 SAG











CONCLUSIONS

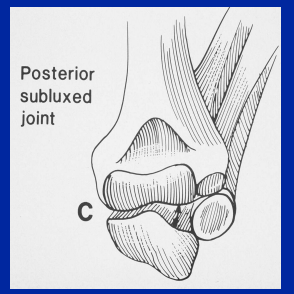
- coronoid major stabilizer of the elbow

CONCLUSIONS

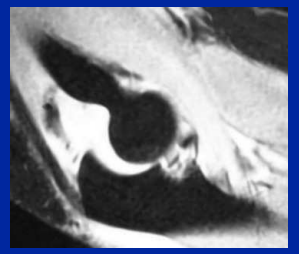
Instability

- dorsal

- postero-lateral rotatory



- postero-medial rotatory



CONCLUSIONS

Open reduction / internal fixaton

- **type III, (some type II)**
- **anteromedial fx**
- **terrible triad injuries**

THANK YOU VERY MUCH