UNIVERSITY OF BRESCIA

Centro R.I.T.M.O.
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Regione Lombardia
ASST Spedali Civili

Posterior shoulder instability:

Spectrum of disease and current treatment

Giuseppe Milano

COI disclosure

- *Arthrex: consultant, research*
- *CONMED: consultant*
- *Stryker: consultant*
- *GreenBone: research*
- *Medacta: research*
- *FGP: research*

Epidemiology

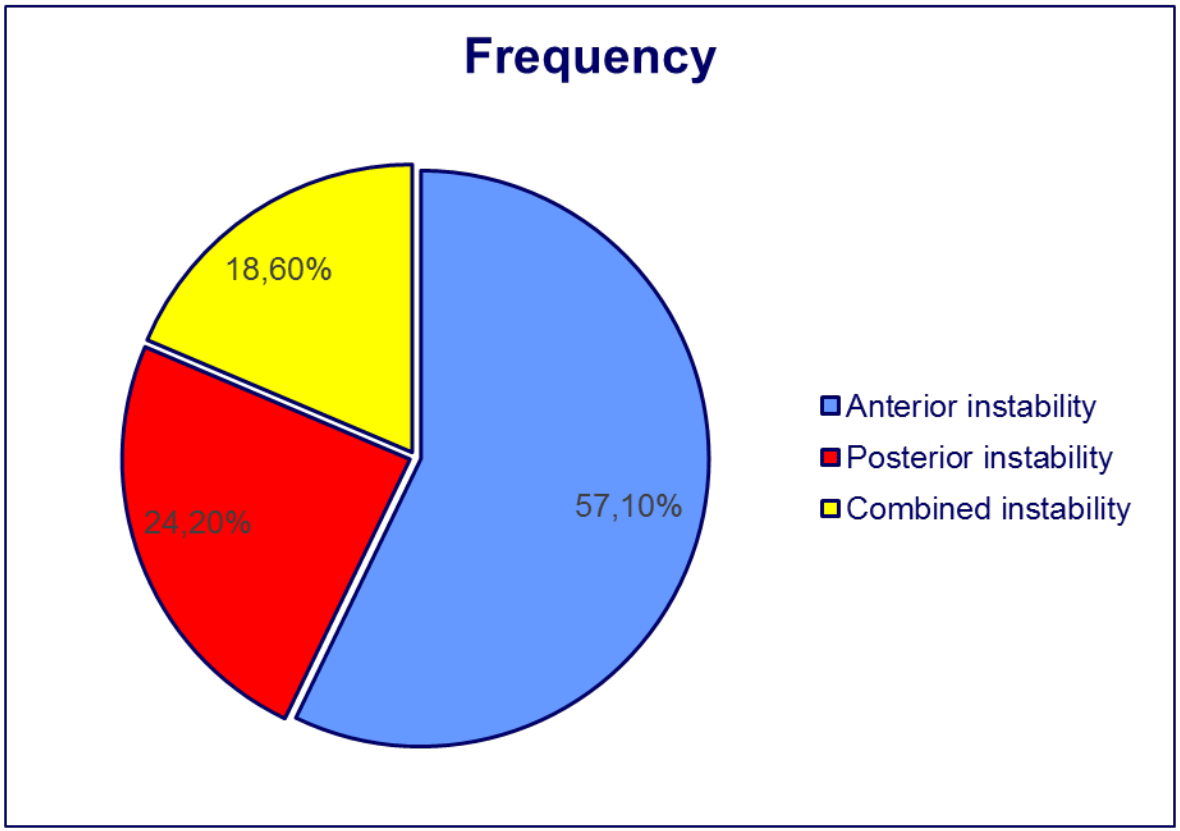
- 5.2-17.9% of all instability cases
- M:F = 8:1
- Age: 14-19 yrs

Lanzi 2017, Woodmass 2018, Bokshan 2020

- Misdiagnosed at first examination: 60-79%

Kokkalis 2017

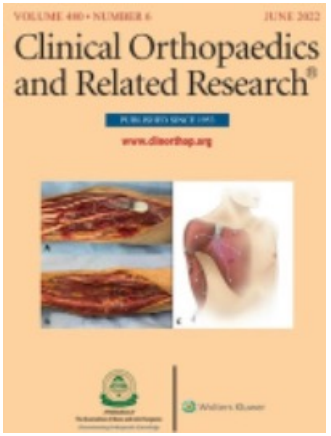
Song DJ, Cook JB, Krul KP, et al.
High frequency of posterior and combined shoulder instability in young active patients.
J Shoulder Elbow Surg (2015) 24, 186-190

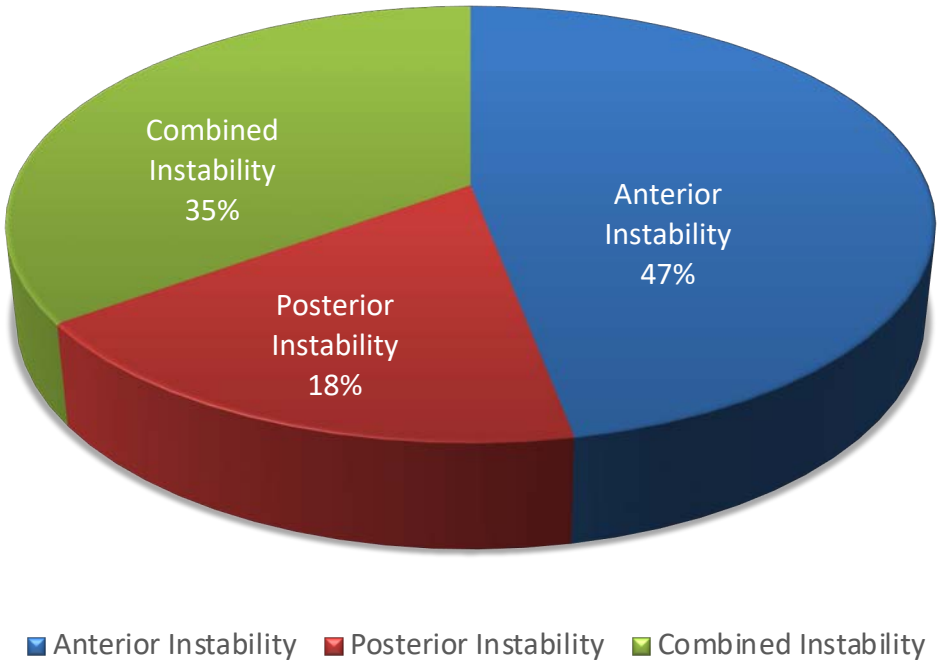


- Cohort study
- **Military population**
- 231 pts (M:F=221:10)
- Mean age= 26 yrs

Posterior + combined instability ≥ 40%

Yow BG, Wade SM, Bedrin MDet al.
The Incidence of Posterior and Combined AP Shoulder Instability Treatment with Surgical Stabilization Is Higher in an Active Military Population than in the General Population: Findings from the US Naval Academy.
Clin Orthop Relat Res. 2021 Apr 1;479(4):704-708

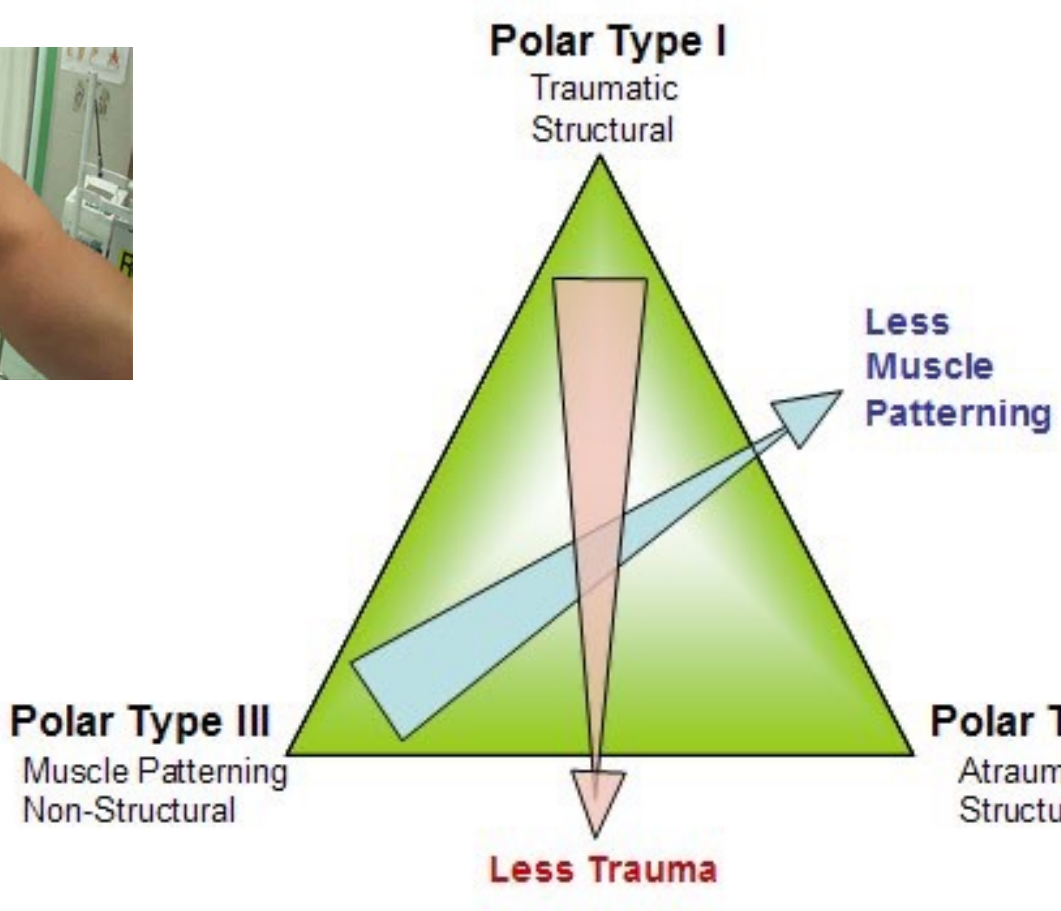




- Cohort study
- **Military population**
- 443 pts (M:F=392:51)
- Mean age= 22 ± 4 yrs

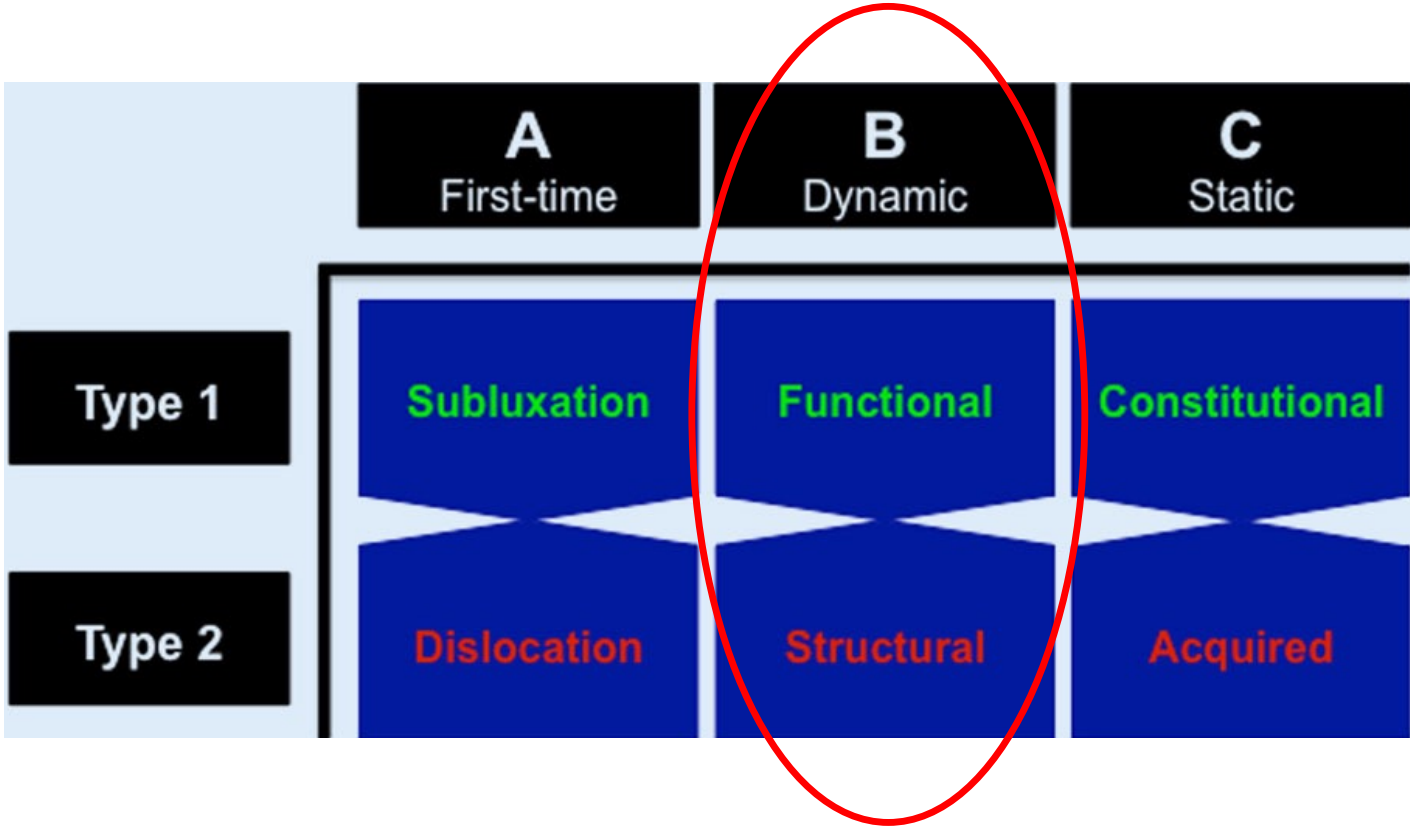
Posterior + combined instability ≥ 53%

Classification



Bailey 2004

Classification



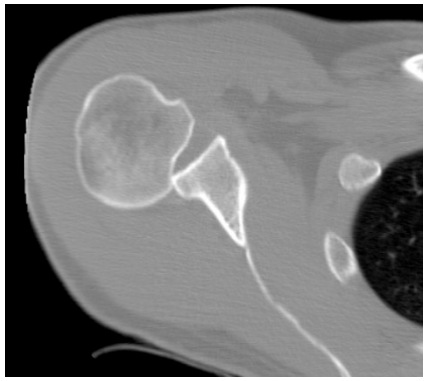
Overlapping between Posterior and MDI

Moroder 2017

A: first time (acute traumatic)

- Traumatic onset / seizures
- Provocative position: adduction, flexion, internal rotation
- Symptoms:
  - A1 (subluxation): pain in provocative positions
  - A2 (dislocation): pain and reduced ROM

- Imaging (CT/MR):
  - Capsulo-labral lesions
  - Glenoid rim fx
  - Reverse Hill-Sachs: 30%-90%



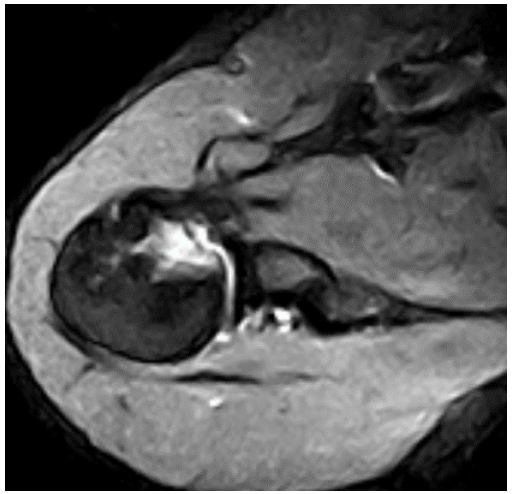
Saupe 2008, Rouleau 2012, Paparoidamis 2021

Treatment

- **Conservative**: *mainstay of treatment*

Festbaum 2022

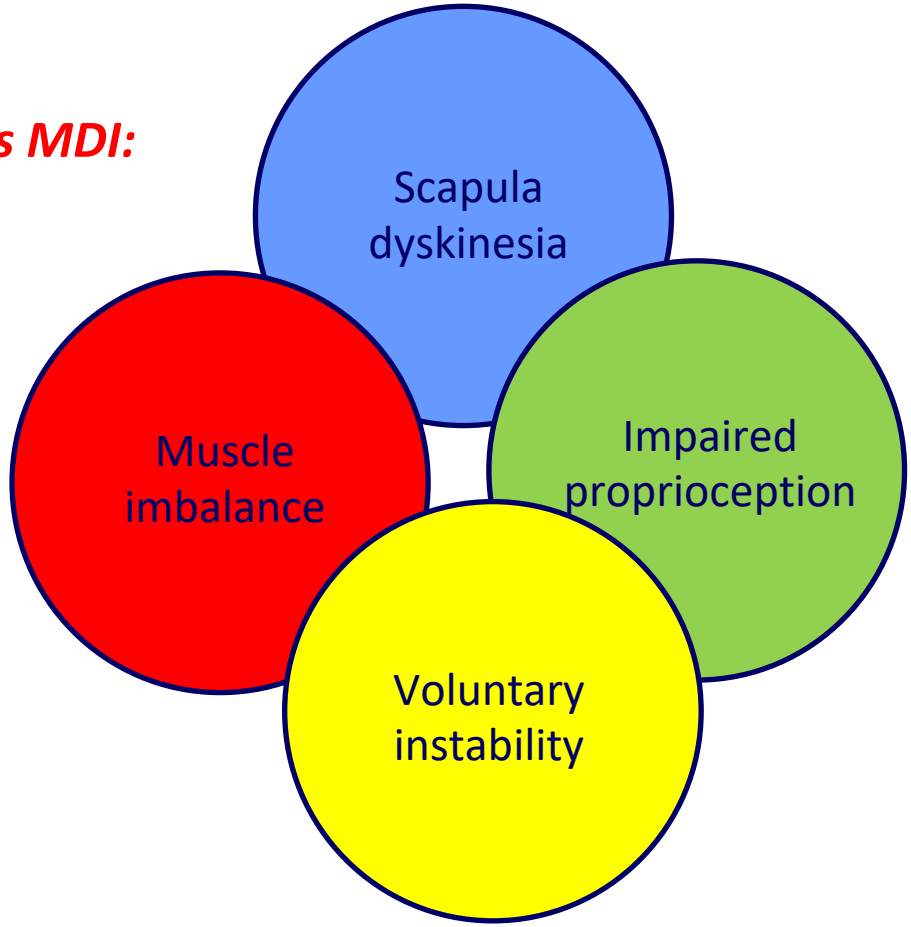
- **Surgery**
  - Large reverse Hill-Sachs
  - Posterior glenoid rim fx
    - Suture anchors (posterior bony Bankart)
    - Direct fixation with screws (large fragments)



B1: Dynamic (functional)

Distinction between Posterior vs MDI:

NOT POSSIBLE!



Kibler 2016, Warby 2017, Moroder 2020

Altered neuromuscular control

- Abnormal scapular kinematics
  - ✓ Reduced scapular upward rotation through ROM
  - ✓ Increased scapular internal rotation during elevation of the arm in the scapular plane

Spanhove 2020, 2021

- Altered muscle activation
  - ✓ Prolonged activation of muscles that stabilize the humeral head
  - ✓ Shorter activation of muscles that accelerate the arm and shoulder girdle

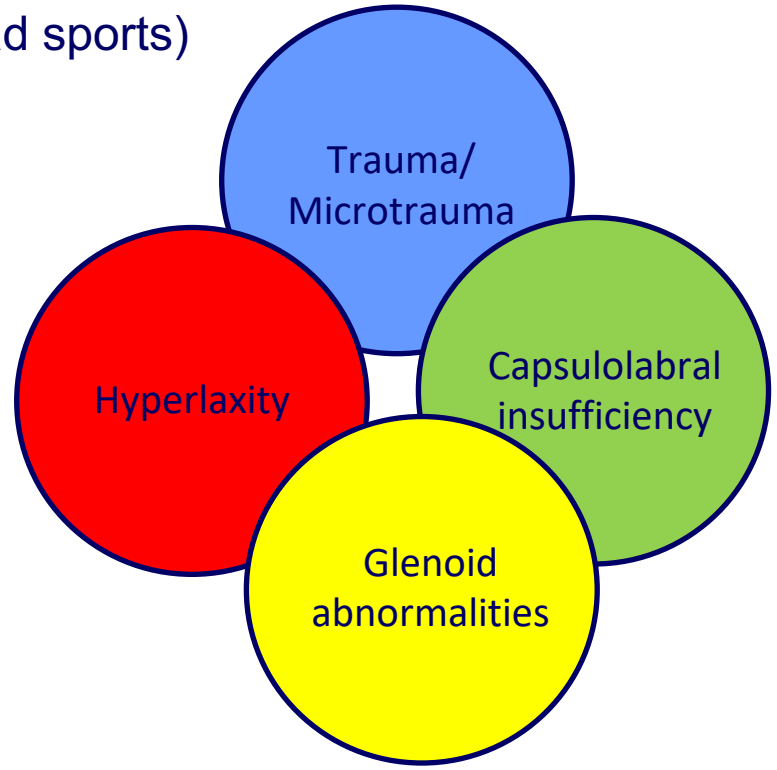
Spanhove 2020, 2021

- Impaired proprioception (joint sense position)

Barden 2004, Warby 2017

B2: Dynamic (structural)

- Recurrence after acute episode
- Repetitive microtrauma (contact, overhead sports)
- Often associated to structural deficiency



Provencher 2008, Forsythe 2010, Moroder 2020, Gouveia 2022

Congenital hyperlaxity

- Connective tissue disorders
  - Ehlers-Danlos syndrome
  - Marfan's syndrome
  - Benign hypermobility syndrome
- Not related to a pathological condition (5-15%)

Juul-Kristensen 2007, Remvig 2007, Johnson 2011

Acquired hyperlaxity

Symptomatic disease

Adaptive pathology

Normal anatomy

Kibler 2013

Capsular insuffciency

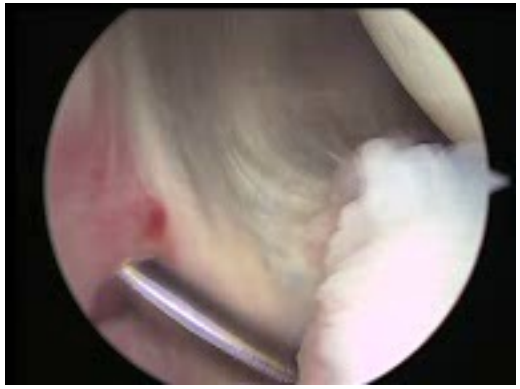
- **Fetal and embryonic shoulders:**

  Redundant capsule may be a

  developmental variant rather the

  consequence of trauma

  Uthoff 1985



- **UNI vs MDI:** Similar capsule properties

  (collagen and elastic fibers)

  Rodeo 1998

CONGENITAL OR ACQUIRED?

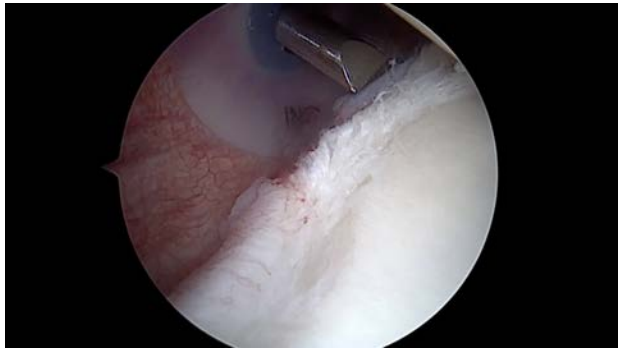
Condrolabral containment

- Posterior/MDI
  - Loss of posterior labral height

Kim 2005

- Posterior labral cleft (MRI finding)
  - Rounded or truncated glenoid rim
  - Shoulder instability

Campbell 2014



Glenoid abnormalities

Controversial…

- Increased glenoid retroversion

  (range 2.6°-16.6°)

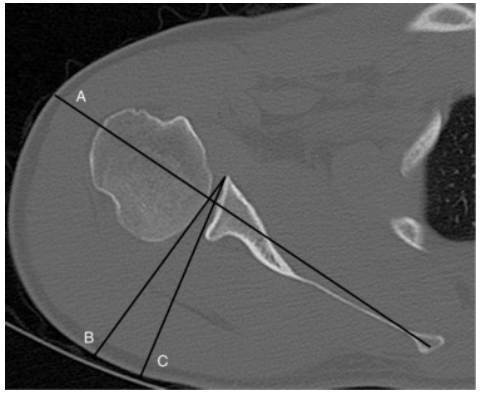
  Kim 2005, von Eisenhart-Rothe 2010

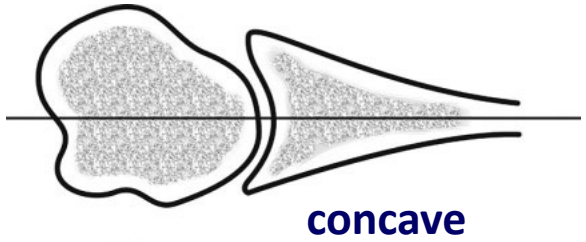
- Loss of glenoid concavity

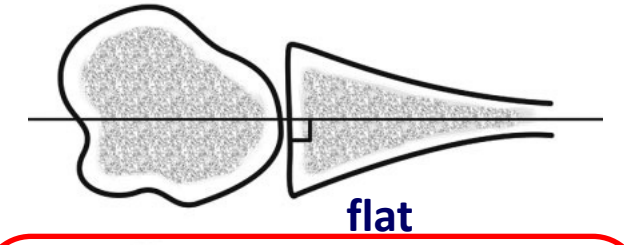
  von Eisenhart-Rothe 2010, Moroder 2015

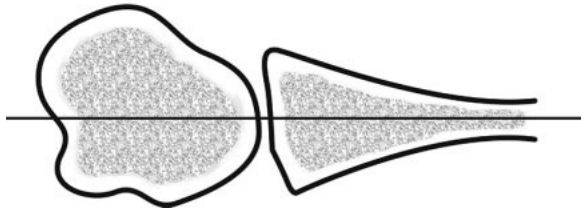
  - Convex glenoid

    Weishaupt 2000, Inui 2002, Yoo 2021



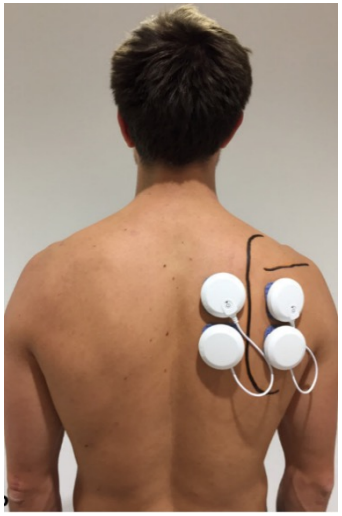






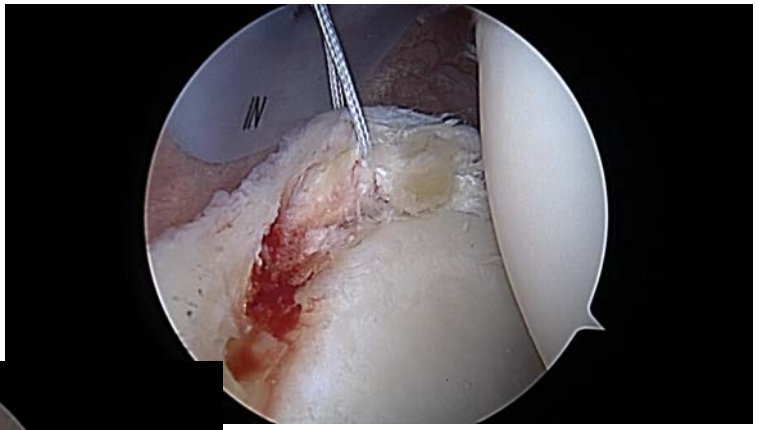
Treatment

- B1 Functional
  - Conservative treatment
  - Shoulder pacemaker *(Moroder 2017, 2020)*
- B2 Structural
  - Surgical treatment
    - Capsulolabral defects or insufficiency
    - Critical bone defects (???)



Anchor-based repair

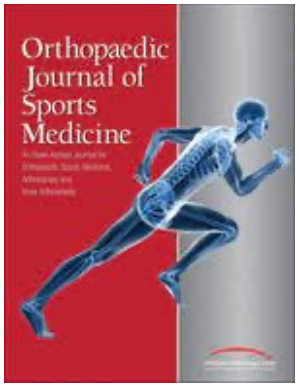
- Kim lesion
- Reverse Bankart
- POLPSA
- GLAD
- pHAGL
- Stretched posterior capsule



Vopat ML, Coda RG, Giusti NE, et al.

Differences in Outcomes Between Anterior and Posterior Shoulder Instability After Arthroscopic Bankart Repair: A Systematic Review and Meta-analysis.

Orthop J Sports Med. 2021 May 25;9(5):23259671211006437



- LOE IV
- 39 studies
- 2077 patients

Difference in Return to Sport Between Anterior and Posterior Instability Patients[a]

	Returned to Sport
Anterior instability (n = 874)	695 (79.52)
Posterior instability (n = 283)	240 (84.81)
Odds ratio (95% CI)	2.31 (1.76-3.04)
P	<.001[b]

Difference in Postoperative Instability Between Anterior and Posterior Instability Patients[a]

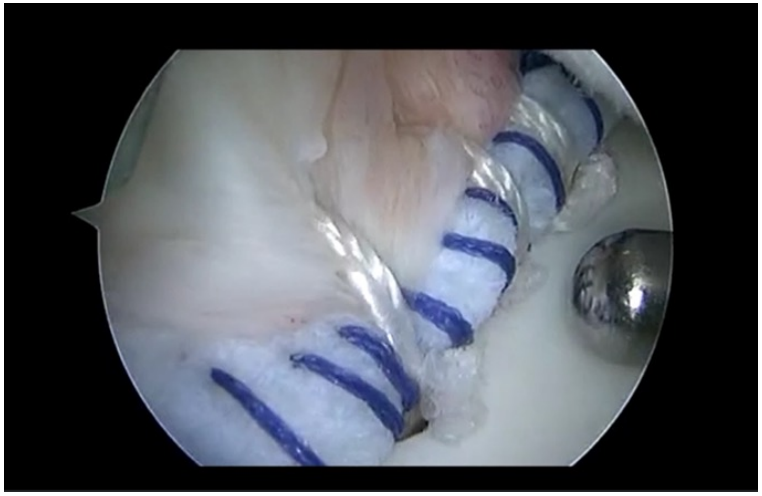
	Postoperative Instability
Anterior instability (n = 1406)	195 (13.87)
Posterior instability (n = 440)	42 (9.54)
Odds ratio (95% CI)	1.53 (1.07-2.23)
P	.02[b]

Posterior shoulder instability

- **Lower** recurrence rate
- **Lower** rate of return to sport

Labral augmentation

- **Indication:**
  - Capsulolabral insufficiency

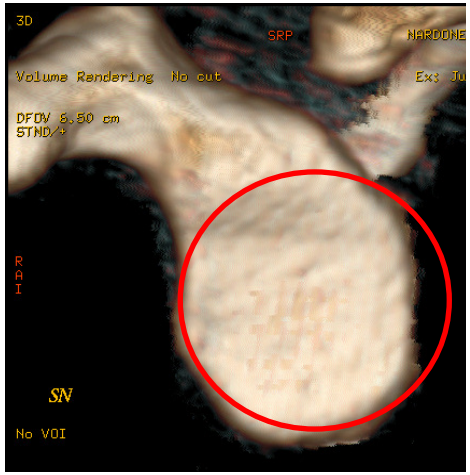


BENEFITS

- Deepens the glenoid cavity
- Increases the joint surface area

Critical bone defects

- **Glenoid**
  - 20% (or less?) *(Nacca 2018)*
  - ***11% ???*** *Arner 2021*
- **Humeral head**
  - Defect size
    - Small : <25%
    - Medium: 25-45%
    - Large: >45%
  - *Location and orientation??*



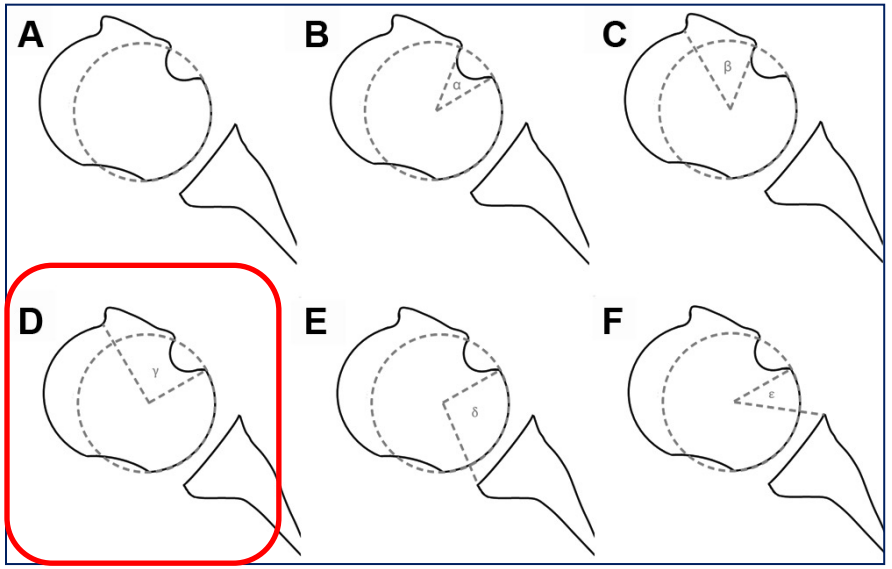
- **Bipolar bone loss??**

Moroder P, Runer A, Kraemer M, et al.

Influence of defect size and localization on the engagement of reverse Hill-Sachs lesions.

Am J Sports Med. 2015 Mar;43(3):542-8.

- Cadaveric study
- 10 specimens
- CT scan
  - α (size)
  - B (location)
  - ɣ (combination)



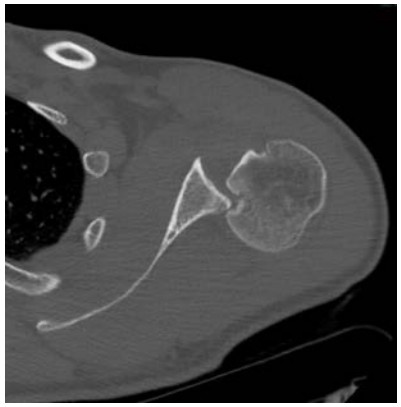
Gamma angle: cut-off value 90°

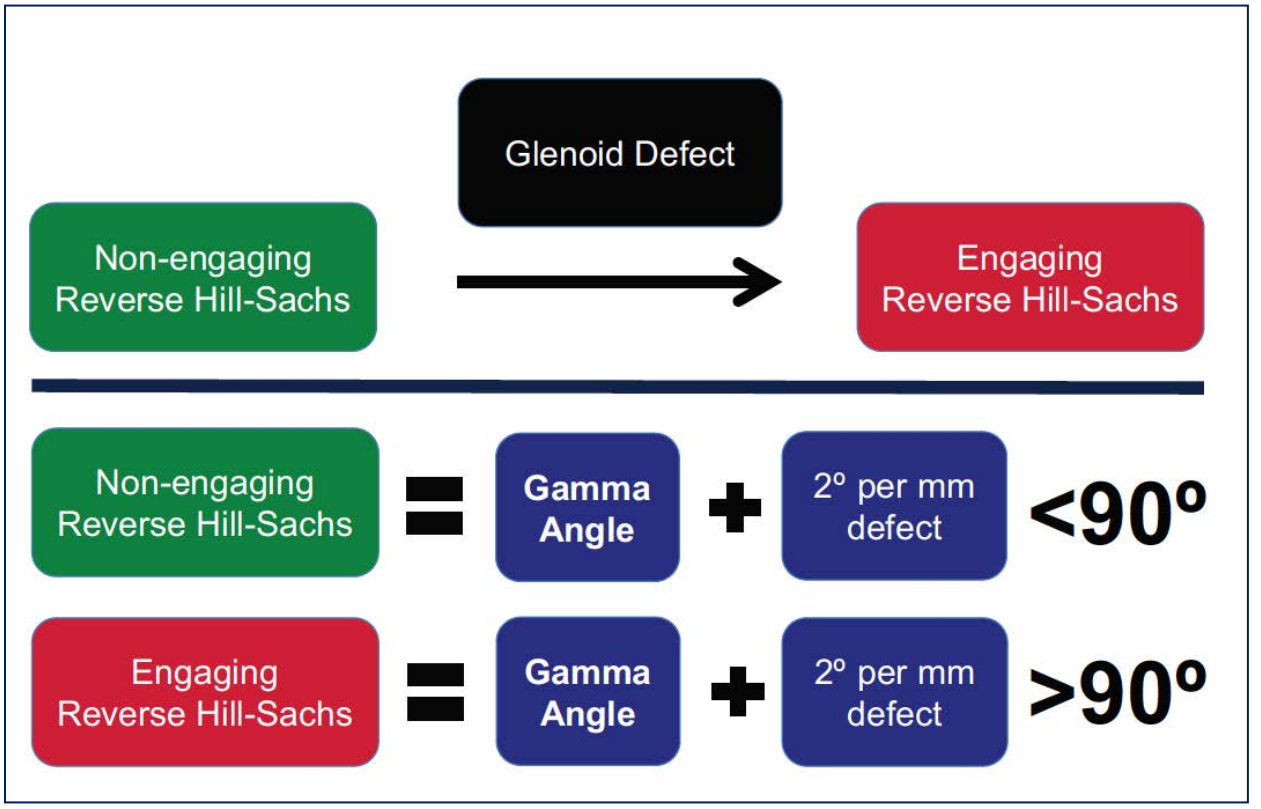
100% sensitivity and 75% specificity

Moroder P, Plachel F, Tauber M, et al.

Risk of Engagement of Bipolar Bone Defects in Posterior Shoulder Instability

Am J Sports Med. 2017 Oct;45(12):2835-2839.





Treatment: glenoid defects

Allograft/autograft options

- Iliac crest
- Scapular spine
- Acromion
- Distal tibia allograft

Recurrent instability: 0-73%

Revision rates: 0-67%

Complications: 13.8%

(mainly related to hardware)

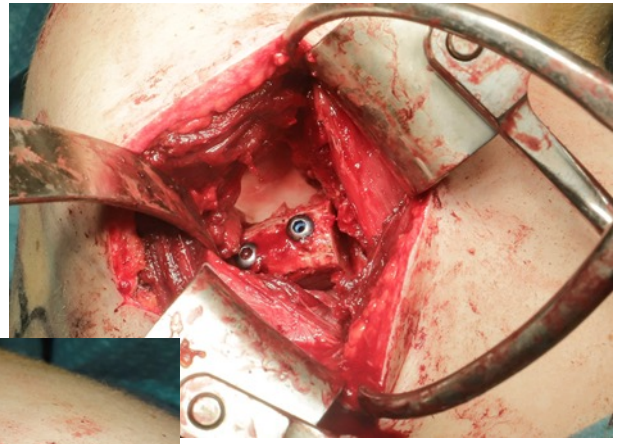
Considerable heterogeneity in study design and samples limits decisive conclusions

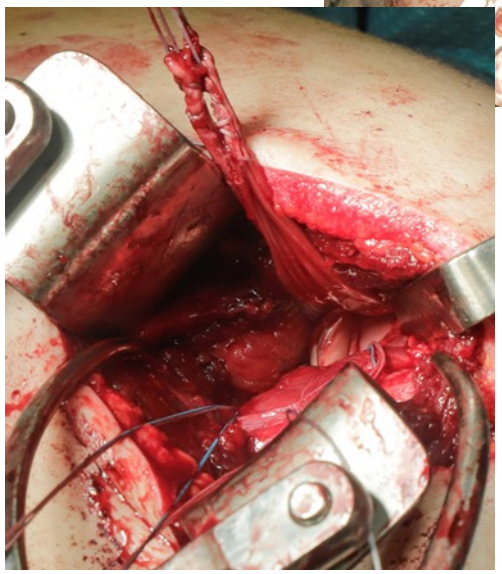
Mojica 2021, Cognetti 2022

Treatment: Glenoid defect

Autologous bone-hamstring tendon graft

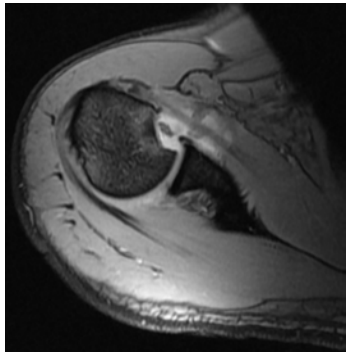
- Bone reconstruction
- Capsule augmentation





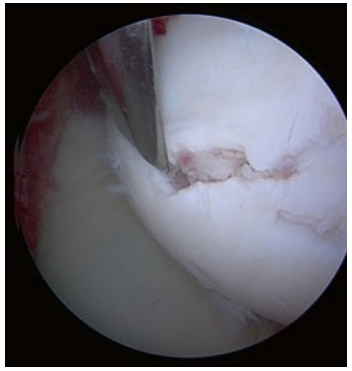
Treatment: HH defect

Small to medium: *anatomic procedures*



- Disimpaction w/wo bone grafting

Bock 2007, Beckmezci 2015, Eular 2015, Cirpar 2017



- Disimpaction w ballon + cement

Jacquot 2013

- OC allograft

Alkaduhimi 2017, Mitchell 2017, Muccioli 2021

Treatment: HH defect

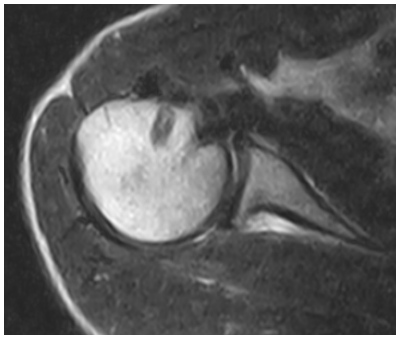
Small to medium: *Non anatomic procedures*

- McLaughlin procedure (Arthro/Open)

  Krackhardt 2006, Lavender 2016, Kelly 2017, Luedke 2017

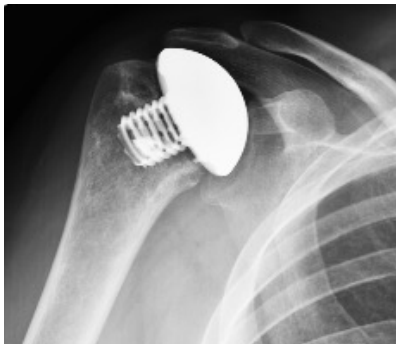
- Neer procedure

  Banerjee 2013, Demirel 2017



- Rotational osteotomy

  Schliemenan 2011, Ziran 2015

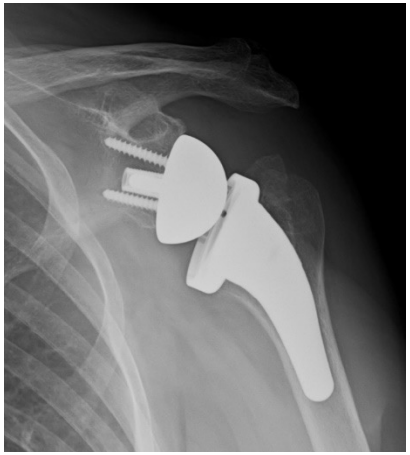


- **Large defects: HA / TSA**

  Gravilidis 2010, Paul 2011, Schliemenan 2011, Raiss 2017

C: Static

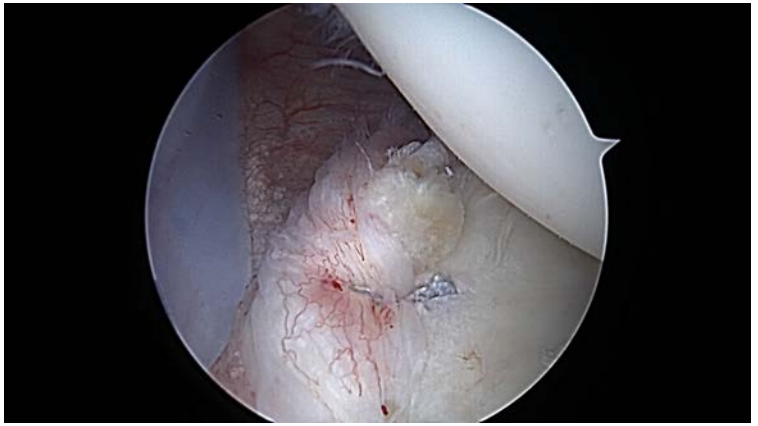
- C1: Constitutional
  - Etiology: unclear
  - Mostly asymptomatic
  - Late diagnosis (degenerative changes)



- C2: chronic locked posterior dislocation
  - Allograft reconstruction (glenoid and humeral head) ***Rüttershoff 2022***
  - Shoulder replacement

Conclusions

- Different subtypes of PI can overlap or even co-exist
- Conservative treatment still remains the first line option
  - ✓ Acute traumatic (A1/2)
  - ✓ Recurrent functional (B1)
  - ✓ Static constitutional (C1)



- Surgical treatment:
  - ✓ Arthroscopic repair/labral augmentation (soft tissue)
  - ✓ Bone defects (bipolar defect ?)

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Thank you!!