

forearm; proximal radius w radial head

♀ 20 yo saleswoman

1st referral : 13.05.2009

HPI : variable swelling and charge-related pain of radial right proximal forearm since Mar 2009, no trauma

Bracing, painkillers, physical therapy effectless

Referral after external work-up

PMH : non contributory

forearm; proximal radius w radial head

May 13, 2009

Clinical examination :

Normal ROM of elbow and wrist except :

- **Pronation 75°**
- **Supination 0° (painful against resistance)**

Palpable swelling over the radial head especially over the biceps tendon

Normal neurological status

forearm; proximal radius w radial head

May 13, 2009

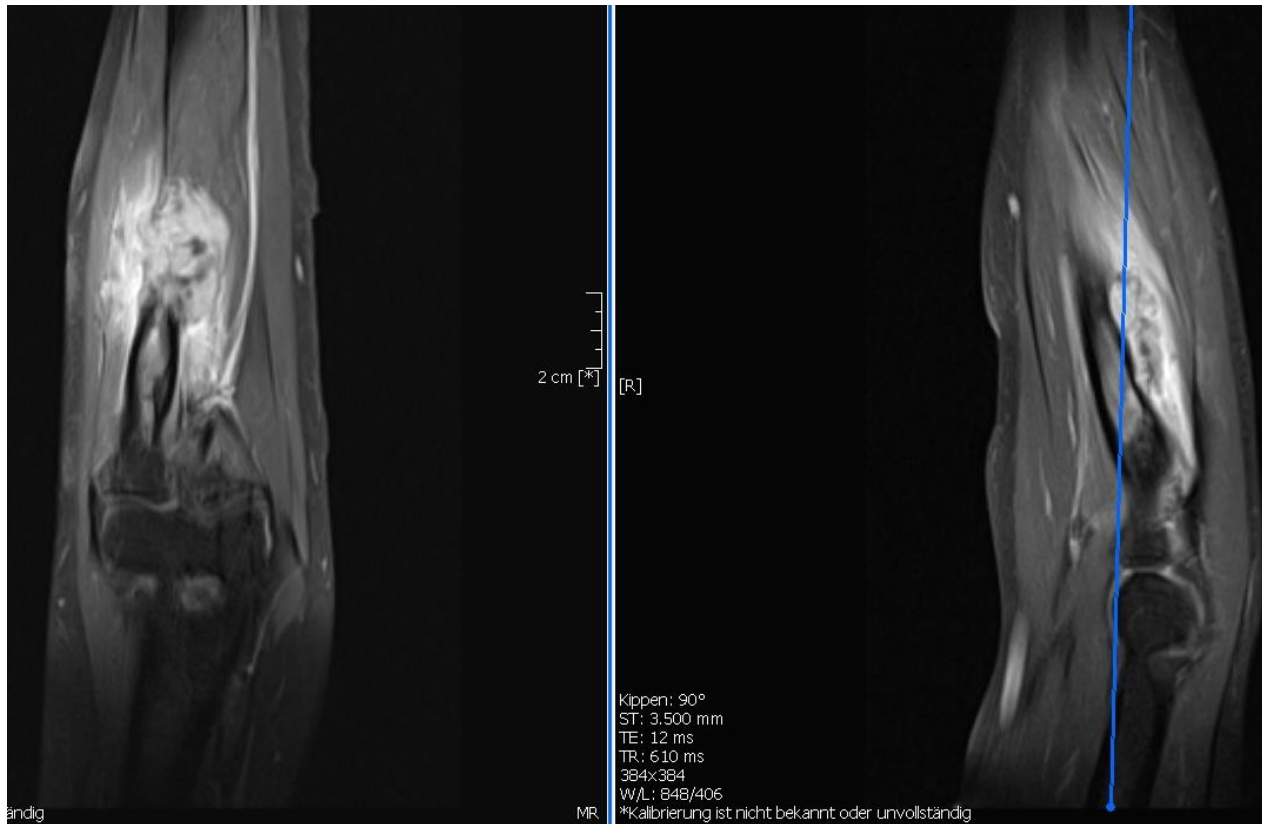
X-ray : soft tissue tumoral process with punch-out lesion of proximal radius, cortex disruption



forearm; proximal radius w radial head

May 12, 2009

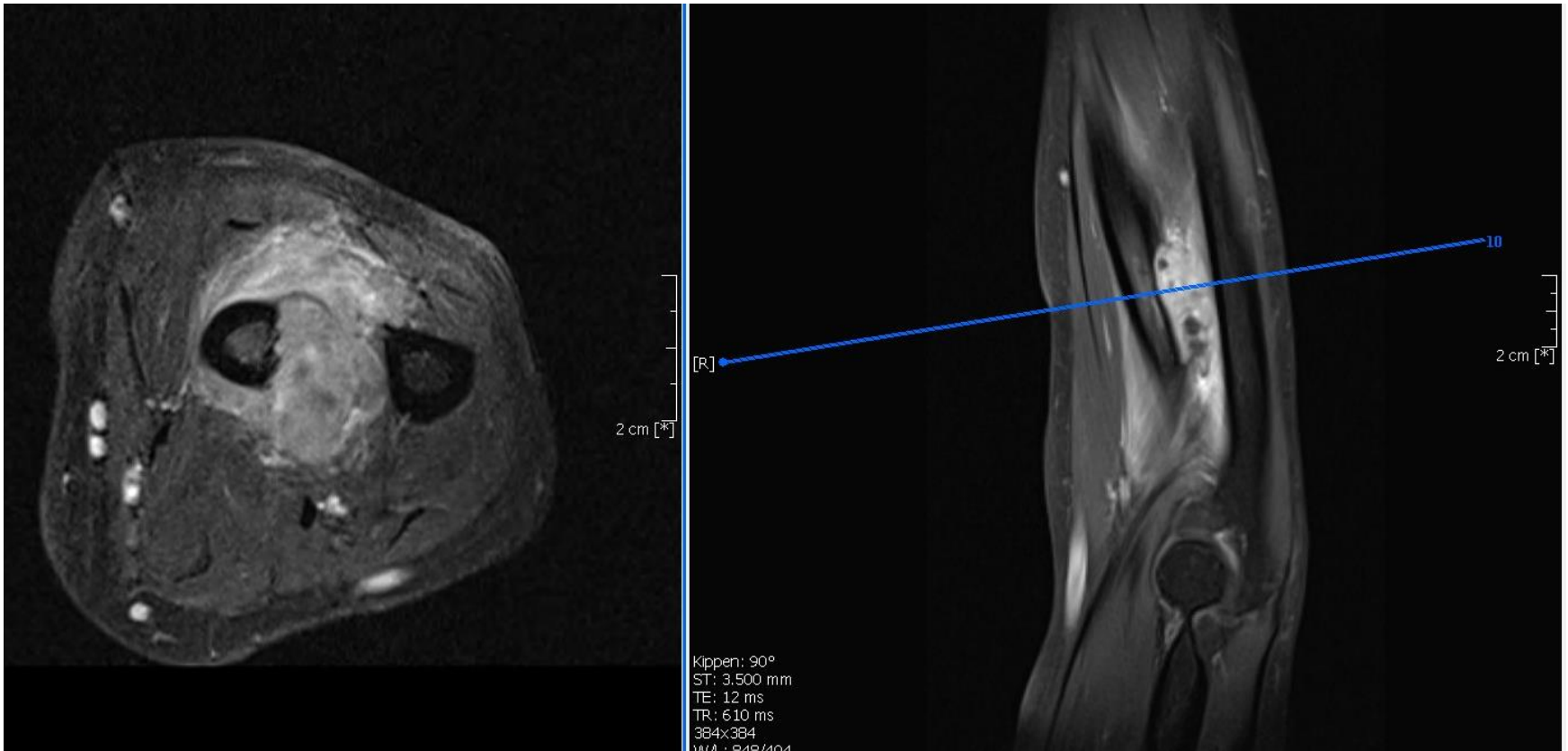
MRI : solid soft tissue tumor, contrast enhancement



forearm; proximal radius w radial head

May 12, 2009

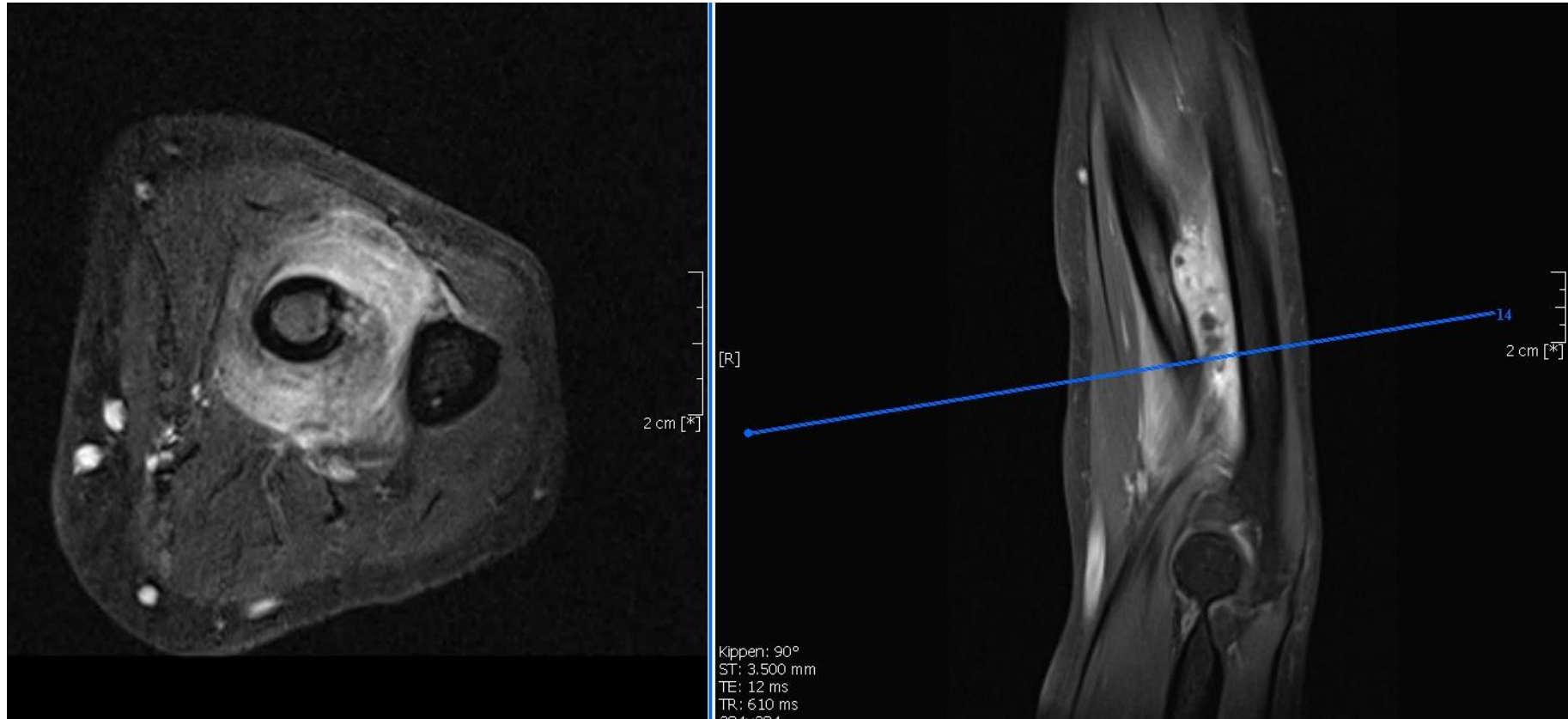
MRI



forearm; proximal radius w radial head

May 12, 2009

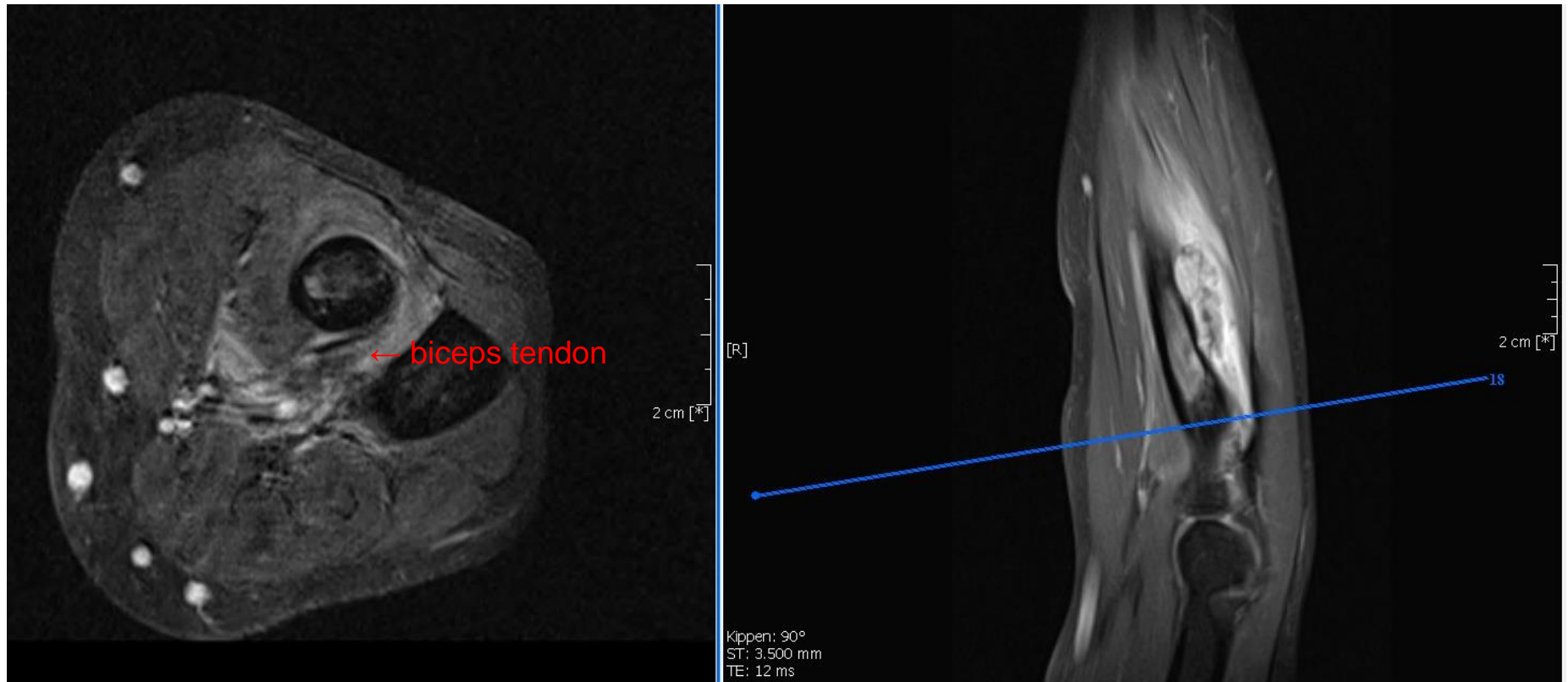
MRI



forearm; proximal radius w radial head

May 12, 2009

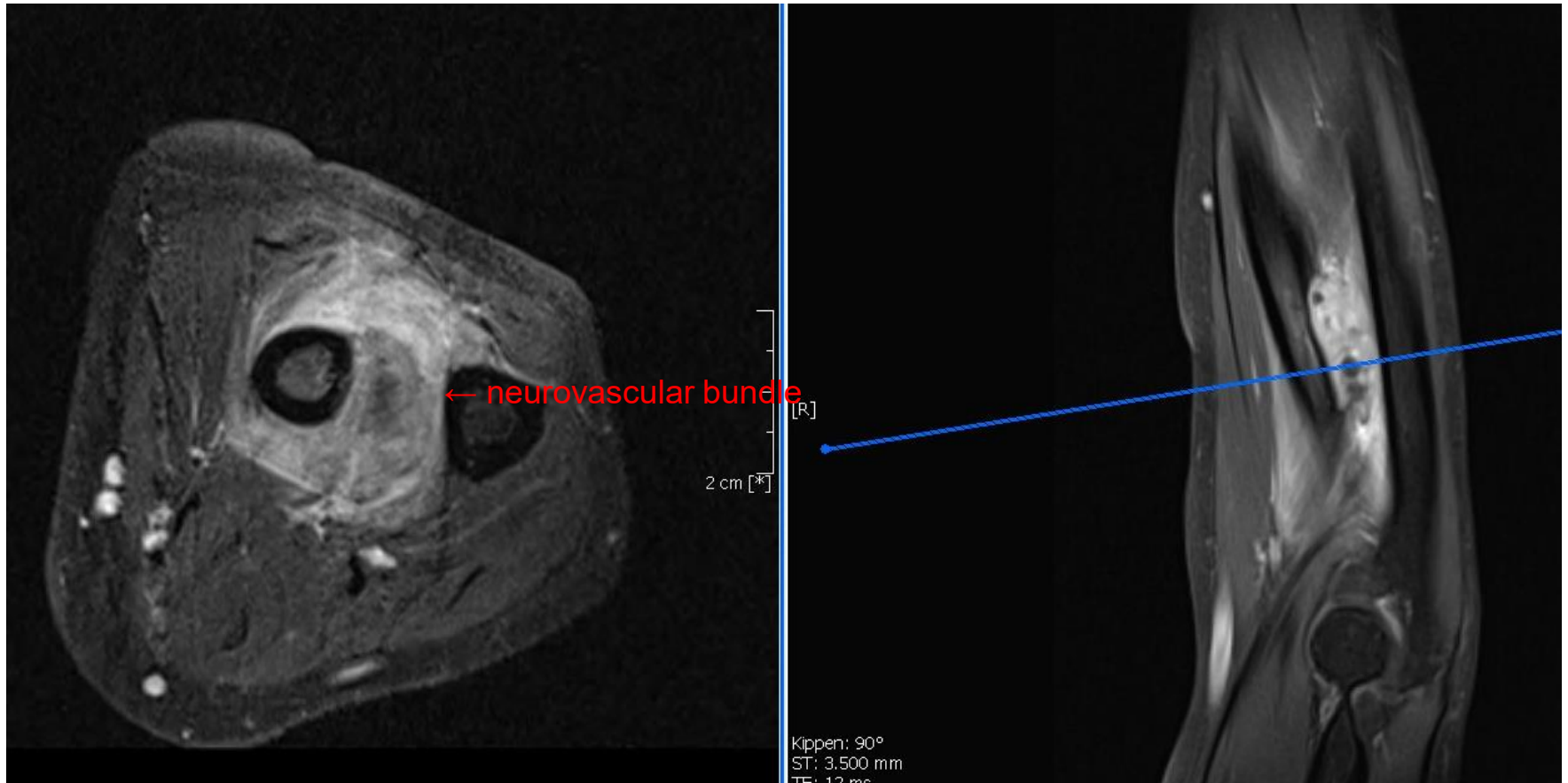
MRI



forearm; proximal radius w radial head

May 12, 2009

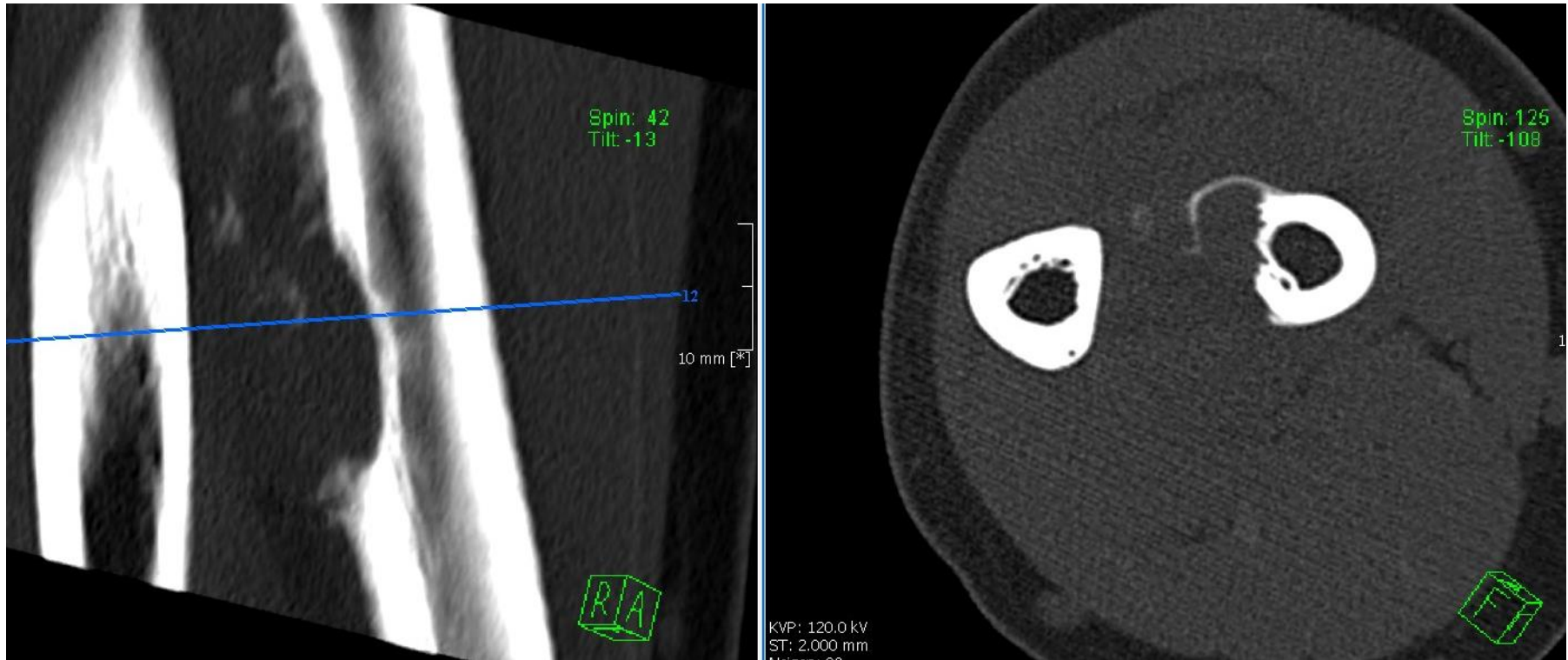
MRI



forearm; proximal radius w radial head

May 12, 2009

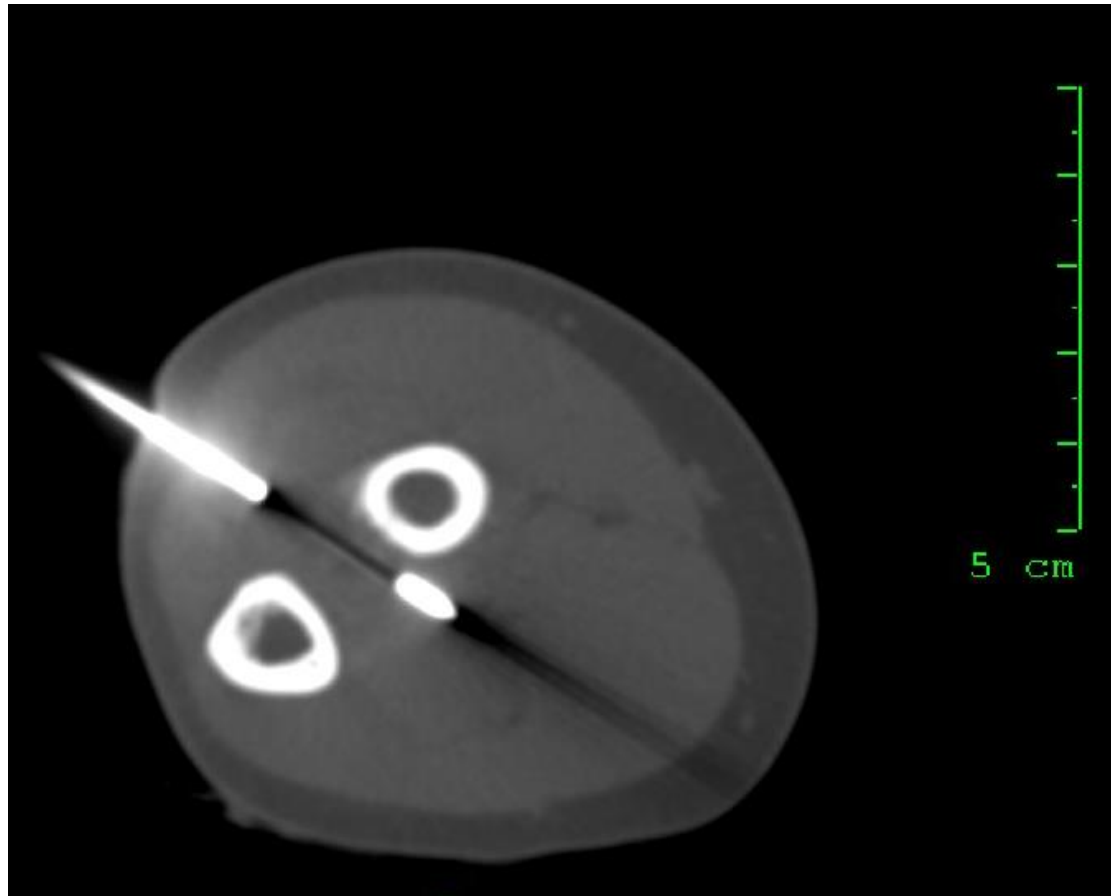
CT

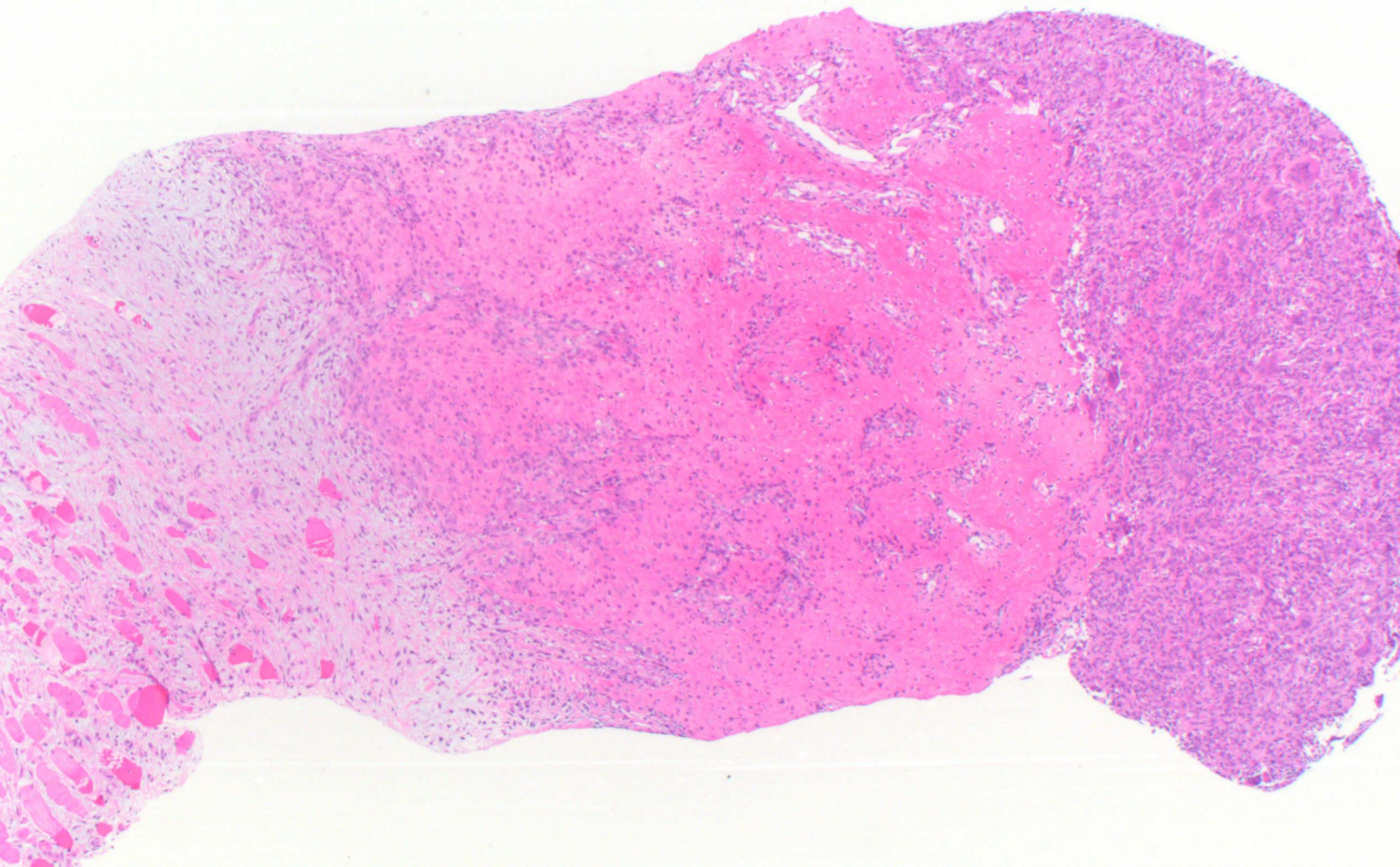


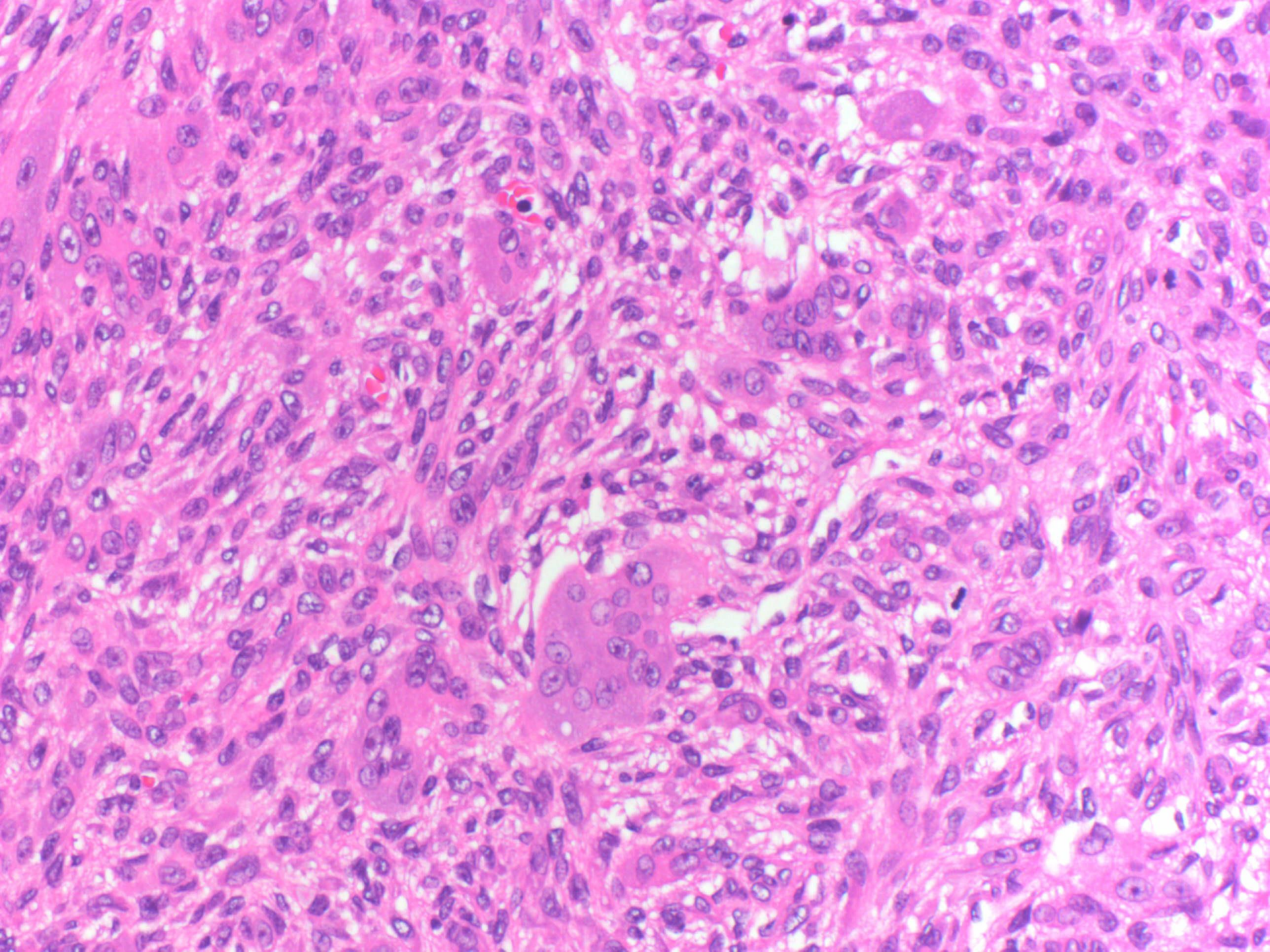
forearm; proximal radius w radial head

May 13, 2009

CT-guided core-needle biopsy :







forearm; proximal radius w radial head

Histology, May 13, 2009

Diagnose

Skelettmuskulatur mit Anteilen einer riesenzellhaltigen Läsion mit Ausbildung von metaplastischem Knochen (Unterarm rechts, Bicepssehne), siehe Kommentar.

Kommentar

Leider liegen uns zur Zeit der histologischen Beurteilung der Läsion keine Röntgenbilder vor - gemäss der klinischen Angaben handelt es sich aber um einen primären Weichteilprozess. Das histologische Bild ist für eine primäre Weichteilläsion ungewöhnlich. Die Morphologie entspricht einem primären ossären Prozess im Sinne eines Riesenzelltumors des Knochens bzw. einer aneurysmatischen Knochenzyste. Solche Neoplasien sind tatsächlich auch primär in den Weichteilen bekannt und werden als **Riesenzelltumoren der Weichteile bzw.**

Riesenzelltumore mit niediregem malignem Potential bezeichnet - vgl. Seite 118 "WHO Classification of Tumours of Soft Tissue and Bone", 2002 . Sie können Lokalrezidive bilden (besonders bei unvollständiger Resektion), bilden aber nur in äusserst seltenen Fällen (wenn überhaupt) Metastasen. Das Bild eines tenosynovialen Riesenzelltumors liegt nicht vor.

forearm; proximal radius w radial head

The American Journal of Surgical Pathology 24(2): 248-256, 2000

Primary Giant Cell Tumor of Soft Tissues

A Study of 22 Cases

Andre M. Oliveira, M.D., Angelo P. Dei Tos, M.D.,
Christopher D. M. Fletcher, M.D., and Antonio G. Nascimento, M.D.

forearm; proximal radius w radial head

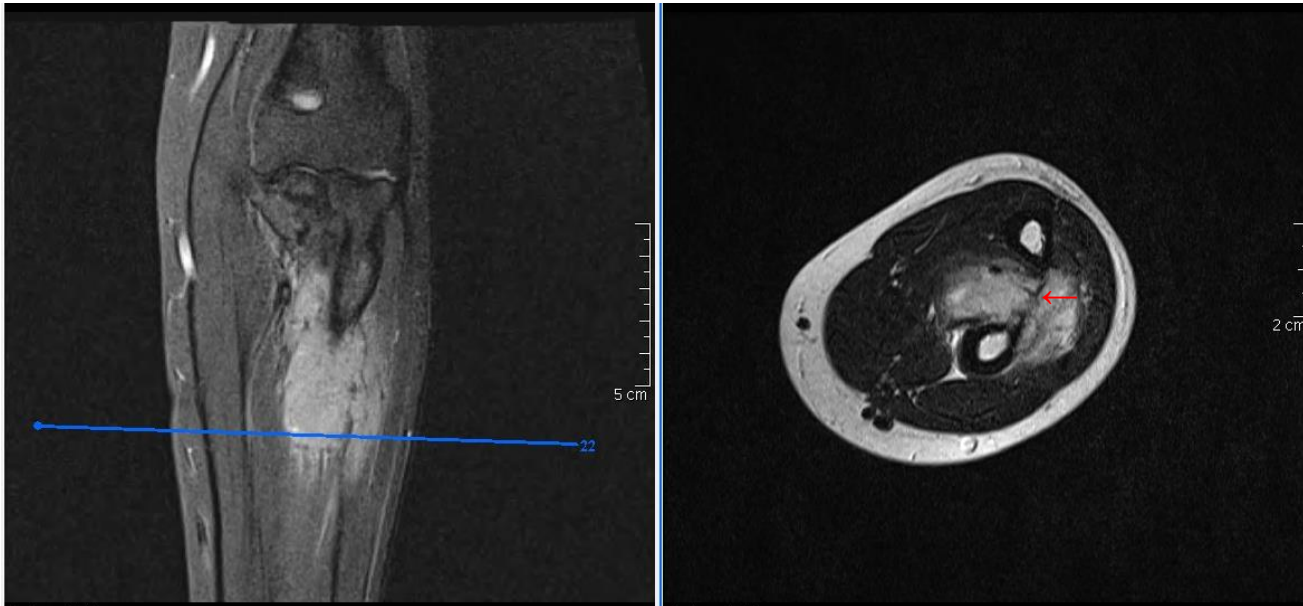
Histology :

**Soft tissue giant cell tumor proximal
radius right**

forearm; proximal radius w radial head

Jun 17, 2009

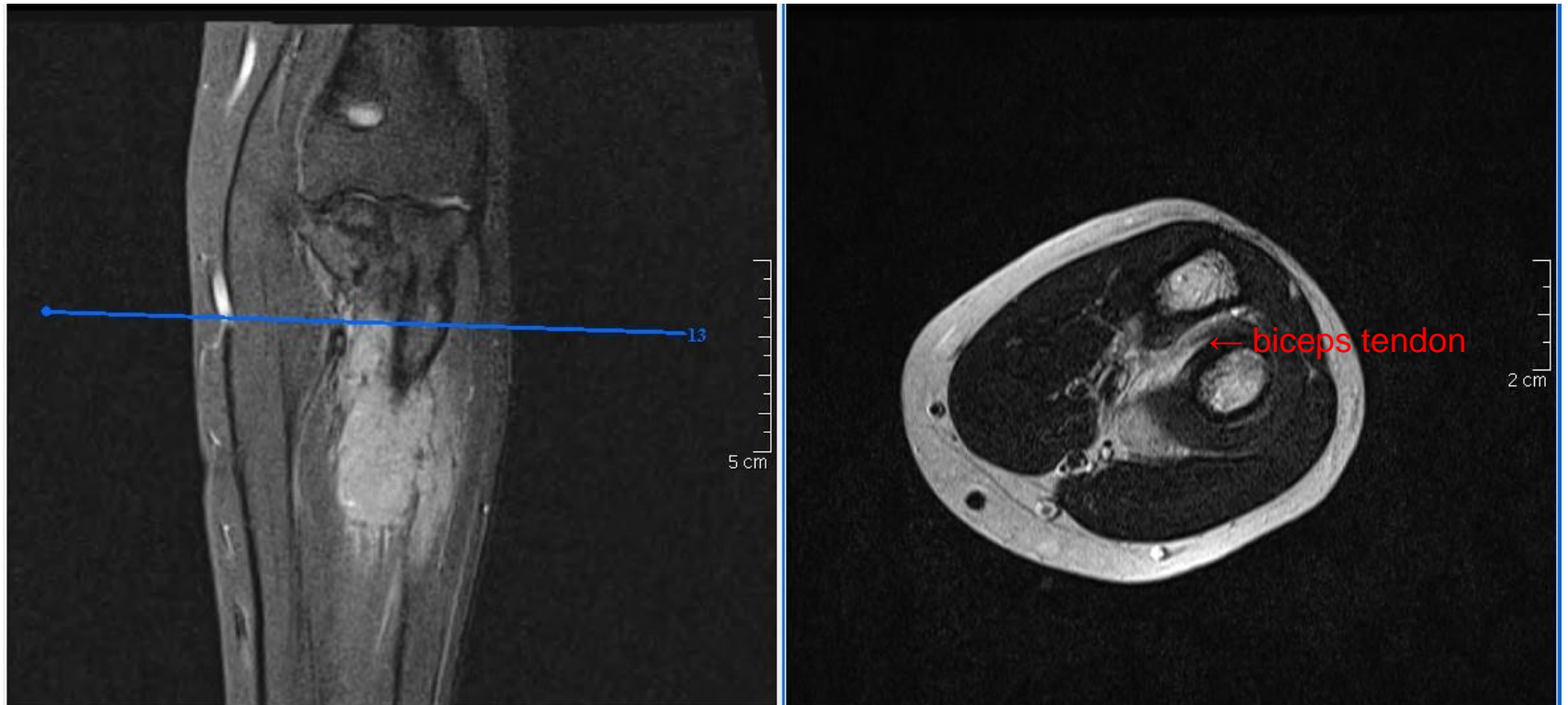
**High-resolution MRI : infiltration of
intraosseous membrane**



forearm; proximal radius w radial head

Jun 17, 2009

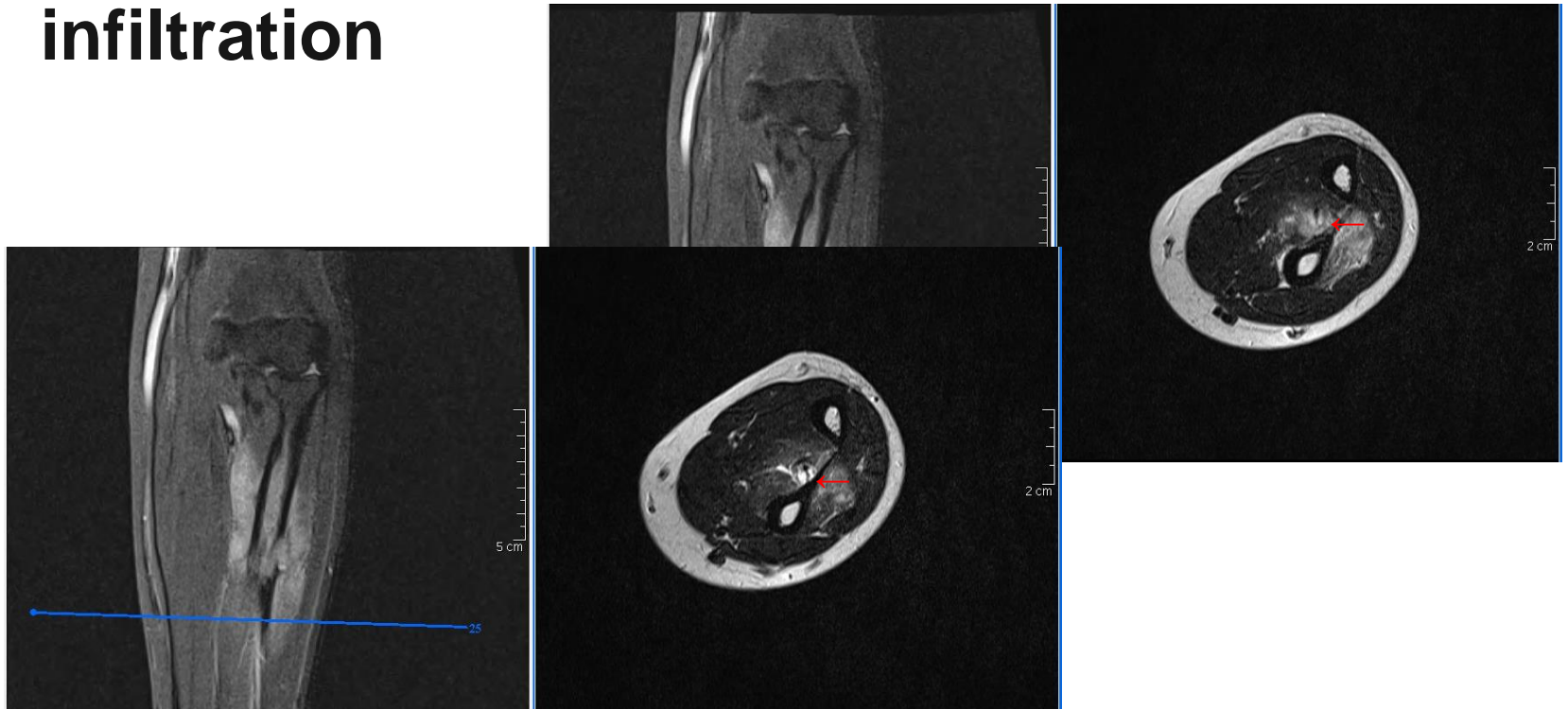
High-resolution MRI : infiltration of biceps tendon



forearm; proximal radius w radial head

Jun 17, 2009

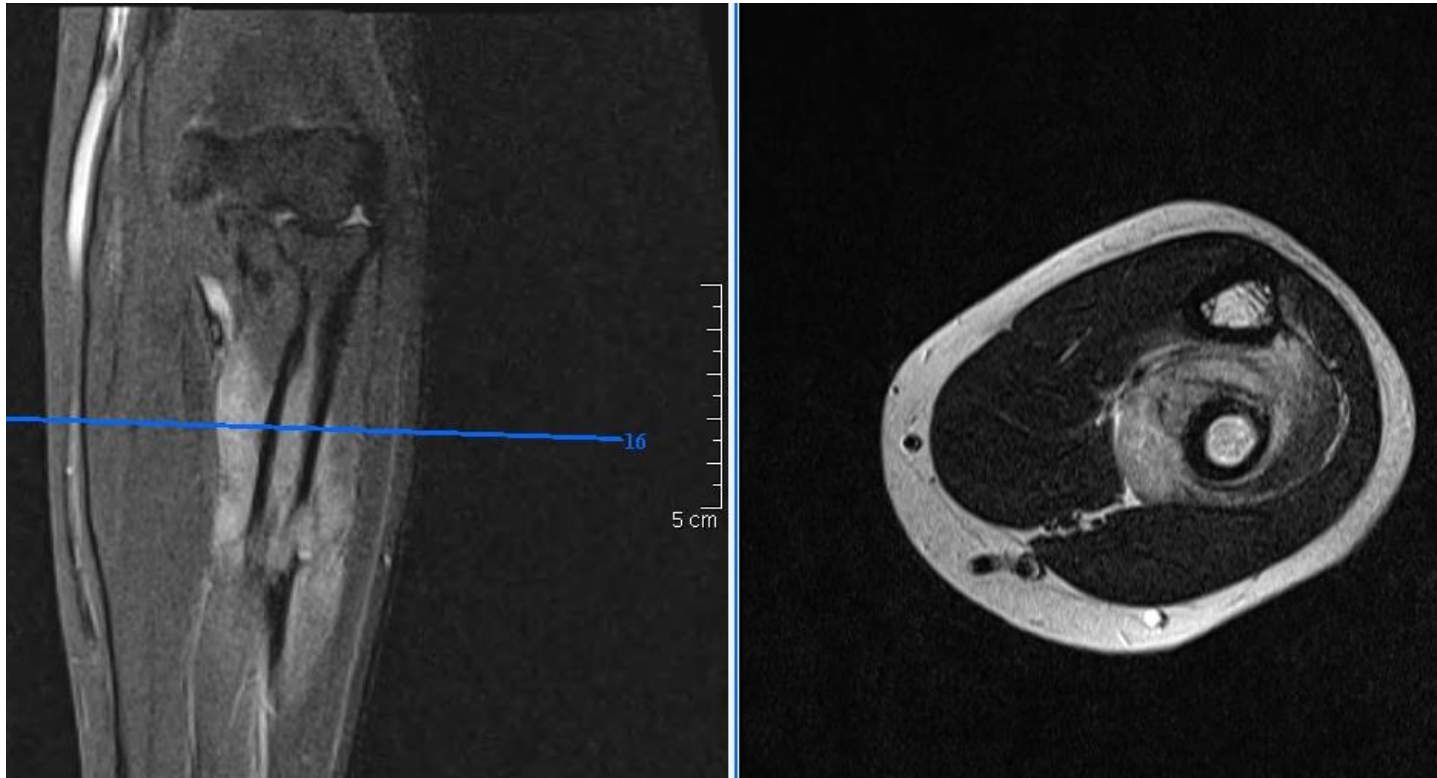
High-resolution MRI : close contact to neurovascular bundle, possible infiltration



forearm; proximal radius w radial head

Jun 17, 2009

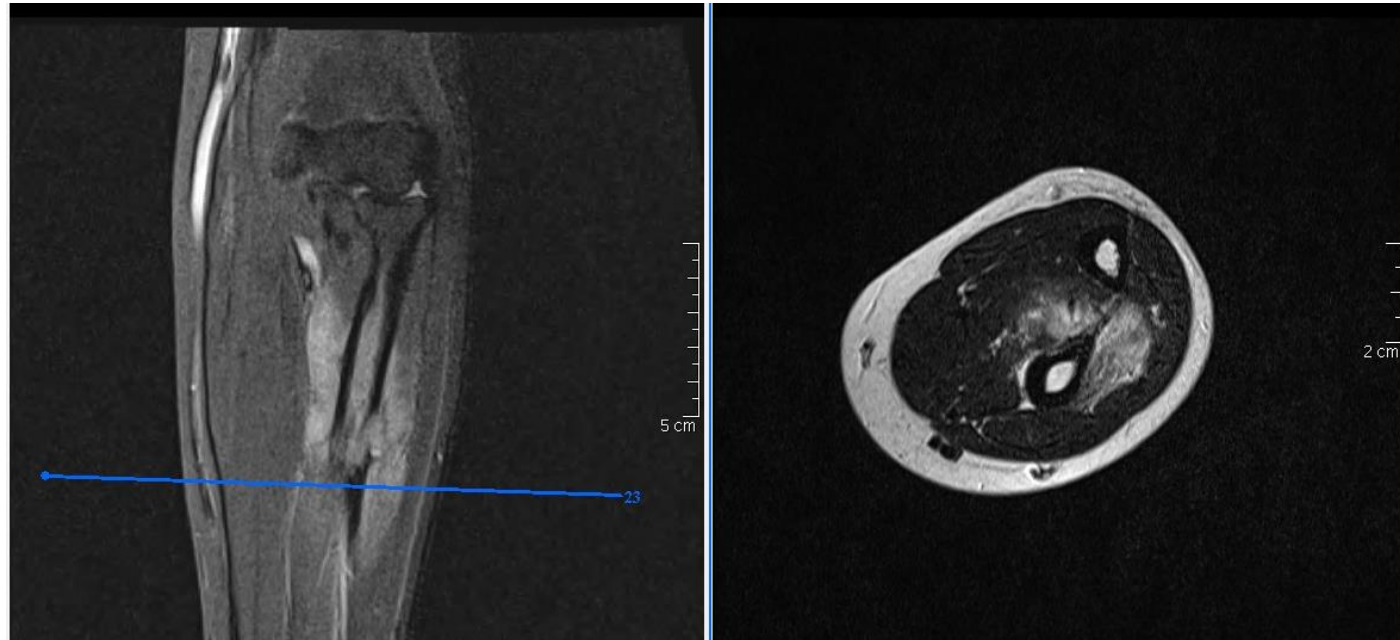
High-resolution MRI : infiltration of supinator muscle



forearm; proximal radius w radial head

Jun 17, 2009

High-resolution MRI : infiltration of deep extensor and deep flexor muscles



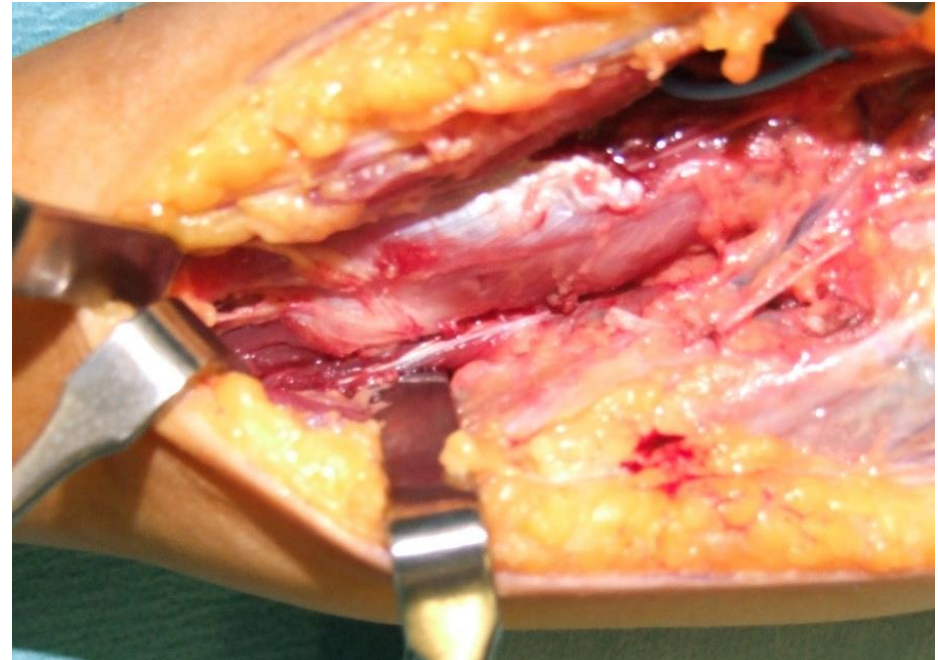
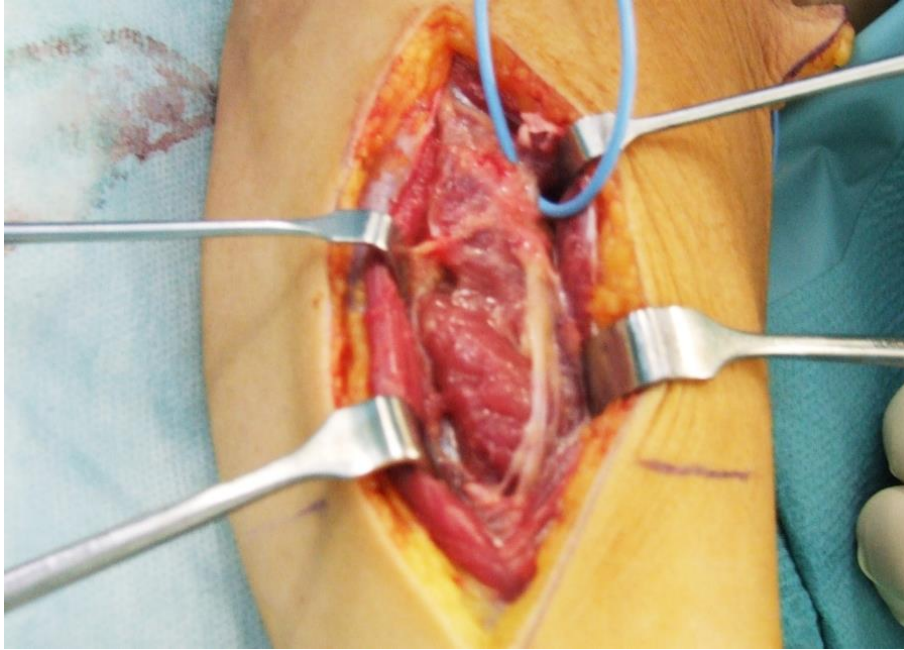
forearm; proximal radius w radial head

Jul 14, 2009

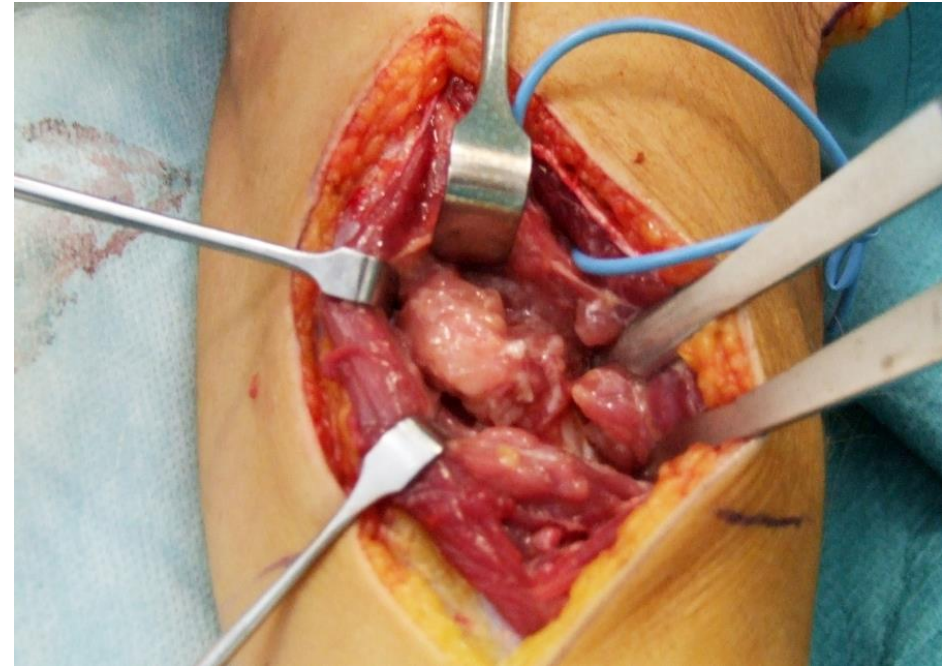
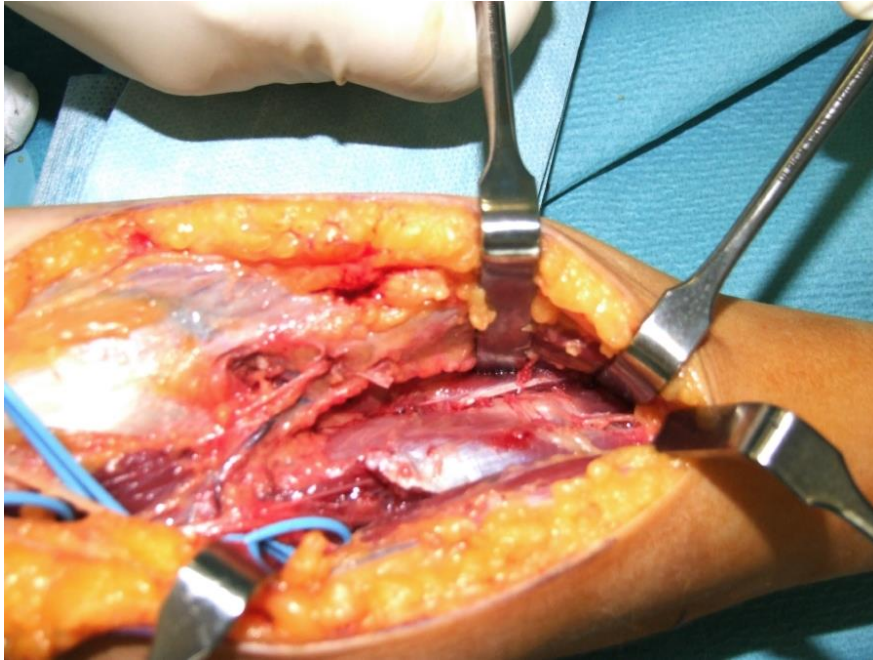
Surgical therapy :

Intralesional tumor excision through anterolateral and dorsal incisions with dissection of radial nerve branches

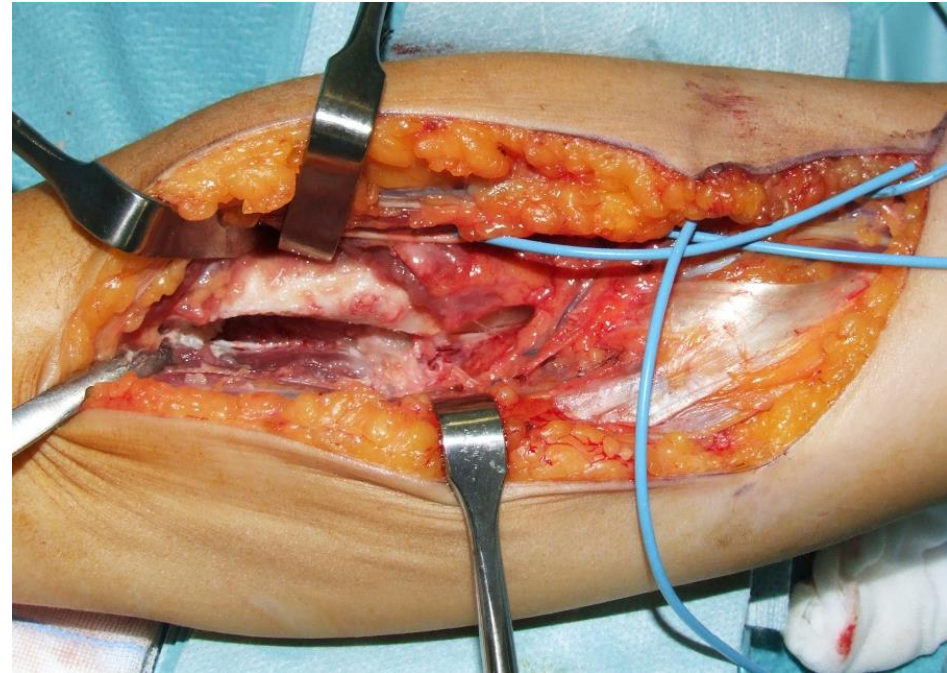
forearm; proximal radius w radial head Surgery, Jul 14, 2009



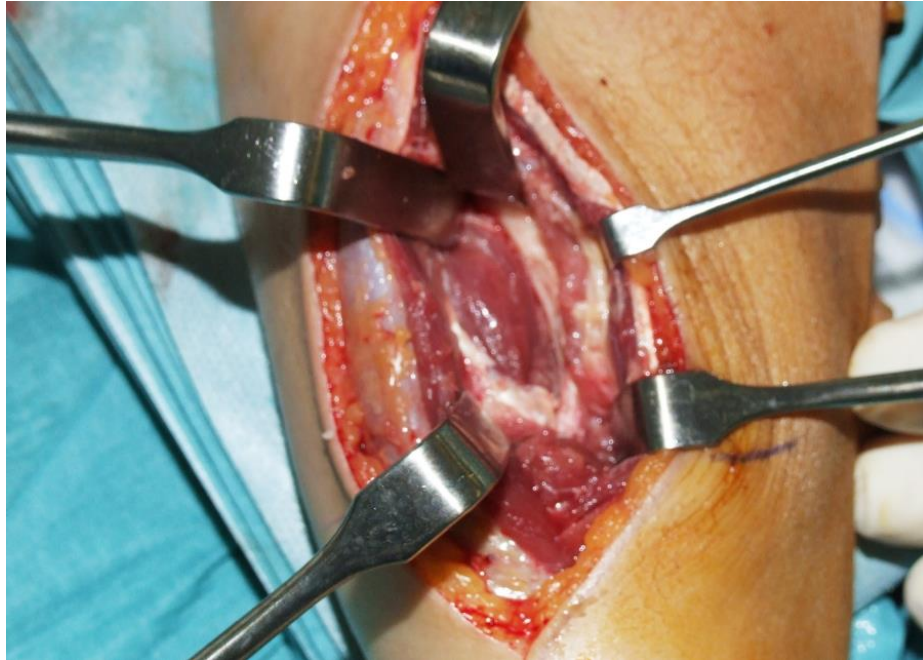
forearm; proximal radius w radial head Surgery, Jul 14, 2009



forearm; proximal radius w radial head Surgery, Jul 14, 2009



forearm; proximal radius w radial head Surgery, Jul 14, 2009



forearm; proximal radius w radial head

Histology, Jul 14, 2009

14.07.2009

Klinische Angaben

Riesenzelltumor der Weichteile.

Diagnose-Bestätigung?

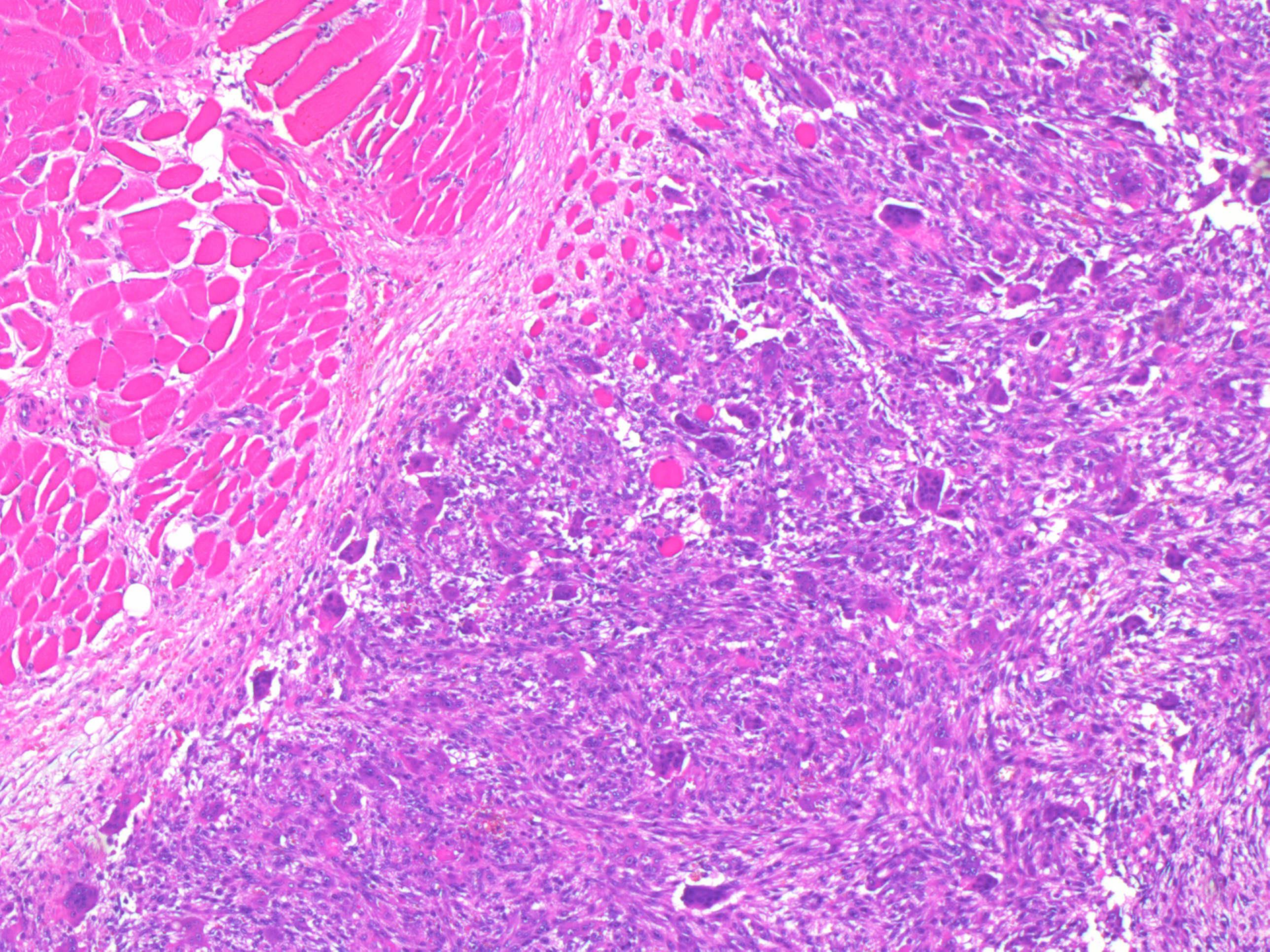
Angaben zur Probe

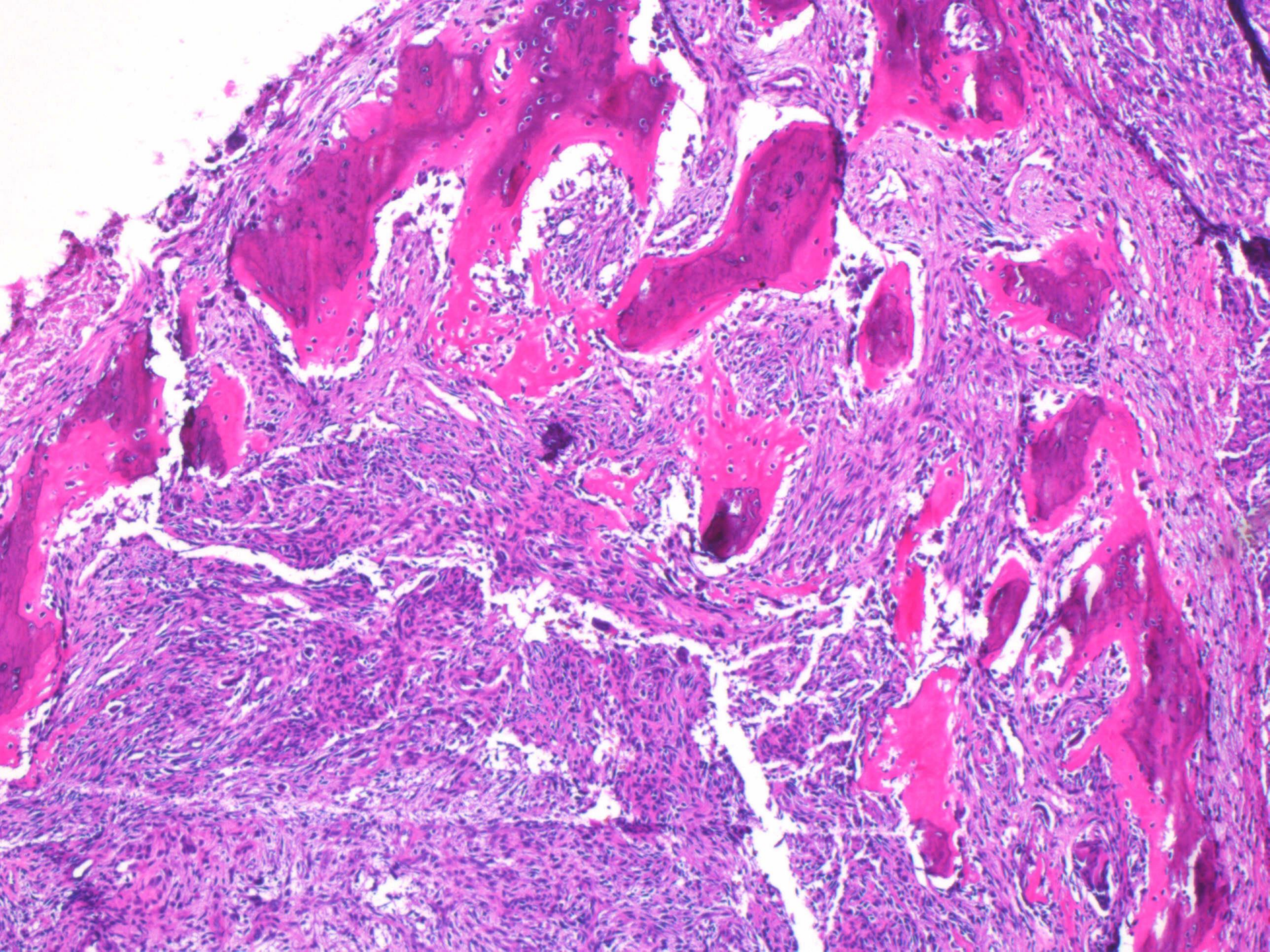
Proximaler Unterarm rechts

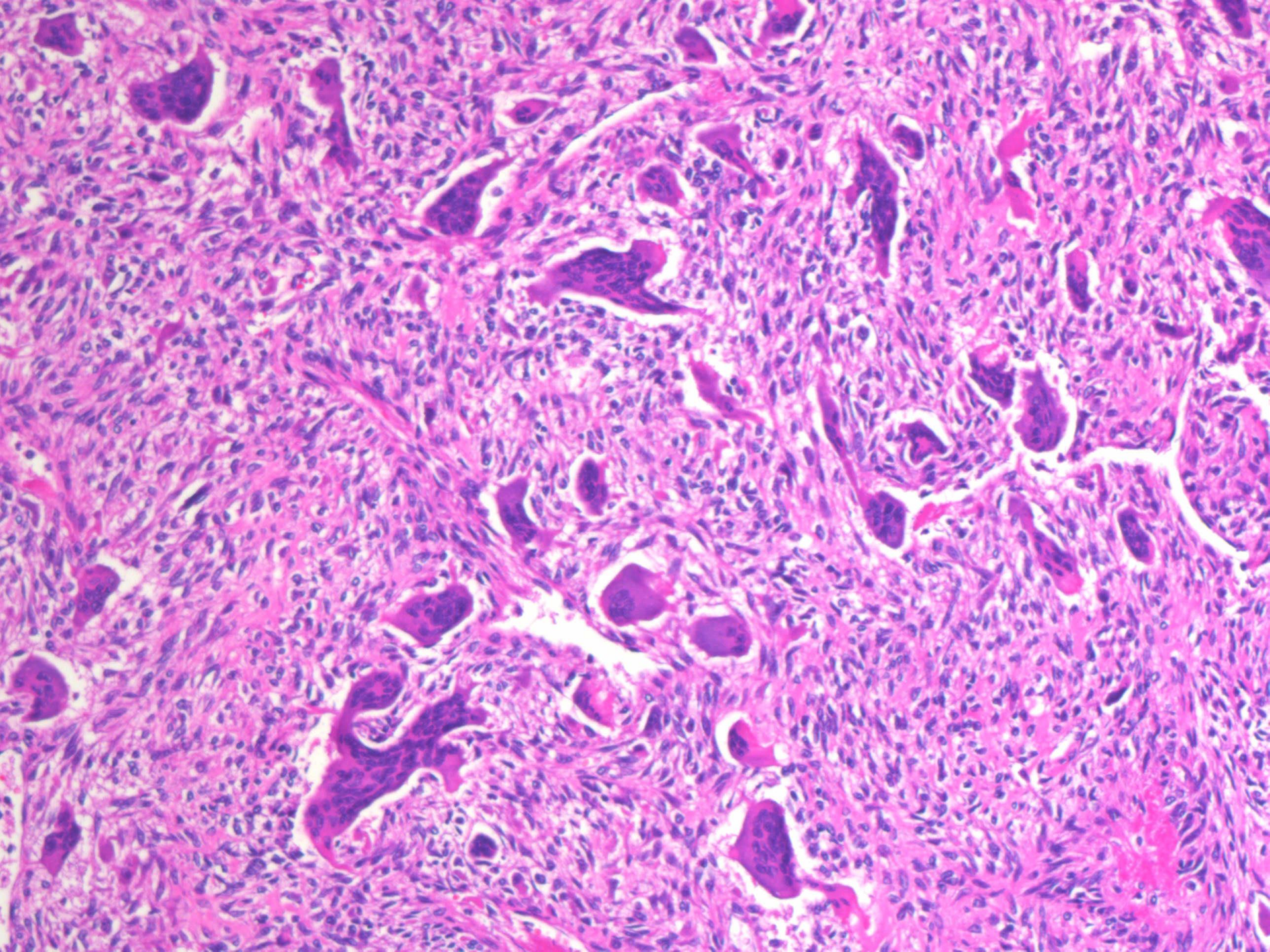
Makroskopischer Befund

In Gaze gebettete-beige bis rötliche Weichgewebsfragmente, zusammengesoben 4 x 4 x 1,2 cm. Das Material enthält teils grössere, faserige, wahrscheinlich Muskelanteile.

ZIMAN/sre







forearm; proximal radius w radial head

Histology, Jul 14, 2009

Proximaler Unterarm rechts: Skelettmuskulatur mit Anteilen einer riesenzellhaltigen Läsion mit Ausbildung von metaplastischem Knochen. Siehe Kommentar.

Kommentar

Es zeigt sich ein identisches Bild wie in der Stanzbiopsie. Der histologische Befund ist in erster Linie vereinbar mit einem Riesenzelltumor der Weichteile (bzw. Riesenzelltumor mit niedrigem malignen Potential). Aufgrund der fragmentierten Einsendung ist keine genaue Stellung zu den Resektatränder möglich. Die Läsion reicht allerdings mehrfach bis an die Präparatränder und ist unvollständig exzidiert.

forearm; proximal radius w radial head

TABLE 2. *Clinical features of giant cell tumor of soft tissues*

Case	Age (yrs)	Location	Sex	Tumor size*	Level	Treatment	Follow up and outcome
1	77	Foot, R	M	3.7	Superficial	N/A	N/A
2	46	Knee	F	5.5	Superficial	N/A	5.2 yr, NED
3	72	Back	M	1.2	Superficial	Wide local excision	5.3 yr, DUC
4	42	Shoulder, R	F	4	Superficial	Wide local excision	4.75 yr, NED
5	33	Thigh, L	F	4	Deep	Wide local excision	7.3 yr, NED
6	24	Back	F	1.7	Deep	Wide local excision	2.75 yr, NED
7	15	Thigh, L	F	3.5	Superficial	Local excision	0.5 yr, NED
8	5	Flank, R	M	1.2	Superficial	Wide local excision	10.8 yr, NED
9	34	Calf, L	M	2.3	Superficial	Wide local excision	0.2 yr, NED
10	14	Leg, R	M	N/A	Superficial	Local excision	N/A
11	9	Neck, L	M	N/A	Superficial	N/A	N/A
12	59	Chest wall, L	M	3.4	Deep	Modified radical mastectomy	0.7 yr, NED
13	53	Buttock, R	M	4.5	Superficial	Wide local excision	1.3 yr, NED
14	57	Buttock, R	F	N/A	Superficial	Local excision	N/A
15	80	Thigh, L	F	10	Superficial	Partial excision + postoperative radiotherapy	1 yr, 2 local recurrences, metastases to lungs, DOD
16	55	Leg, L	F	5	Superficial	N/A	N/A
17	80	Knee	F	1.5	Superficial	Wide local excision	4.6 yr, NED
18	16	Knee, L	M	1.5	Superficial	Wide local excision	6.6 yr, NED
19	44	Hand, L	M	1.2	Superficial	N/A	0.7 yr, NED
20	32	Forearm, L	M	3	Superficial	Wide local excision + postoperative radiotherapy	4.5 yr, NED
21	57	Leg, R	M	1.8	Superficial	N/A	N/A
22	15	Hand, L	F	1	Superficial	Wide local excision	4 yr, NED

DOD, died of disease; DUC, died of unrelated cause; N/A, not available; NED, no evidence of disease.

* Greatest dimension in centimeters.

forearm; proximal radius w radial head

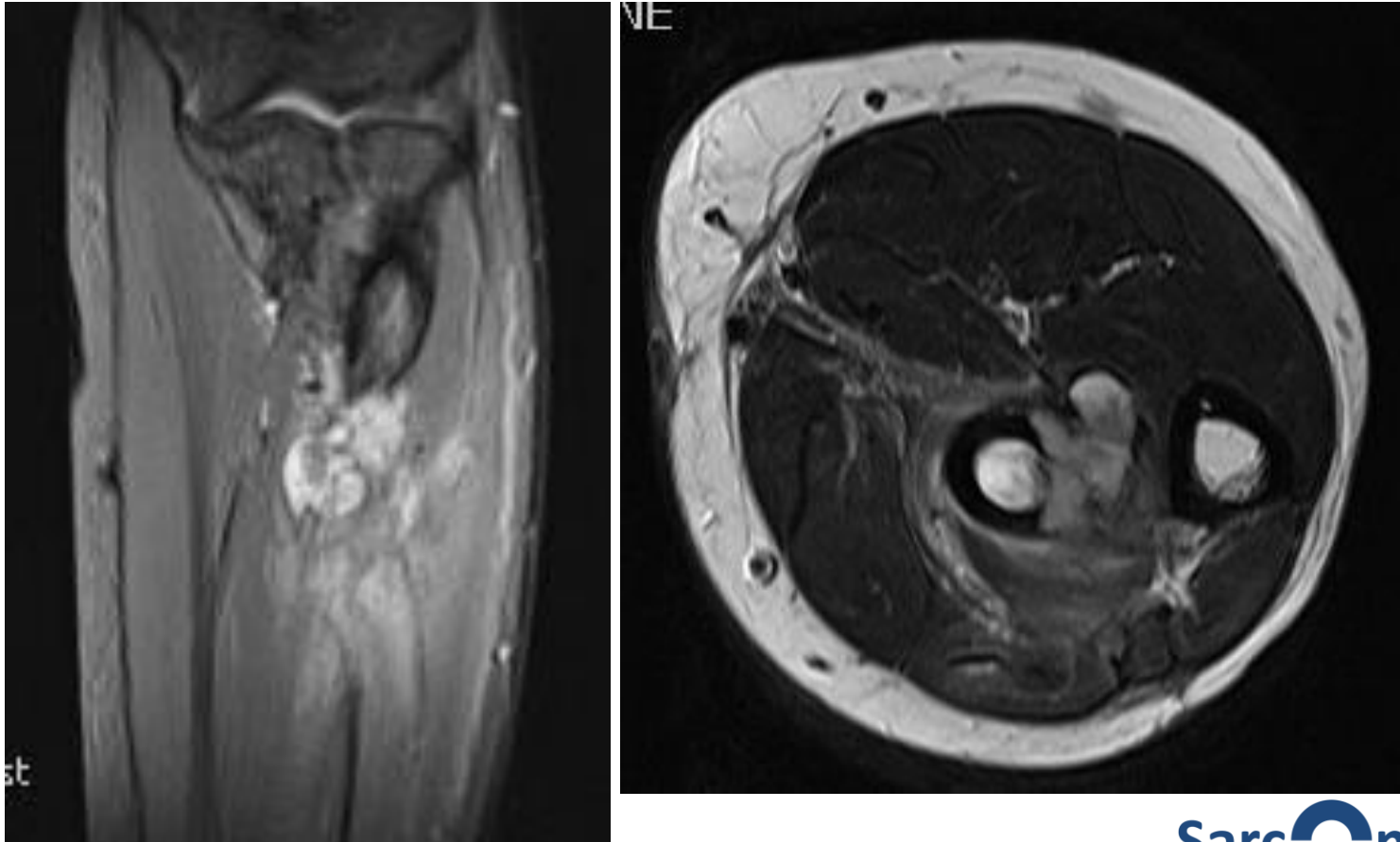
current situation :

Postoperative status :

- **protective brace (1-2 weeks)**
- **free mobilisation**
- **wound care**

forearm; proximal radius w radial head MRI, Oct 28, 2009

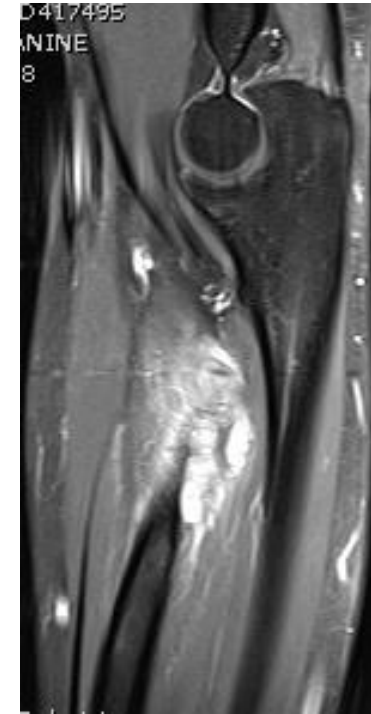
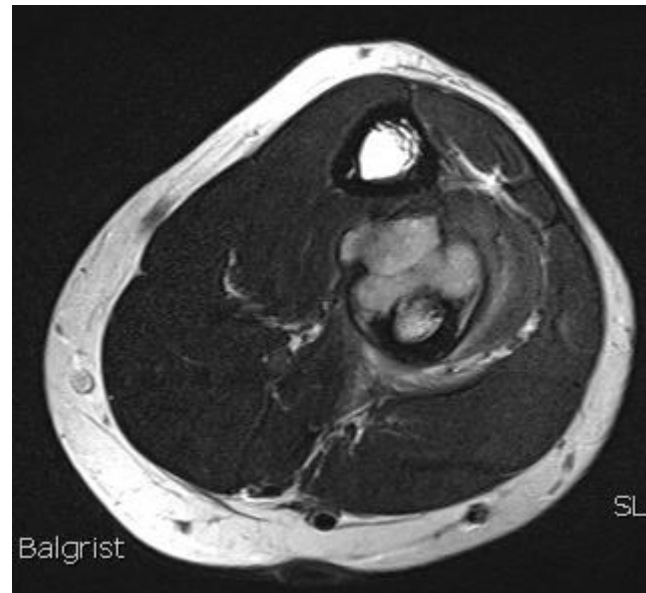
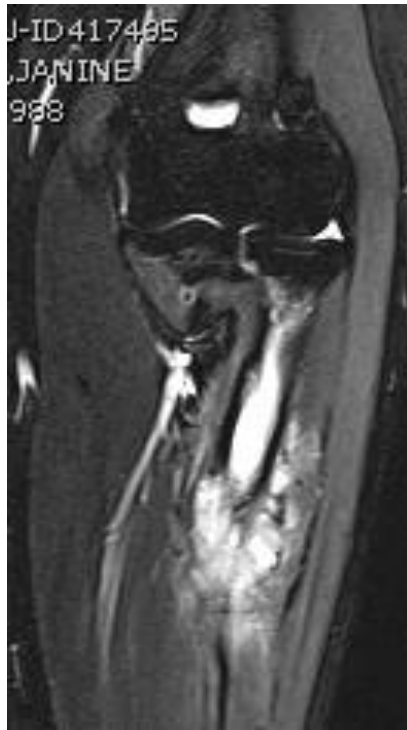
Remaining tumor, around the radius



forearm; proximal radius w radial head

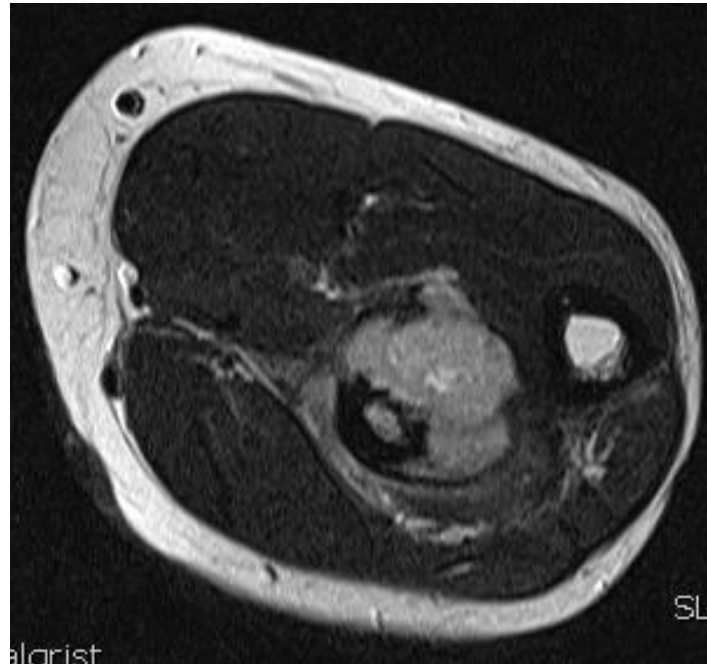
MRI, April 14, 2010

Increasing size of tumor



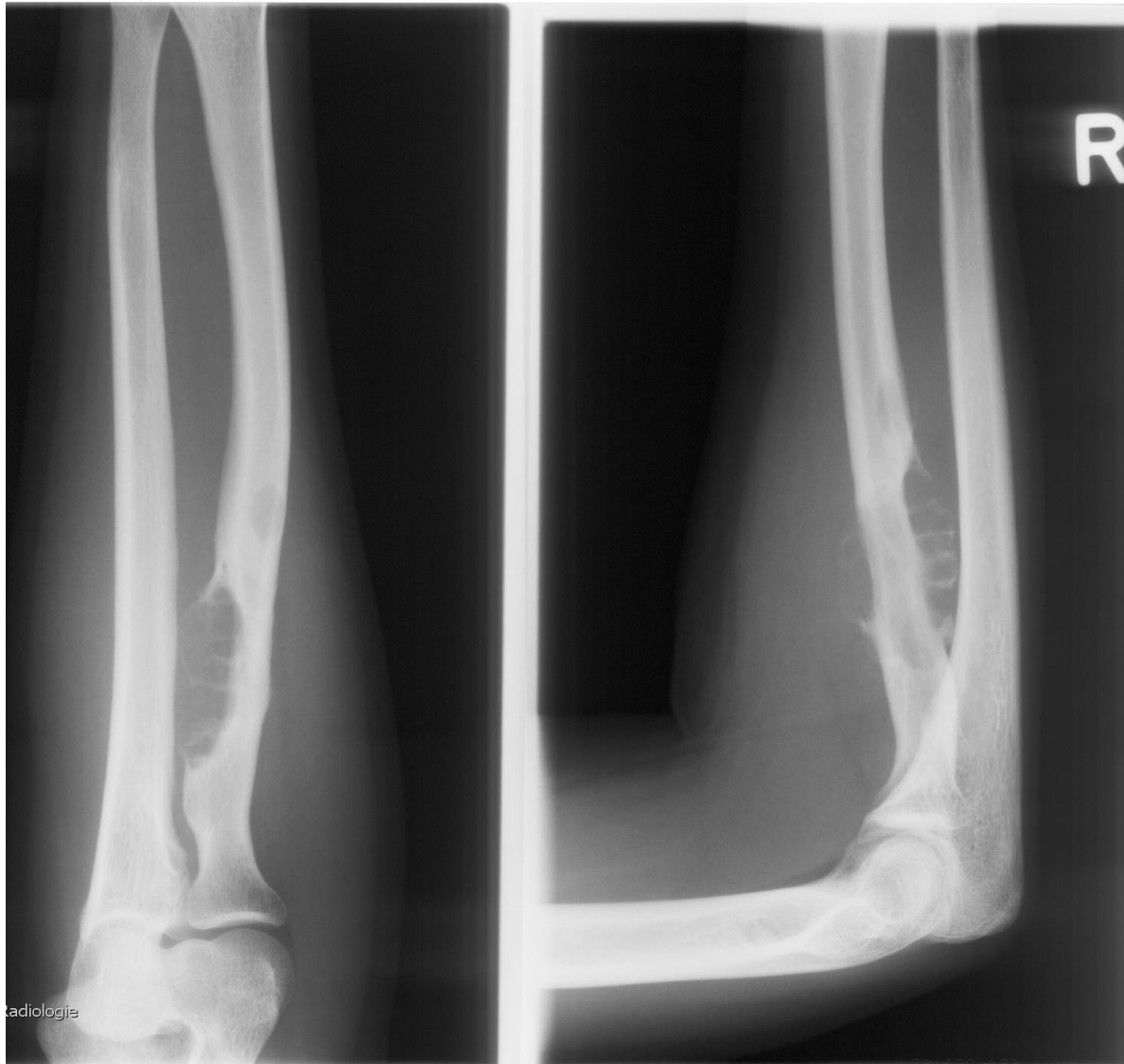
forearm; proximal radius w radial head MRI, April 14, 2010

Stationary size of tumor



forearm; proximal radius w radial head

Rx, Nov 16, 2010



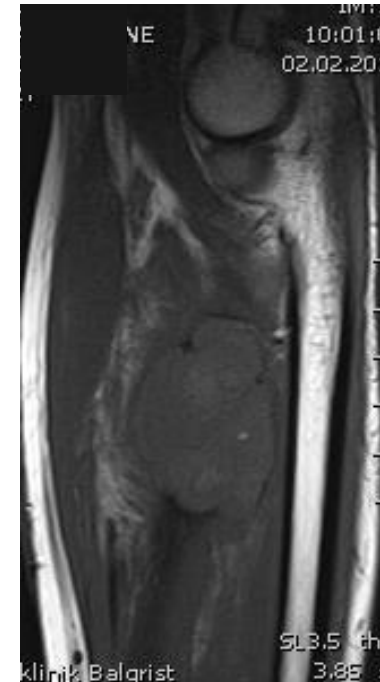
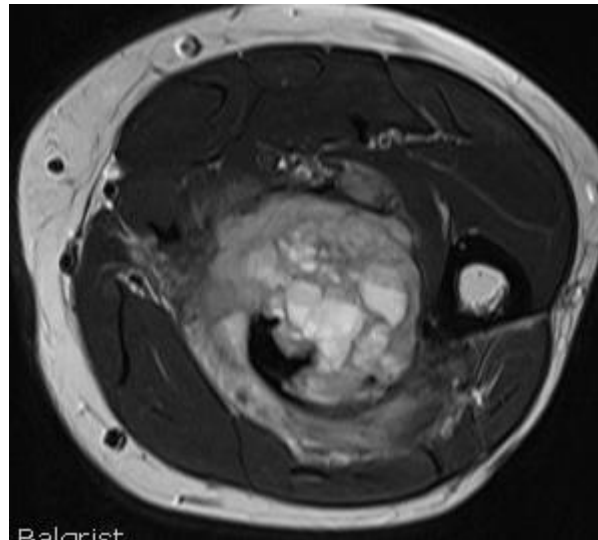
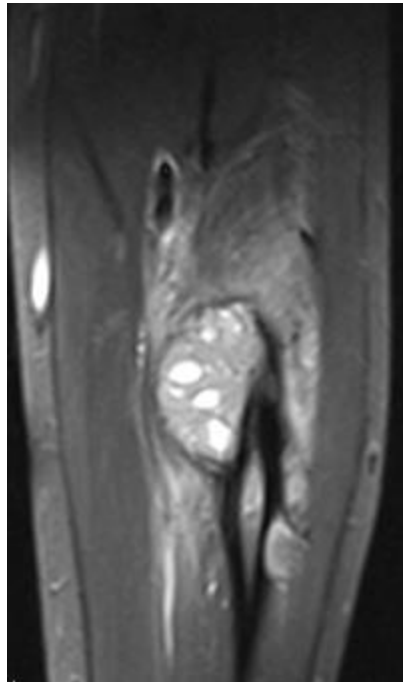
forearm; proximal radius w radial head Rx, Dec 21, 2010



forearm; proximal radius w radial head MRI, Feb 2, 2011

Increasing size of tumor

Therapy: RANK-Ligand-Inhibitor
(Denosumab, since 2.2.2011, for 4 months)



forearm; proximal radius w radial head MRI, March 2, 2011

After 4 injections à 120mg Prolia
(Denosumab)



forearm; proximal radius w radial head

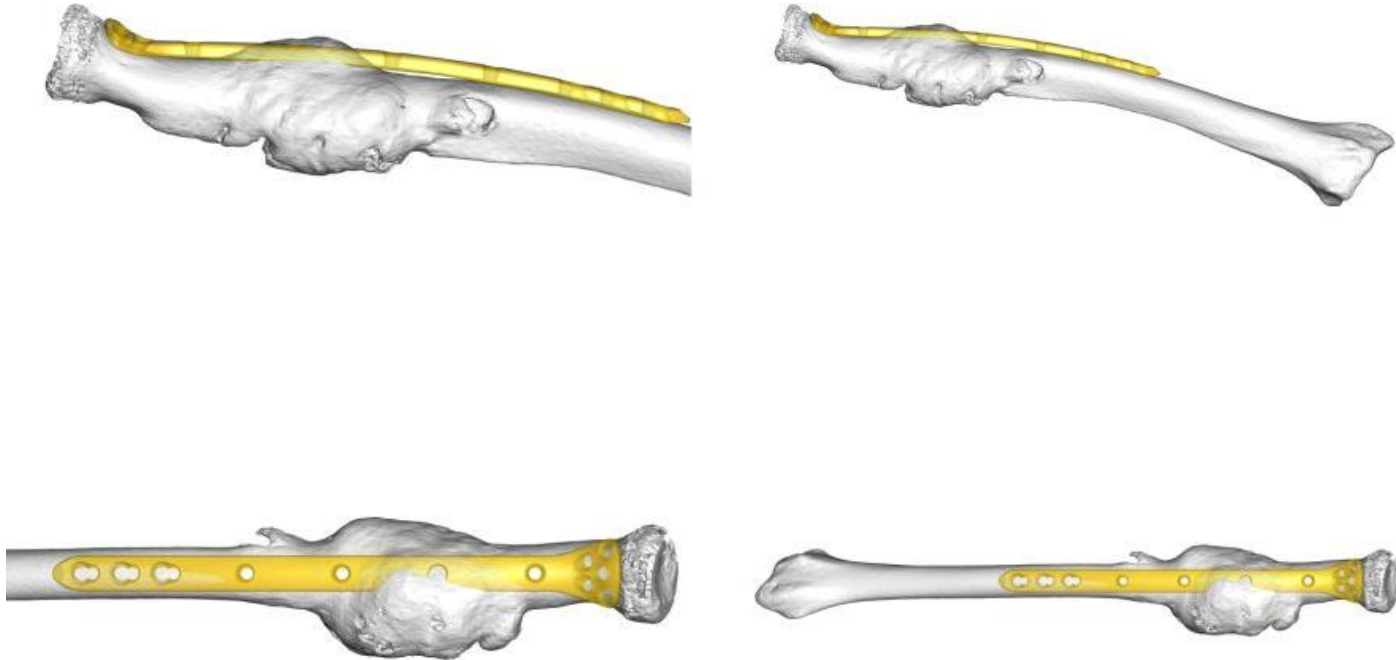
CT, July 15, 2011

Surgical planning



forearm; proximal radius w radial head

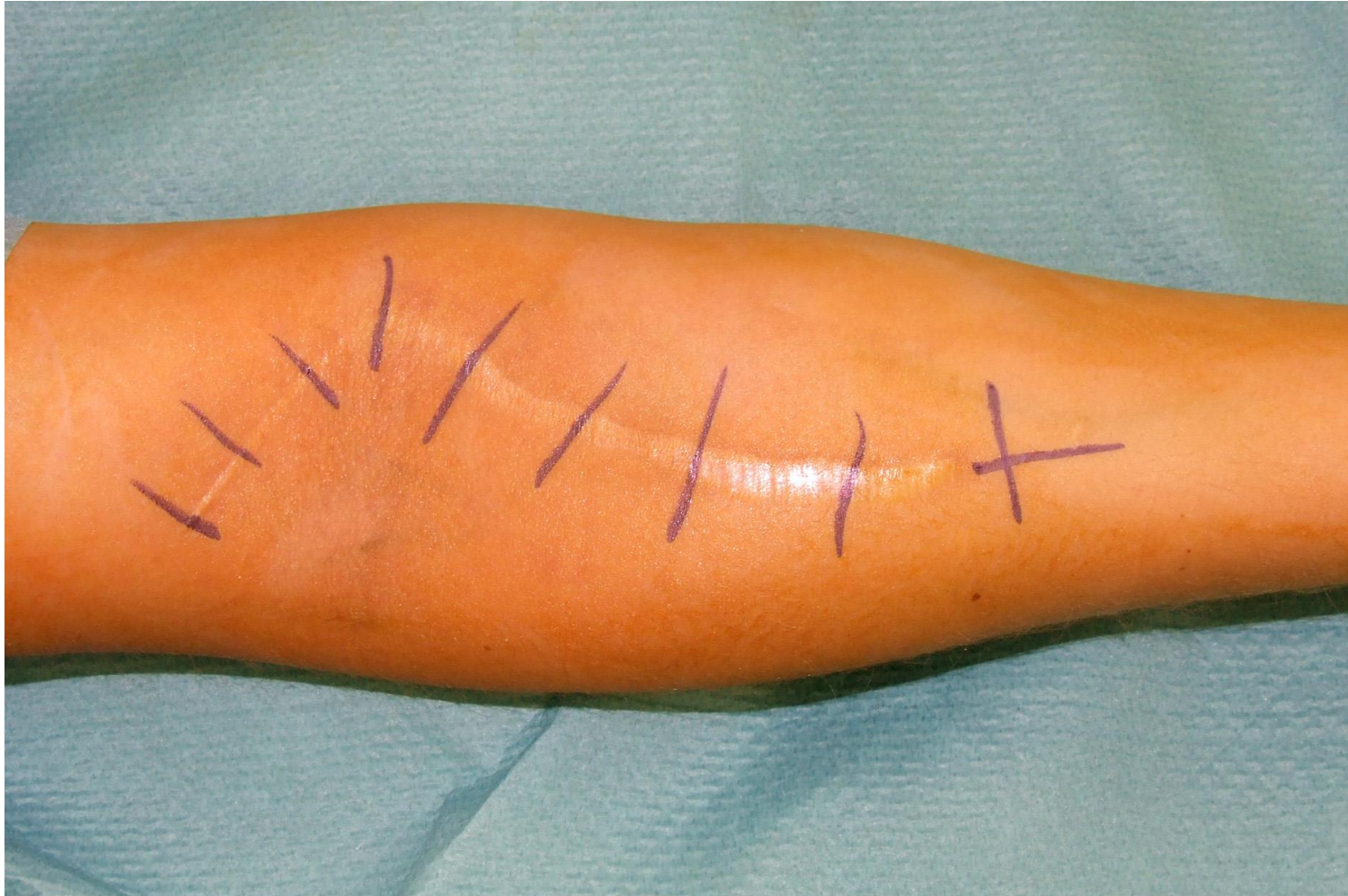
Surgical planning, 2011



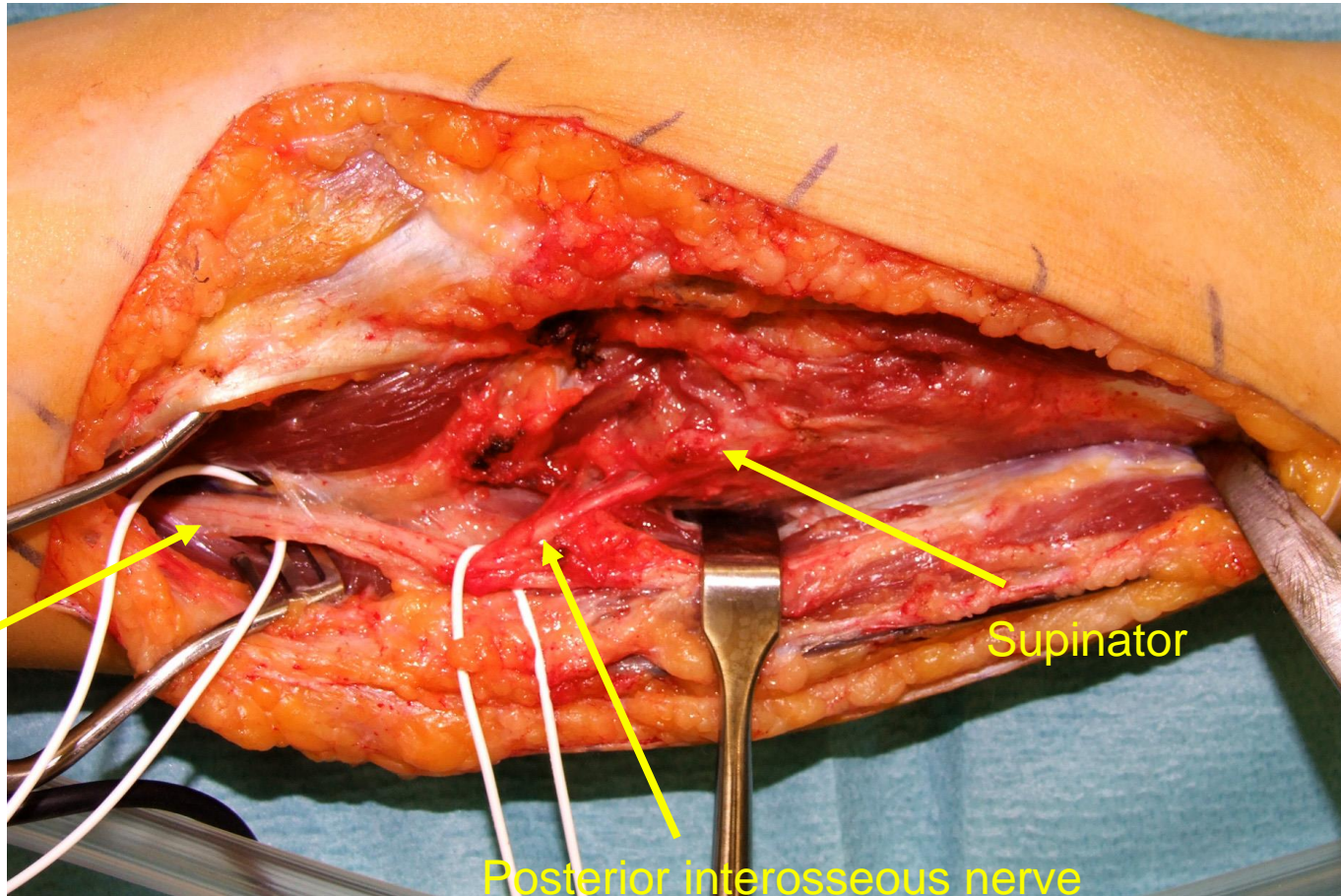
forearm; proximal radius w radial head Surgery, Sept 27, 2011



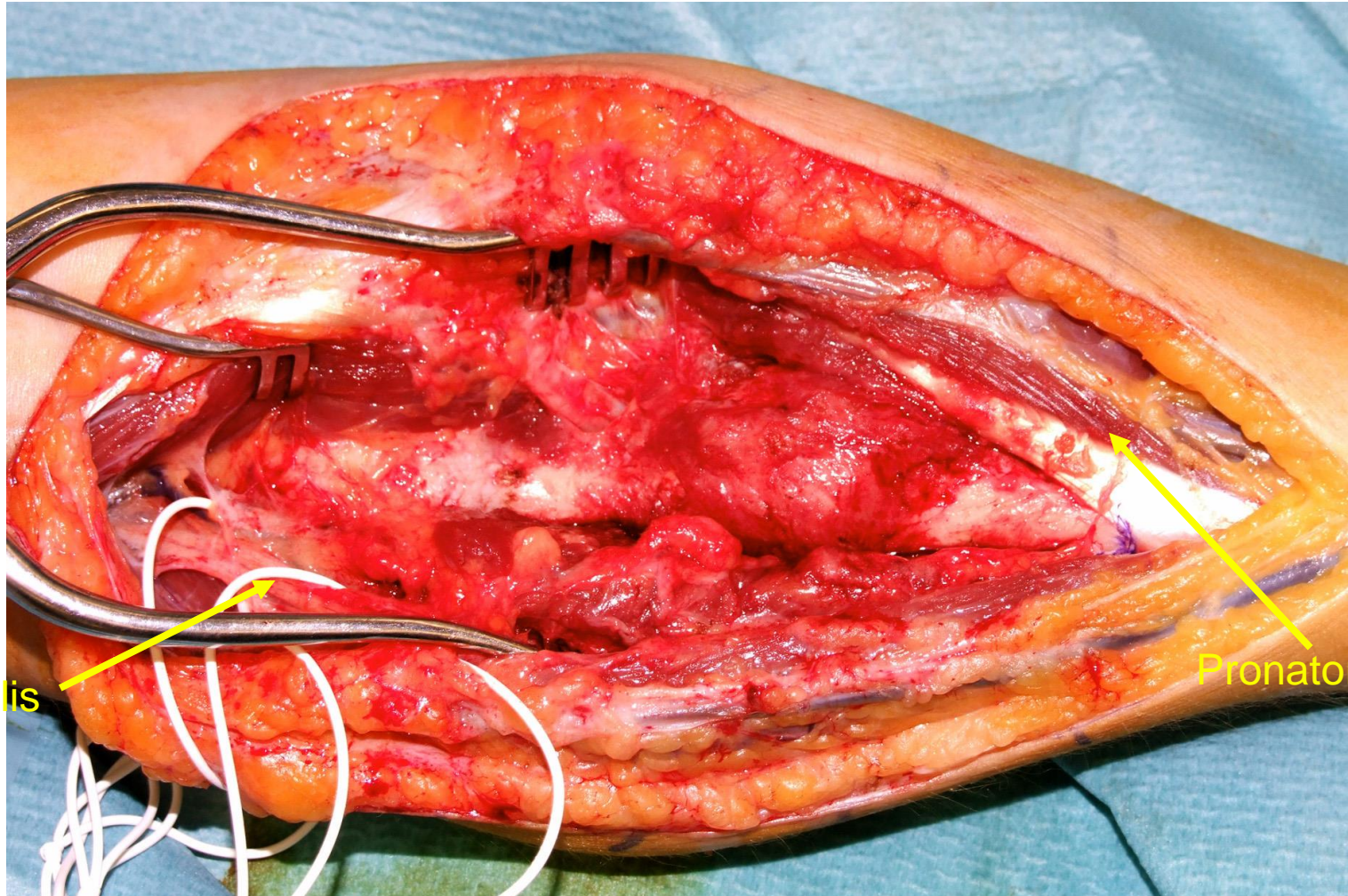
forearm; proximal radius w radial head Surgery, Sept 27, 2011



forearm; proximal radius w radial head Surgery, Sept 27, 2011



forearm; proximal radius w radial head Surgery, Sept 27, 2011



N. radialis

Pronator teres

forearm; proximal radius w radial head Surgery, Sept 27, 2011

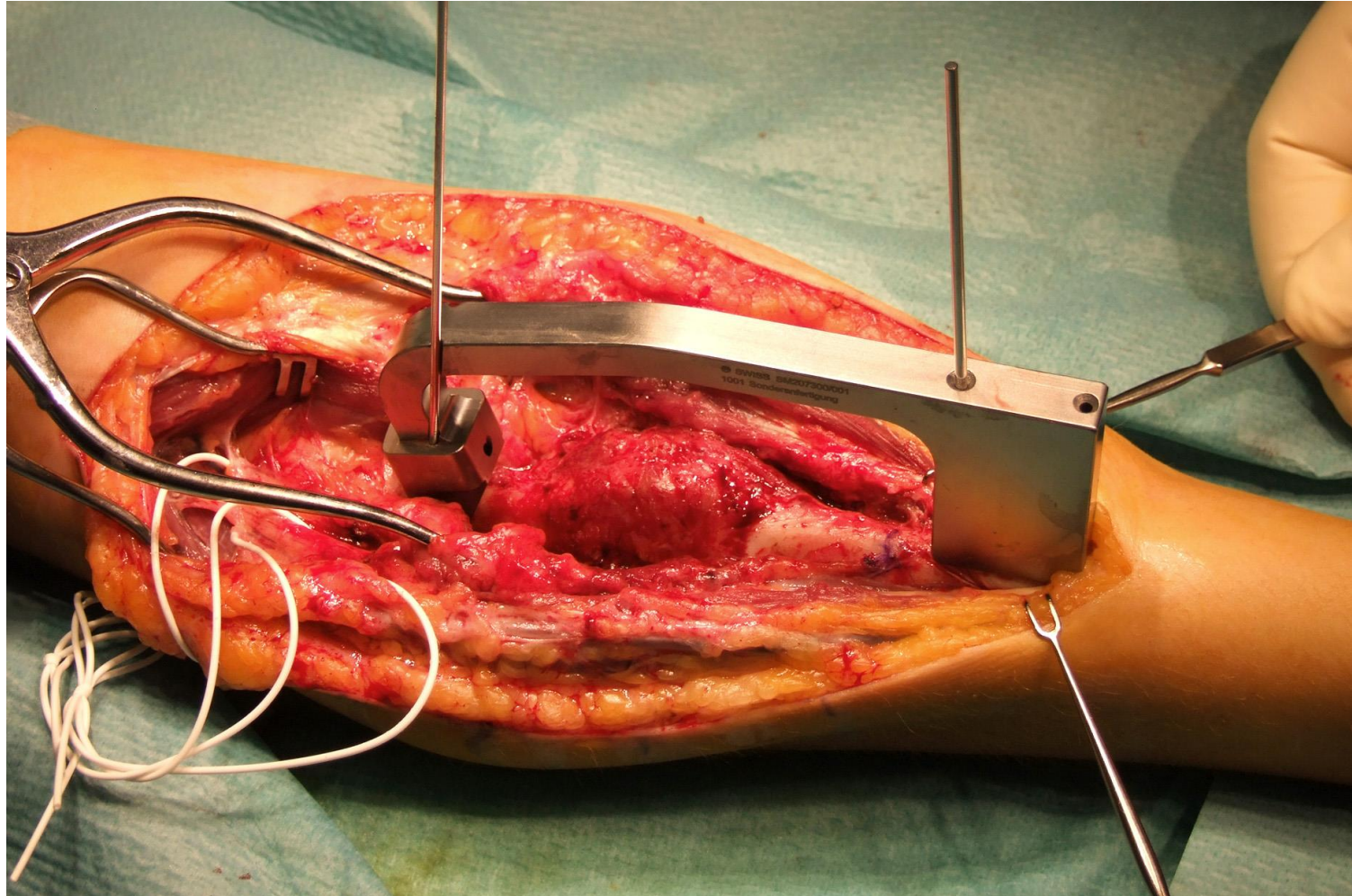


forearm; proximal radius w radial head

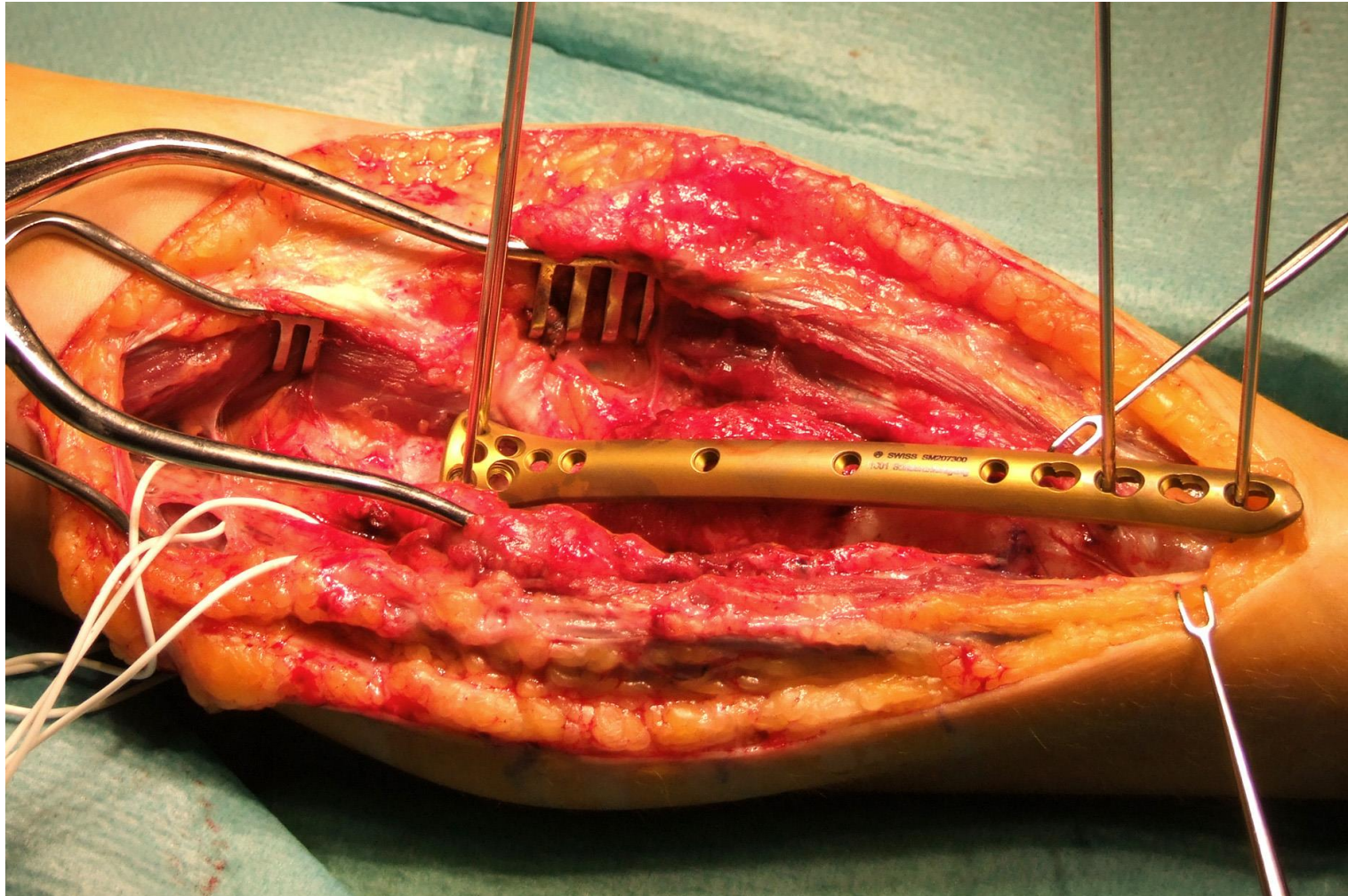
Surgery, Sept 27, 2011



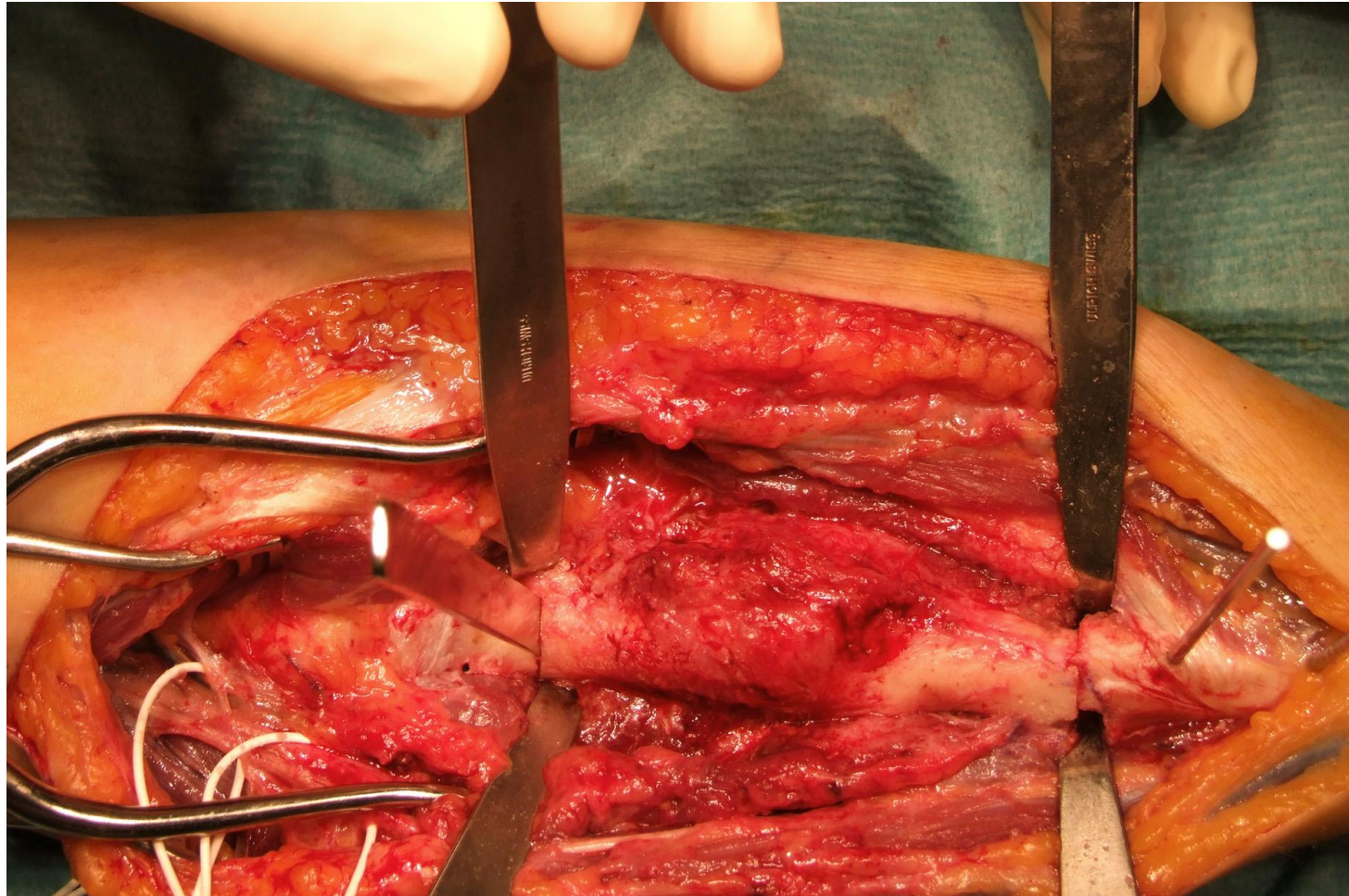
forearm; proximal radius w radial head Surgery, Sept 27, 2011



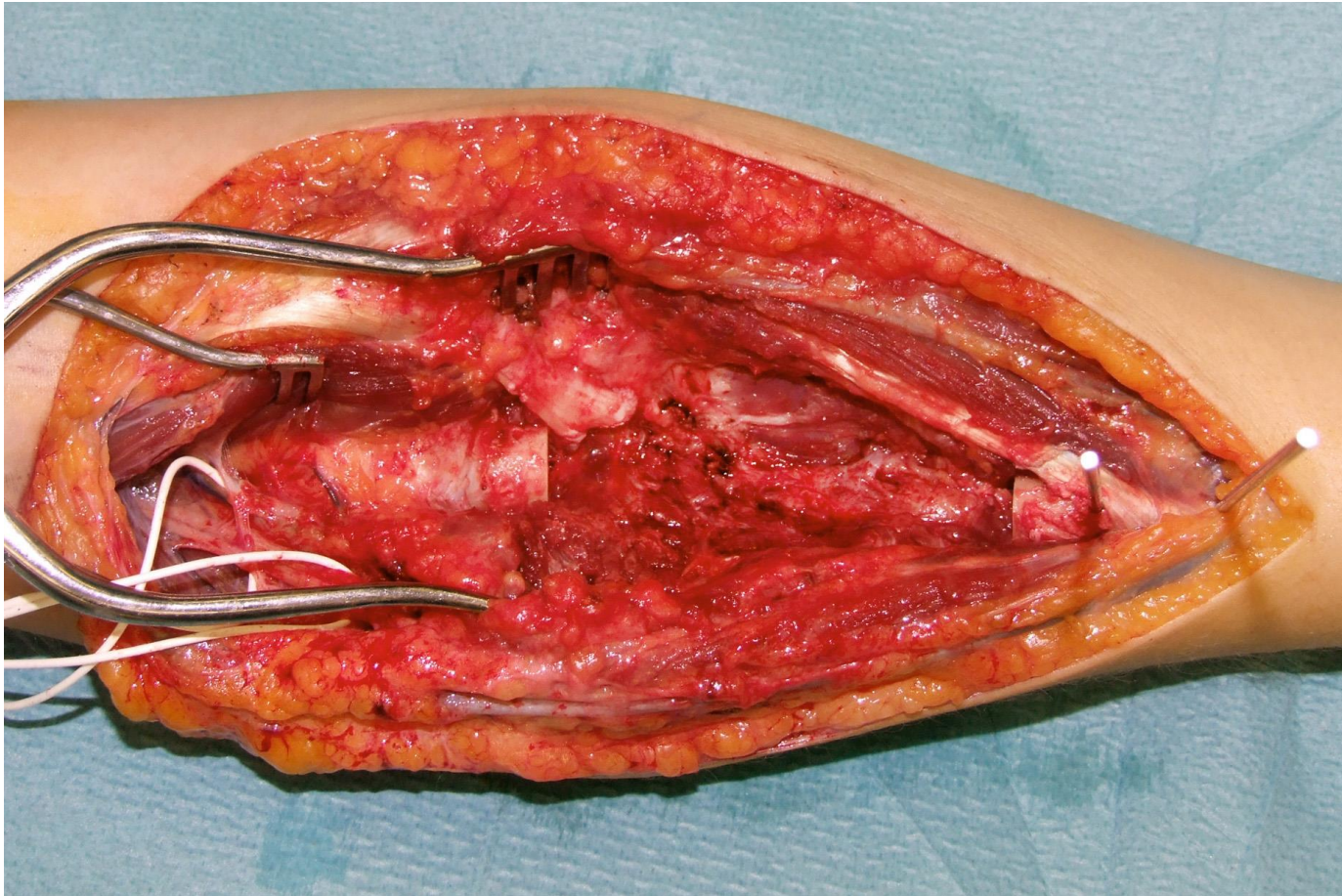
forearm; proximal radius w radial head Surgery, Sept 27, 2011



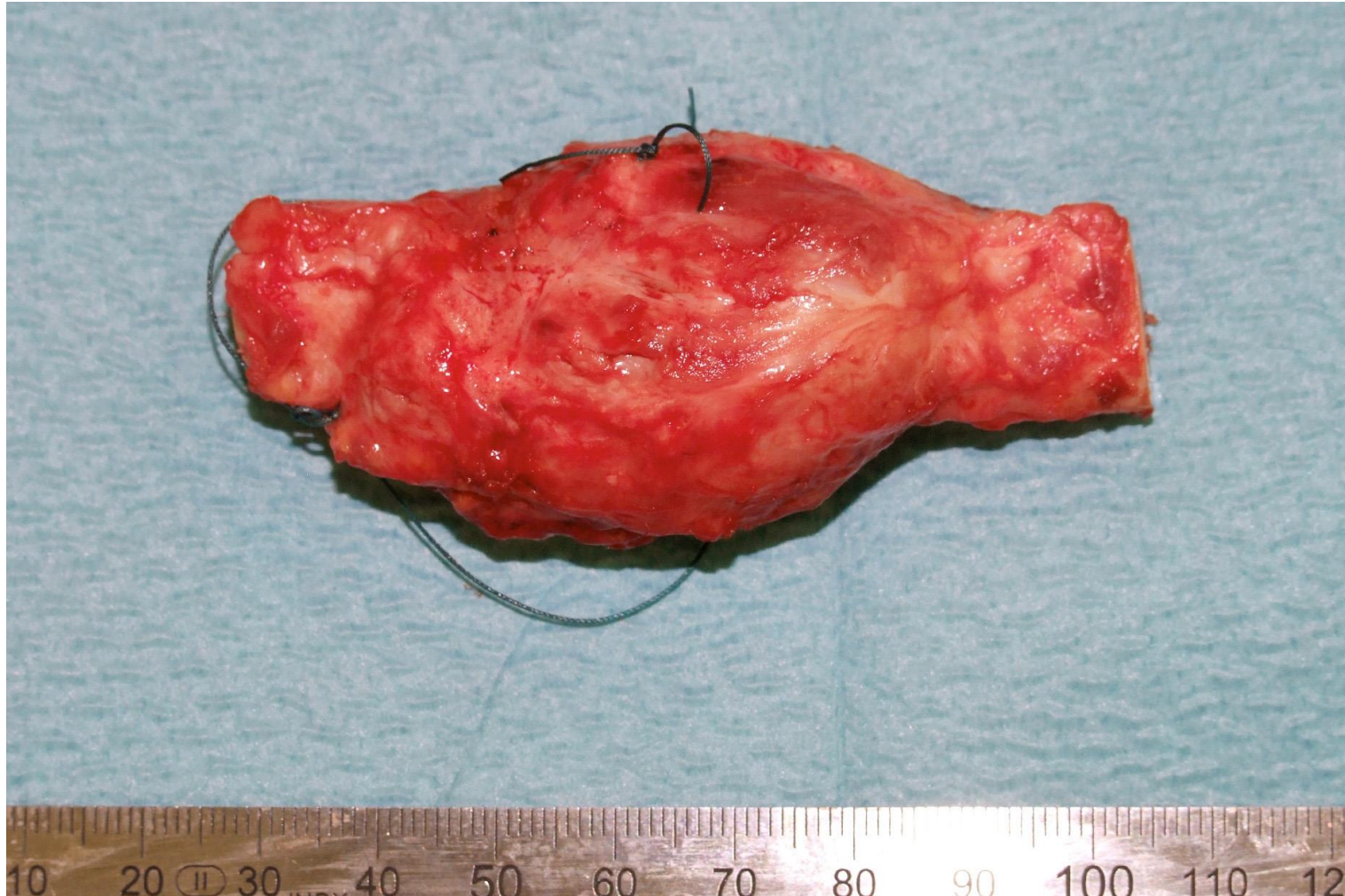
forearm; proximal radius w radial head Surgery, Sept 27, 2011



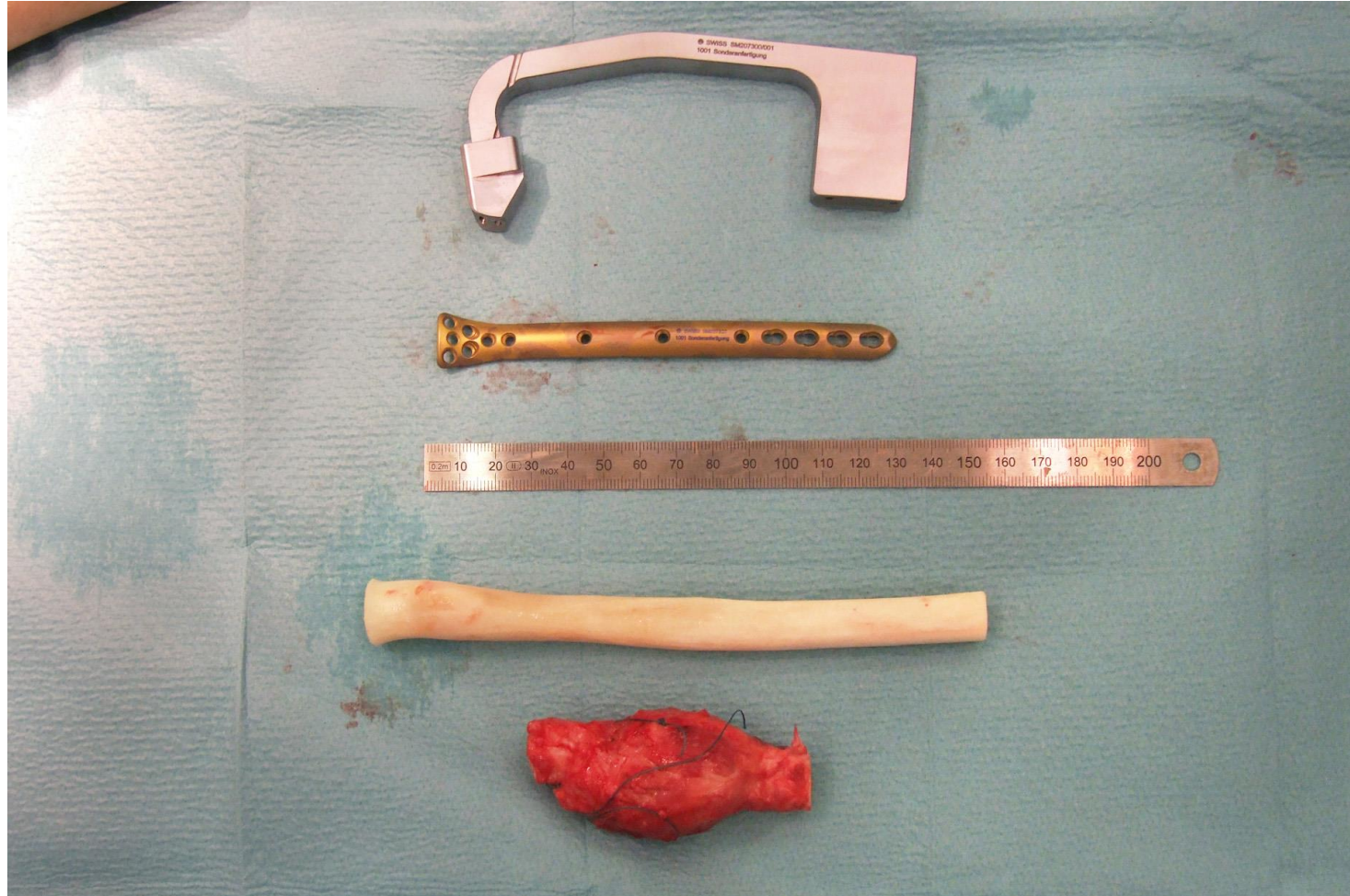
forearm; proximal radius w radial head Surgery, Sept 27, 2011



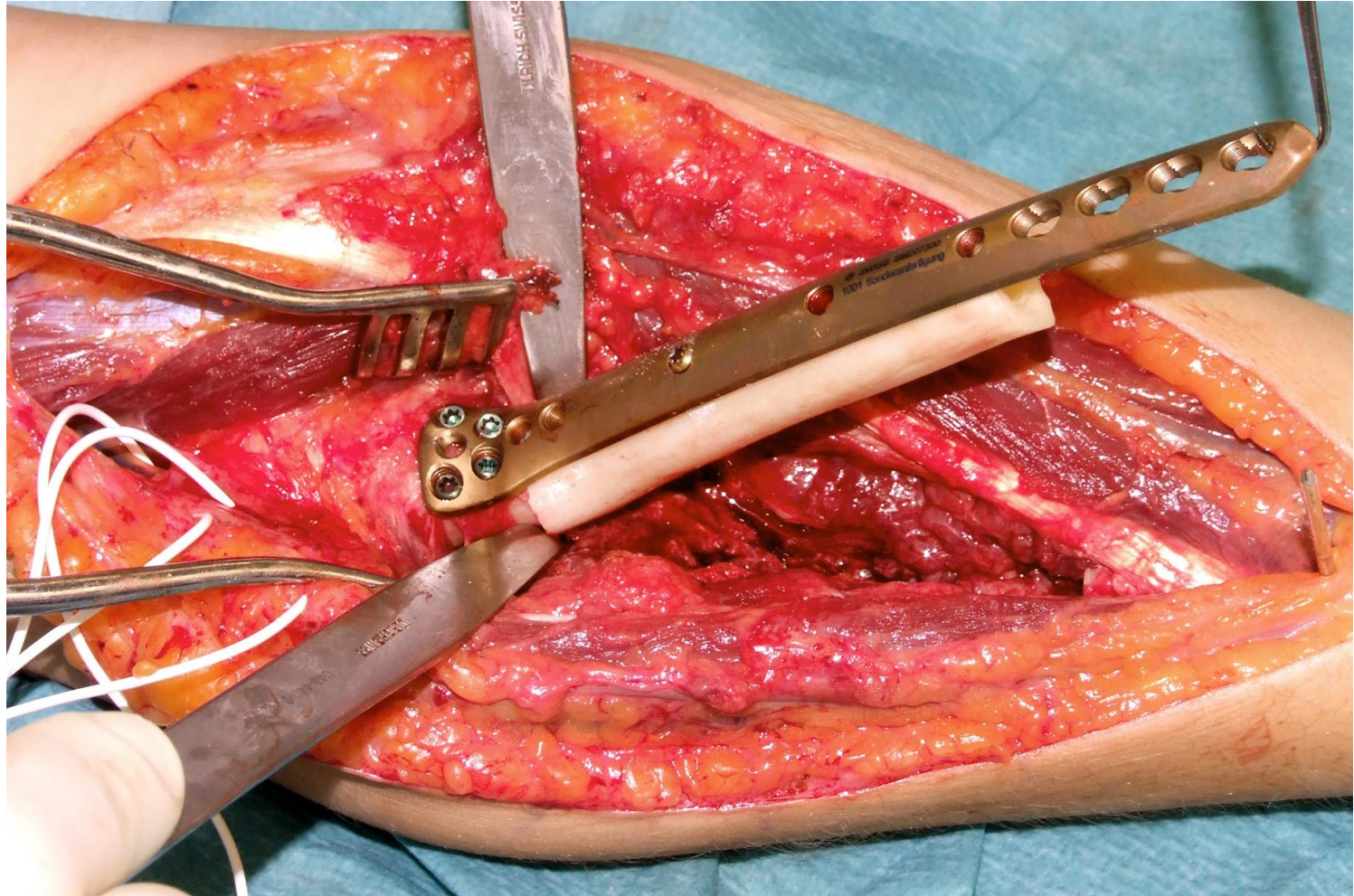
forearm; proximal radius w radial head Surgery, Sept 27, 2011



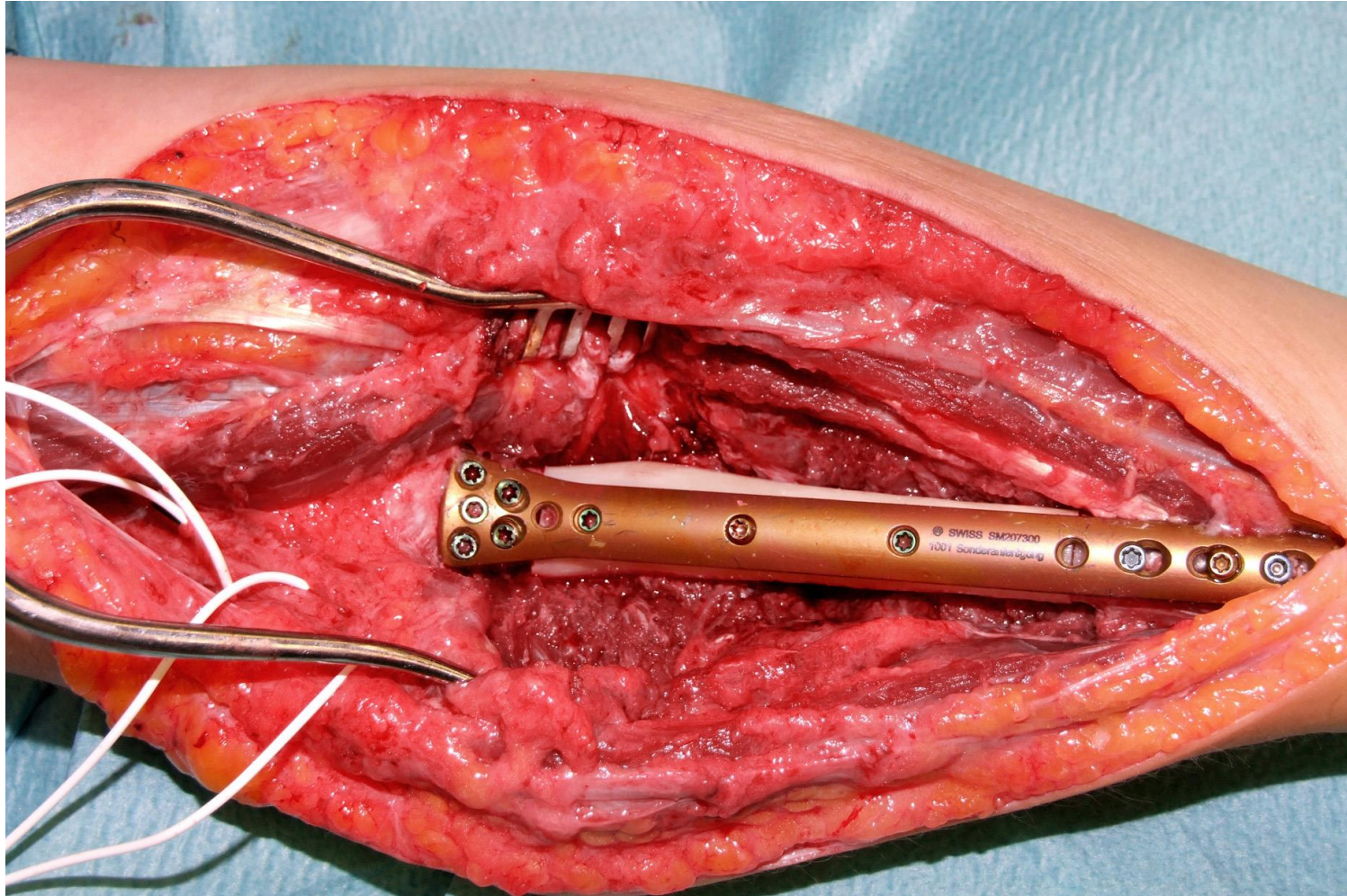
forearm; proximal radius w radial head Surgery, Sept 27, 2011



forearm; proximal radius w radial head Surgery, Sept 27, 2011



forearm; proximal radius w radial head Surgery, Sept 27, 2011



forearm; proximal radius w radial head

Rx post-op, Sept 28, 2011



forearm; proximal radius w radial head

Histology, Sept 27, 2011

Eingang: 27.09.2011

Klinische Angaben

Rezidiv nach intraläsionaler Tumorexzision proximaler Vorderarm am 14.7.09 bei Riesenzelltumor.

Riesenzelltumor?

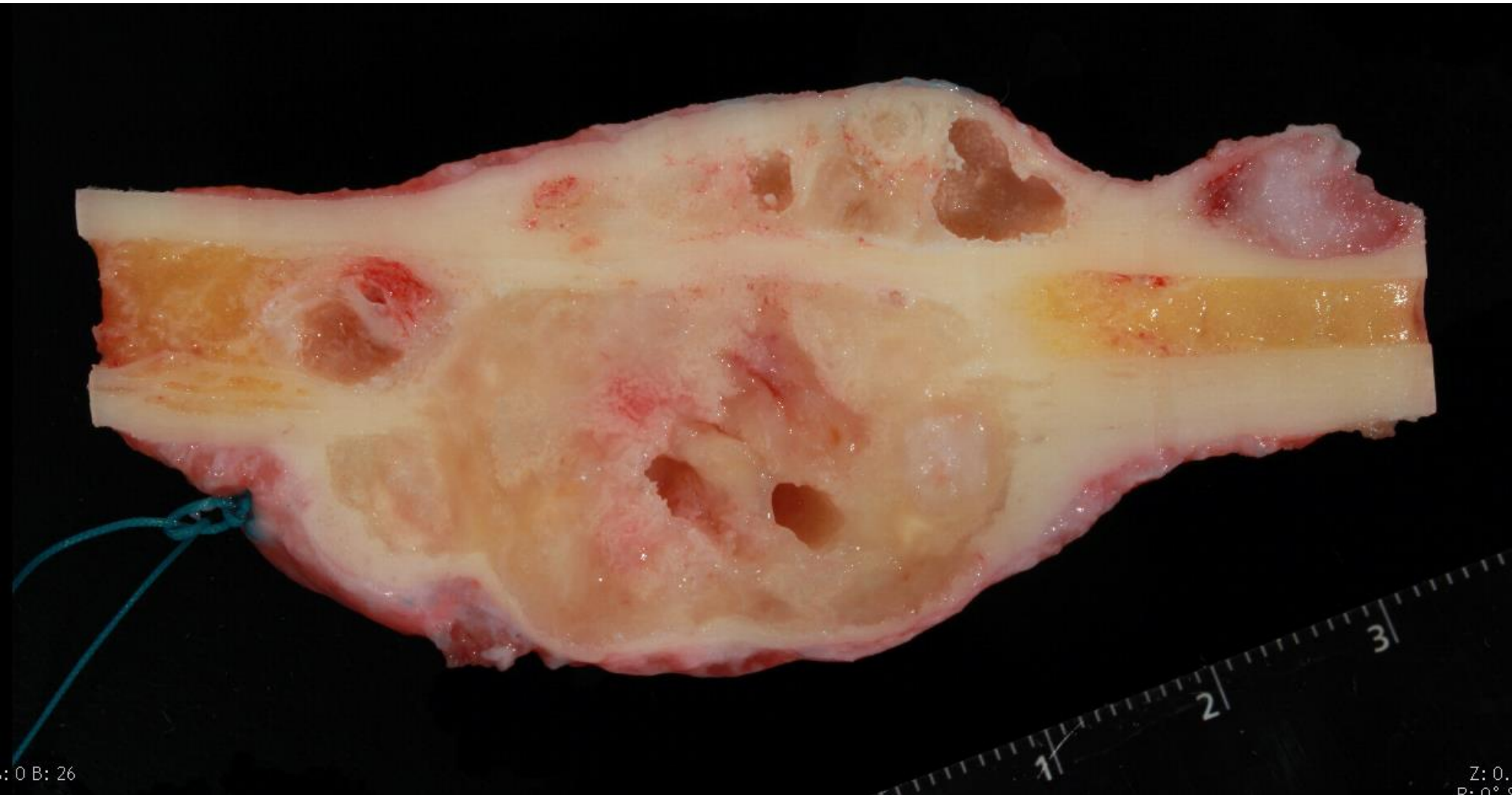
Bemerkungen: St.n. Denosomap-Therapie. Fadenmarkierung: lang = proximal, kurz = Membran interossia.

Angaben zur Probe

Proximaler Radius rechts

forearm; proximal radius w radial head

Histology, Sept 27, 2011

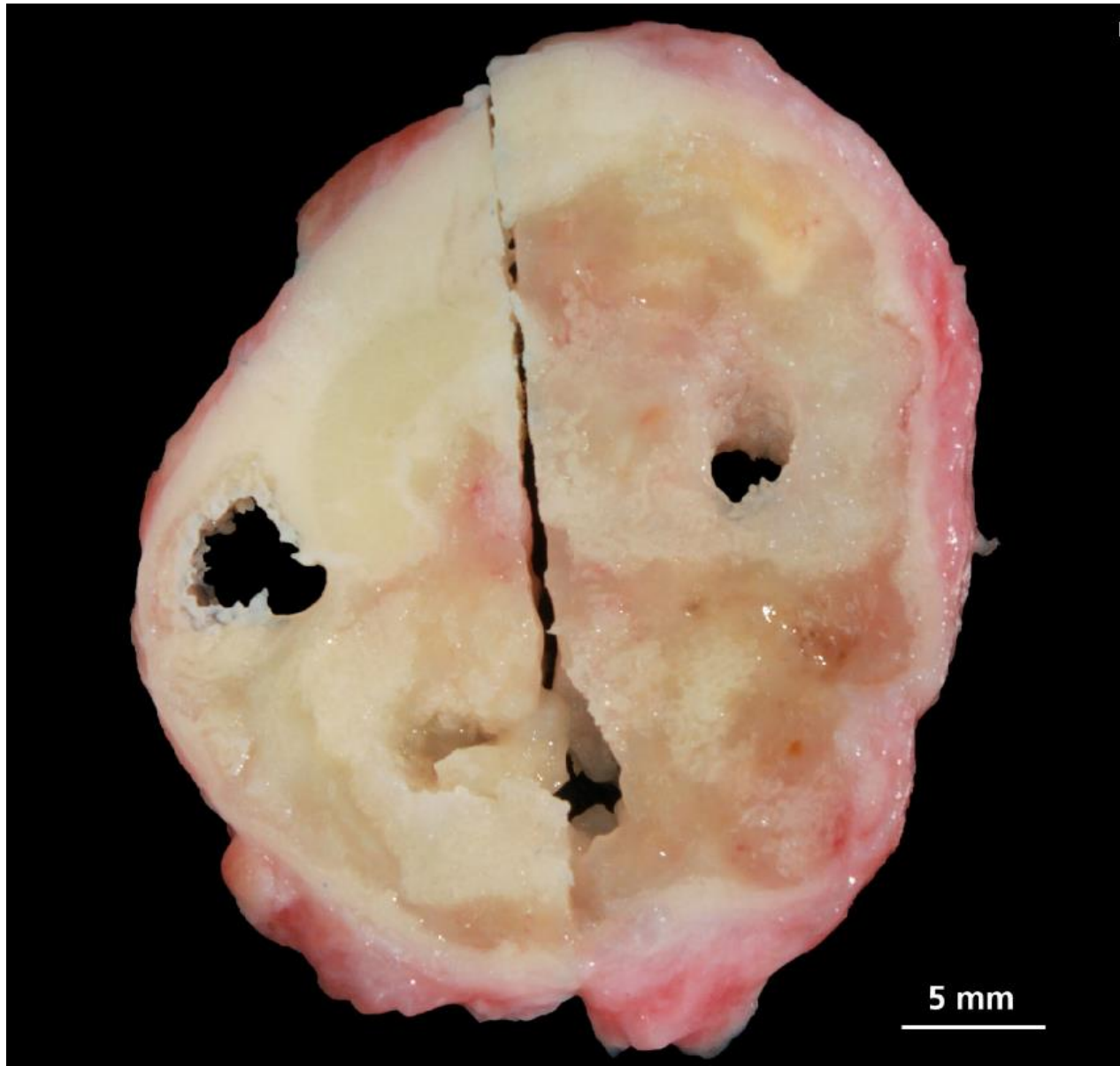


: 0 B: 26

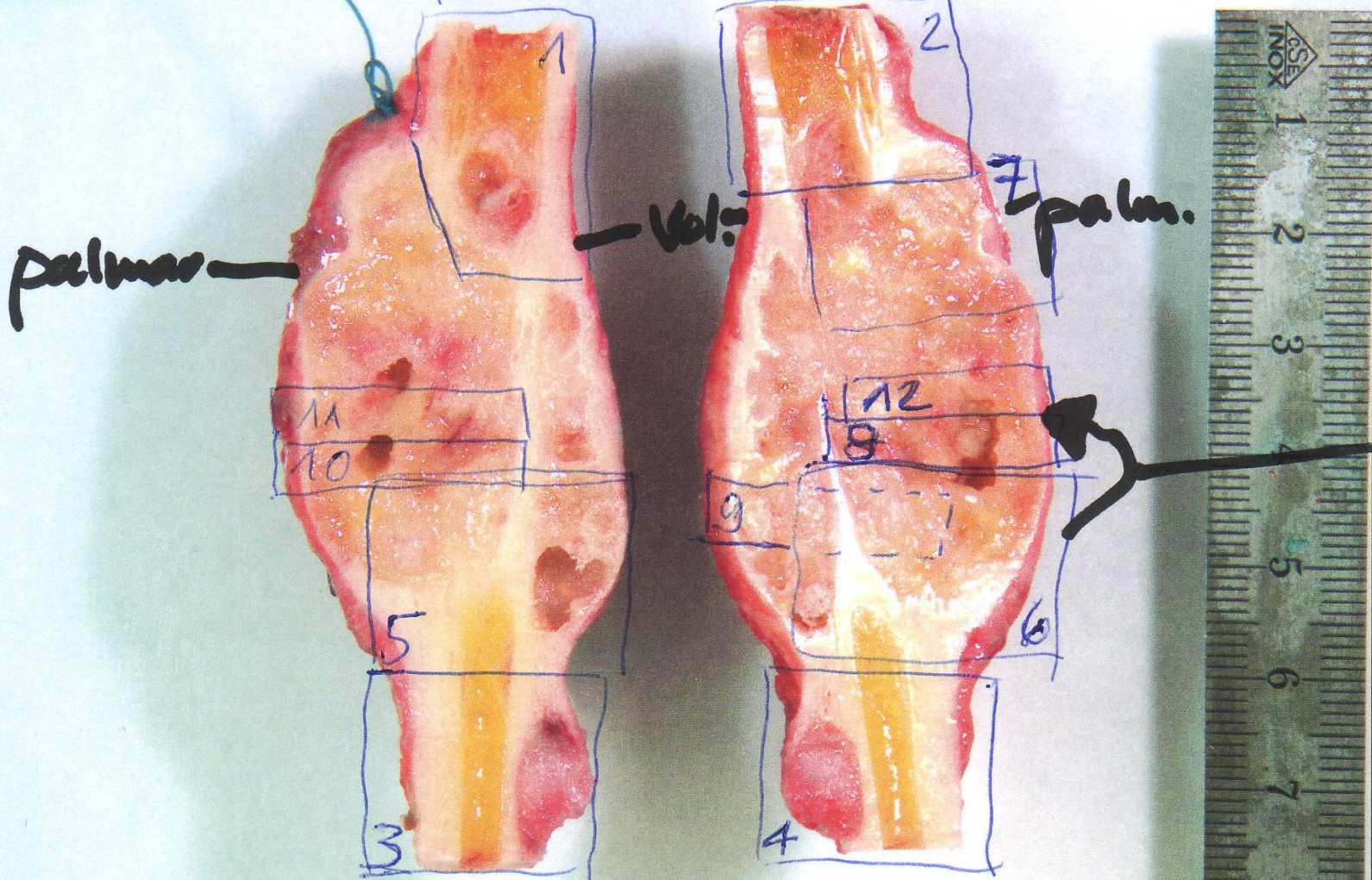
Z: 0.
P: 0°

forearm; proximal radius w radial head

Histology, Sept 27, 2011



proximal



palm.

Vol.

palm.

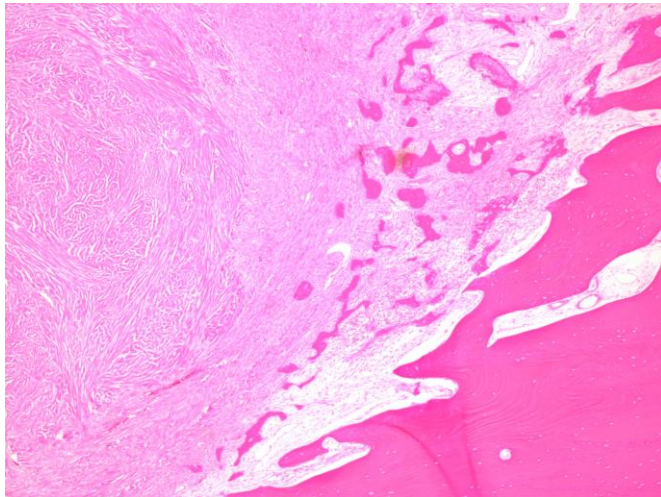
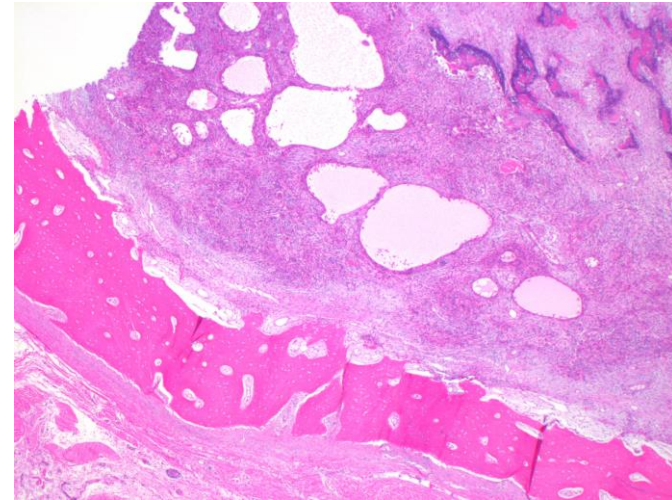
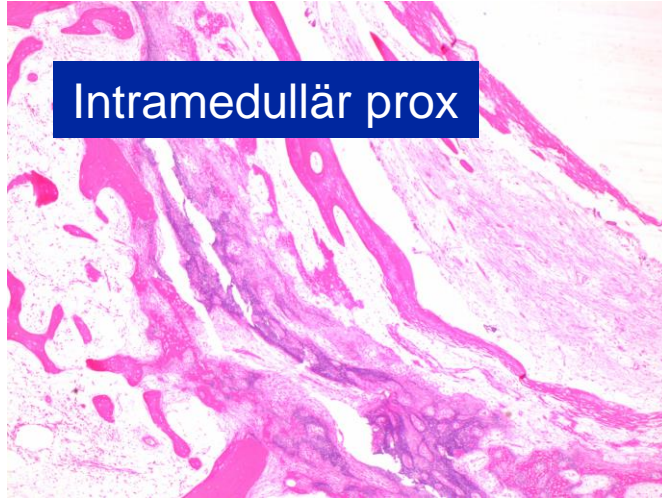
kurzer Faden

distal

2000 μm

forearm; proximal radius w radial head

Histology, Sept 27, 2011



forearm; proximal radius w radial head

Histology, Sept 27, 2011

B 2009.31197

Diagnose

Knochenteilresektat (proximaler Radius rechts) mit bis max. ca. 4,8cm messendem intraossär gelegenen, praktisch ausschliesslich intrakortikalem Infiltrat einer riesenzellhaltigen Läsion, vereinbar mit einer aneurysmatische Knochenzyste bei Status nach Therapie mit Denosumab (vgl. Kommentar).

Praktisch vollständige Umschliessung der Läsion durch eine knöcherne Schale. Kein Nachweis von Tumorgewebe in den Resektionsrändern sowohl ossär wie auch zirkumferentiell in den Weichteilen, bis auf eine fragliche Stelle im Bereiche der distalen Kortikalis (vgl. Kommentar). Keine Malignität.

14.07.2009

Kommentar

Im Vergleiche mit den Vorbefunden, sowohl histologisch als auch bildgebend zeigt sich eine eindruckliche Antwort auf die stattgefundene Therapie mit Denosumab. Das Gewebe ist nun deutlich lokalisiert und von einer Knochenschale demarkiert. Das Gewebe lässt sich eindeutig auf Epizentrum innerhalb der Kortikalis des Radius zuordnen. Auch in ihrem mikroskopischen Aufbau zeigt das Tumorgewebe eine eindruckliche Änderung: Die Anzahl der mehrkernigen Riesenzellen ist deutlich reduziert, sie enthalten weniger Kerne und die Hauptmasse besteht aus kollagenreichen Proliferat von blanden Spindelzellen mit eindrucklicher reaktiver Knochenneubildung und stellenweise prominenten Ausbildung von sog. "blue bone".

In Gesamtschau passt die Evolution dieser riesenzellhaltigen Läsion, welche ursprünglich praktisch ausschliesslich in den Weichteilen nachweisbar war, besser zur Diagnose einer überwiegend **intrakortikalen aneurysmatischen, überwiegend soliden Knochenzyste** als zu einem extraossärem Riesenzelltumor der Weichteile.

Nach wie vor keine Hinweise für Malignität.

forearm; proximal radius w radial head xRay, Nov 09th, 2011



forearm; proximal radius w radial head MRI, Jan 04th, 2012



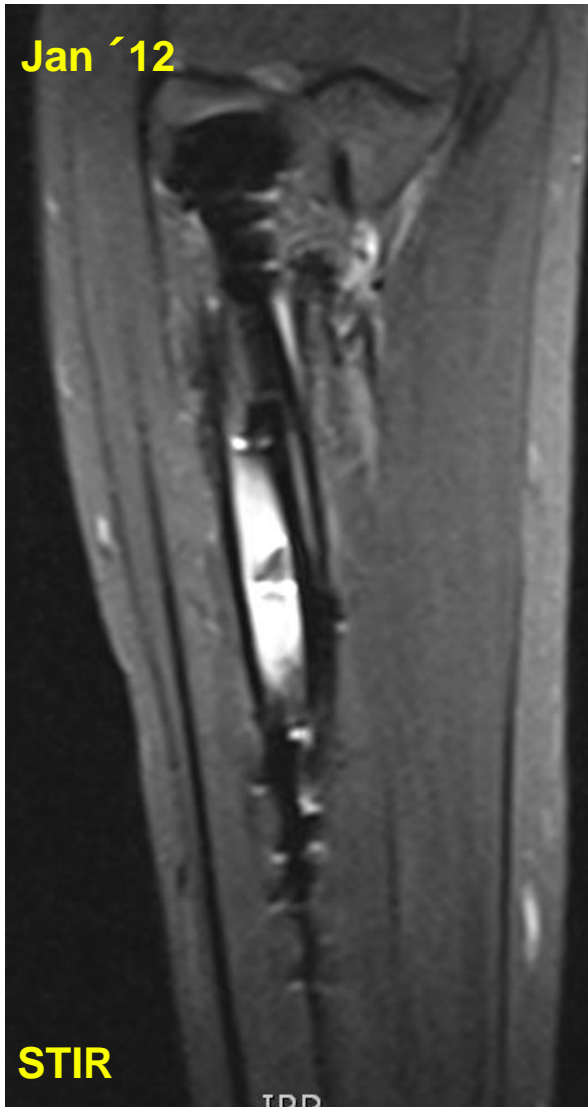
No signs of local recurrence

forearm; proximal radius w radial head X-rays, Feb 6th, 2013



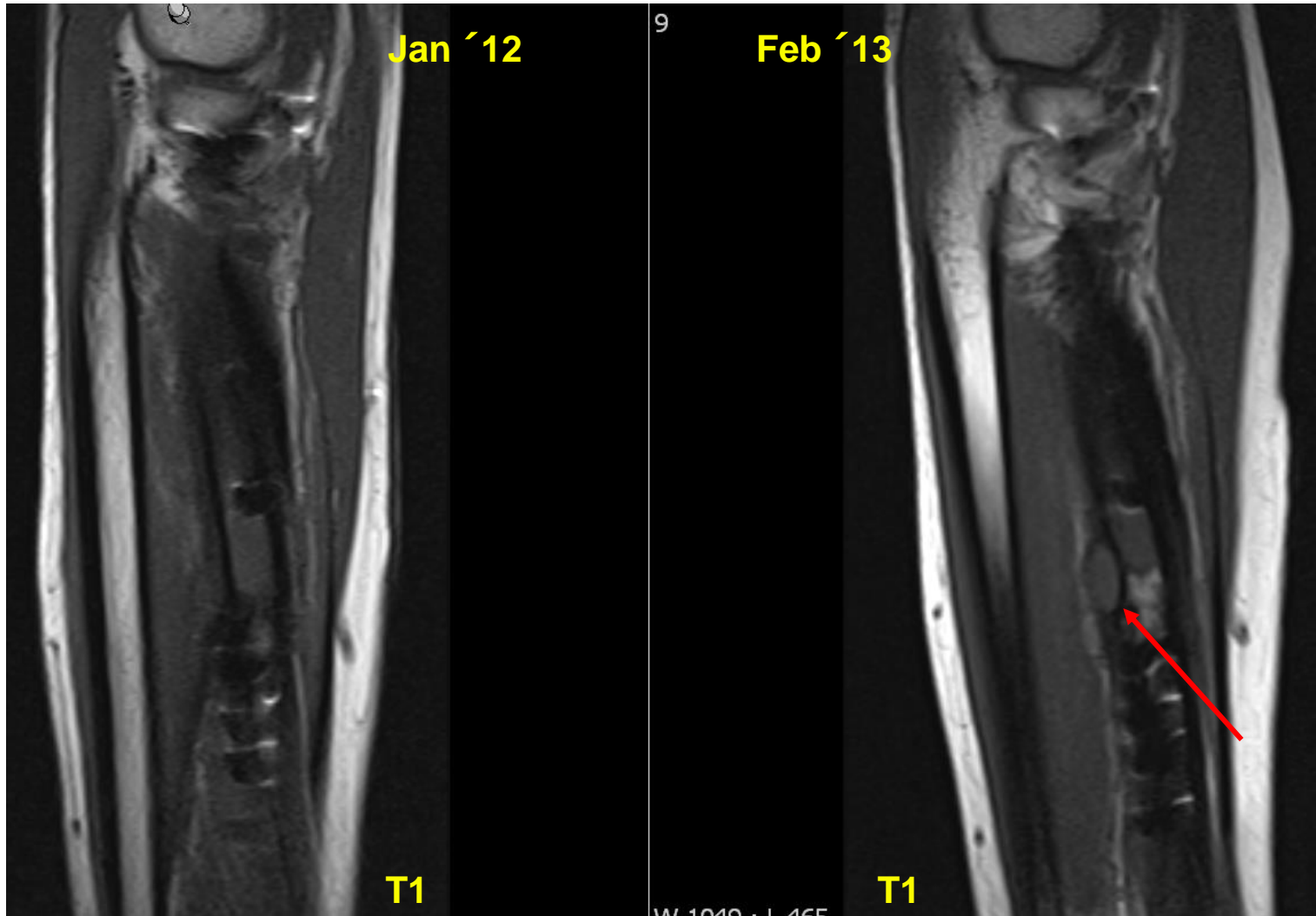
forearm; proximal radius w radial head

MRI, Feb 6th, 2013



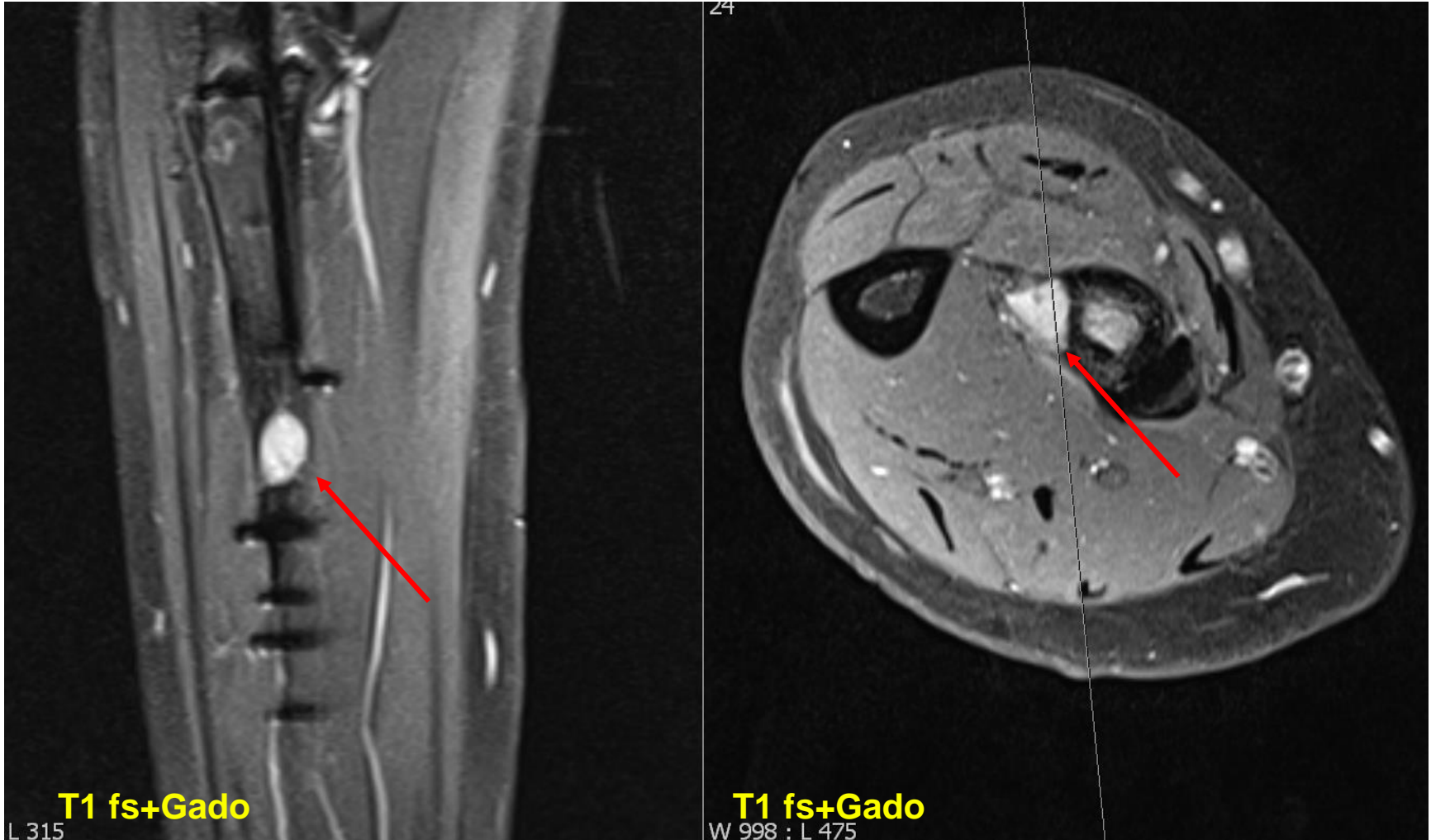
forearm; proximal radius w radial head

MRI, Feb 6th, 2013



forearm; proximal radius w radial head

MRI, Feb 6th, 2013



forearm; proximal radius w radial head

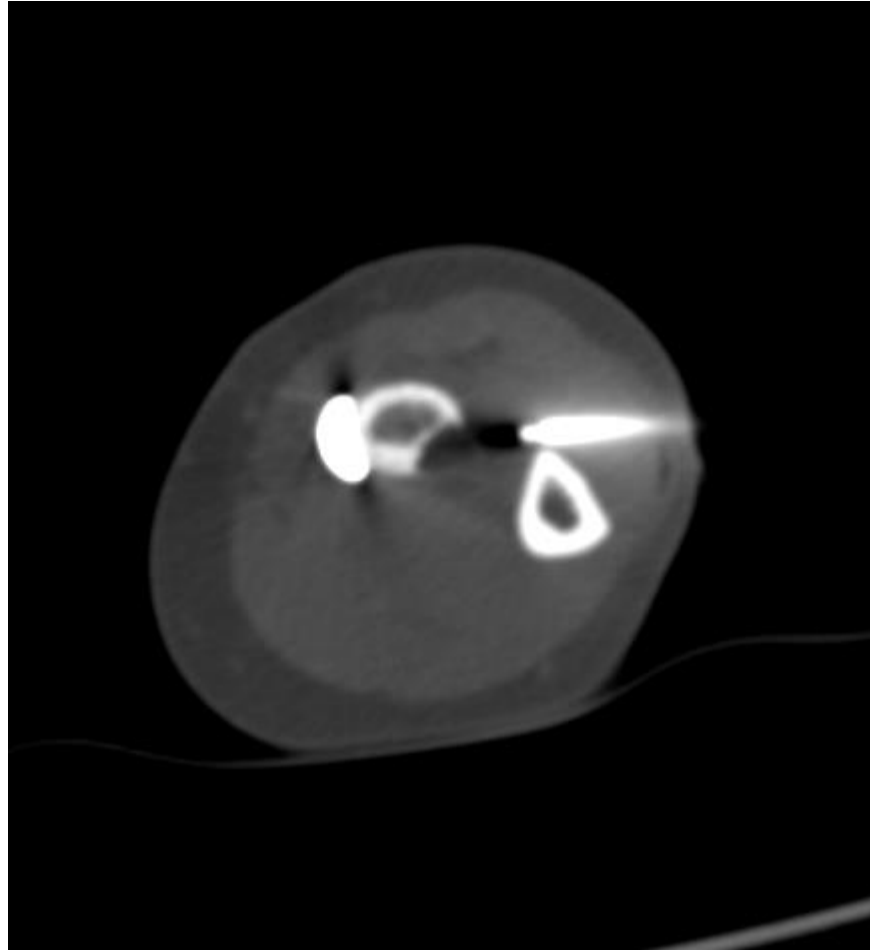
Sarcoma- Board: Feb 21st, 2013

Recommendation:

Biopsy of the lesion

forearm; proximal radius w radial head

Biopsy, Mar 1st, 2013



forearm; proximal radius w radial head

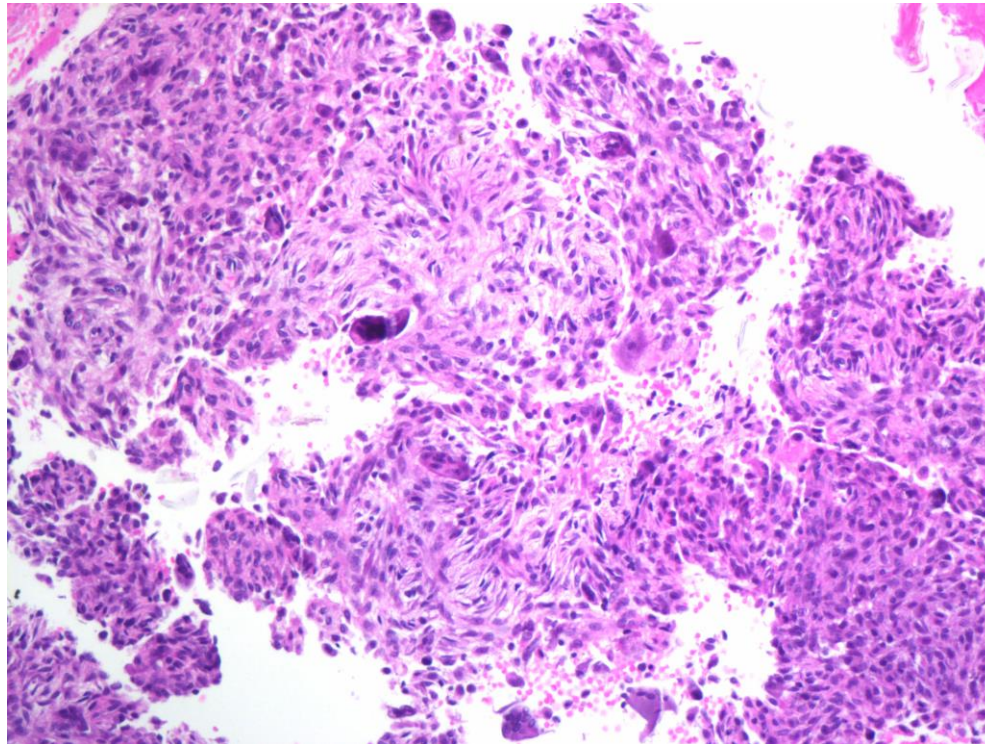
Result Biopsy, Mar 1st, 2013

Entnahme: 01.03.2013

Eingang: 01.03.2013

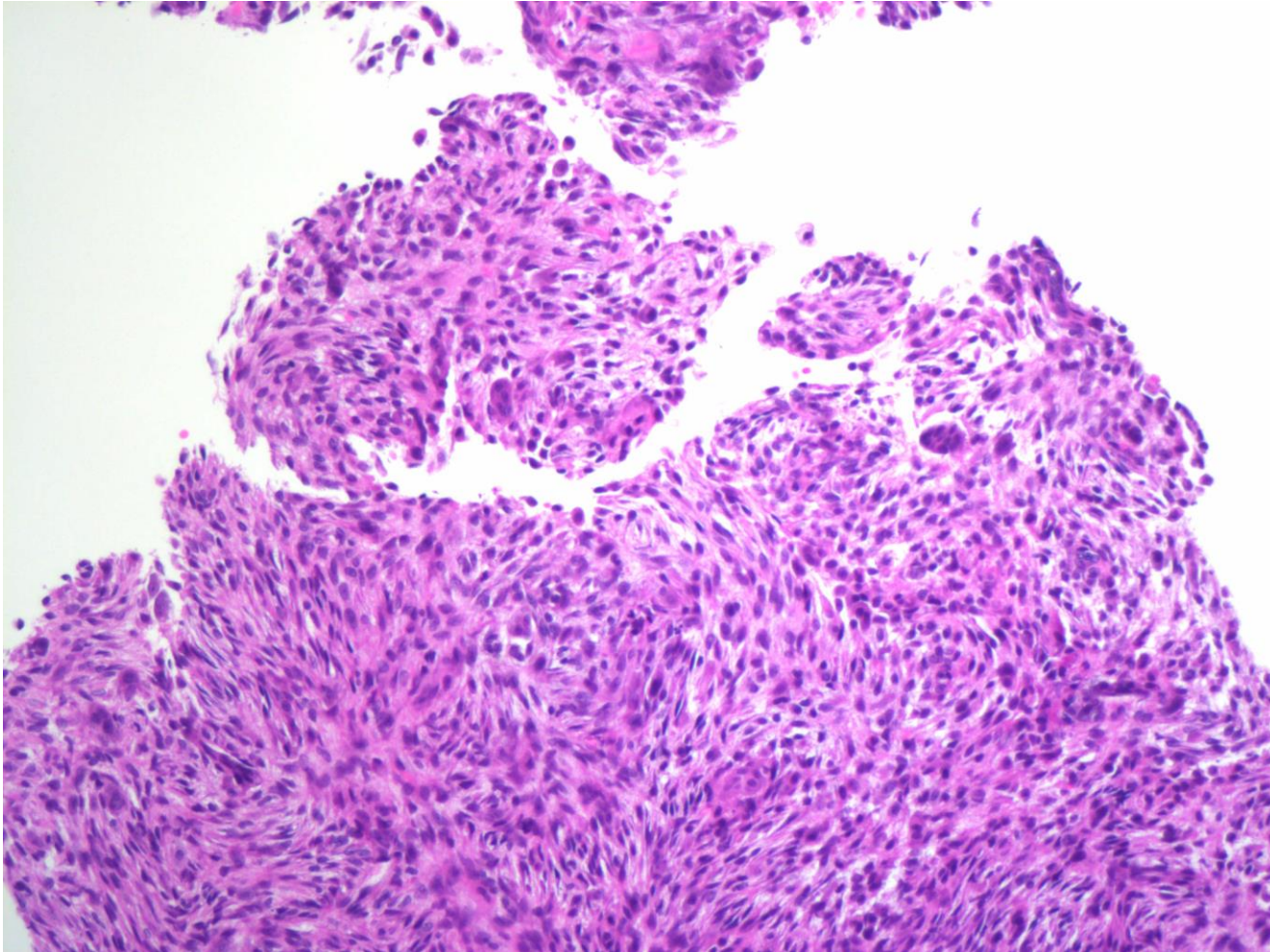
Klinische Angaben

Dignität und Art der neu aufgetretenen Läsion CT-gesteuerte Punktion (zuerst Jamshidi 11G, danach...). Leider sehr wenig Material, da kleine Läsion.



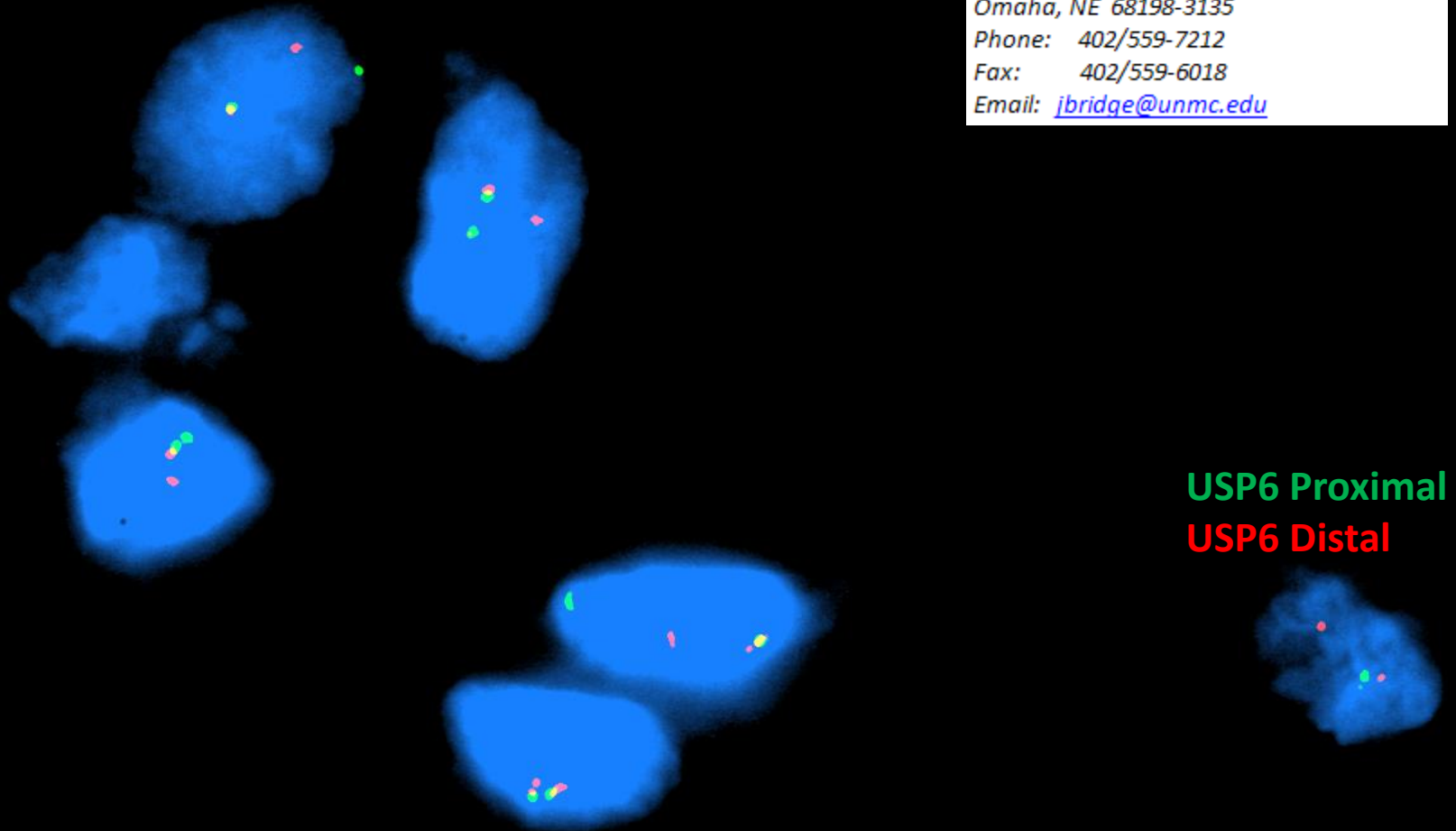
forearm; proximal radius w radial head

Result Biopsy, Mar 1st, 2013



Homebrew ABC(17p13.2) Dual Color Breakapart Probe B09.31197 Brack , Janie

*Julia A. Bridge, M.D., FACMG
Professor
Departments of Pathology/Microbiology
Pediatrics and Orthopaedic Surgery
983135 Nebraska Medical Center
Omaha, NE 68198-3135
Phone: 402/559-7212
Fax: 402/559-6018
Email: jbridge@unmc.edu*



forearm; proximal radius w radial head

Result Biopsy, Mar 1st, 2013

Entnahme: 01.03.2013

Eingang: 01.03.2013

Diagnose

Rezidiv der vordiagnostizierten aneurysmatischen Knochenzyste (Unterarm rechts; vgl. Kommentar). Keine Malignität

Kommentar

Zwischenzeitlich wurde die Biopsieprobe B09.31197 hinsichtlich der Rearrangierung des *USP6*-Gens im Labor von Frau Prof. J. Bridge, Nebraska Medical Center, USA untersucht. Die Rearrangierung des USP6-Gens konnte mittels einer FISH-Untersuchung nachgewiesen und somit die Diagnose einer (wohl periostealen/kortikalen) aneurysmatischen Knochenzyste definitiv bestätigt werden.

forearm; proximal radius w radial head

Sarcoma- Baord: Mar 7, 2013

Therapeutic decisions:

Radiotherapy:

No

Chemotherapy:

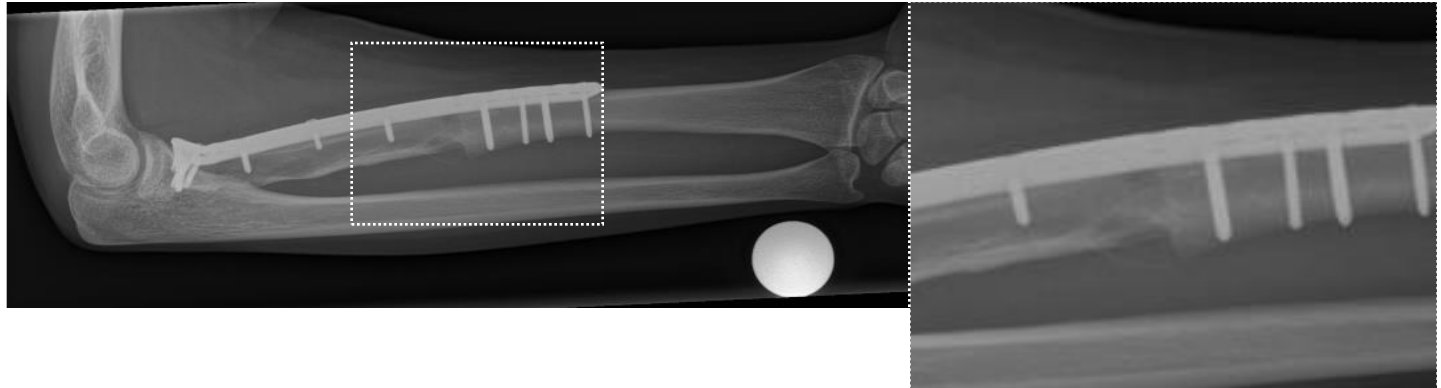
A neoadjuvant systemic therapy with denosumab for 6 months is recommended

Surgery:

After completion of the treatment system, the resection of recurrence is planned with possibly new allograft.

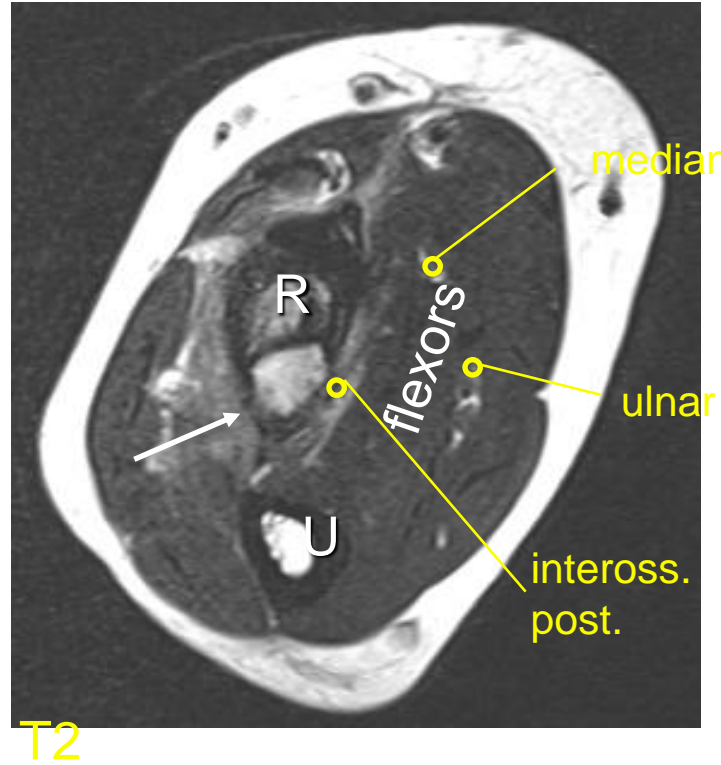
forearm; proximal radius w radial head

x-ray right forearm, July 10, 2013



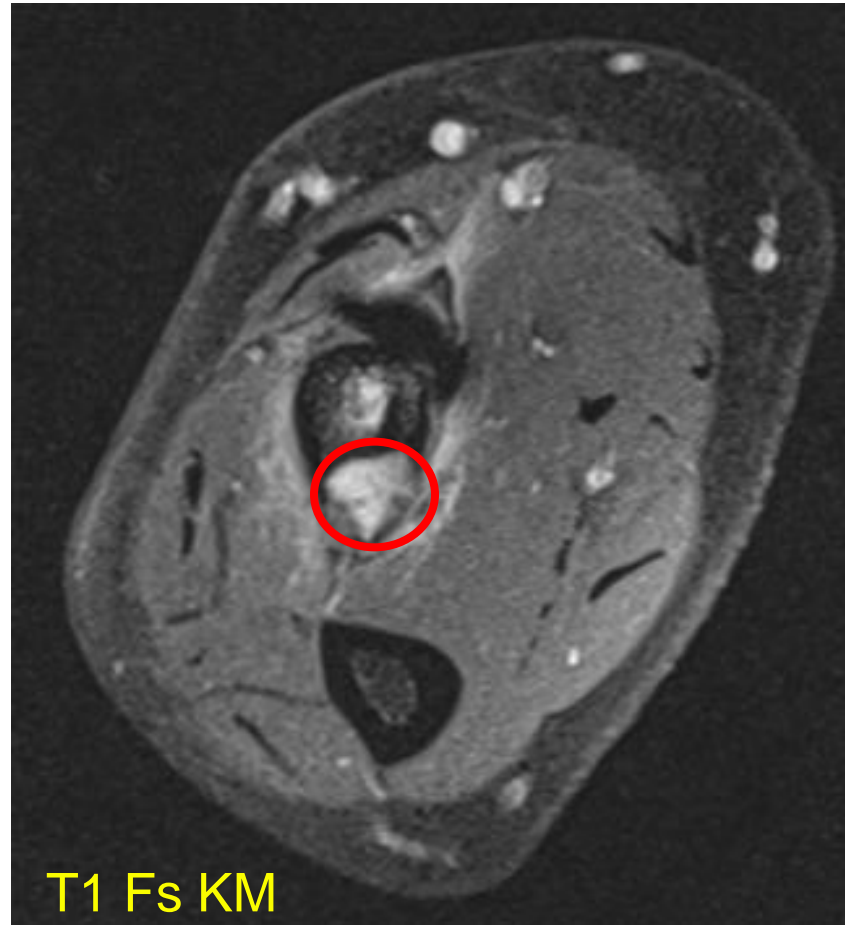
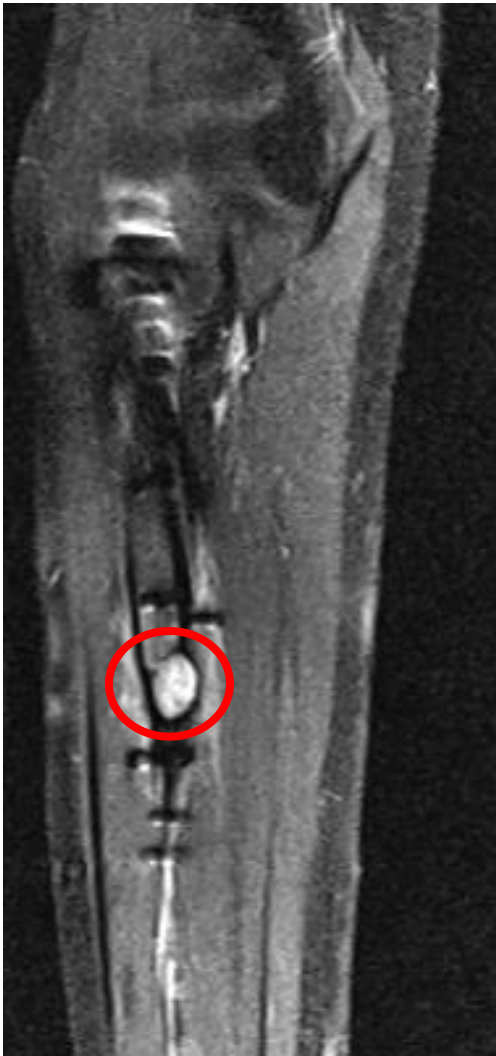
forearm; proximal radius w radial head

MRI right forearm, July 10, 2013



forearm; proximal radius w radial head

MRI right forearm, July 10, 2013



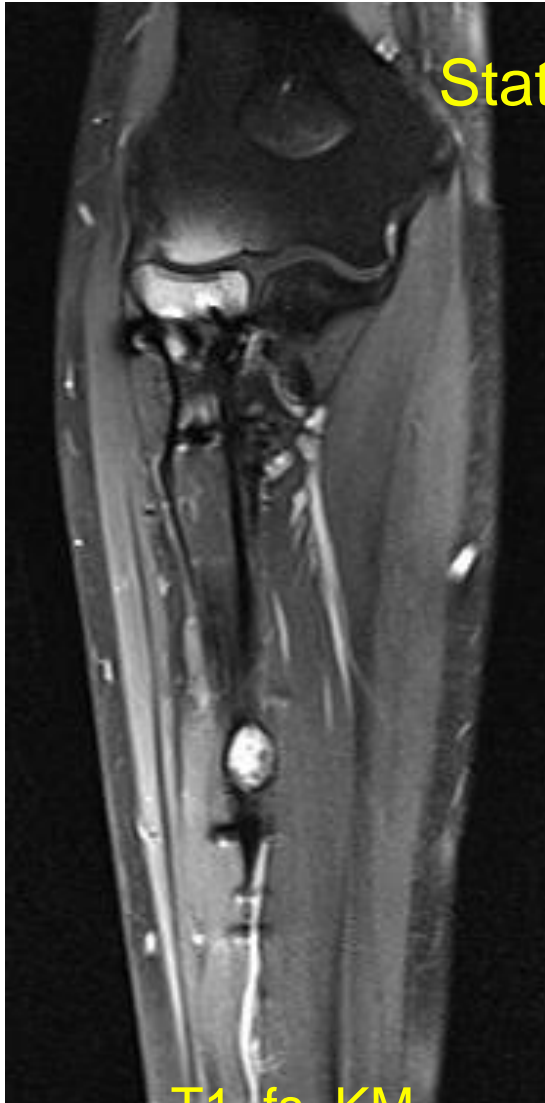
forearm; proximal radius w radial head

X-ray, Oct 02, 2013



forearm; proximal radius w radial head

MRI right forearm, Oct 02, 2013



Stationary size

T1_fs_KM



T1_fs_KM

forearm; proximal radius w radial head

Sarkom Board: October 10, 2013

Therapeutic decisions:

It is recommended to perform a CT thorax, with a special search for calcified foci, to ensure that no metastases are present

Chemotherapy:

It is recommended to continue with Denosumab

Radiotherapy:

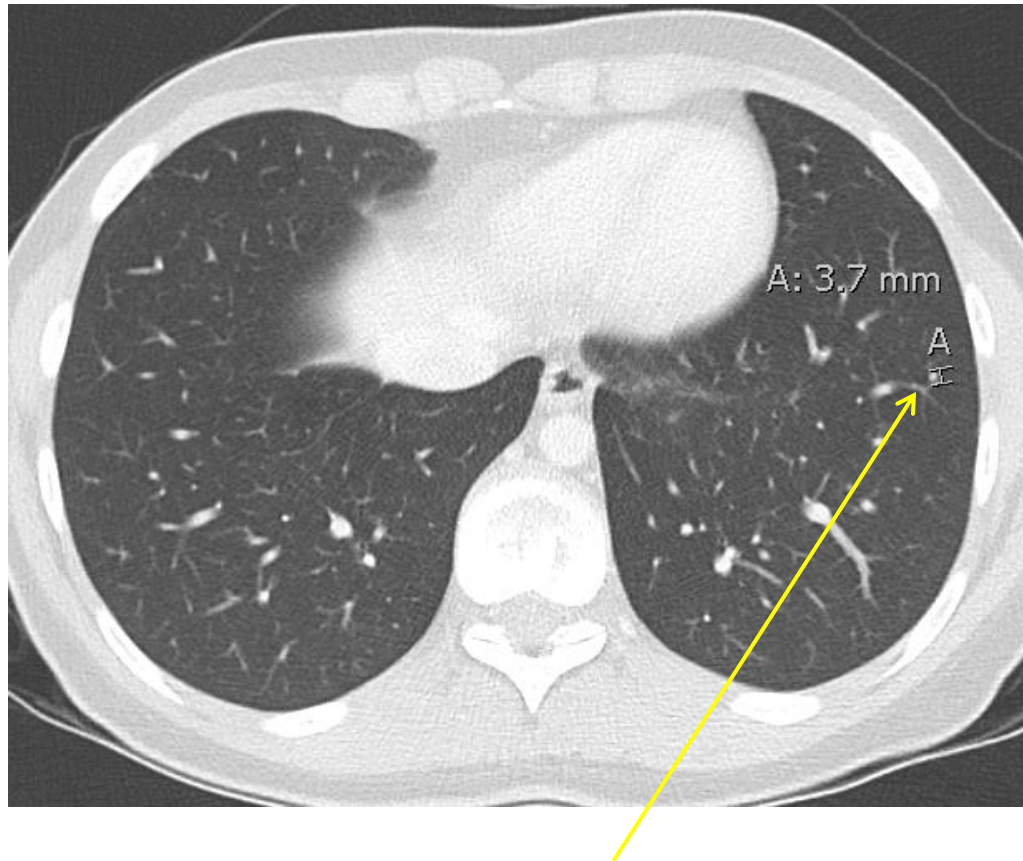
No

Surgery:

Yes, the surgery is planned on January 2014.

forearm; proximal radius w radial head

Chest CT: October 16, 2013



4mm nodule in left inferior lobe – not suspect for metastasis

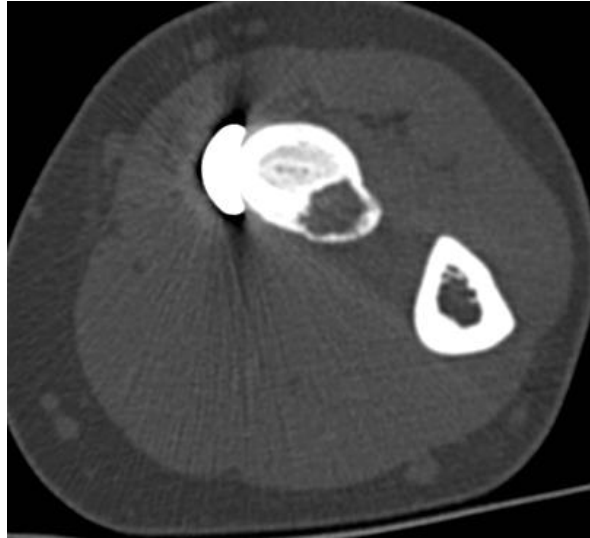
forearm; proximal radius w radial head

Denosumab 120mg: 5 cycles

March – November 2013

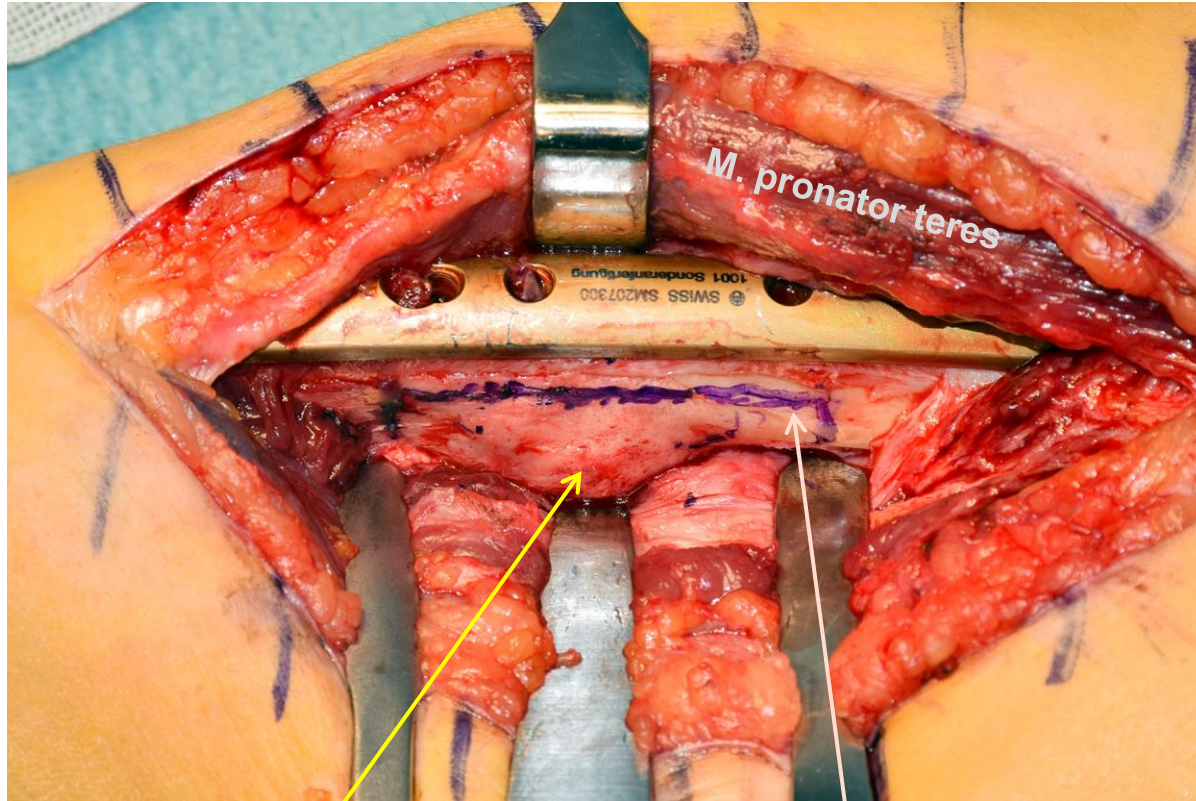
forearm; proximal radius w radial head

Preoperative CT: January 20, 2014



forearm; proximal radius w radial head

Surgery: January 21, 2014



Proximal (elbow)

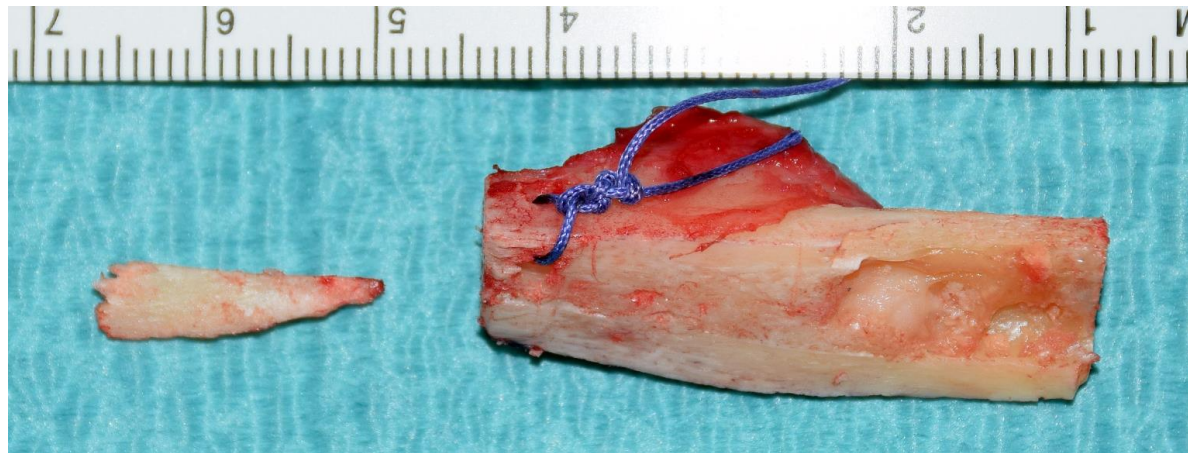
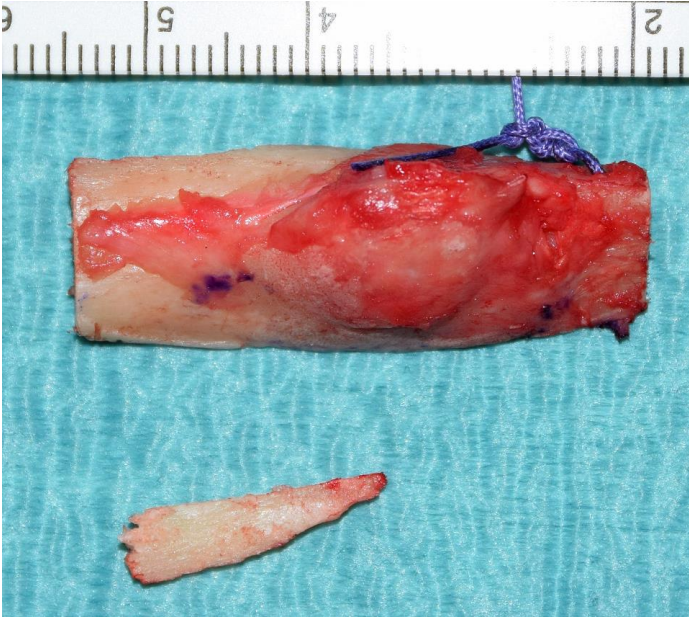
Distal (hand)

Radius (lesion)

Planned resection (osteotomy)

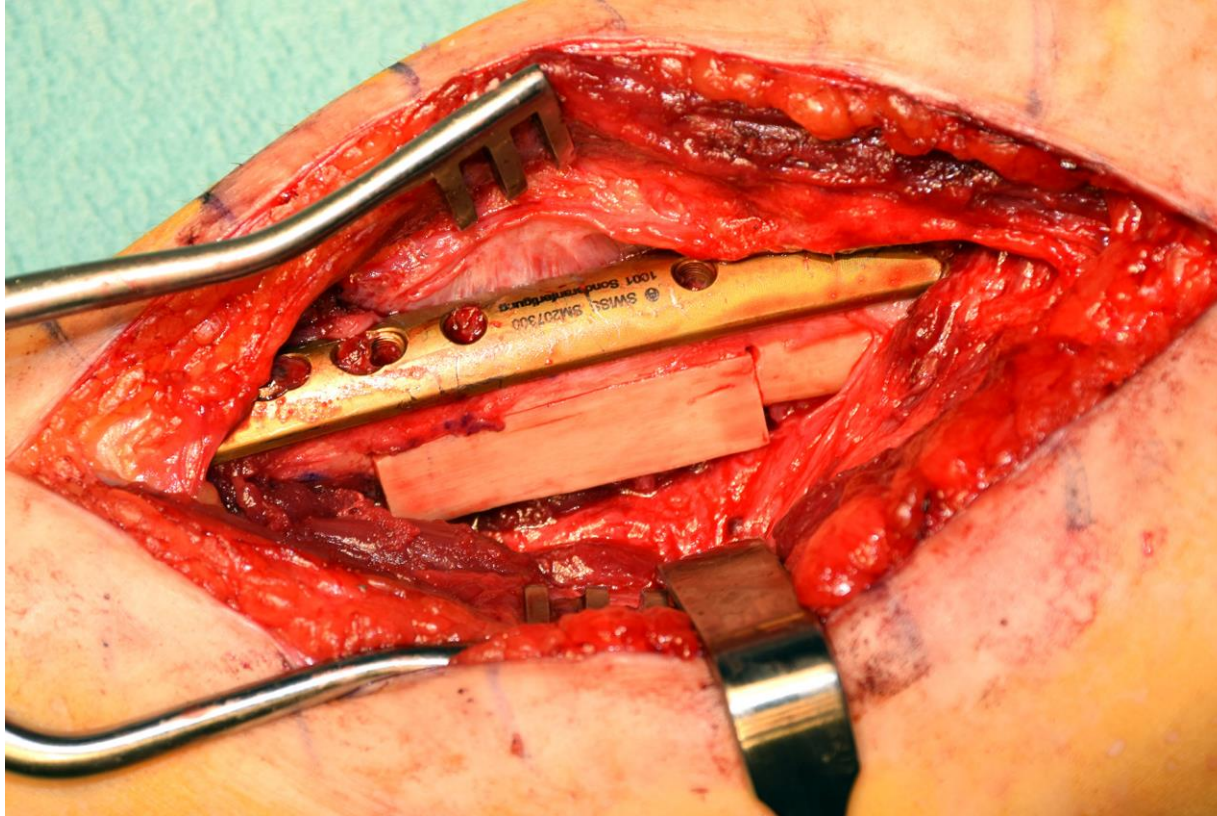
forearm; proximal radius w radial head

Surgery: January 21, 2014



forearm; proximal radius w radial head

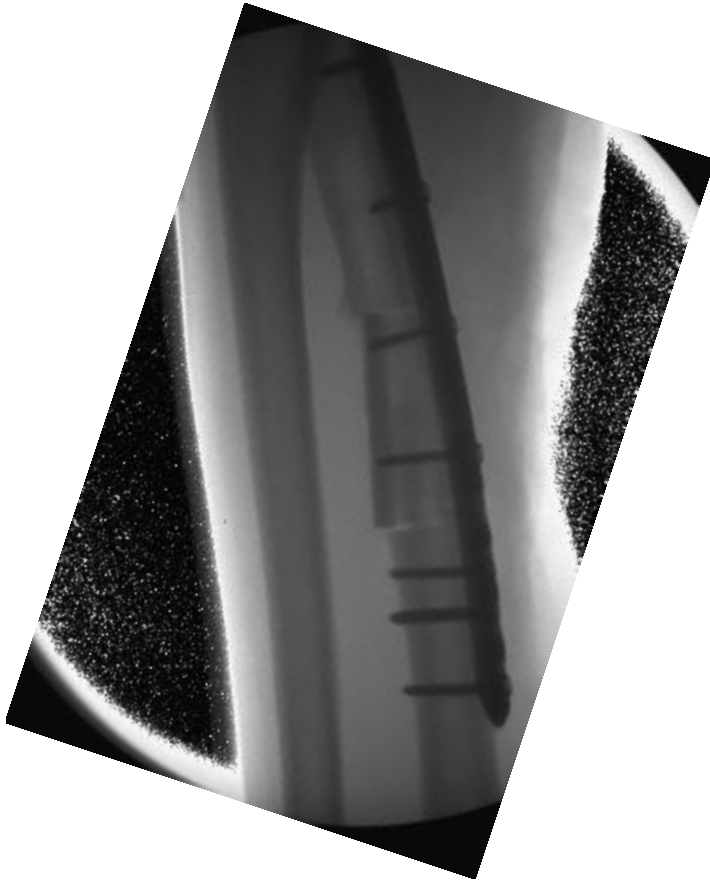
Surgery: January 21, 2014



Allograft fixation, using same plate

forearm; proximal radius w radial head

January 21, 2014



forearm; proximal radius w radial head path report January 21, 2014

Entnahme: 21.01.2014

Eingang: 21.01.2014

Klinische Angaben

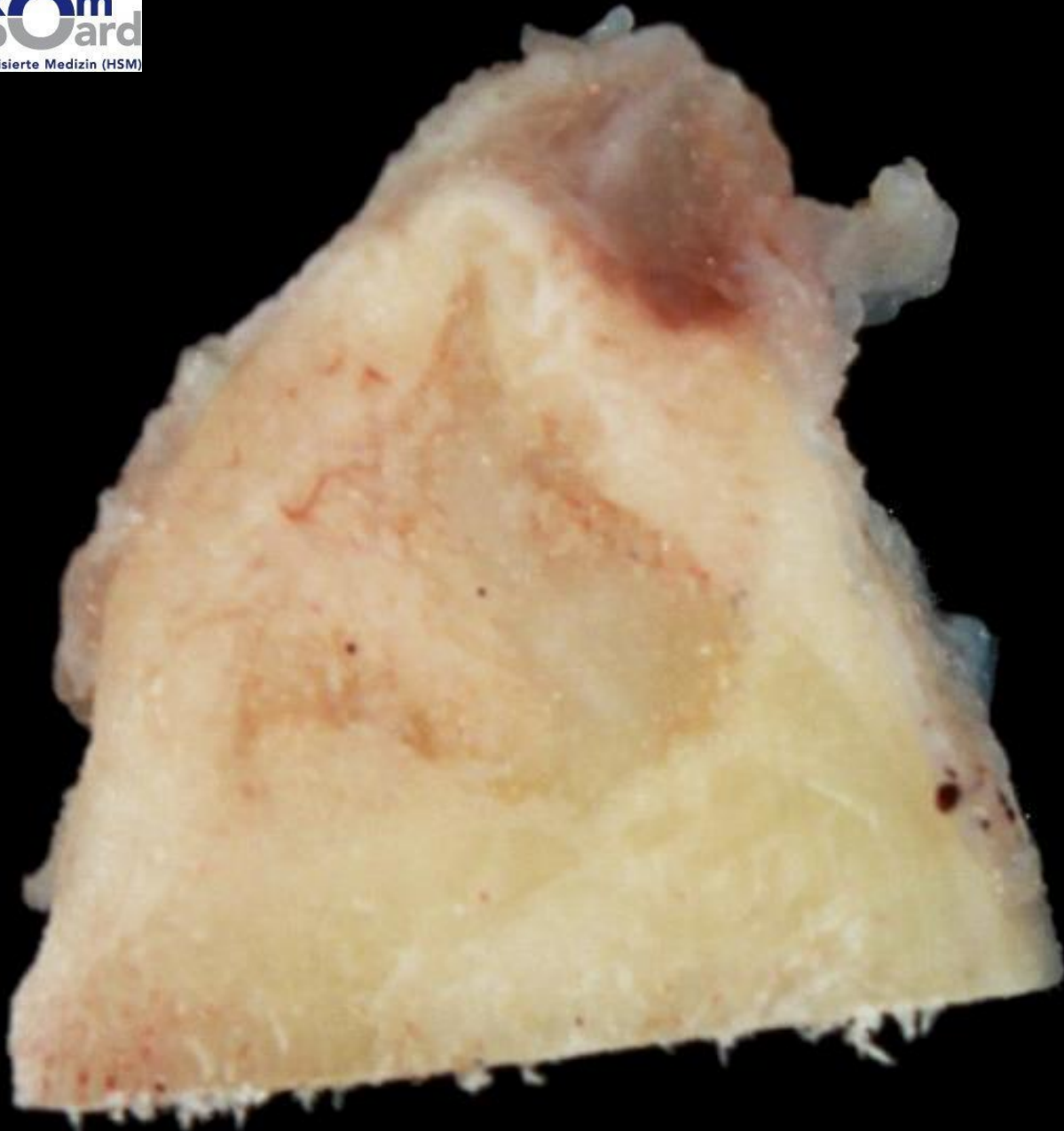
Rezidiv einer aneurysmatischen Knochenzyste intrakortikal an der Osteotomiestelle nach Allograft-Implantation 2011. Dignität?

Angaben zur Probe

Radius rechts lang-distal

forearm; proximal radius w radial head path report: January 21, 2014

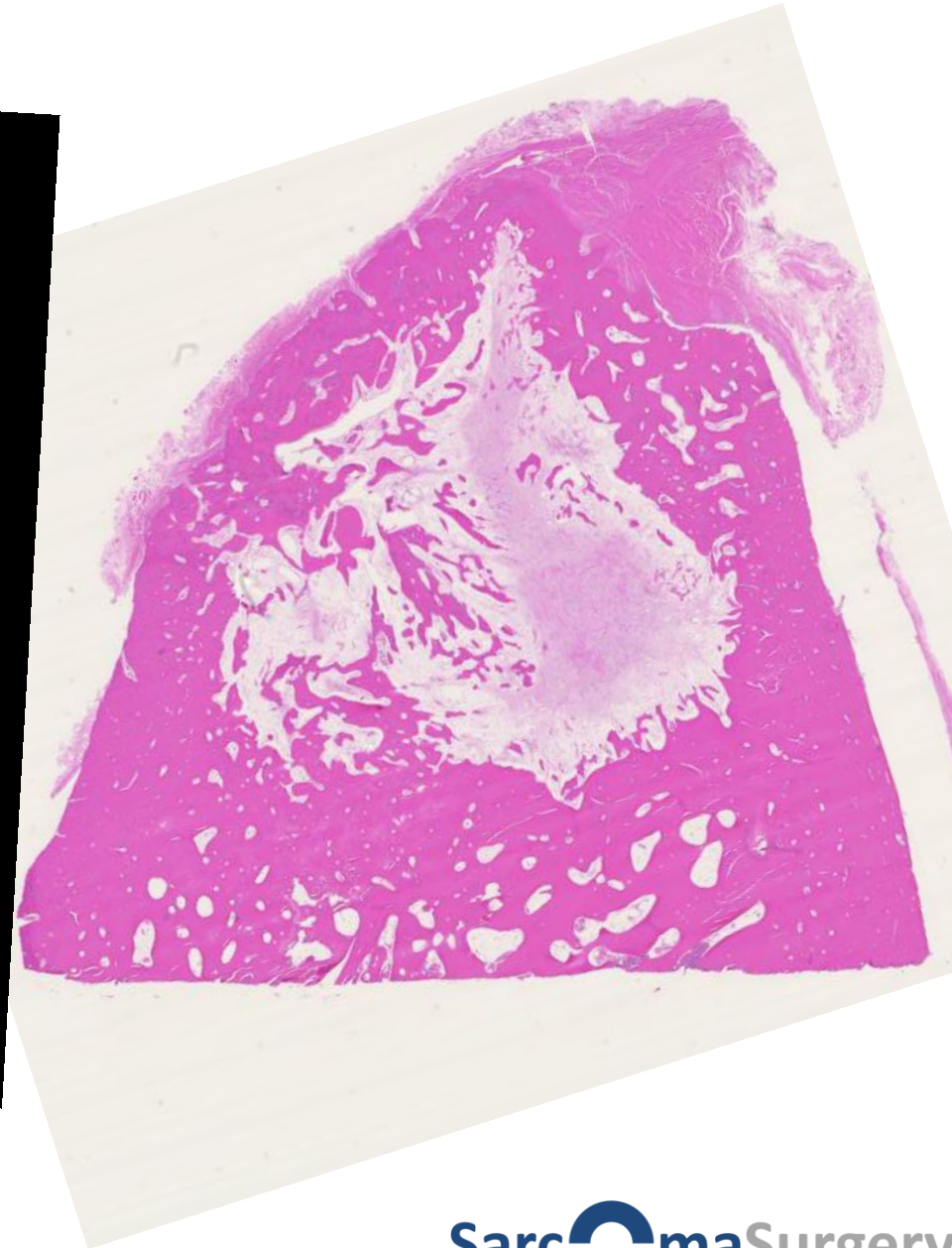




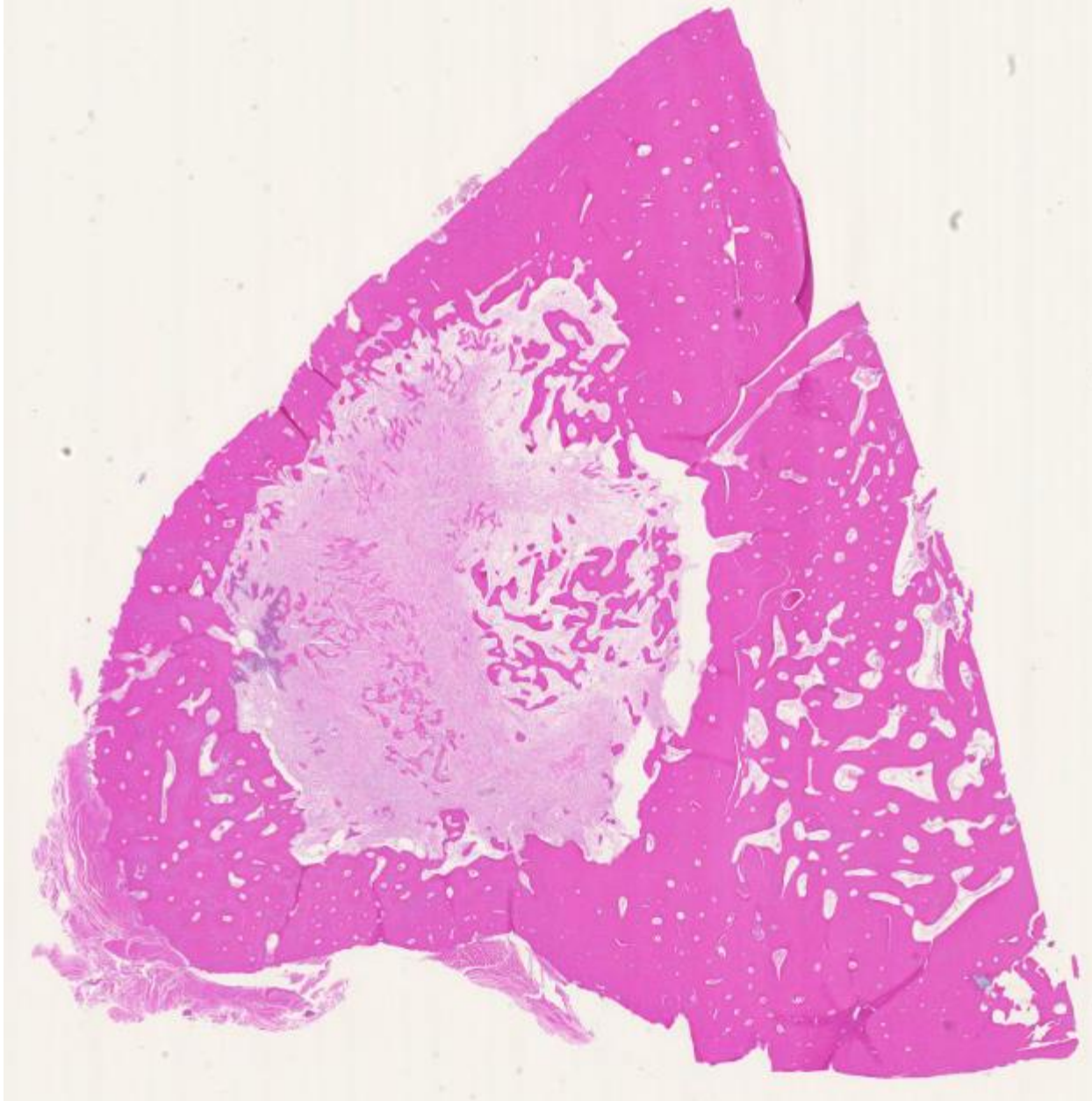
5 mm



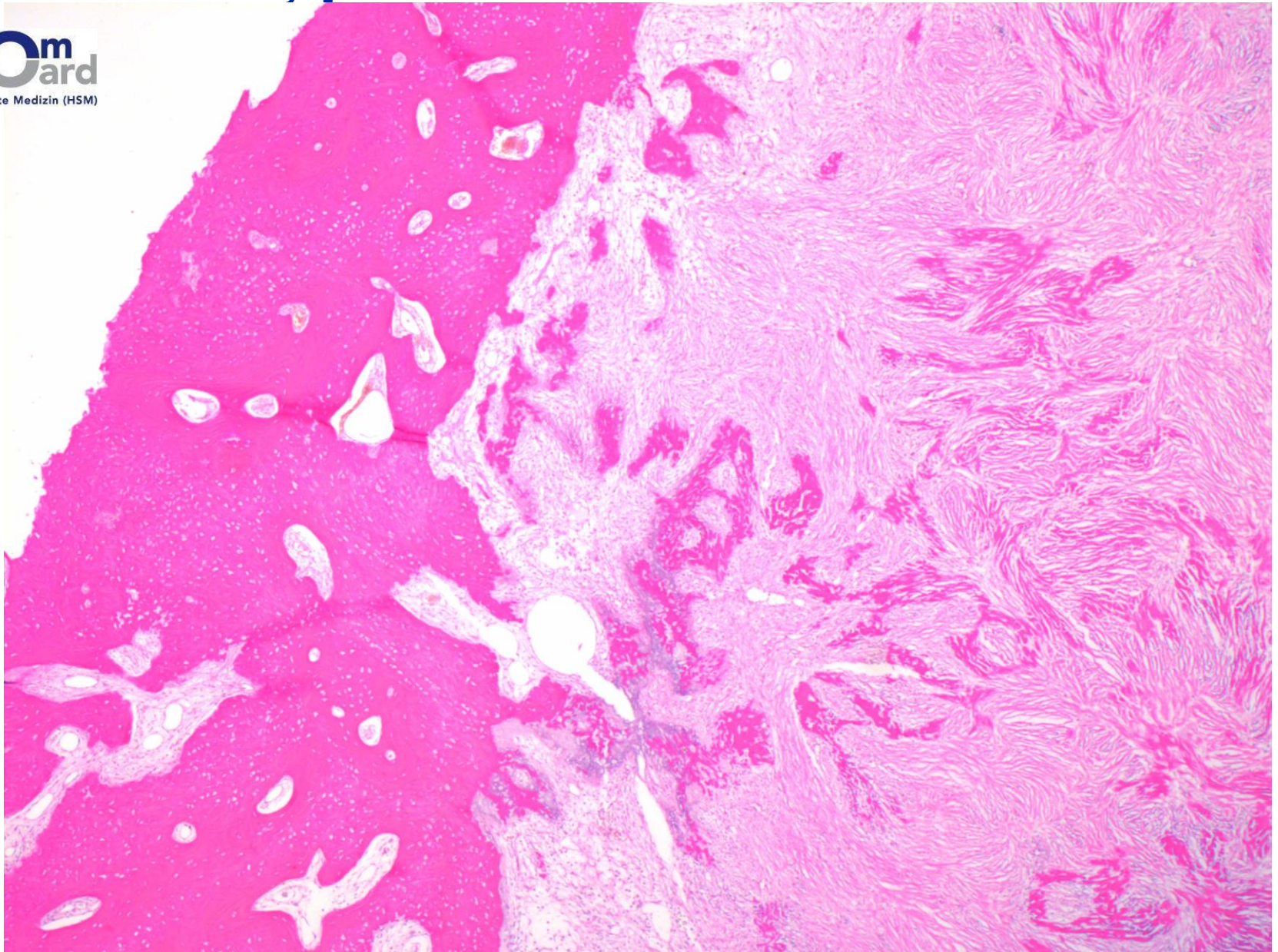
forearm; proximal radius w radial head



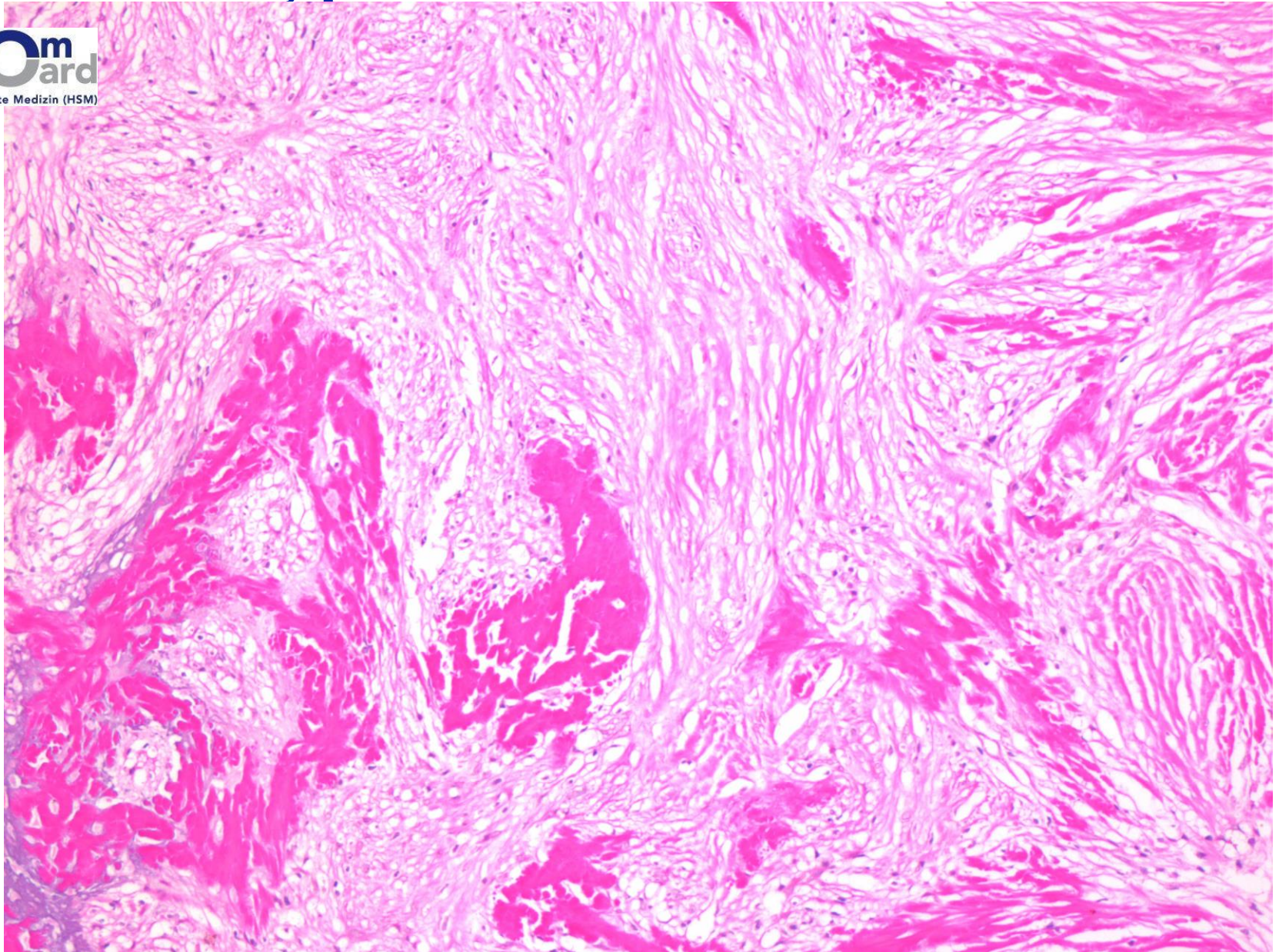
forearm: proximal radius w radial head



forearm; proximal radius w radial head



forearm; proximal radius w radial head



forearm; proximal radius w radial head

Result Surgery: January 21, 2014

Entnahme: 21.01.2014

Eingang: 21.01.2014

Diagnose

Knochenresektat (Radius rechts) mit einem vollständig entfernten, 6 mm messenden, überwiegend intrakortikal gelegenen Residuum der vordiagnostizierten, aneurysmatischen Knochenzyste mit regressiven Veränderungen bei St. n. vorausgegangener Denosumab-Therapie (vgl. Kommentar). Keine Malignität.

Kommentar

Der makroskopisch beschriebene, intrakortikale Herd überschreitet die Kortikalisgrenzen nicht, weder in die Richtung des Periost noch des Markraum. Die Resektionsränder bestehen einerseits aus unauffälliger Spongiosa und Kortikalis, andererseits (ausen zirkumferenziell) aus unauffälligen, etwas fibrosierten, periostären Weichteilen. Das läsionale Gewebe besteht ausschliesslich aus kollagenreichem Granulationsgewebe bzw.

Narbe mit etwas Blutungsresiduen und wenig reaktivem Osteoid (kleinherdig "blue bone") praktisch ohne Nachweis von mehrkernigen Riesenzellen.



CASE REPORT

Open Access

Response of an aggressive periosteal aneurysmal bone cyst (ABC) of the radius to denosumab therapy

Chantal Pauli¹, Bruno Fuchs², Christian Pfirmann³, Julia A Bridge⁴, Silvia Hofer⁵ and Beata Bode^{1*}

Abstract

Aneurysmal bone cyst (ABC), once considered a reactive lesion, has been proven to be a neoplasia characterized by rearrangements of the *USP6*-gene. Aggressive local growth and recurrences are common and therapeutic options may be limited due to the vicinity of crucial structures. We describe a case of a locally aggressive, multinucleated giant cell-containing lesion of the forearm of a 21-year old woman, treated with denosumab for recurrent, surgically uncontrollable disease. Under the influence of this RANKL inhibitor, the tumor showed a marked reduction of the content of the osteoclastic giant cells and an extensive metaplastic osteoid production leading to the bony containment, mostly located intracortically in the proximal radius. The diagnosis of a periosteal ABC was confirmed by FISH demonstrating *USP6* gene rearrangement on the initial biopsy. Function conserving surgery could be performed, enabling reconstruction of the affected bone. Inhibition of RANKL with denosumab may offer therapeutic option for patients not only with giant cell tumors but also with ABCs.

Keywords: Aneurysmal bone cyst, FISH, USP6, Denosumab