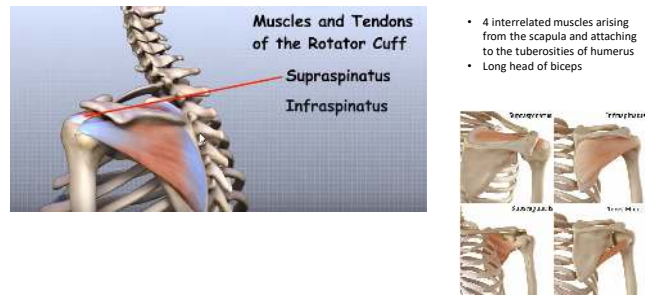
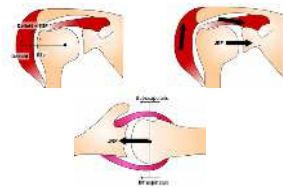




Anatomy Rotator cuff



Big ball and small socket joint



→ Glenohumeral stability: sagittal and coronal cuff forces

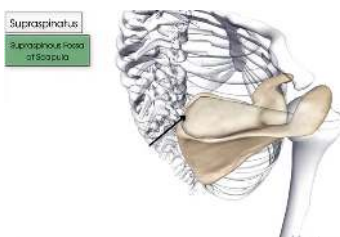
Gleno-humeral stabilisers



STATIC	DYNAMIC
Articular conformity	Rotator Cuff
Negative joint pressure	M Deltoid
Adhesion/Cohesion	M LHB
Labrum	
Capsular ligaments	

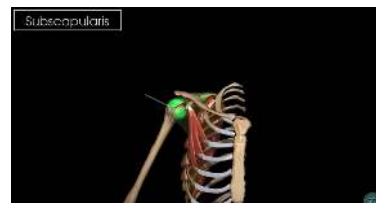
- NI function = Balance between mobility en stability
- Fixed fulcrum for concentric rotation of humeral head
- Neutralizes shearing forces of deltoid in early abduction

M Supraspinatus



M SUPRASPINATUS
Fossa supraspinatus, greater tuberosity
Fct: Abduction
N: N Suprascapularis
A: A Suprascapularis, A dorsalis scapulae, A Subclavius
DIAGNOSTIC
Hug Up Test 84% sensitivity, 76% specificity
Empty Can 84% sensitivity, 74% specificity
Full Can 74% sensitivity, 82% specificity
Neer/Hawkins impingement test

M Subscapularis



M SUBSCAPULARIS
Fossa subscapularis, lesser tuberosity humerus
Fct: medial rotation
N: N subscapularis
A: A Axillaris, A subscapularis, A thoracodorsalis, A circumflexa scapulae
DIAGNOSTIC
Bear Hug Sensitivity 60%, specificity 200%
Belly Press Sensitivity 40%, specificity 98%
Lift Off Sensitivity 27%, specificity 92%
Internal rotation resistance test 76% sensitivity



M infraspinatus

Infraspinatus
MUSCLE HOW TO FIND



M INFRASPINATUS

Fossa infraspinatus, greater tubercle of humerus
Fct: external rotation
N: N Suprascapularis
A: A Suprascapularis, A circumflexa scapulae

DIAGNOSTIC

External rotation resistance
Lag Sign

M Teres minor

Teres Minor



M TERES MINOR

Scapulae, greater tubercle humerus
Fct: external rotation
N: N Axillaris
A: A Subscapularis, A circumflexa scapulae

DIAGNOSTIC

ER Lag Sign 100% sensitivity, 92 % specificity
Hornblower sign 91% sensitivity, 72% specificity
Drop Sign 87% sensitivity, 88% specificity

Rotator cuff disorders

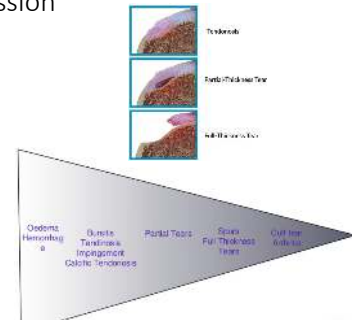
- Impingement
- Calcific tendinopathy
- **Rotator cuff tears**



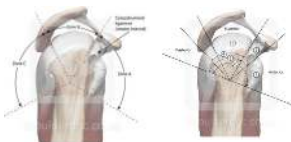
→ Mechanical (Extrinsic)
→ Degenerative/vascular (Intrinsic)

Cuff disease progression

- **Stage 1:** Edema and Hemorrhage
→ Age < 25Years
- **Stage 2:** Fibrosis and tendinosis
→ Age 25-40 Years
- **Stage 3:** Bone spurs and tendon rupture
→ Age > 40 Years



Topographic Classification RC tears



Habermeyer classification	
Zone A	Subscap, LHB lesion
Zone B	Central sup lesion ssp
Zone C	Post lesion Isp en teres minor

Patte classification	
Segment 1	Isolated subscapularis tear
Segment 2	Isolated coracohumeral tear
Segment 3	Isolated supraspinatus tear
Segment 4	Complete supra- and 1/3 infraspinatus tear
Segment 5	Complete supra- and infraspinatus tear
Segment 6	Complete subscapularis, supra- and infraspinatus tear

Habermeyer, JBJS (A) 2006

Patte G, CORR, (254) 81-86, 1990

Classification: Tear size

- Full-thickness tears
- Classify the size of the tears by the widest diameter:

	Diameter
Small	<1cm
Medium	1-3cm
Large	3-5 cm
Massive	> 5cm

→ Cofield classification, 1982
= Bateman classification, 1984

Classification: partial thickness tears

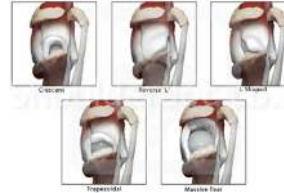
Ellman classification



Ellman classification	Depth
Grade 1	Partial tear <3mm deep
Grade 2	Partial tear 3-6 mm deep (<50%)
Grade 3	Partial tear > 50% deep

Ellman Classification	Location
A	Articular
B	Bursal
C	Interstitial

Classification: Tear shape



Ellman and Gartsman classification
Crescent
Reverse 'L'
'L' shaped
Trapezoidal
Massive full thickness rotator cuff tears

Ellman H, Gartsman G. Open repair of full thickness RCT. Pg 181-202, Philadelphia, 1993

Fatty degeneration / Atrophy RC

Goutallier Classification

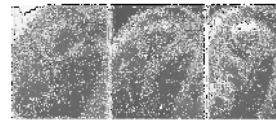


Goutallier Classification System	Amount of fat in muscle
Grade 0	No fat in muscle
Grade 1	Small amount of fatty changes
Grade 2	Muscle fills almost but not completely with fat
Grade 3	Typical amounts of fatty muscle
Grade 4	Muscle full of fat, muscle is absent

Classification system of fatty muscle atrophy described by Goutallier et al [14].

Prognostic importance: Grade 3 & 4 have less chance of return to function

Atrophy Rotator Cuff



Thomazeau classification

	Atrophy	Occupation ratio
Stage 1	Normal/slight atrophy	1,00- 0,60
Stage 2	Moderate atrophy	0,60-0,40
Stage 3	Severe atrophy	<0,40

Occupation ratio R = S1 / S2

Classification: cuff tear retraction

Patte Classification



Stage 1	Proximal stump close to bony insertion
Stage 2	Proximal stump at level of humeral head
Stage 3	Proximal stump at glenoid level

Cuff tear arthropathy

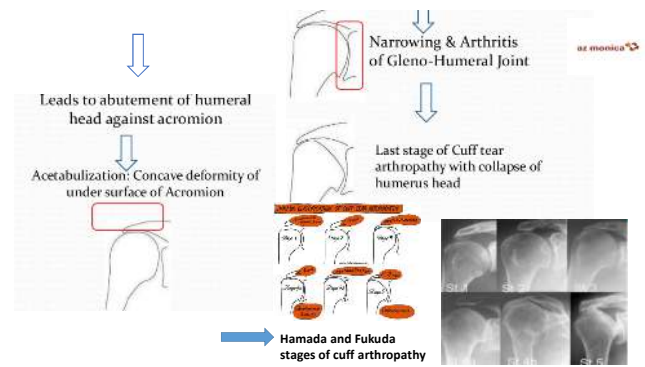
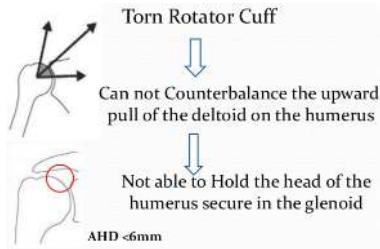


- Disruption rotator cuff integrity → failed glenohumeral stability → superior migration humeral head → impingement acromion
- Increased friction cartilage + arthritis

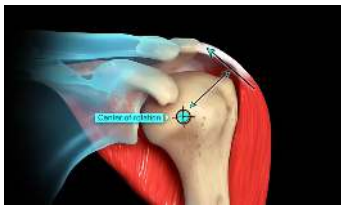
Humeral head collapse, biceps tendon dislocation, superior glenoid, acromion and coracoid erosion

- Cuff tear arthropathy

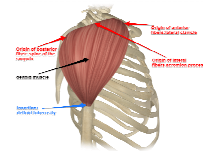
Cuff arthropathy



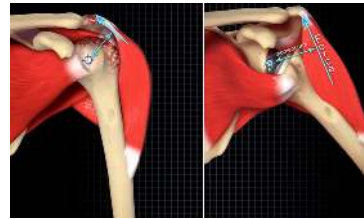
Importance M. Deltoideus



→ Rotator cuff acts as a mechanical couple in conjunction with deltoid in shoulder rotation and elevation
 → compressive forces to center of rotation from RC and deltoid
 → Goal: centralisation humeral head in fossa glenoidalis
 → Deltoides: ideal moment/lever arm



Biomechanics RSA



- Relieve pain + prevent progressive erosion by superior migration humerus
- restores stability
- RSP → shifting joint center of rotation medially an inferiorly → elongation deltoid and increasing resting tone and tension
- Larger abductor moment arm → compensation for impaired function RC.
- Medial translation humerus → less impingement

Take home message

- Goal RC → restore glenohumeral stability: center of rotation
- Anatomy RC: supraspinatus, subscapularis, infraspinatus, Teres minor
- Different classification systems: tear location, size, shape, atrophy, fatty infiltration, retraction
- Cuff arthropathy
- RSA: function M Deltoideus
- Anatomy RC → Biomechanics
- RC disorders: treatment options

