

CLINICAL EXAMINATION IN SHOULDER REVISION SURGERY

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SYMPTOMS

- Pain
- Weakness
- Loss of function
- Instability
- Stiffness
- Clinical signs of infection

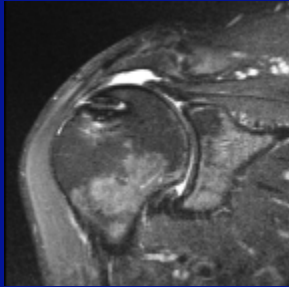


GOAL OF THE EXAM

- Find the problem
- Check if your salvage plan is realistic



EXAMPLE SITUATIONS



**Failed cuff
repair**



**Failing
prosthesis**



**Failed
osteosynthesis**



**Failed
stabilization**

WHAT TO LOOK FOR

ALWAYS: INFECTION

**Particularly with foreign material /
prosthesis**



DIAGNOSIS

Algorithm:

Anamnesis (symptom duration, other sources of infection)

Local findings

Laboratory finding

Joint aspirate*

Radiology



Osmon, Clin Infect Dis , 56: 1, 2013

* Infektionsrisiko 100'000x höher als bei nativem Gelenk

DIAGNOSIS

1 major criterion:

- **Fistula**
- **2 positive cultures**



DIAGNOSIS

3 of 5 «minor»-criteria:

1. sedimentation rate and CRP ↑
2. cell count of joint aspirate ↑
3. Proportion of neutrophil granulocytes ↑

OR

Leukocyte Esterase ++

4. positive histological tissue sample
5. 1 positive culture



THRESHOLDS

Table 2

The Threshold for the Minor Diagnostic Criteria.

Criterion	Acute PJI (<90 days)	Chronic PJI (>90 days)
Erythrocyte Sedimentation Rate (mm/hr)	Not helpful. No threshold was determined	30
C-Reactive Protein (mg/L)	100	10
Synovia White Blood Cell Count (cells/ μ l)	10,000	3,000
Synovial Polymorphonuclear (%)	90	80
Leukocyte Esterase	+ Or ++	+ Or ++
Histological Analysis of Tissue	>5 neutrophils per high power field in 5 high power fields ($\times 400$)	Same as acute

Parvizi, J Arthroplasty, 2014

Shinsky MF, JBJS AM, 2008

Osmon, Clin Infect Dis , 56: 1, 2013

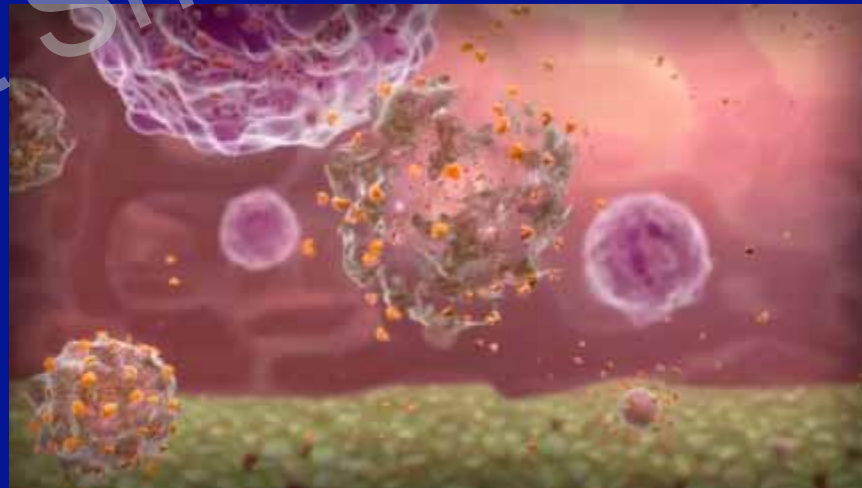
BIOMARKER ALPHA-DEFENSIN



Neutrophil releasing alpha defensin



Alpha defensin reaching the bacteria



Alpha defensin killing the bacteria



ALPHA-DEFENSIN



- Sensitivity/specificity: 97% / 96%
- fast: 10 minutes
- No indication which germ
- costly

INTRAOPERATIVE DIAGNOSTIC

Tissue samples

5-6 samples

1 sample

to culture

to histology

sonication:

Increases specificity with equal sensitivity

*Atkins BL et al. J Clin Microbiol 1998

**Trampuz A, et al. N Engl J Med 2007

**Piper KE, et al. J Clin Microbiol 2009



FAILED HEMIPROSTHESIS



FAILED HEMIPROSTHESIS



Salvage options:

- Fix infection
- Refixation of tendons / tuberosities
- Resurface glenoid
- Convert to RTSA



FAILED HEMIPROSTHESIS



Salvage options:

- Fix infection
- Refixation of tendons / tuberosities
- Resurface glenoid
- Convert to RTSA

Exams: Exclude infection
Check cuff function, (subscapularis !)
Check joint centering with res. abduction
Make test infiltration with LA
Further radiological examination



FAILED HEMIPROSTHESIS



Salvage options:

- Fix infection
- Refixation of tendons / tuberosities
- Resurface glenoid
- Convert to RTSA

STABILITY:



FAILED HEMIPROSTHESIS



Salvage options:

- Fix infection
- Refixation of tendons / tuberosities
- Resurface glenoid
- Convert to RTSA

STABILITY:



FAILED HEMIPROSTHESIS



FAILED HEMIPROSTHESIS



Salvage option:

- **Conversion to RTSA**
- **RTSA + possible tendon transfer**

Exam: Check for deltoid function and external rotators, radiological control of bone stock, height and length of shaft



FAILED HEMIPROSTHESIS



FAILED ANATOMICAL



Salvage options:

- Fix infection
- Refixation of tendons / tuberosities
- Exchange glenoid/shaft
- Convert to RTSA



FAILED ANATOMICAL



Salvage options:

- Fix infection
- Refixation of tendons / tuberosities
- Exchange glenoid/shaft
- Convert to RTSA

Exams: Exclude infection

Check cuff function, (subscapularis !)

Check joint centering with res. abduction

Make test infiltration with LA

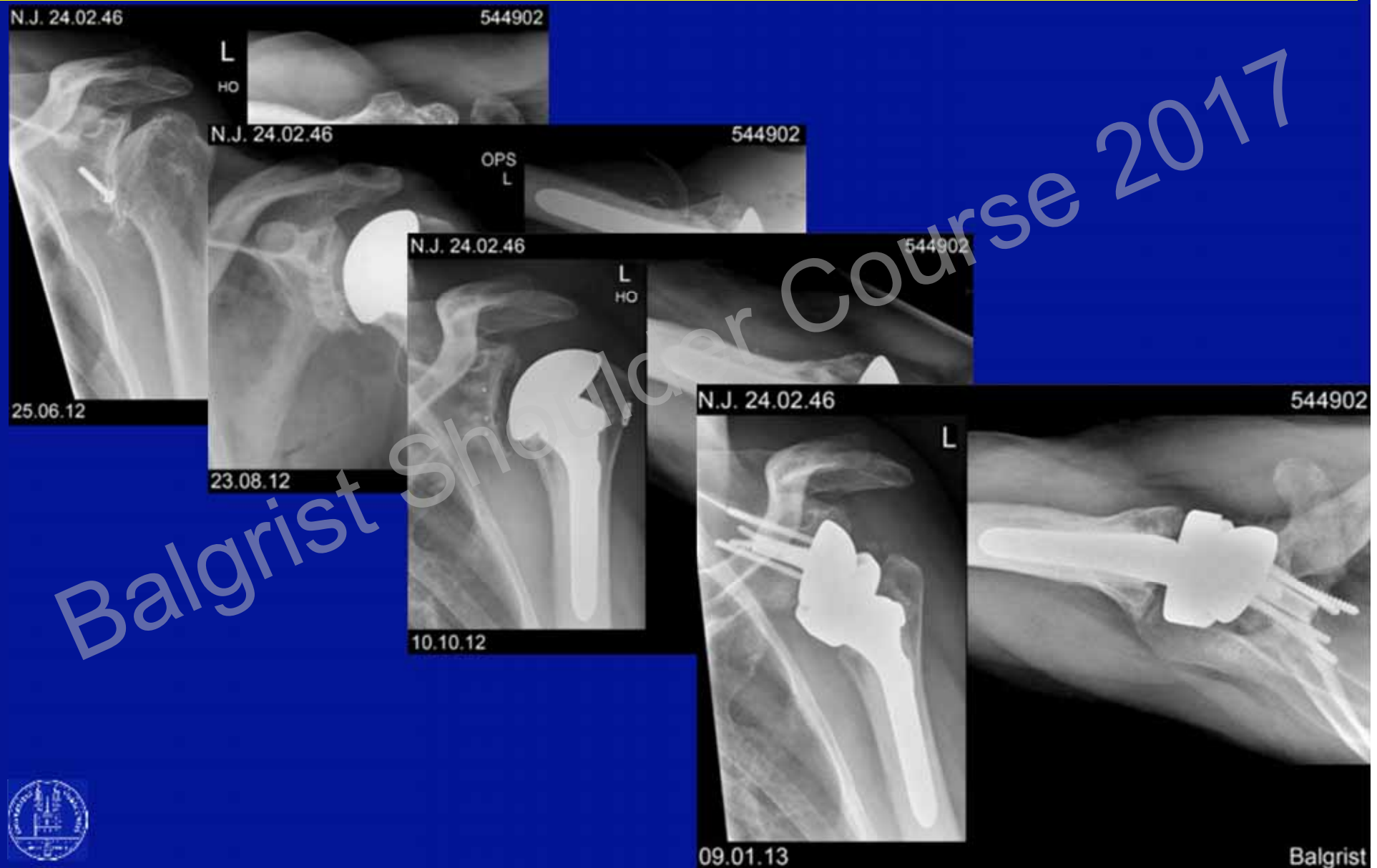
Check glenoid stability and bone stock



FAILED ANATOMICAL



FAILED ANATOMICAL

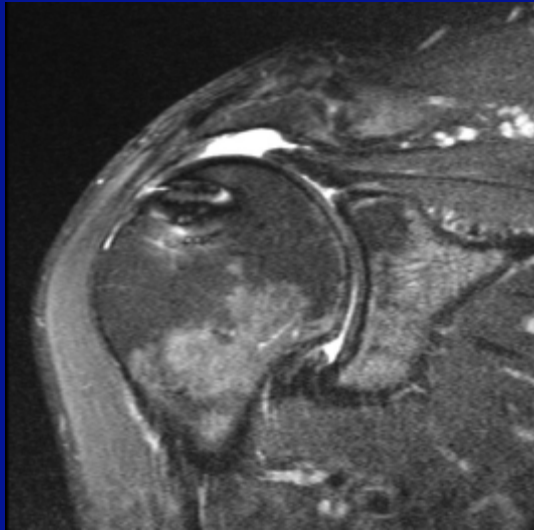


FAILED ANATOMICAL



If shaft is convertible no
problem
usually glenoid problem
shaft height important

FAILED CUFF REPAIR

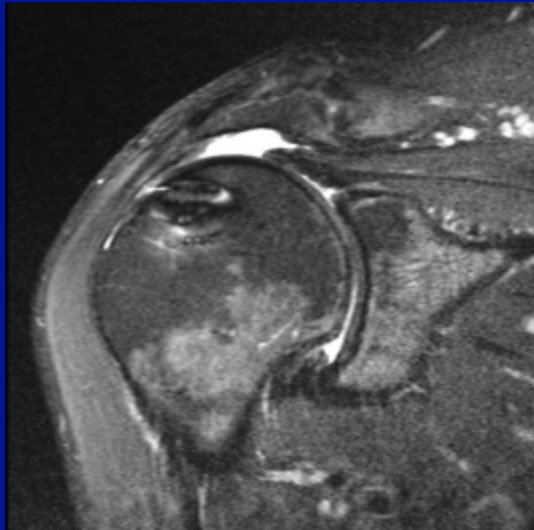


Salvage options:

- Cuff revision
- Tendon transfer / patch ?
- RTSA / w tendon transfer
- Treat stiffness



FAILED CUFF REPAIR



Salvage options:

- Cuff revision
- Tendon transfer / patch?
- RTSA / w tendon transfer
- Treat stiffness

Exams: - Cuff function, lag signs, muscle and tendon quality, joint mobility

- radiological control of bone stock
- deltoid function



FAILED CUFF REPAIR

Cuff exams:

SSP



ISP



FAILED CUFF REPAIR

SSC

Cuff exams:

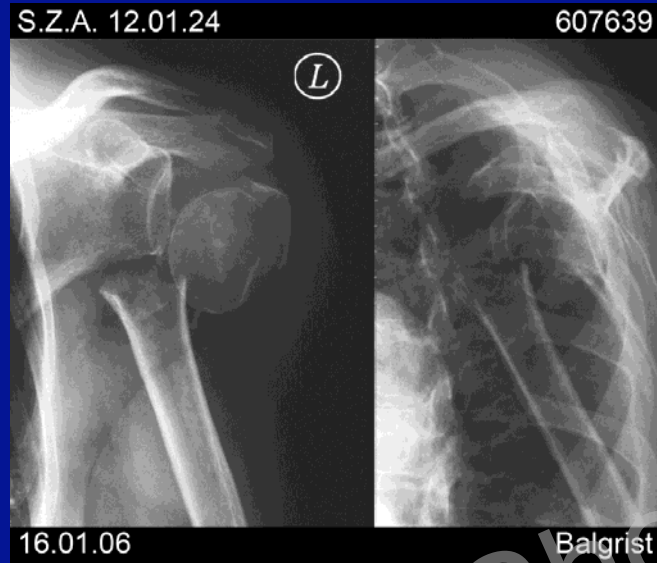


FAILED CUFF REPAIR

Deltoid integrity?



FAILED OSTESYNTHESIS



FAILED OSTESYNTHESIS



Salvage options:

- (Treat infection)
- Metal removal
- Treat stiffness
- RTSA / w tendon transfer

FAILED OSTESYNTHESIS



Salvage options:

- (Treat infection)
- Metal removal
- Treat stiffness
- RTSA / w tendon transfer

Exams:

- Exclude infection
- Exclude osteonecrosis / pseudarthrosis
- Check cuff / joint function, external rotators
- Exclude glenoid damage
- Ensure deltoid integrity



PROBLEMS AFTER FAILED OSTESYNTHESIS

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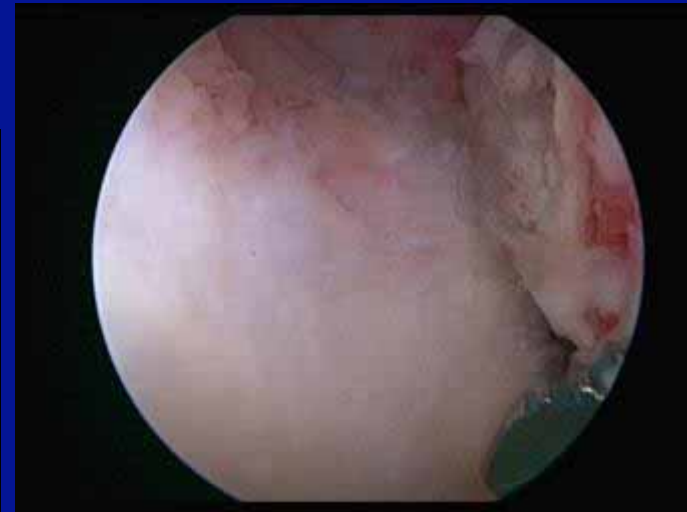
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GLENOID DESTRUCTION



FAILED OSTESYNTHESIS



AFTER FAILED OSTESYNTHESIS



AFTER FAILED OSTESYNTHESIS



INSTABILITY



Salvage options:

- (Treat infection)
- Bone augmentation / block
- Deltoid augmentation
- RTSA / w tendon transfer
- Bipolar prosthesis
- (fusion if no prosthesis)

INSTABILITY



Salvage options:

- (Treat infection)
- Bone augmentation / block
- Deltoid augmentation
- RTSA / w tendon transfer
- (fusion if no prosthesis)

Exams:

- Cuff function, lag signs, muscle and tendon quality, joint mobility
- radiological control of bone stock
- deltoid function



FAILED STABILIZATION





END

Balgrist Shoulder Course 2017

