SSSR
Swiss Society of
Musculoskeletal Radiology

Hip Prosthesis Imaging

PD Dr. med. Reto Sutter

University Hospital Balgrist Zurich
University of Zurich

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EXPERTISE IN MOTION

Hip prosthesis imaging

Choose the imaging modality

Follow the Surgical Approach

Image the Complications

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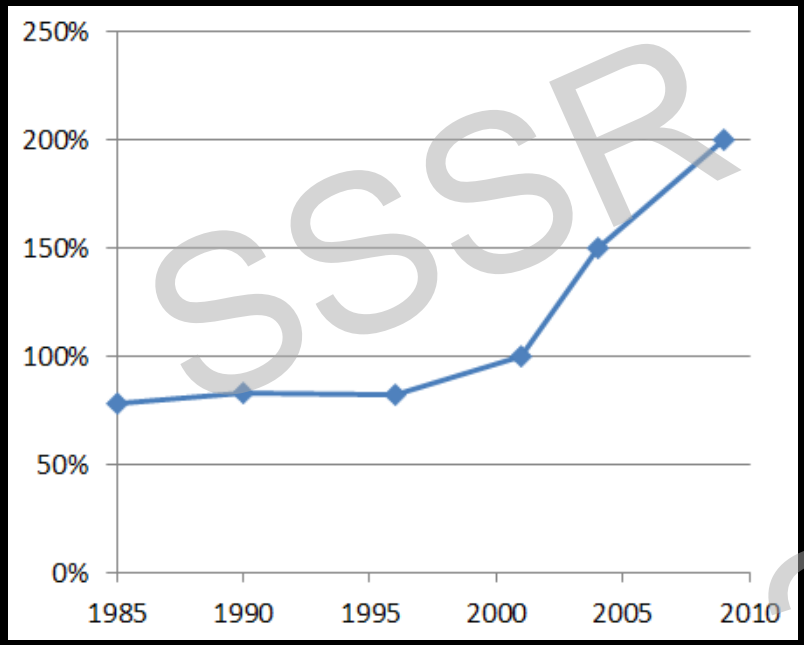
Increase of primary THA



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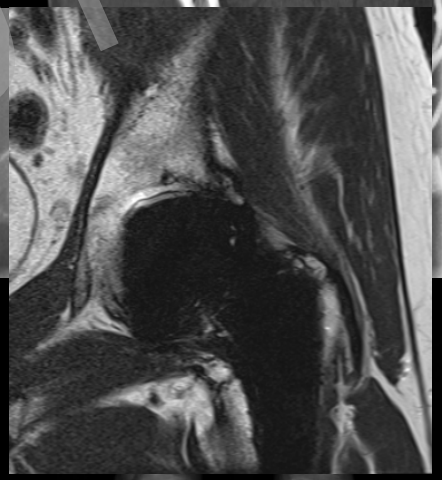
Imaging of prosthesis:
Major impact in the next 10 years

Balgrist diagnostic algorithm

1. Patient history + Clinical examination

2. Radiographs
   hip and pelvis / leg length



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Protocol: MRI Hip prosthesis

1. **FOV whole prosthesis**
   - cor STIR SEMAC 5:57 min
   - tra STIR WARP 4:23 min
2. **Smaller FOV** (joint, tendon, muscles)
   - cor T2 high bandwidth 2:28 min
   - tra T1 high bandwidth 3:52 min
   - sag T1 high bandwidth 3:18 min

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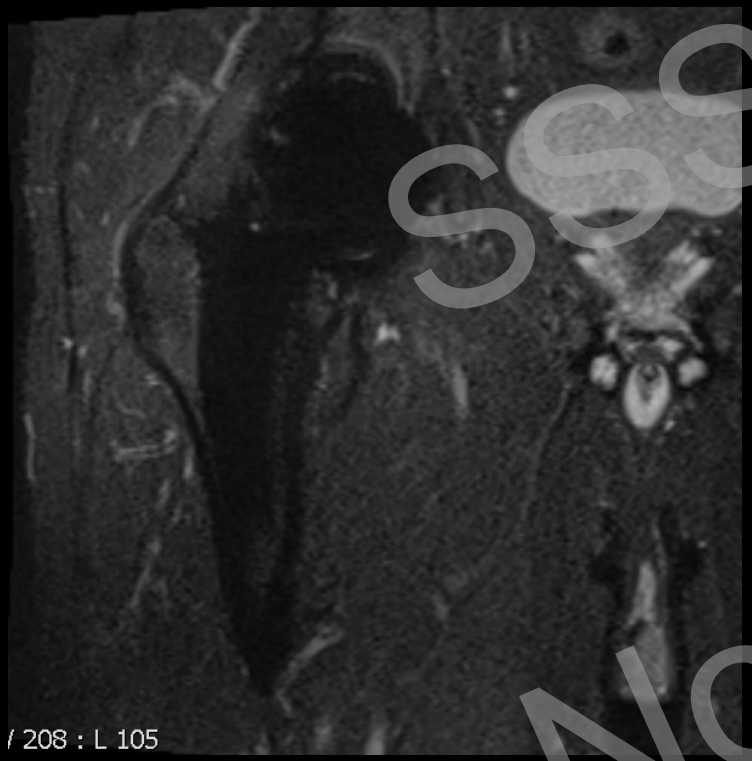
THA: Normal findings



STIR SEMAC

T2 with high bandwidth

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Benefit of good fat supression

cor STIR high BW

cor STIR SEMAC

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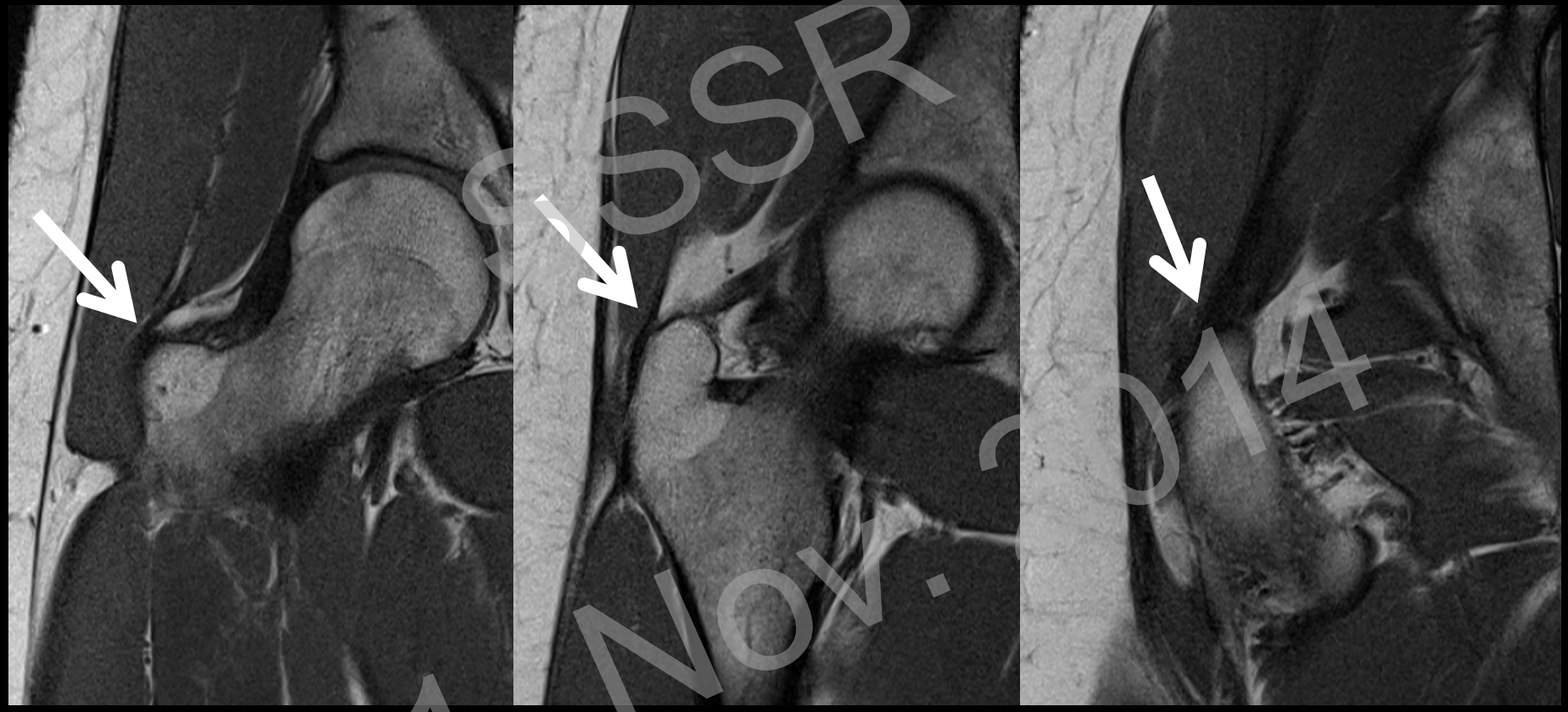
Follow the Surgical Approach

ant → post



G. minimus

G. medius (lateral)

G. medius (posterior)

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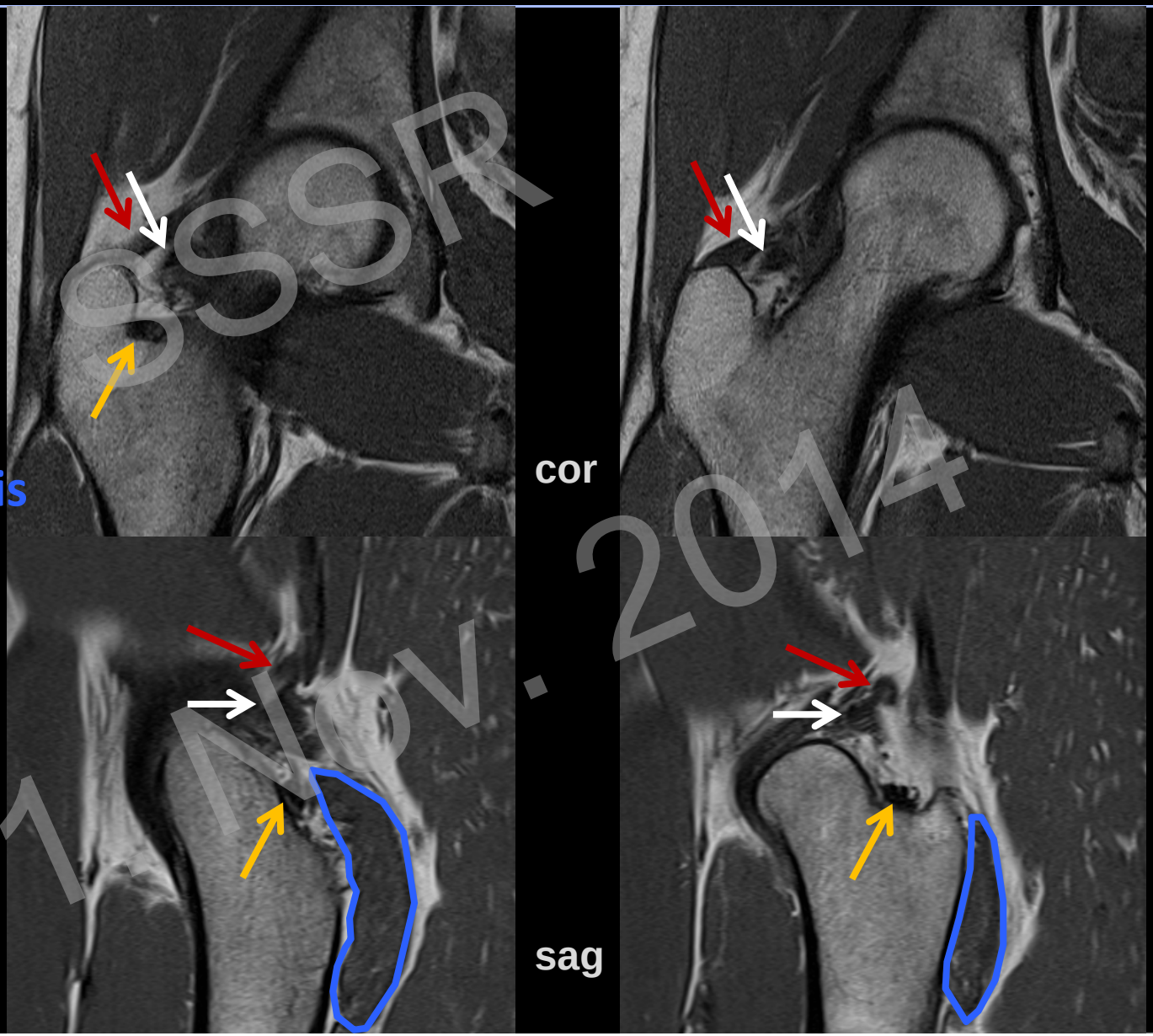
External rotators

Piriformis

Int. Obturator

Ext. Obturator

Quadratus femoris



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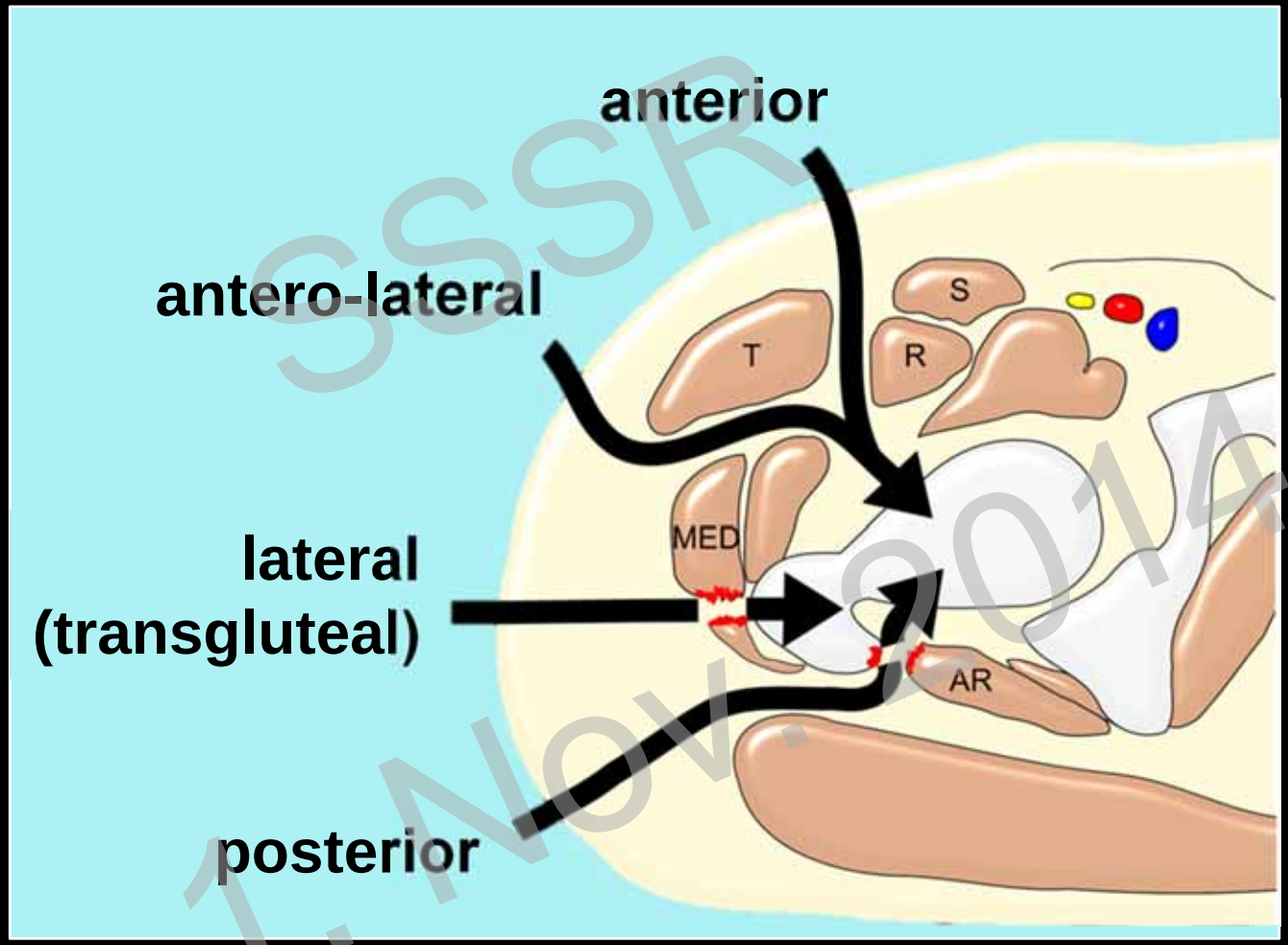
Surgical approaches



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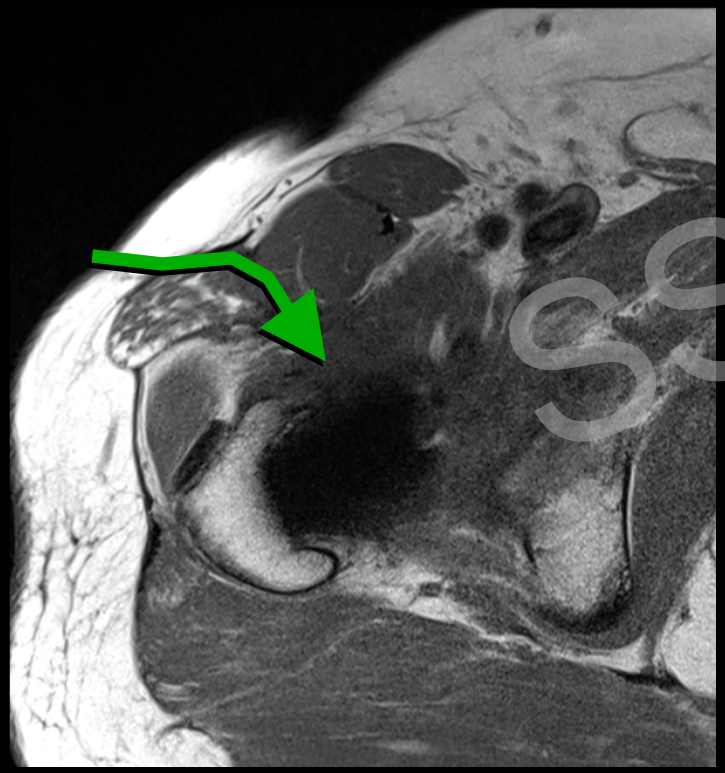
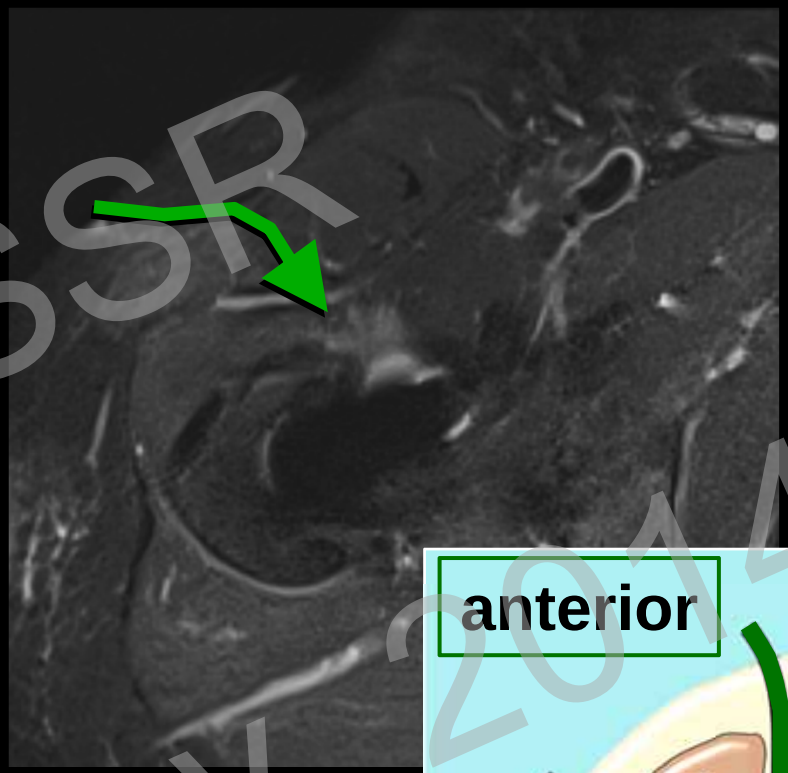
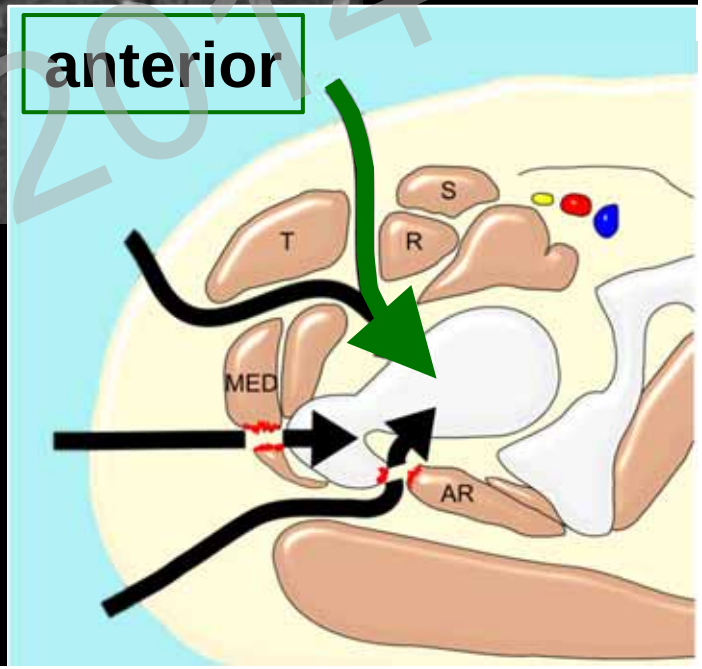
Agten CA et al. Radiologe 2014 Jul;54(7):715-25.

Anterior approach







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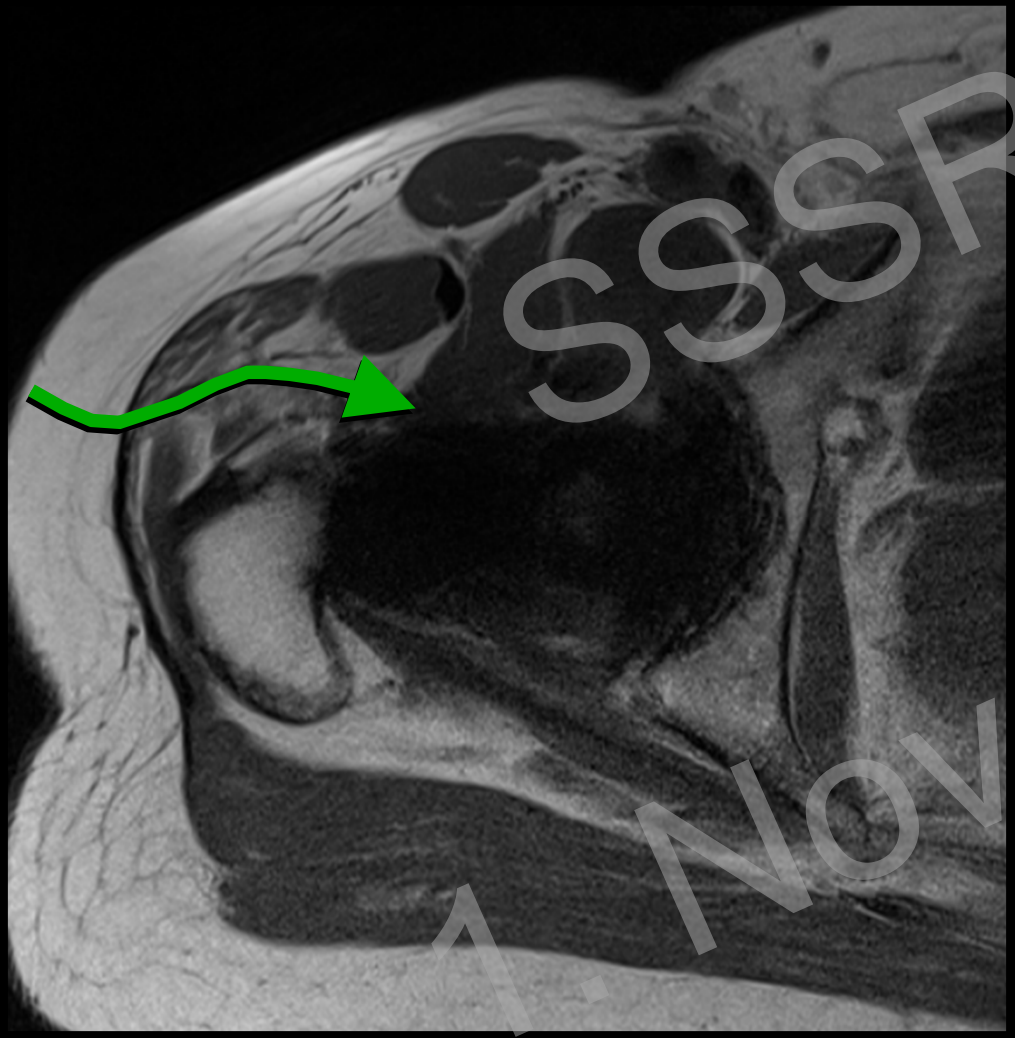
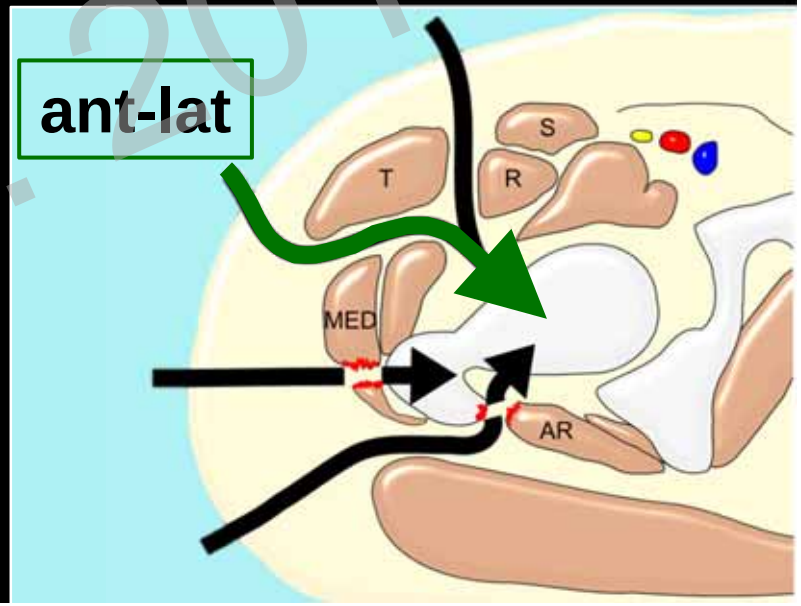
Antero-lateral approach





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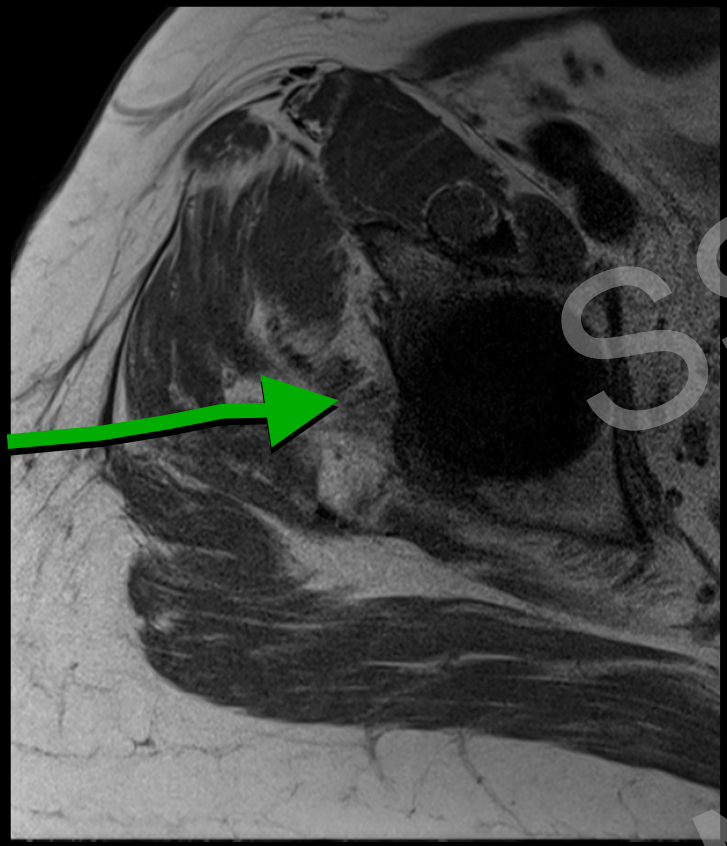
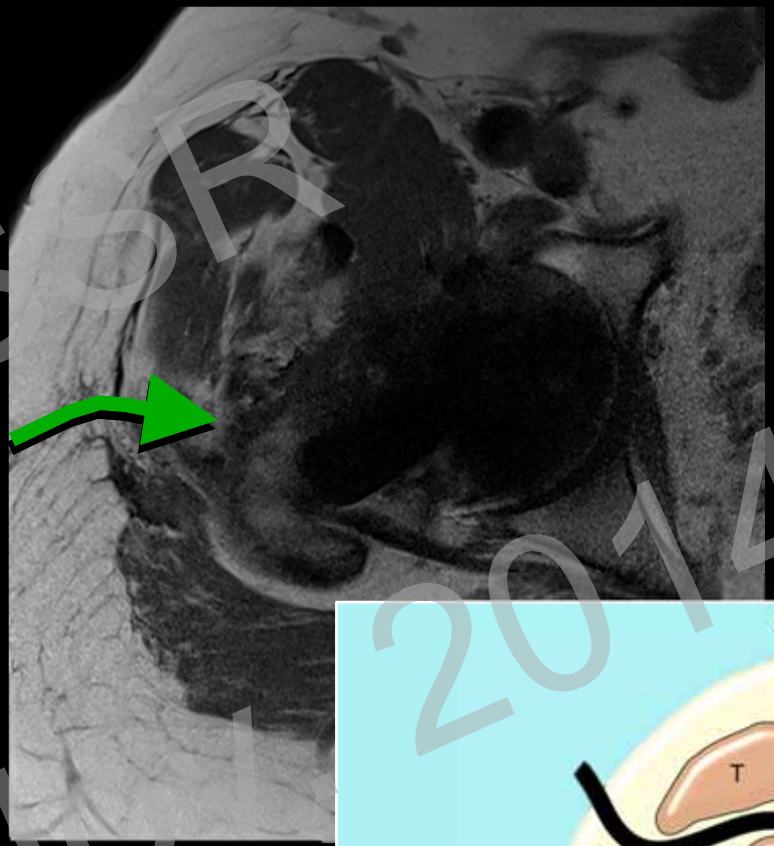
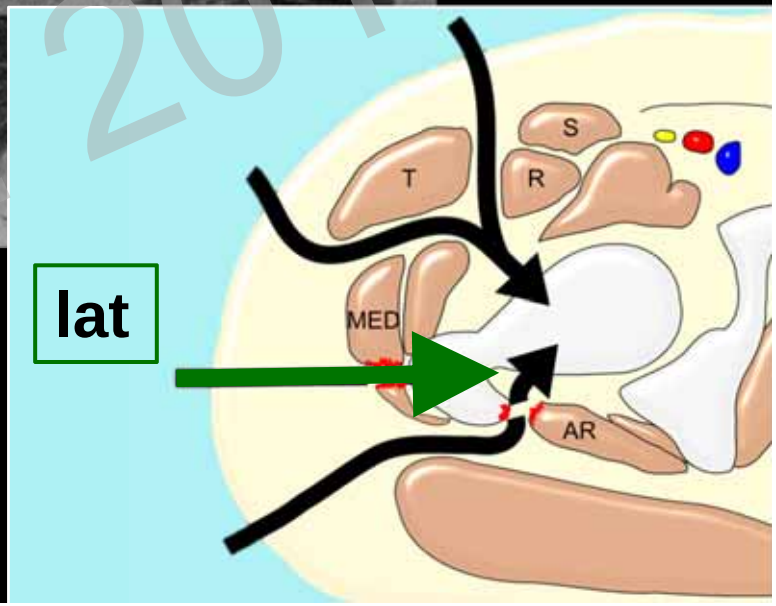
Lateral approach







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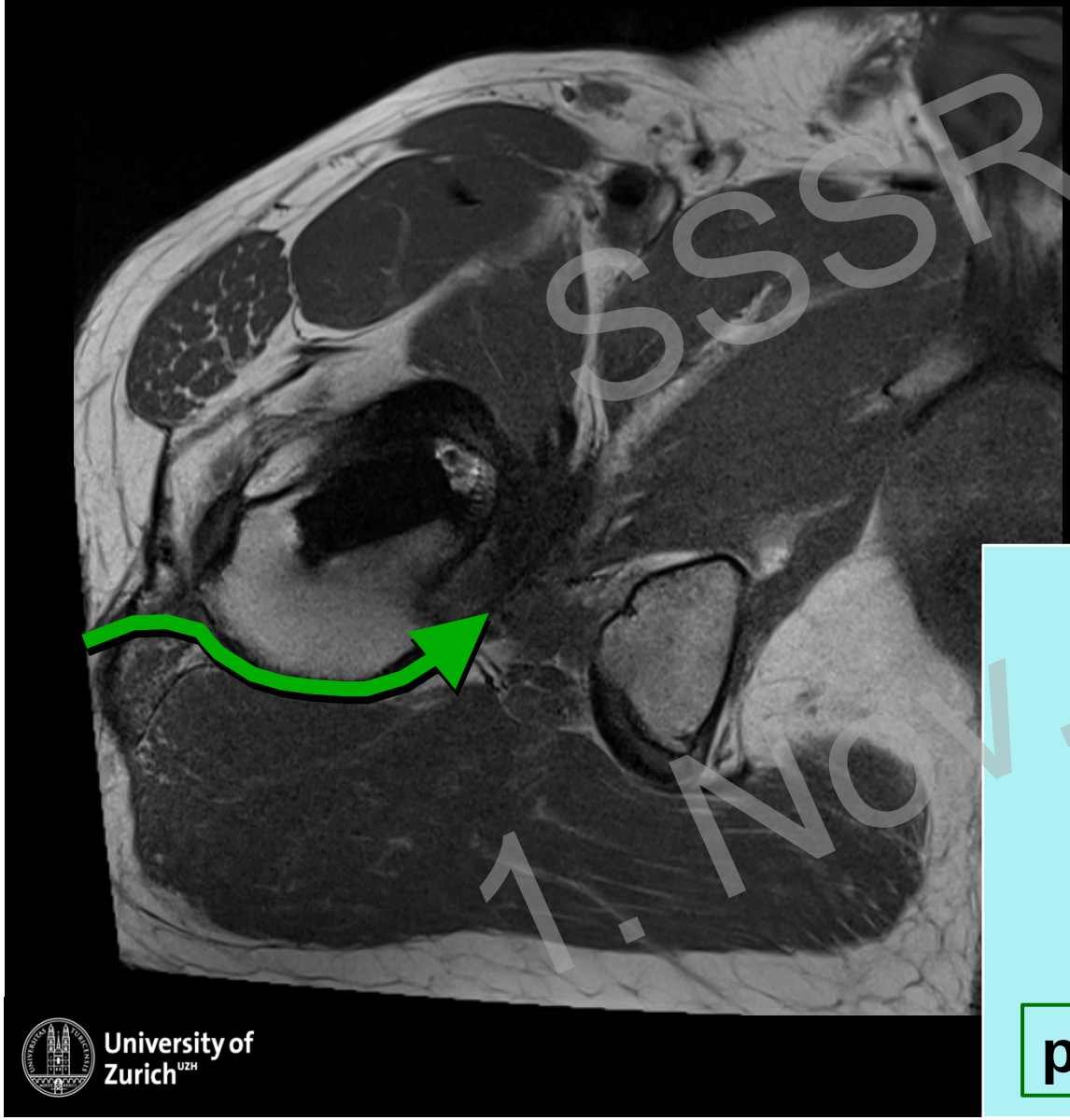
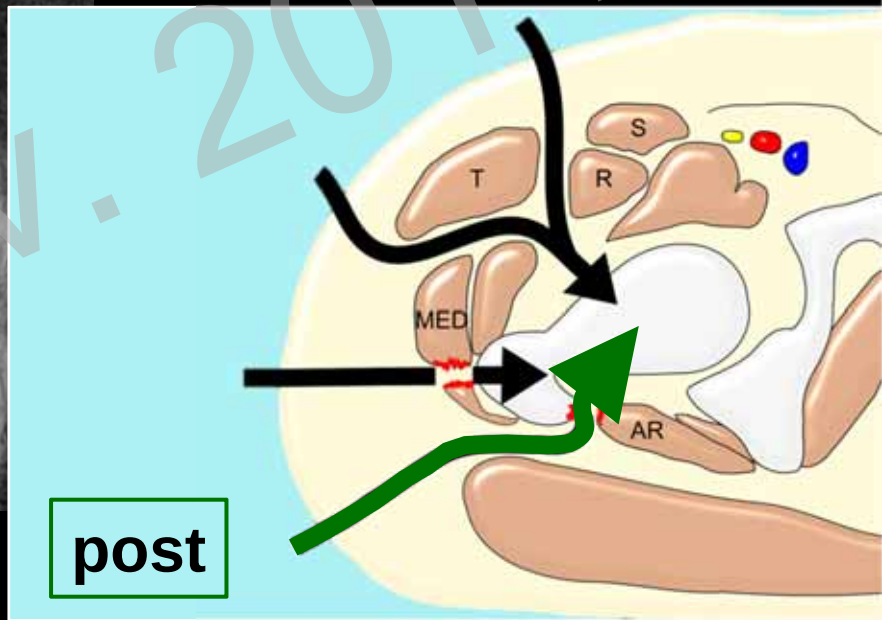
Posterior approach





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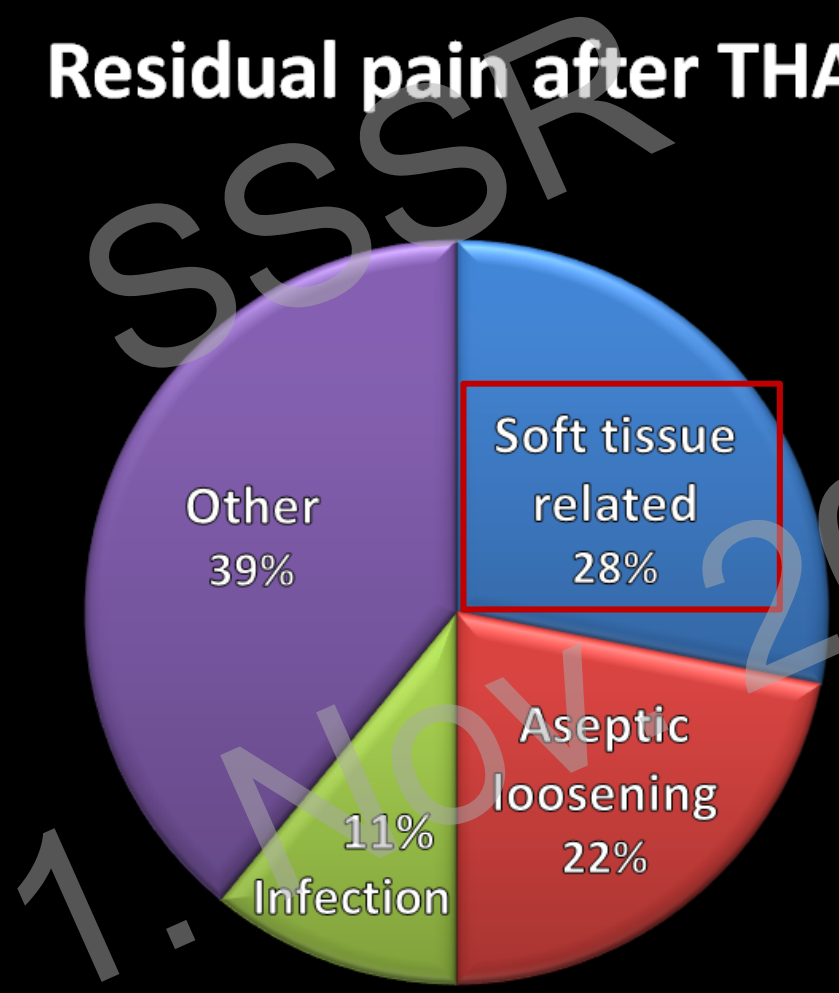

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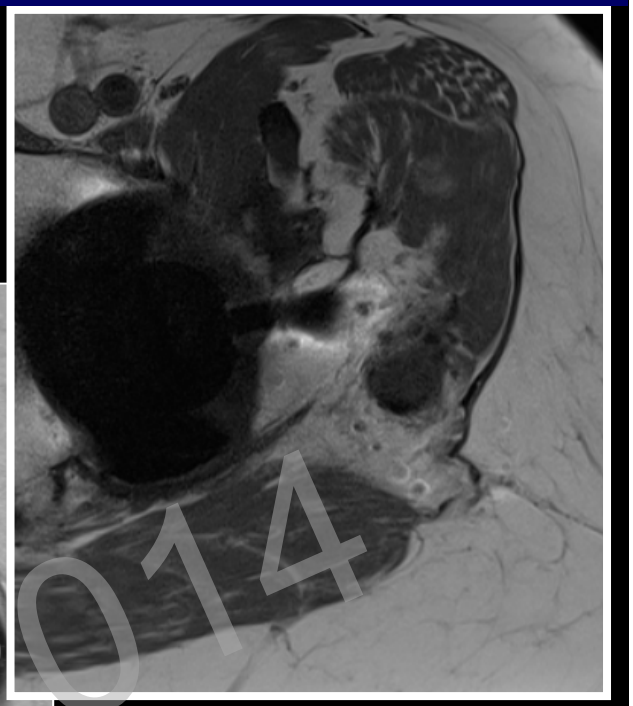
1. Soft tissue related complications



posterior approach

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Tensor fasciae latae

anterolateral approach

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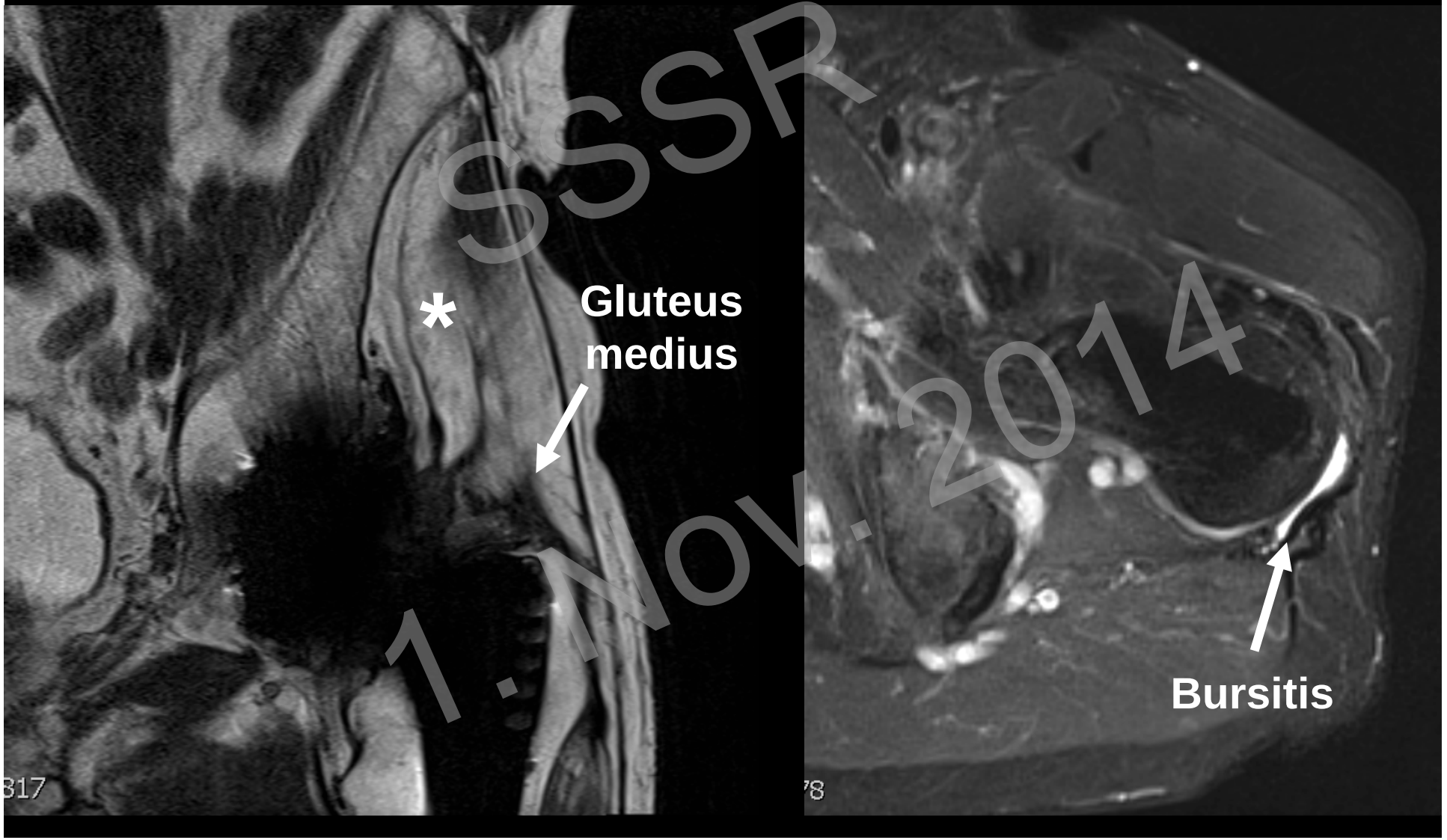
Extensive abductor damage



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Muscle: Atrophy + fatty degeneration

T1 transverse sequence

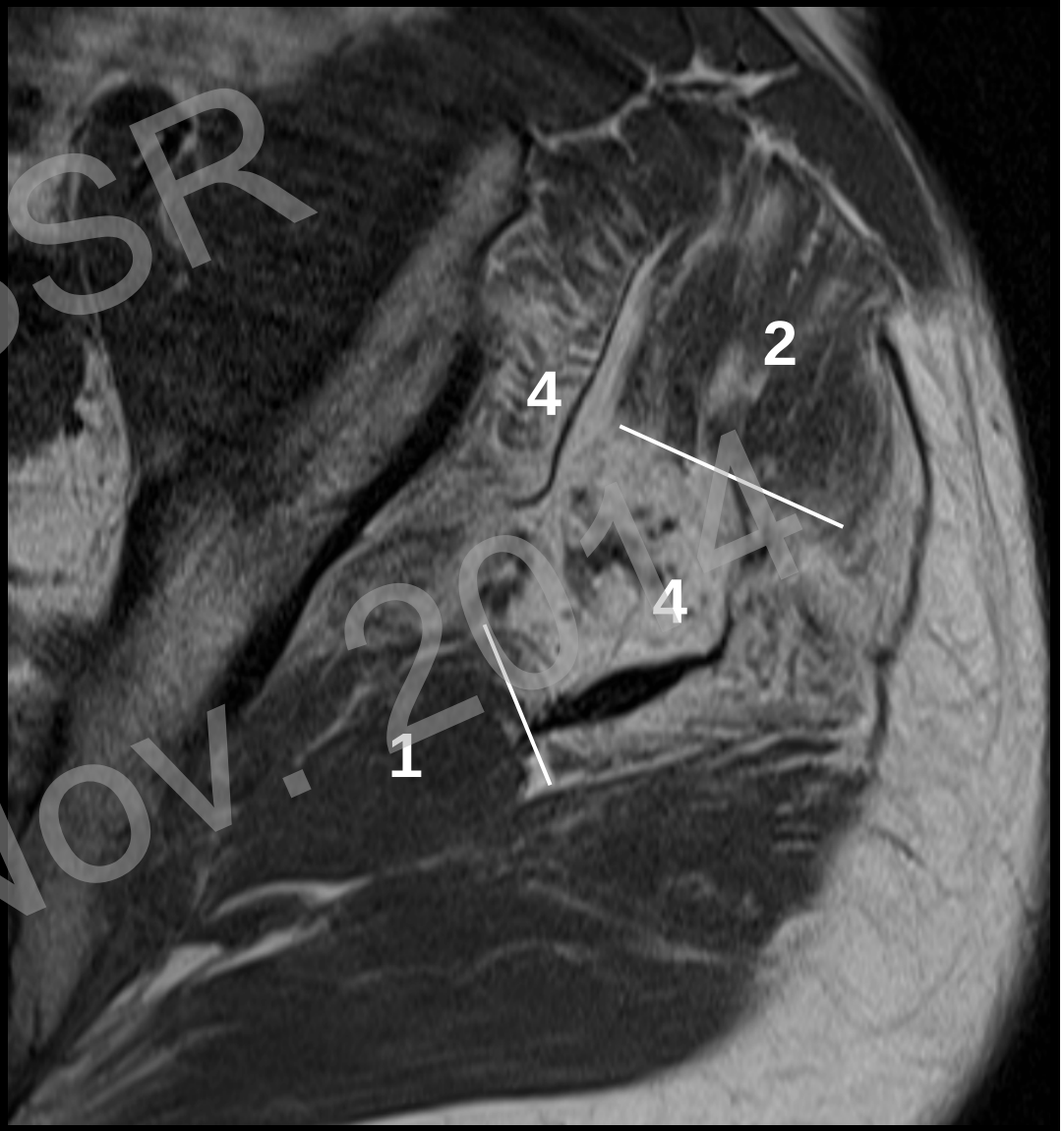
0 no fatty infiltration

1 some fatty streaks

2 less fat than muscle

3 as much fat as muscle

4 more fat than muscle



Goutallier D, et al.
CORR 1994;304:78.

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What changes are symptomatic?

	symptomatic		*asymptomatic*
Tendon defects			
Gluteus minimus	22		2
Gluteus medius (lat)	24		4
Gluteus medius (post)	7		0
Tendon: High signal intensity			
Gluteus minimus	30		16
Gluteus medius (lat)	32		22
Gluteus medius (post)	23		5
Bursitis	24	>	8

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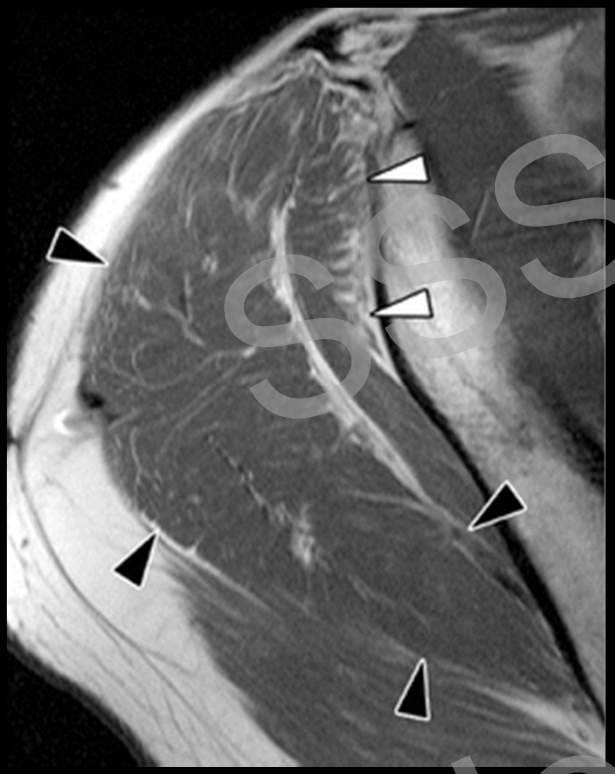
Pfirrmann CW, et al. Radiology 2005 Jun;235(3):969-76.

Fatty atrophy



asymptomatic **asymptomatic**

Gluteus minimus: Fatty atrophy of anterior 2/3
in both asymptomatic and symptomatic patients

Pfirrmann CW, et al. Radiology 2005 Jun;235(3):969-76.

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Symptomatic patient

79-year old female with Trendelenburg sign

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Iliopsoas tendon irritation

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2. Aseptic loosening

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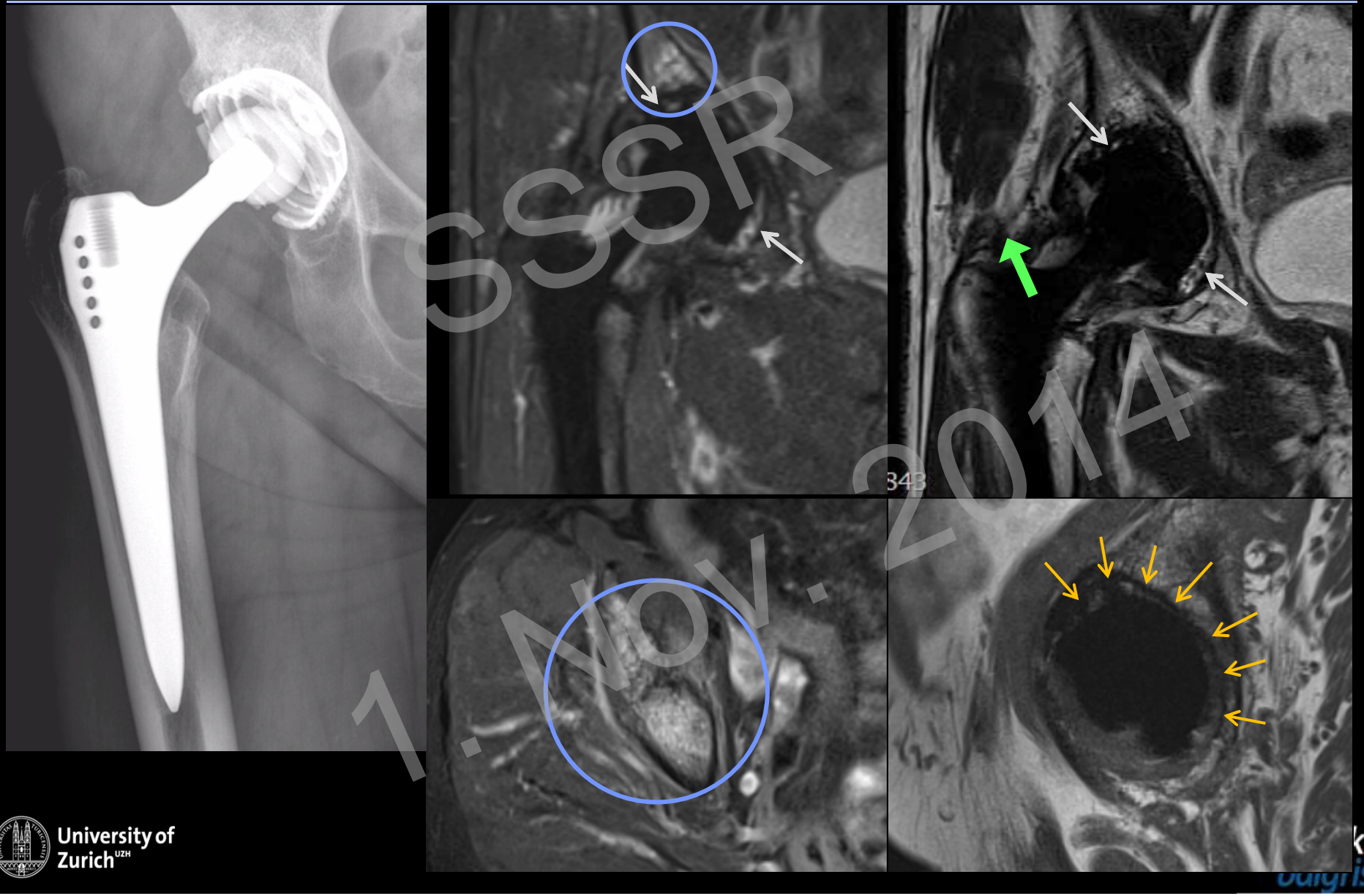
Polyethylen wear + abductor damage



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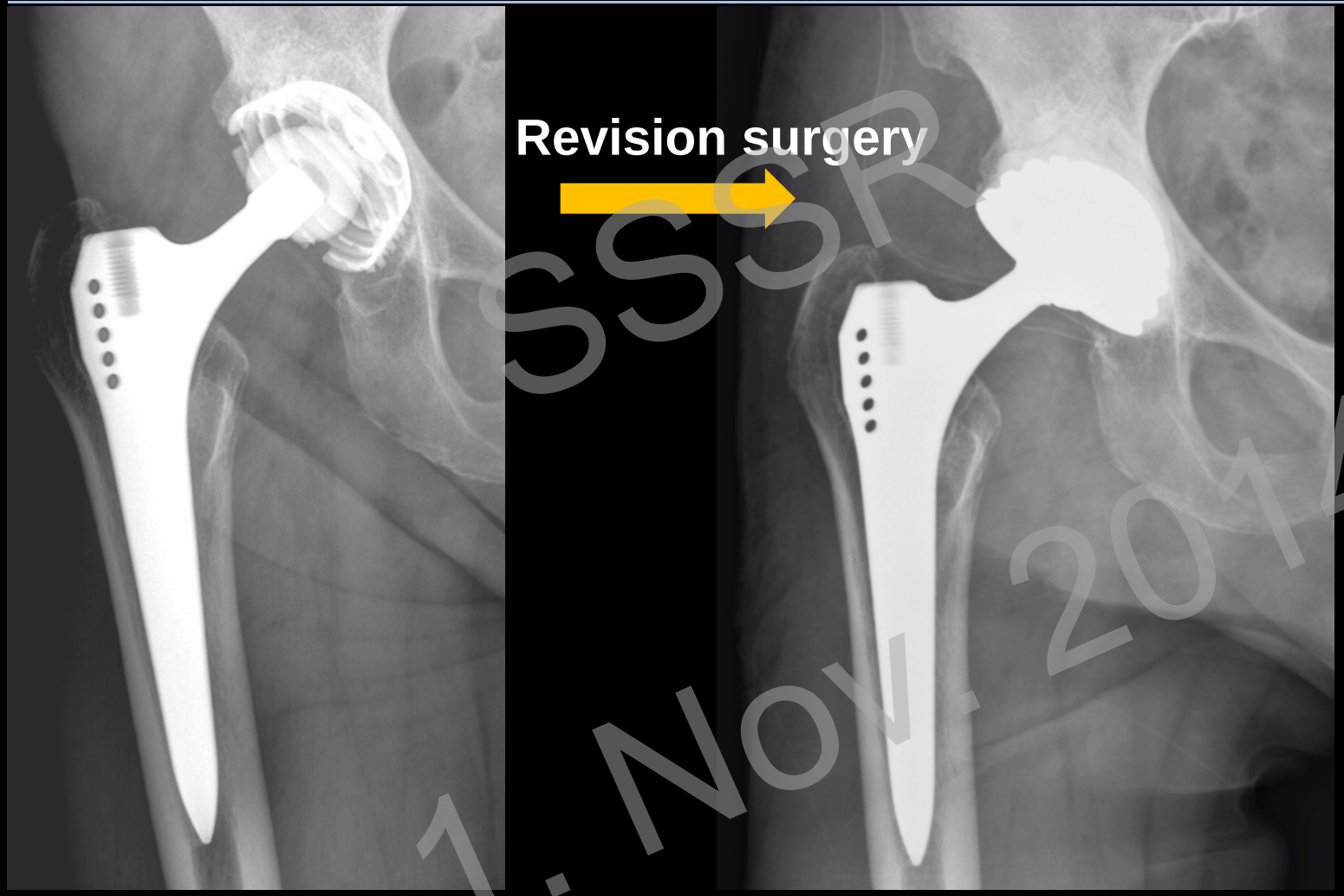

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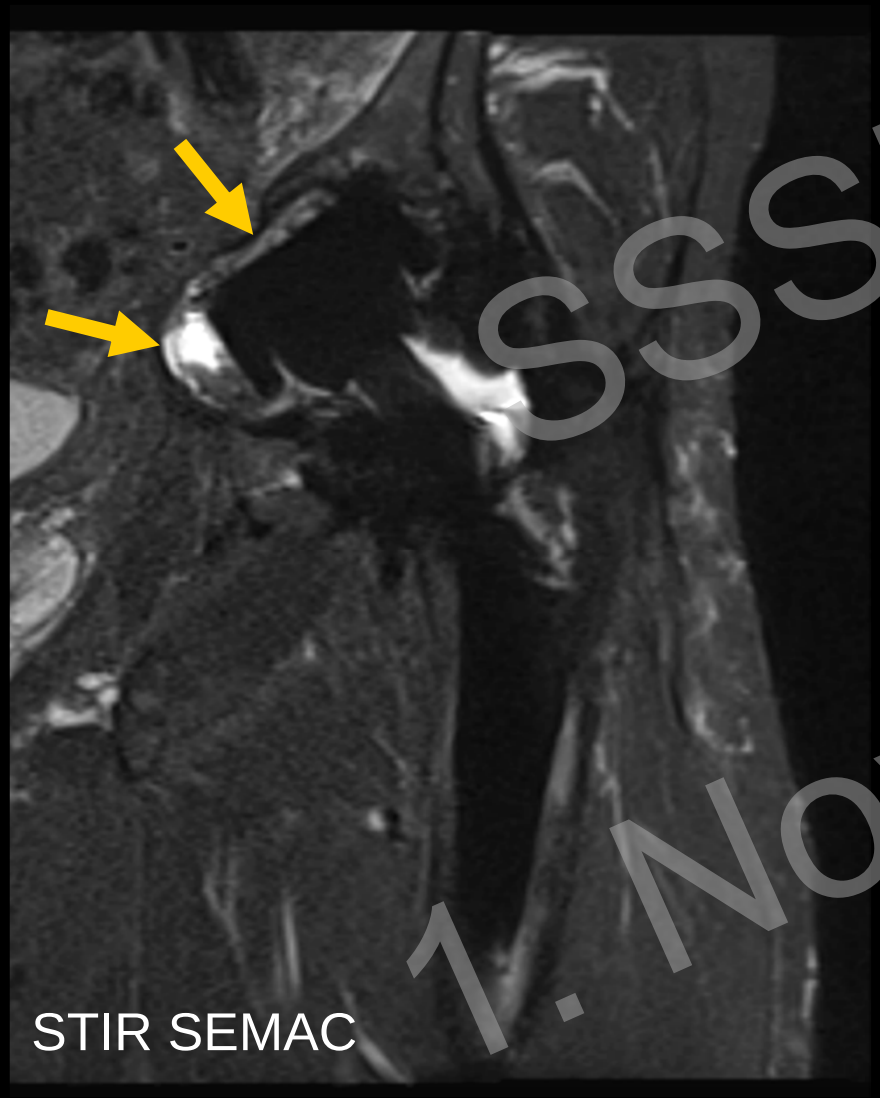
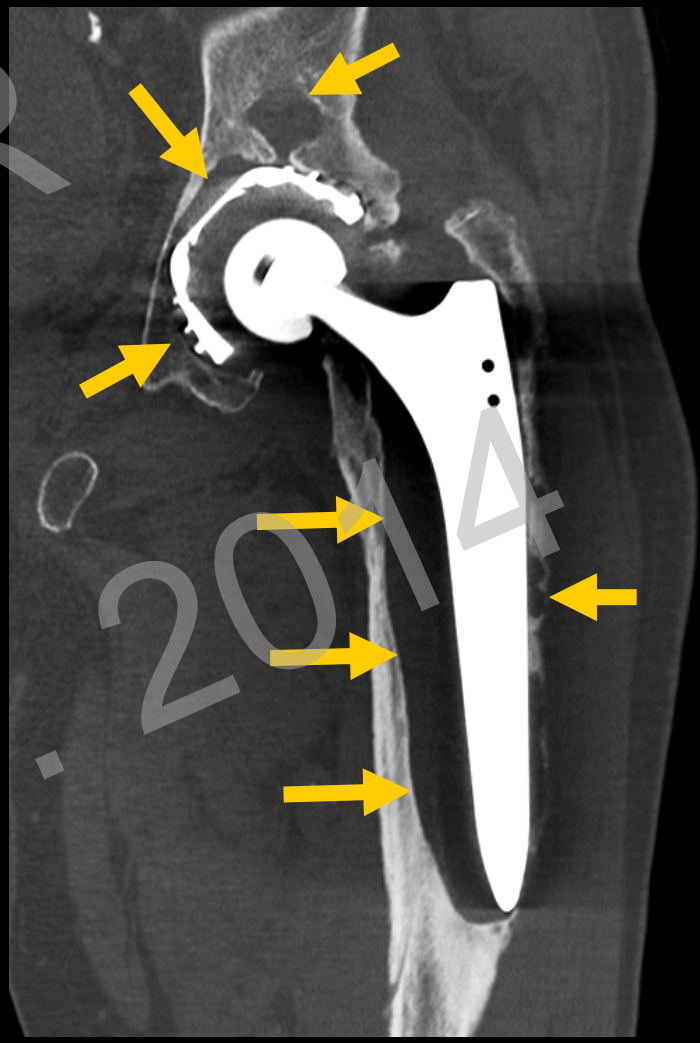
Two cases with loosening





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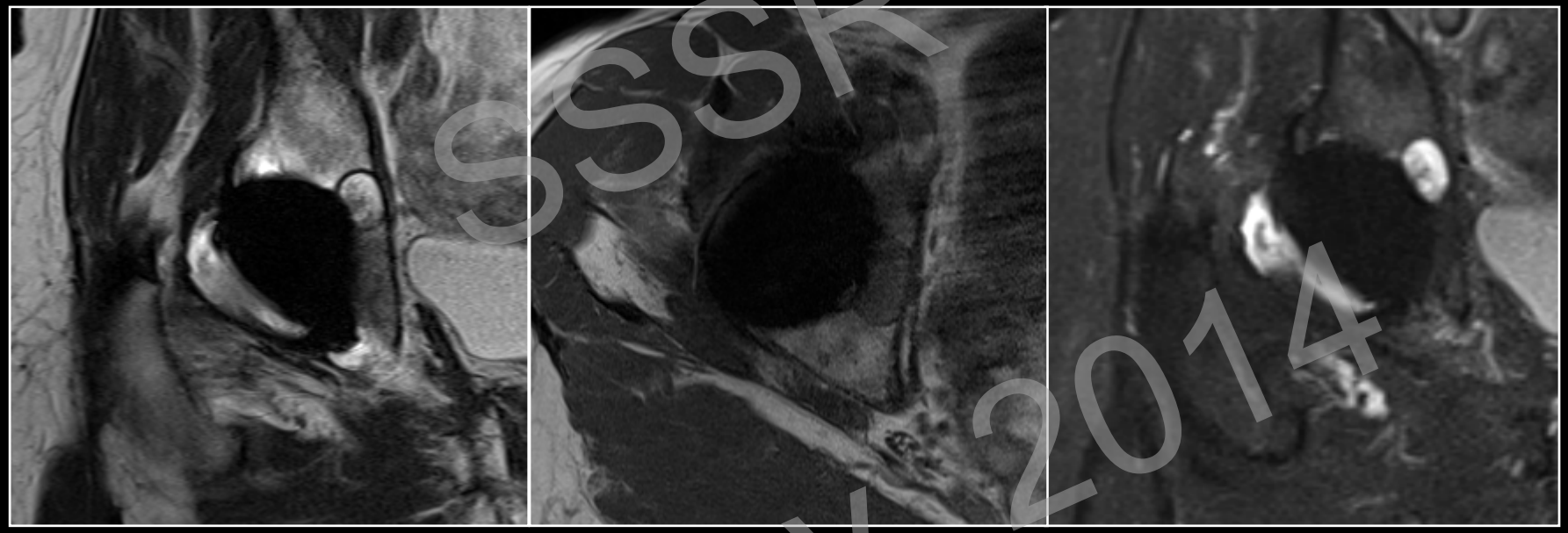
Depiction of periprosthetic osteolysis



Cor T2 hiBW | Tra T1 hiBW | Cor STIR SEMAC

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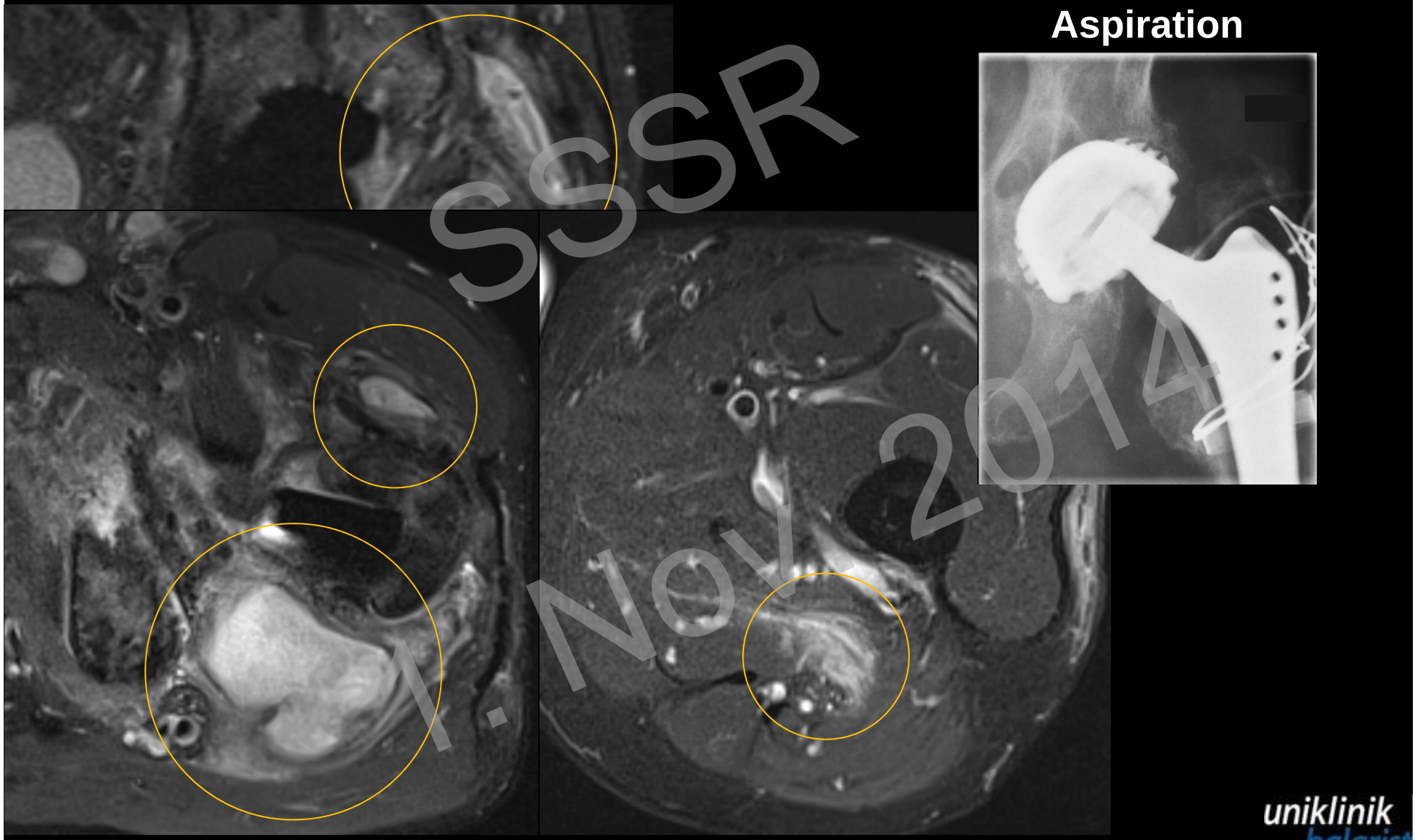
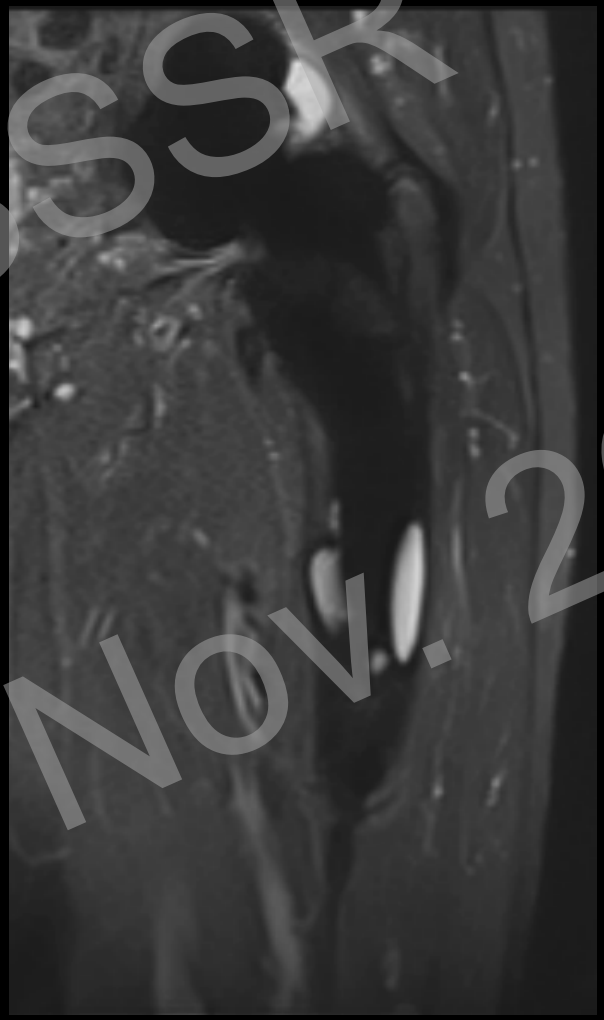
3. Infection



Low-grade infection

68-year old male
stem replaced two years ago
due to low grade infection

MRI: Soft tissue component?



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4. Other Complications

- Adverse local tissue reaction
- Metallosis
- Implant failure
- Dislocation of components
- Fracture
- Osseous stress reaction
- Extraarticular impingement
- Heterotopic ossifications
- Nerve damage

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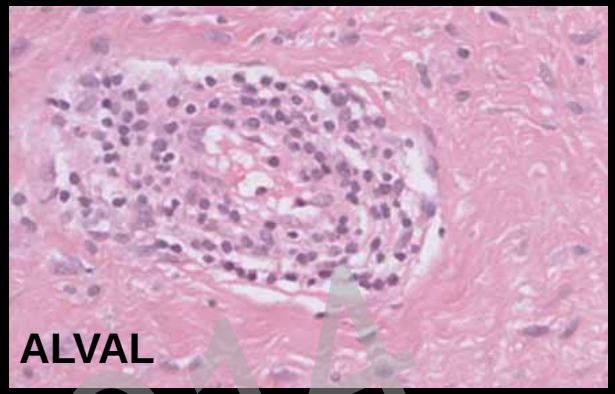
Metal-on-Metal prosthesis (MoM)

Adverse Local Tissue Reaction (ALTR)

➔ rare but potentially catastrophic
➔ difficult to diagnose clinically

Can manifest as **'aseptic lymphocytic vasculitis-associated lesion' (ALVAL)**



– Pain (or no pain!)
– Aggressive soft tissue destruction, Pseudotumors
– Osteolysis (some cases)

Follow-up: MRI or ultrasound
Early diagnosis important for successful revision surgery

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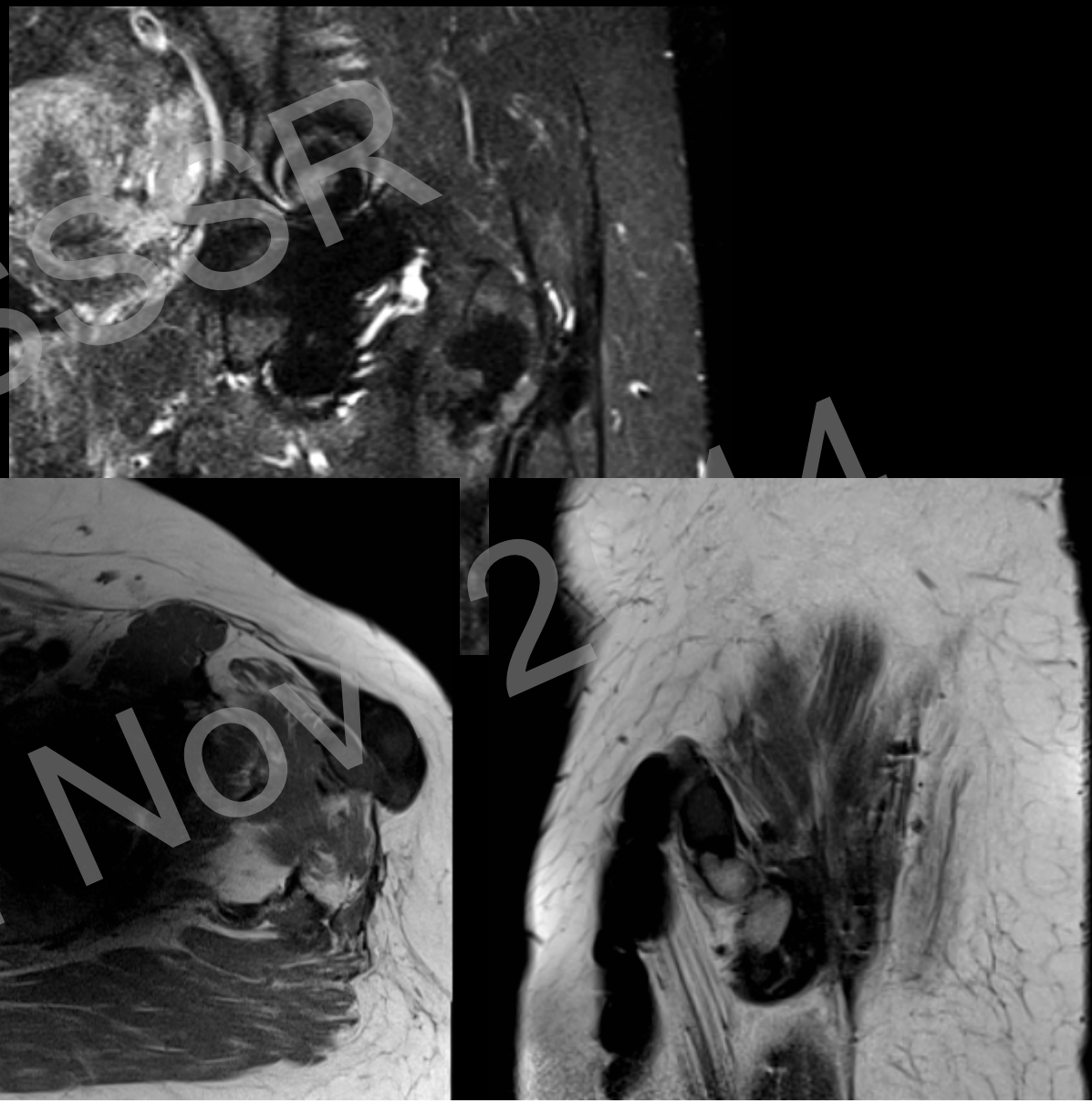
Campbell P, et al. CORR 2010;468:2321-7.

Pseudotumors + Osteolysis

Metal-on-Metal



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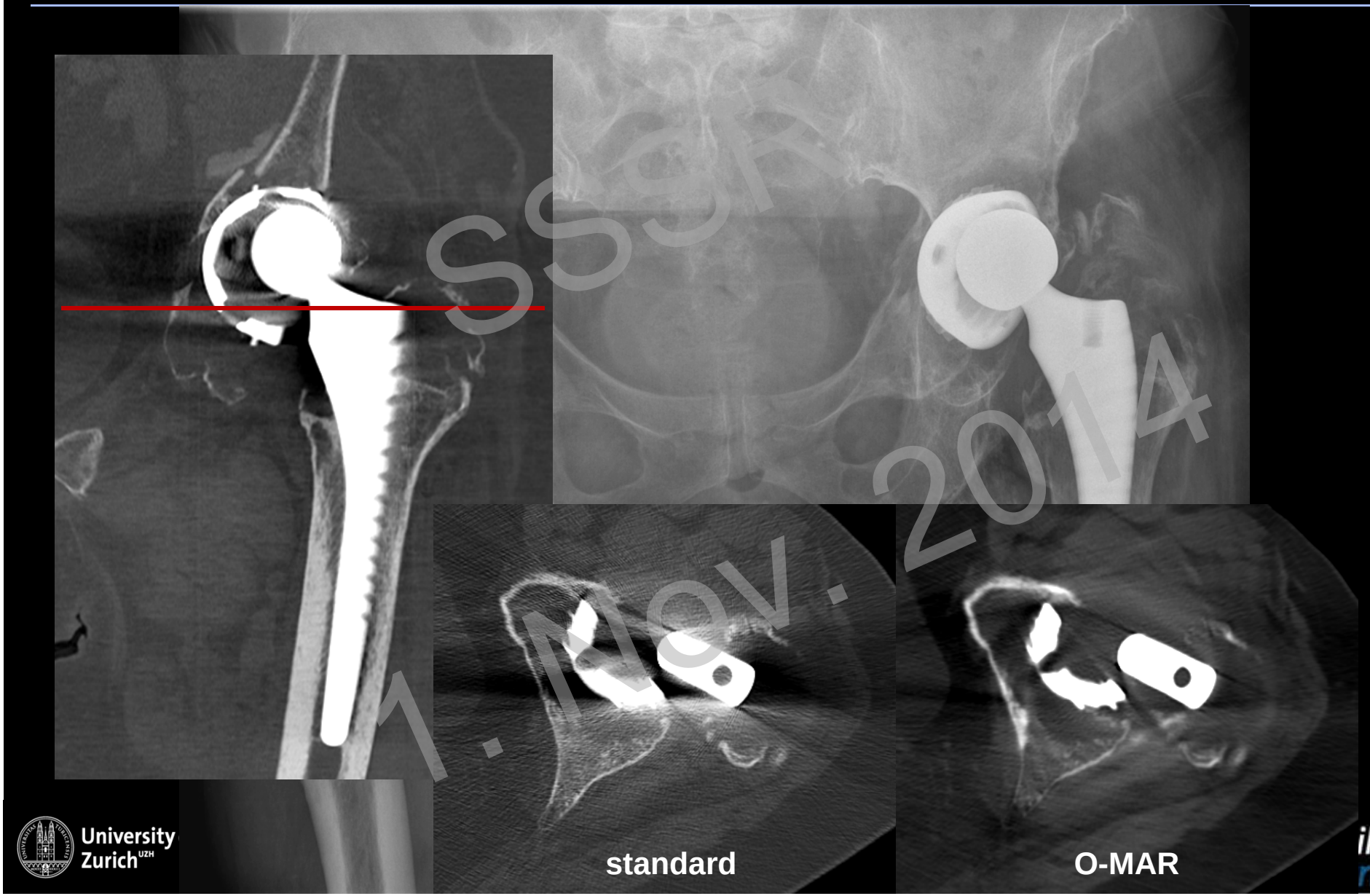
Polyethylen wear + Metallosis



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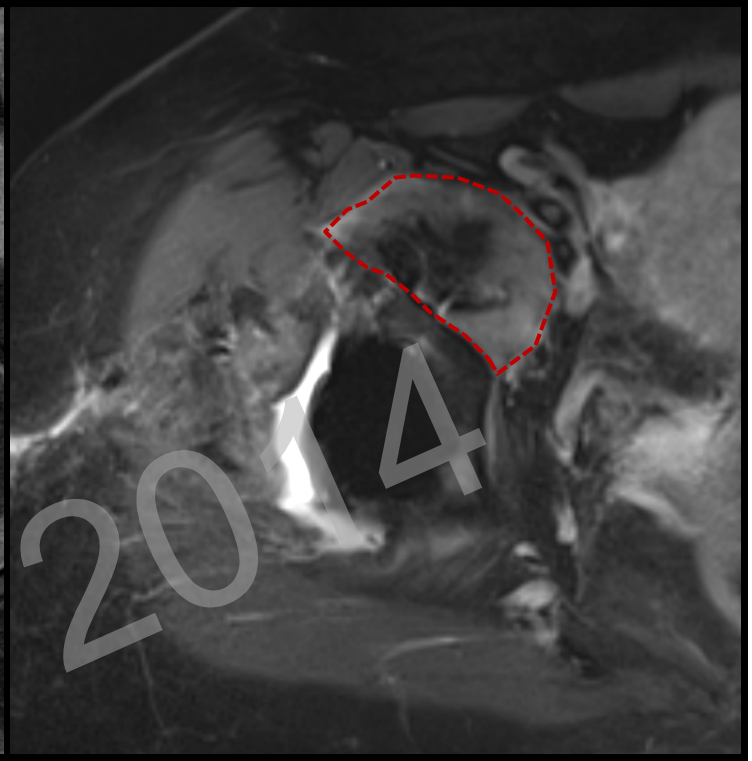
Pseudotumors



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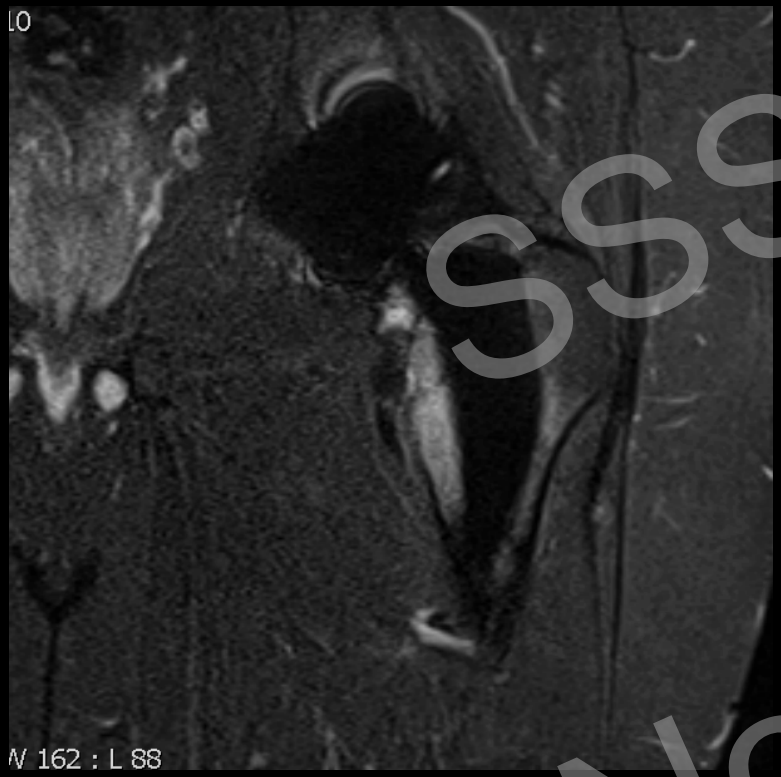
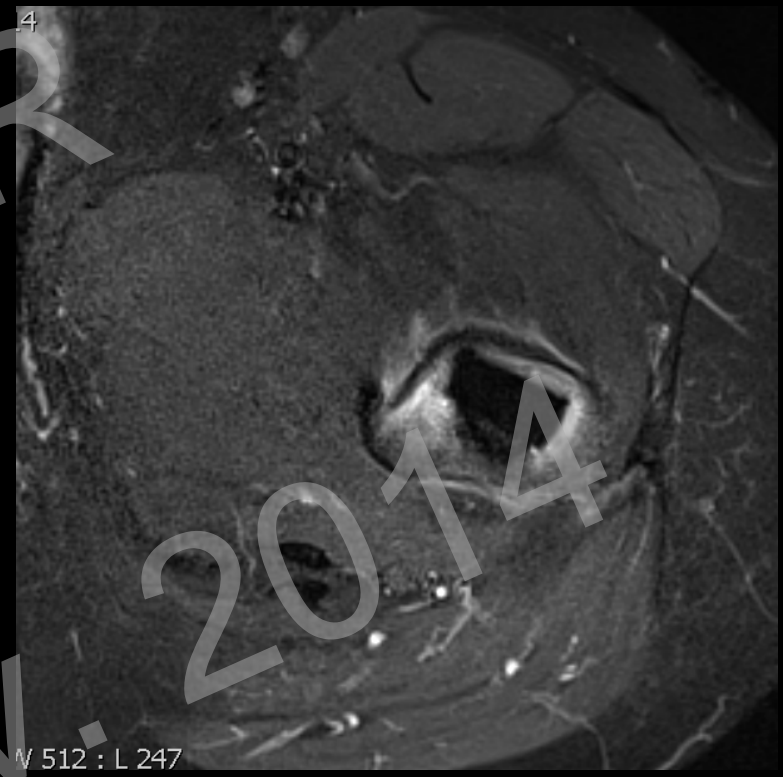
Modulary stem

Blood levels for Cobalt + Chrome elevated

Osseous stress reaction



cor STIR SEMAC



tra STIR WARP

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Extraarticular Impingement

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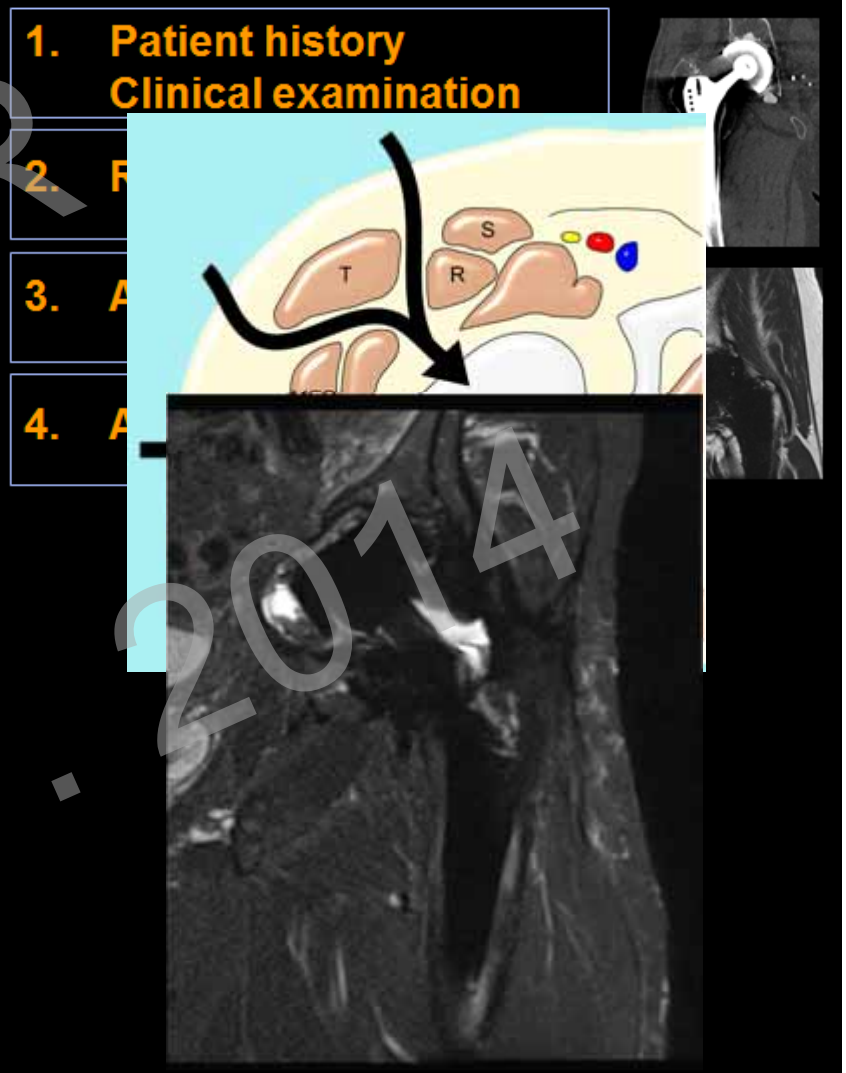
TAKE HOME MESSAGE

Diagnostic algorithm

Surgical approaches

Complications

- Soft tissue related
- Aseptic Loosening
- Infection
- Other



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Thank you

Vorschau

Einladung zur Antrittsvorlesung von PD Dr. Reto Sutter

Hüft-Impingement: Radiologische Aspekte einer neu entdeckten Krankheit

Samstag, 15. November 2014, 10.00 Uhr
Aula Universität-Zentrum, Rämistrasse 71

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