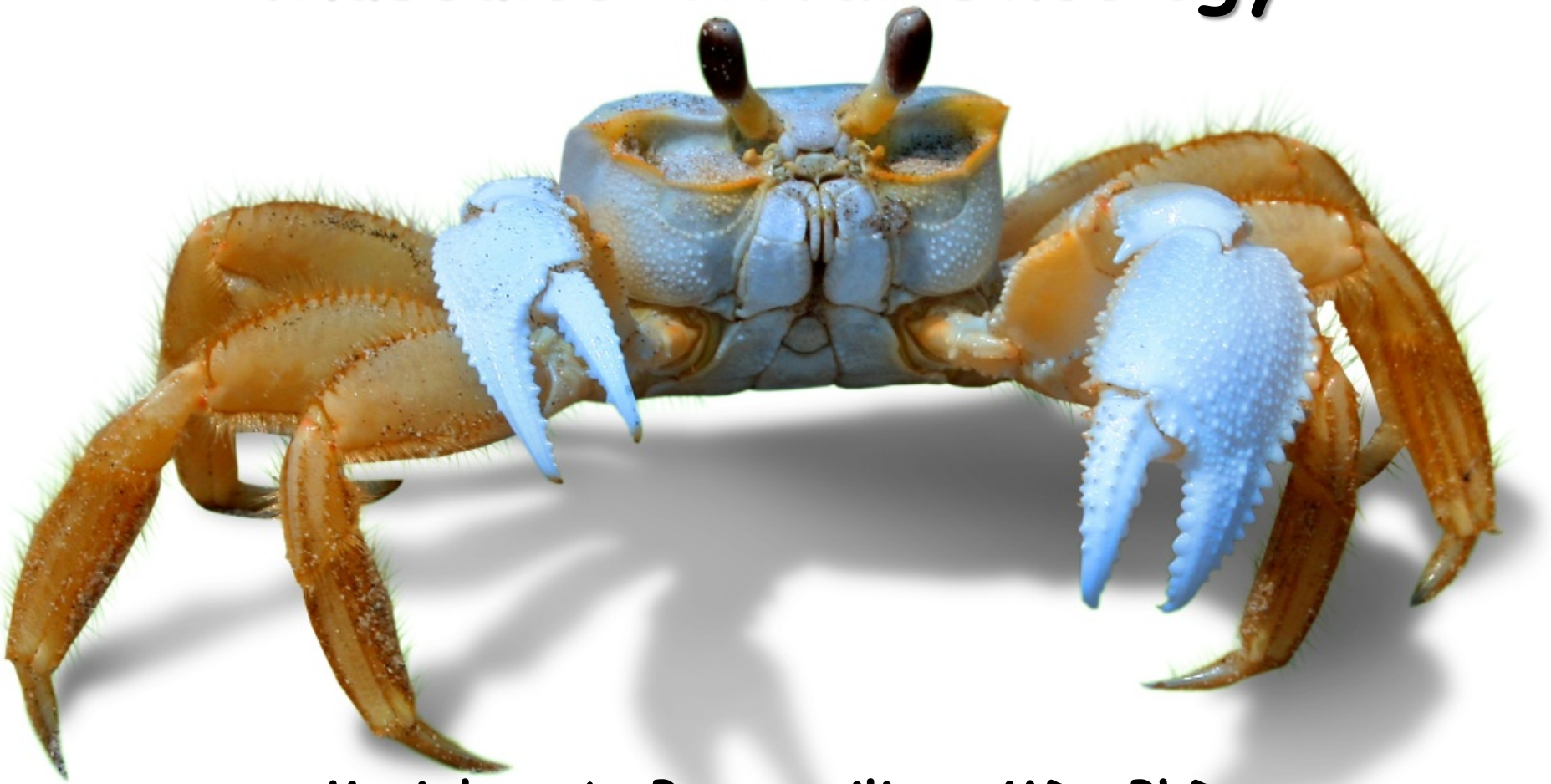
Limb-salvage Operations in Musculoskeletal Oncology



Kyriakos A. Papavasiliou, MD, PhD
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3rd Orthopaedic Dept. Aristotle University Of Thessaloniki Medical School
Papageorgiou General Hospital
papavasiliou.kyriakos@gmail.com

Surgical Technique

Pathology Report

Follow-up

Surgical Technique

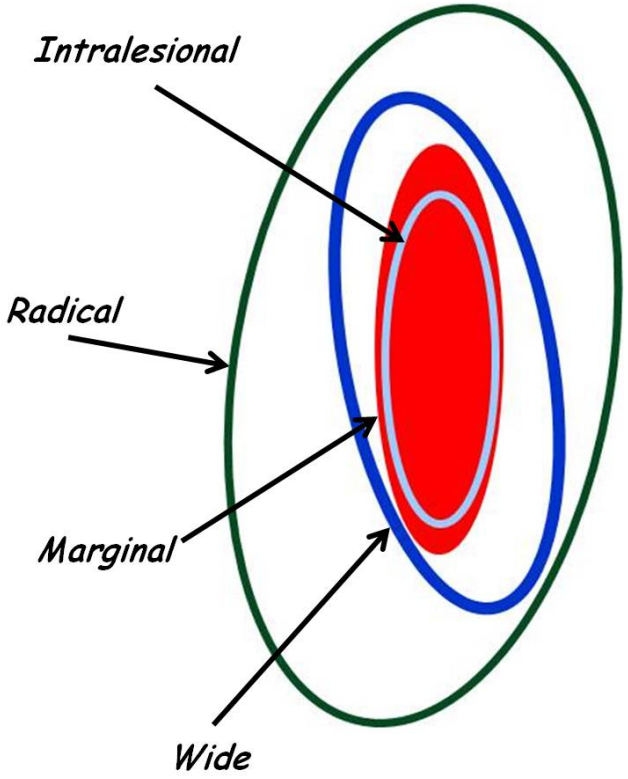
Surgical Technique

Full operative excision of both the primary lesion and/or metastasis is a prerequisite for long-term survivorship.

- **Bielack SS, Kempf-Bielack B, Delling G, et al.** Prognostic factors in high-grade osteosarcoma of the extremities or trunk: an analysis of 1,702 patients treated on neoadjuvant cooperative osteosarcoma study group protocols. J Clin Oncol 2002;20:776-790.
- **Bacci G, Longhi A, Versari M, et al.** Prognostic factors for osteosarcoma of the extremity treated with neoadjuvant chemotherapy: 15-year experience in 789 patients treated at a single institution. Cancer 2006;106:1154-1161.

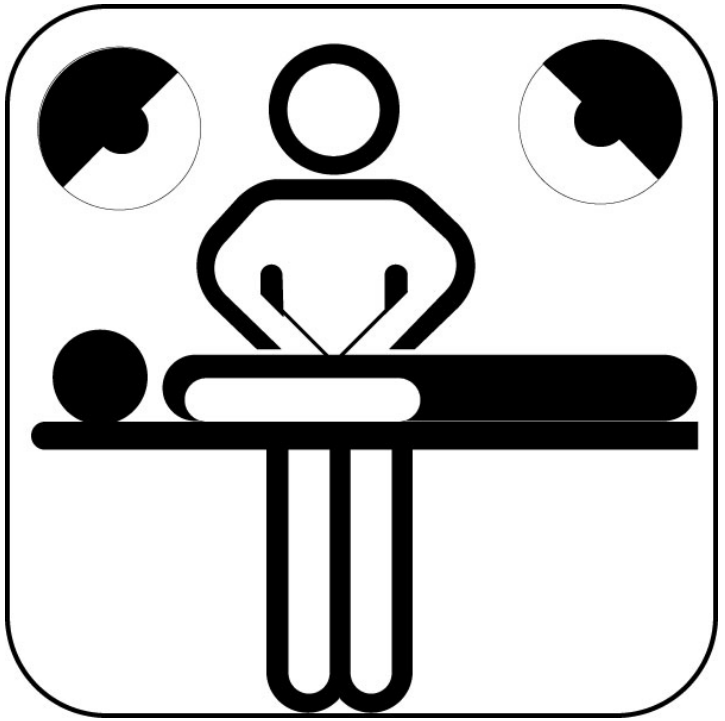
Surgical Technique

Wide excision margins "secure" local control.



- **Bacci G, Longhi A, Versari M, et al.** Prognostic factors for osteosarcoma of the extremity treated with neoadjuvant chemotherapy: 15-year experience in 789 patients treated at a single institution. Cancer 2006;106:1154-1161.
- **Enneking WF, Spanier SS, Goodman MA.** A system for the surgical staging of musculoskeletal sarcoma. Clin Orthop Relat Res 1980;153:106-120.
- **Picci P, Sangiorgi L, Rougraff BT, et al.** Relationship of chemotherapy-induced necrosis and surgical margins to local recurrence in osteosarcoma. J Clin Oncol 1994;12:2699-2705.
- **Bacci G, Forni C, Longhi A, et al.** Local recurrence and local control of non-metastatic osteosarcoma of the extremities: a 27-year experience in a single institution. J Surg Oncol 2007;96:118-123.
- **Grimer RJ, Taminiau AM, Cannon SR.** Surgical outcomes in osteosarcoma. J Bone Joint Surg Br 2002;84:395-400.

Surgical Technique



Surgical operation should be performed in Designated Oncological Centers.

The majority of amputations take place in non-designated oncological centers.

Andreou D, Bielack SS, Carrle D et al. The influence of tumor- and treatment-related factors on the development of local recurrence in osteosarcoma after adequate surgery. An analysis of 1355 patients treated on neoadjuvant Cooperative Osteosarcoma Study Group protocols. Ann Oncol 2011; 22:1228-35.

Surgical Technique

The best treatment modality is discussed and approved during an MDT meeting

APPROVED

- Grimer R, Athanasou N, Gerrand C, Judson I, Lewis I, Morland B, Peake D, Seddon B, Whelan J. UK Guidelines for the Management of Bone Sarcomas. Sarcoma. 2010;2010:317462.
- "Eretria" Working Group Consensus Meeting

Case #1

Medical record file and/or photos belong to a patient treated by the speaker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\\AKTINOGRAFIA GONATOS


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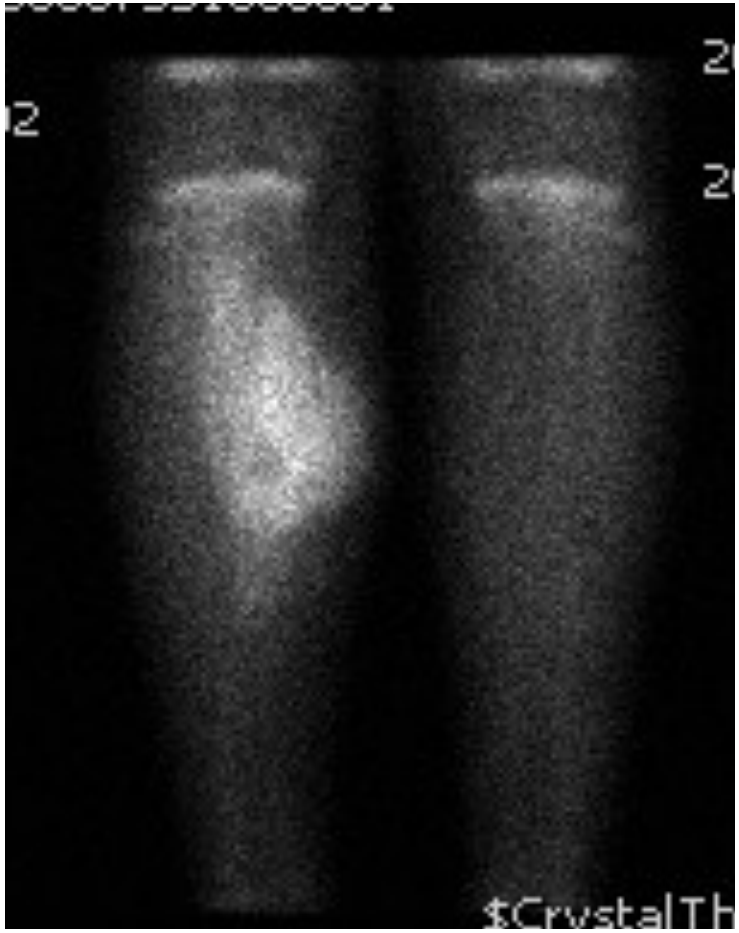

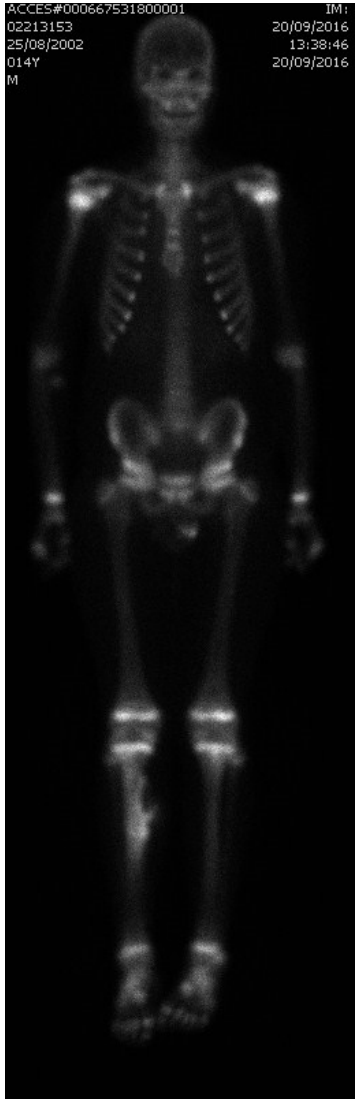
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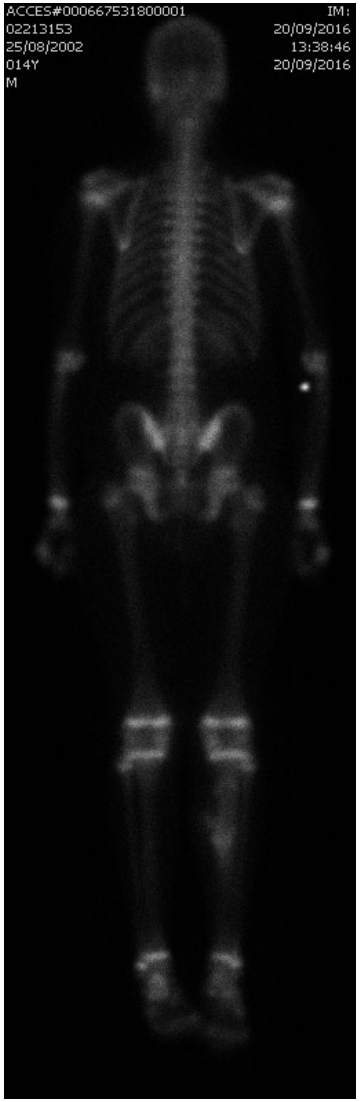
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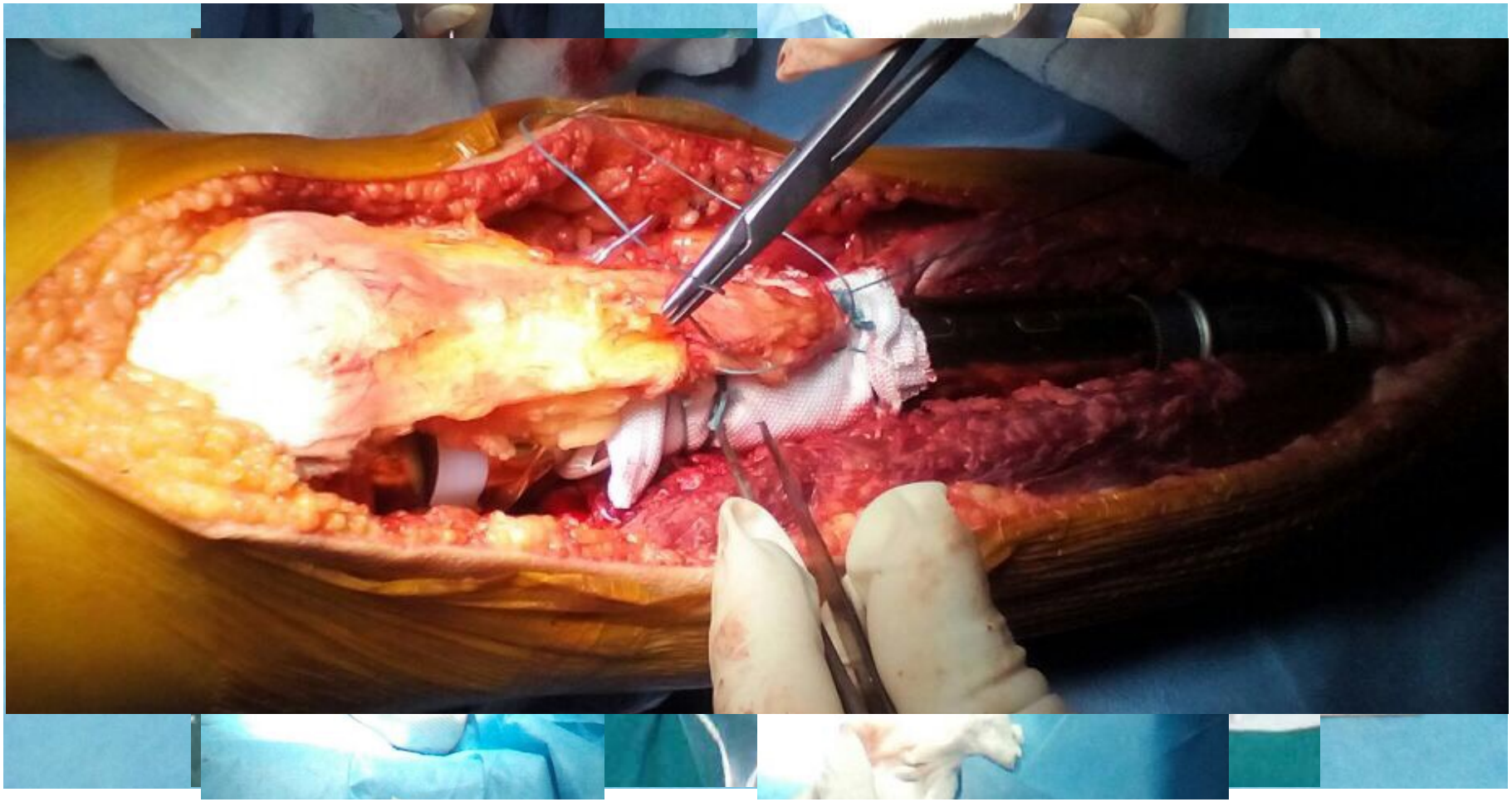


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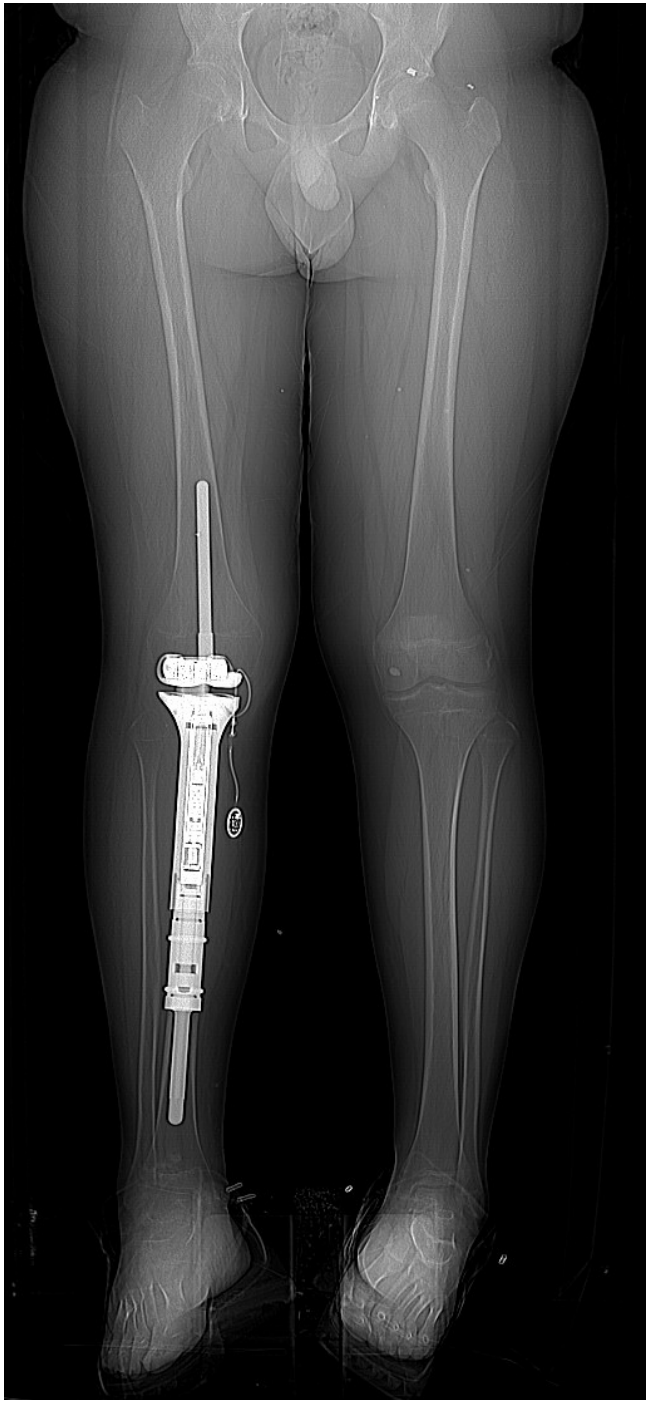

Case #2

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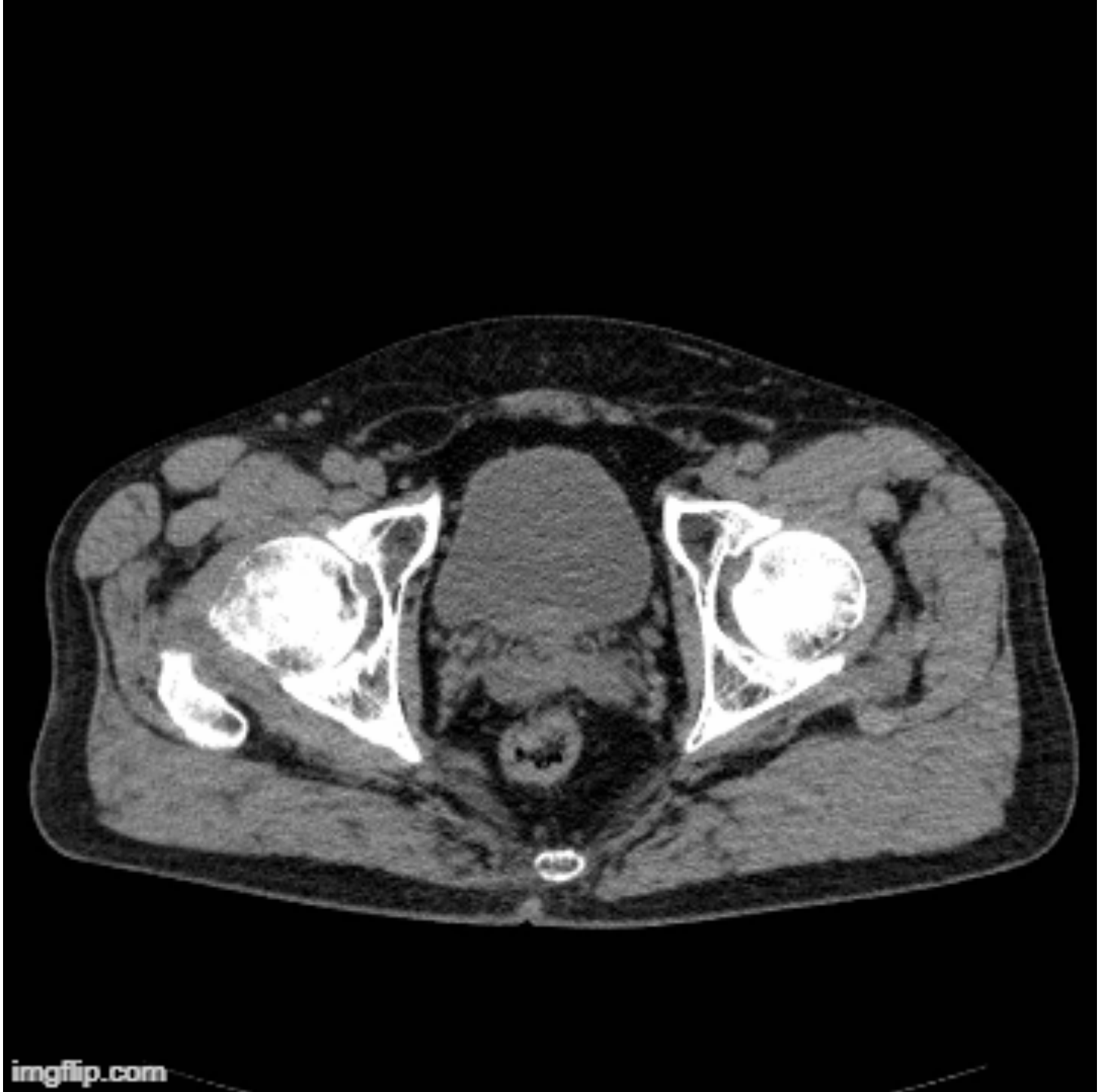
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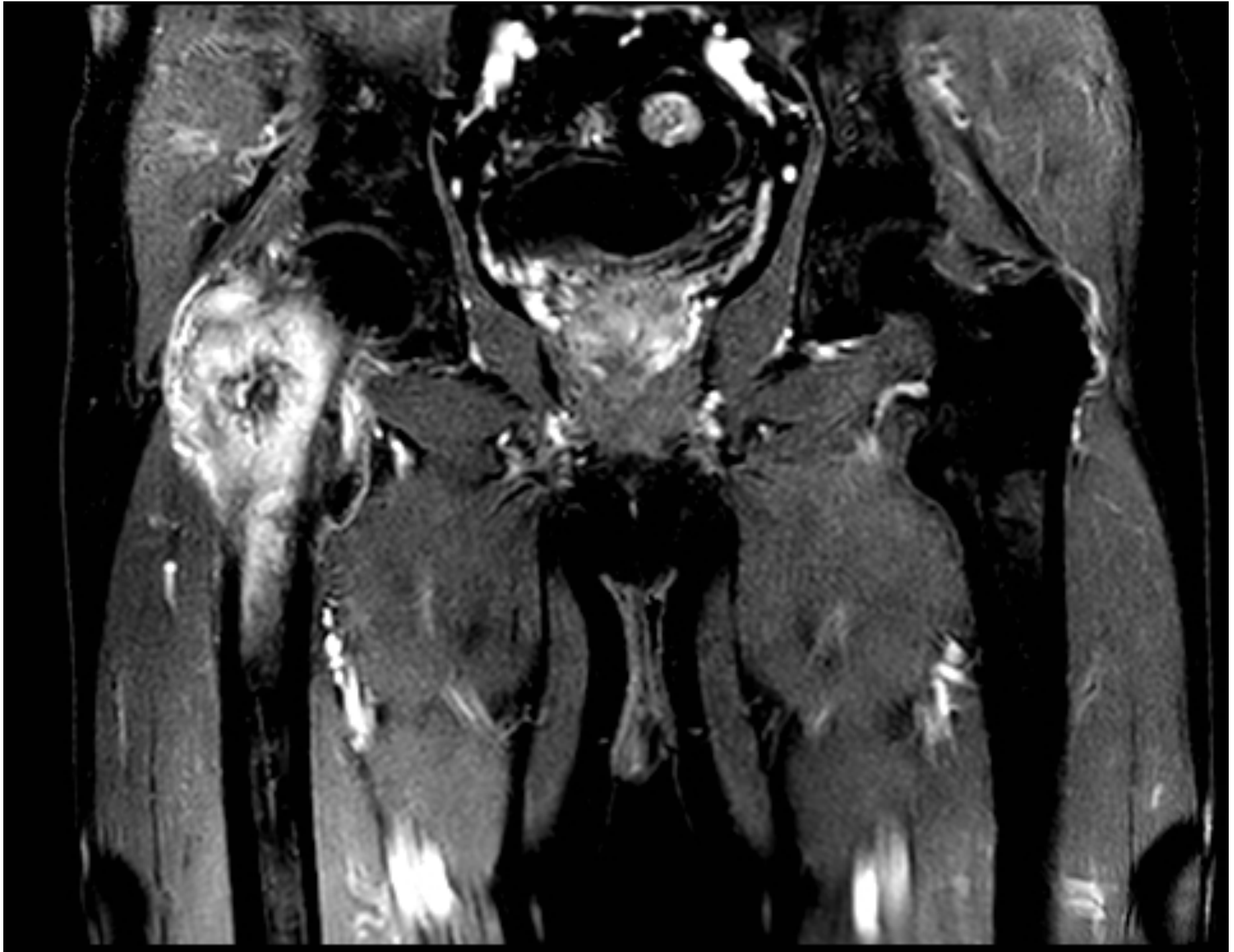

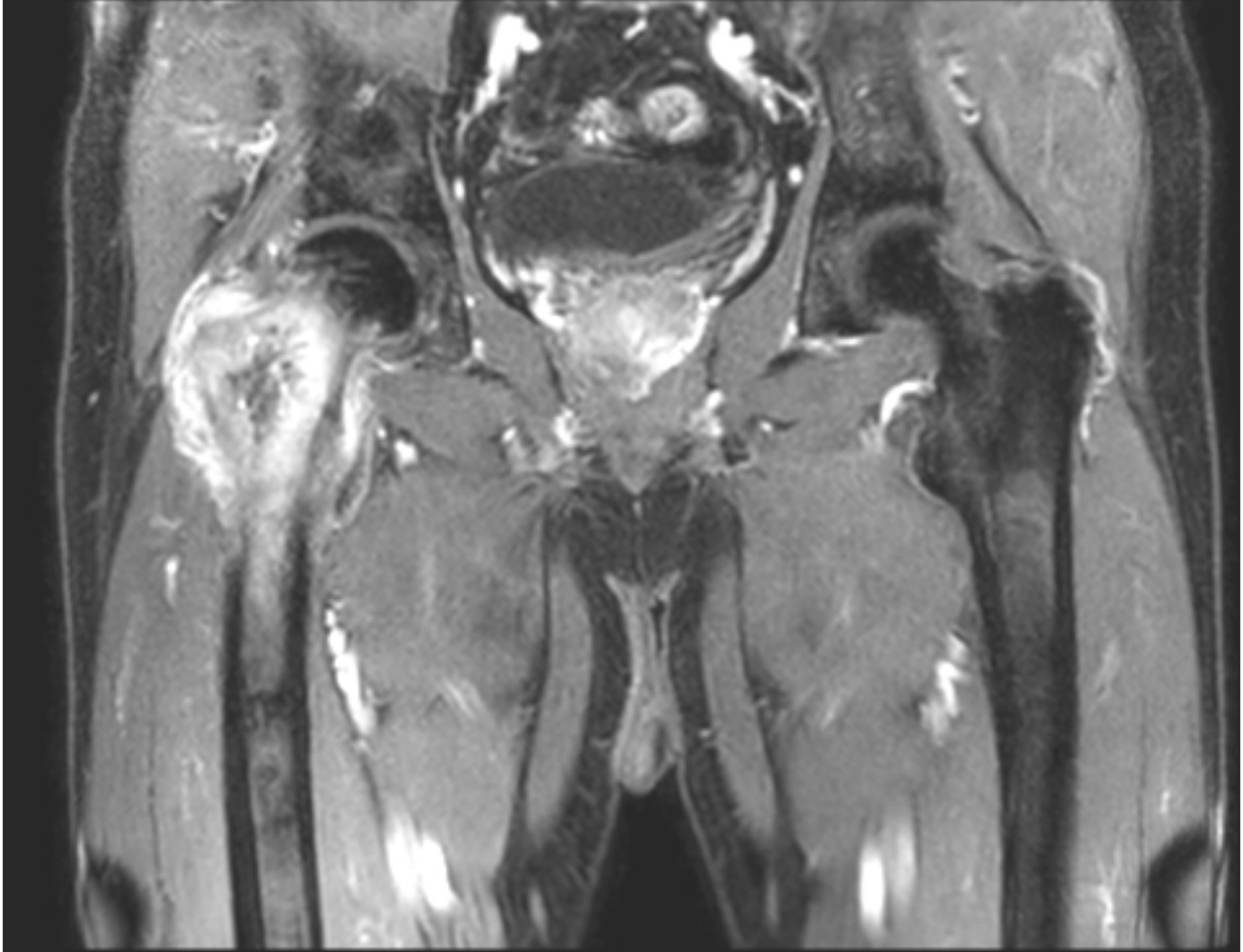


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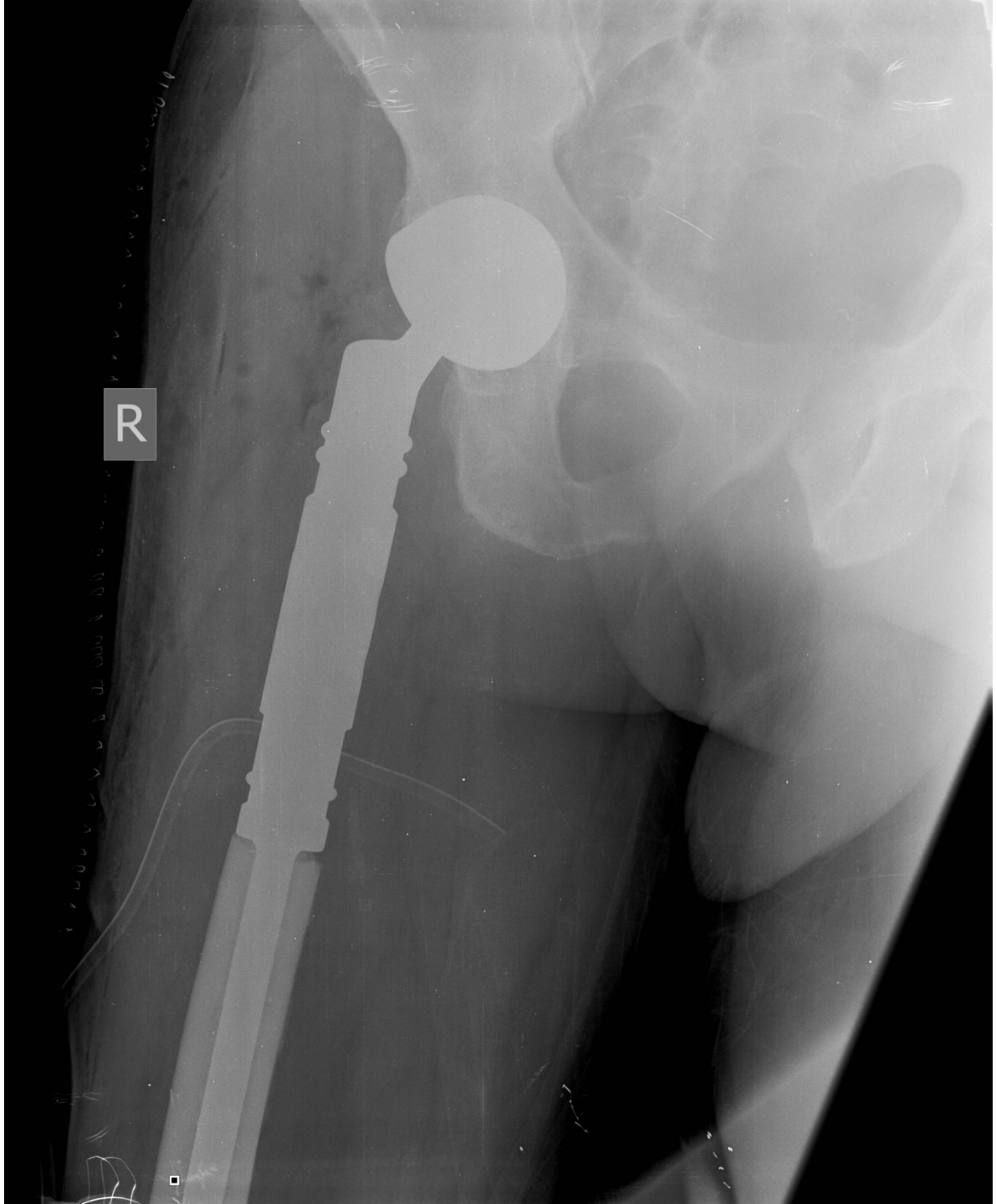
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Case #3

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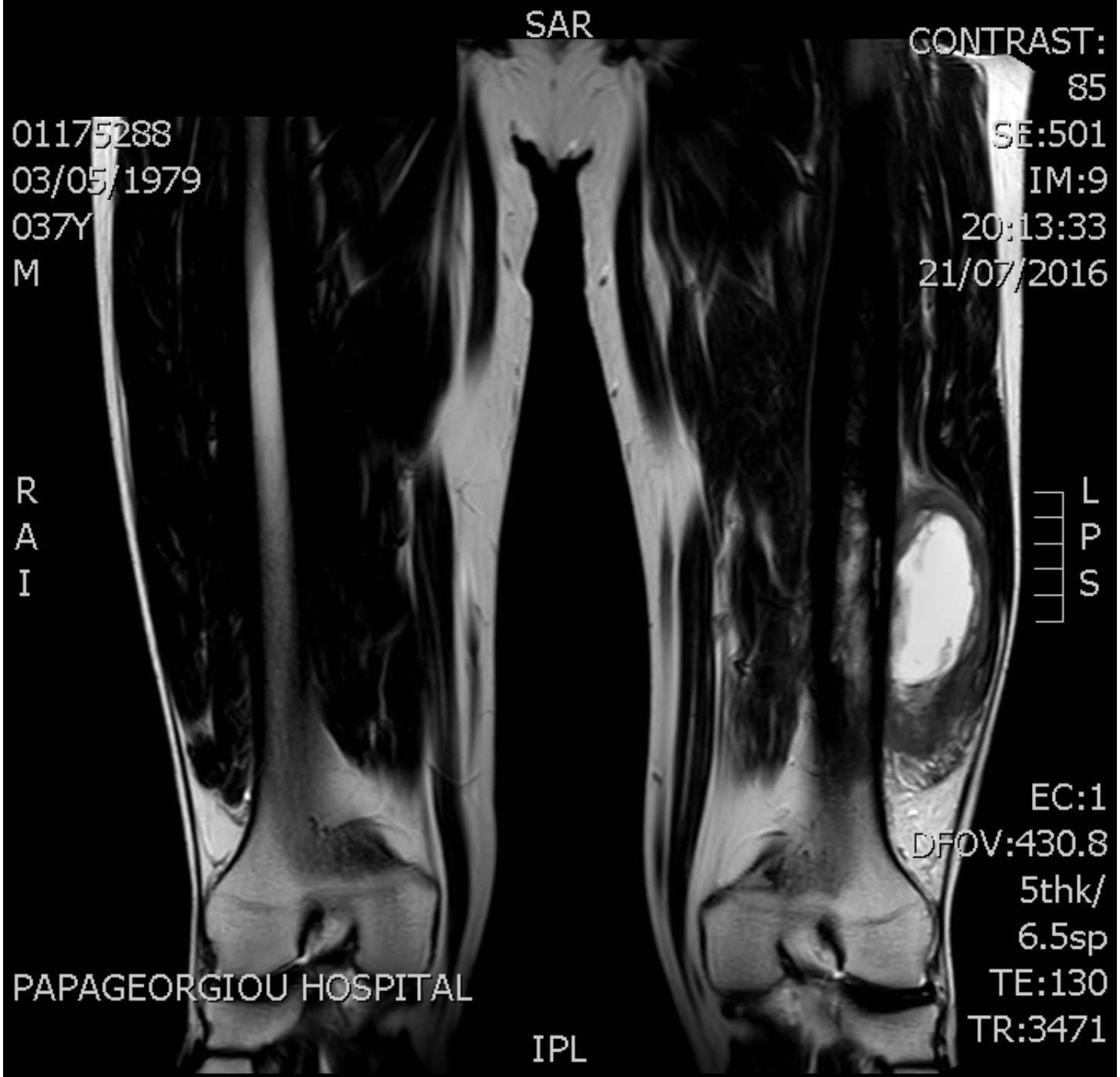
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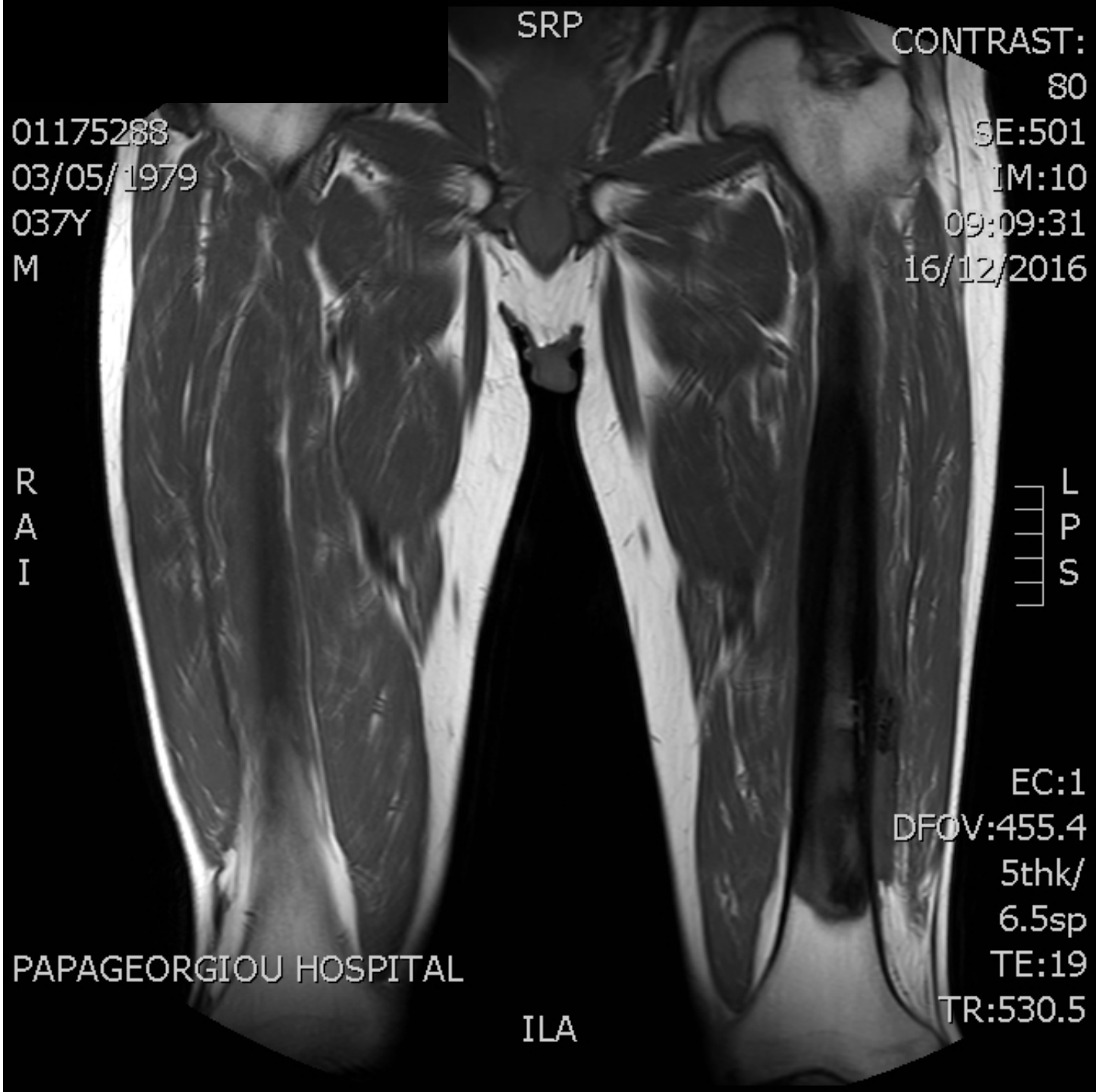
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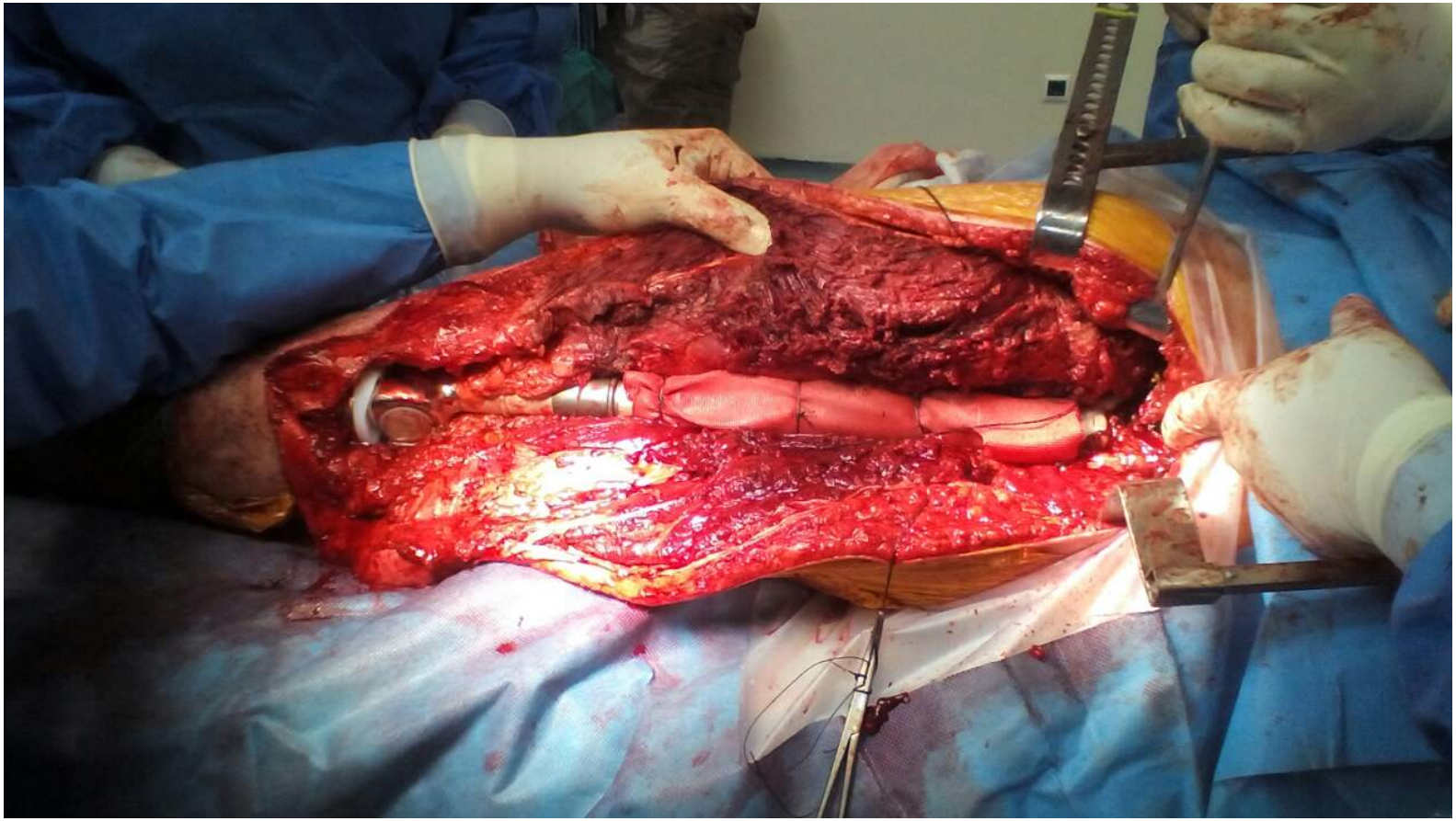


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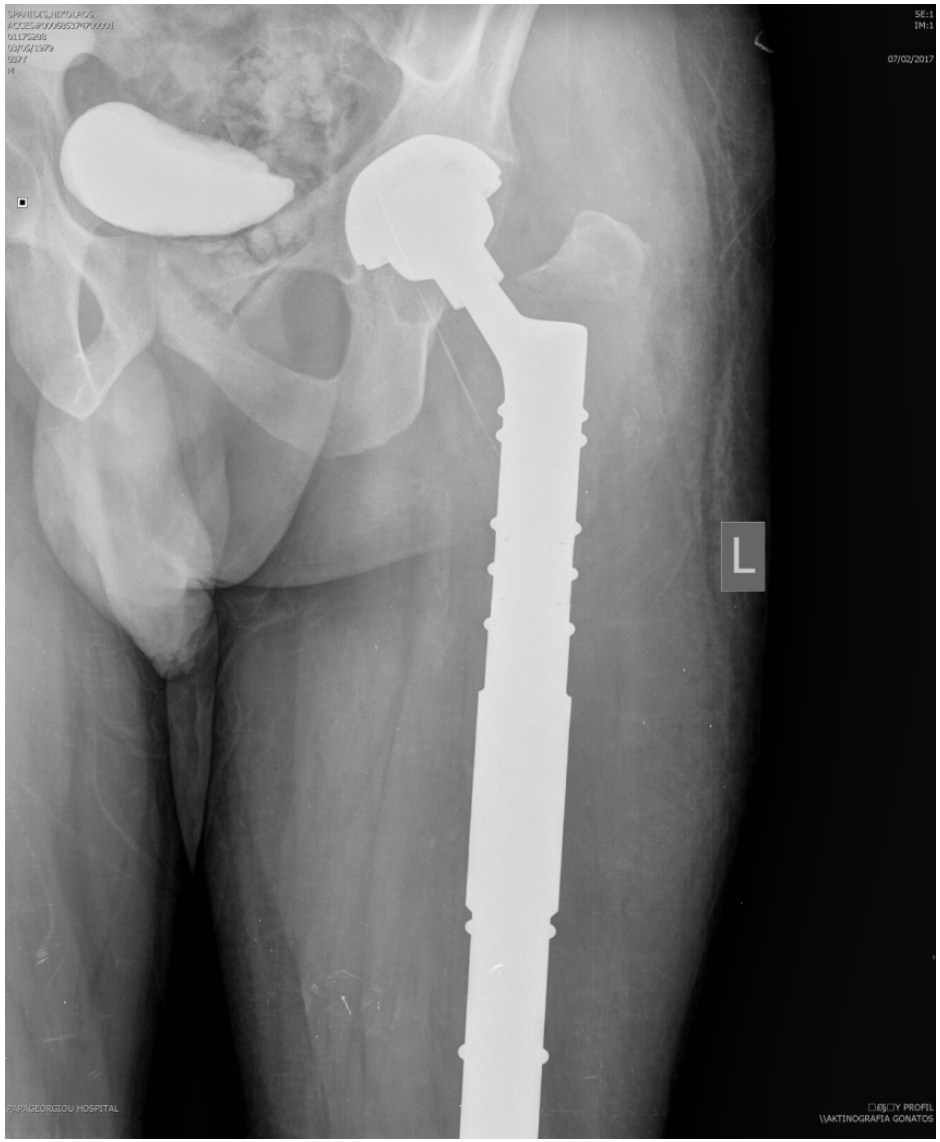
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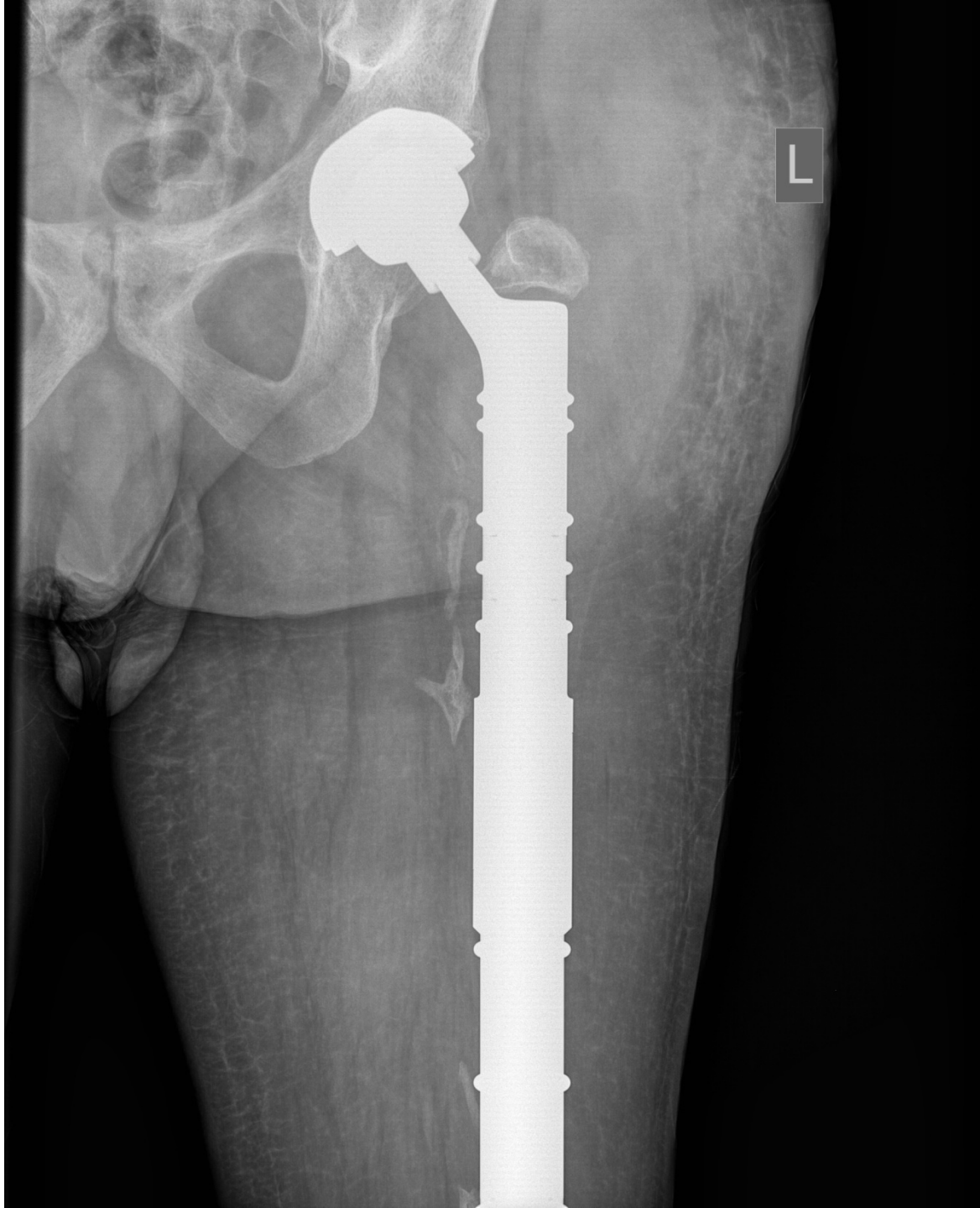
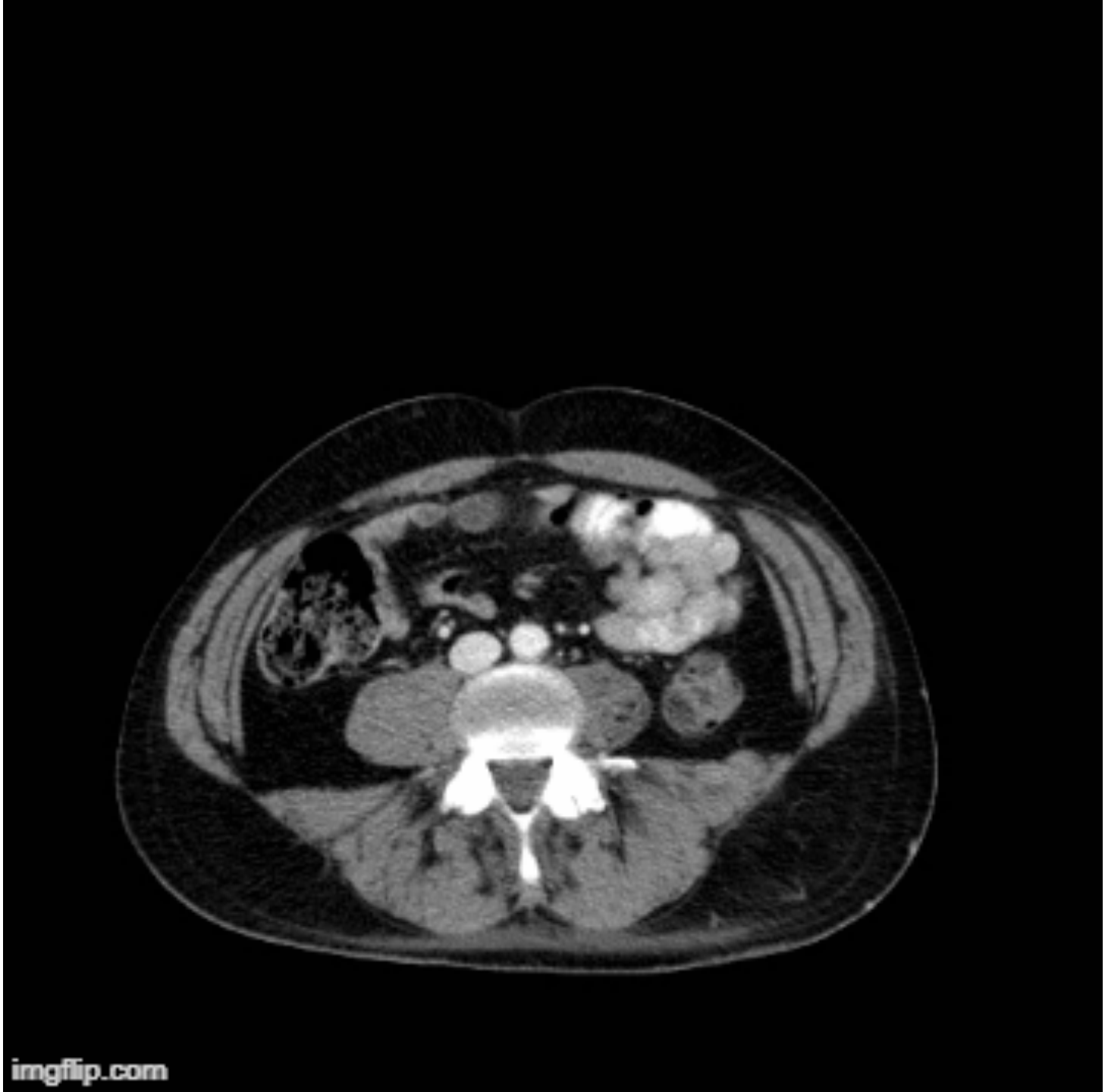
3 months postop

12 months postop

12 months postop

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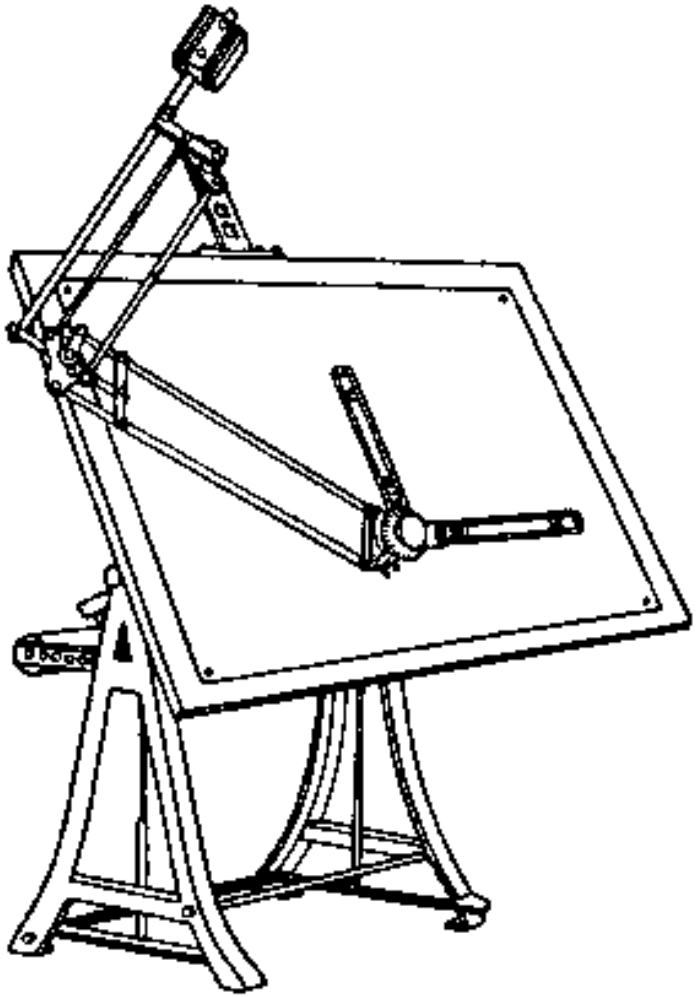
Surgical Technique

Limb salvage is always tried, as long as proper oncological treatment is not at stake.



- **Aksnes LH, Bauer HC, Jebsen NL, et al.** Limb-sparing surgery preserves more function than amputation: a Scandinavian sarcoma group study of 118 patients. J Bone Joint Surg Br 2008;90:786-794.
- **Eiser C, Darlington AS, Stride CB, Grimer R.** Quality of life implications as a consequence of surgery: limb salvage, primary and secondary amputation. Sarcoma 2001;5:189-195.

Surgical Technique

Nonetheless, postoperative limb function should be also taken into consideration, once wide margins have been achieved.

Hogendoorn PCW on behalf of the ESMO/EUROBONET Working Group. Bone sarcomas: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. Ann Oncol 2010;21 Suppl 5:204-13.

Surgical Technique

Does limb salvage procedures lead to increased local recurrence rates?

Some studies disagree with that.

- **Sluga M, Windhager R, Lang S, et al.** Local and systemic control after ablative and limb sparing surgery in patients with osteosarcoma. Clin Orthop Relat Res 1999;358:120-127.
- **Bacci G, Ferrari S, Lari S, et al.** Osteosarcoma of the limb. Amputation or limb salvage in patients treated by neoadjuvant chemotherapy. J Bone Joint Surg Br 2002;84:88-92.

Others claim exactly the opposite.

- **Grimer RJ, Taminiau AM, Cannon SR.** Surgical outcomes in osteosarcoma. J Bone Joint Surg Br 2002;84:395-400.
- **Brosjö O.** Surgical procedure and local recurrence in 223 patients treated 1982-1997 according to two osteosarcoma chemotherapy protocols. The Scandinavian Sarcoma Group experience. Acta Orthop Scand Suppl 1999;285:58-61.

Surgical Technique

Local recurrence and/or metastasis excision(s) should be decided during an MDT meeting.

Grimer R, Athanasou N, Gerrand C, Judson I, Lewis I, Morland B, Peake D, Seddon B, Whelan J. UK Guidelines for the Management of Bone Sarcomas. Sarcoma. 2010;2010:317462.

Case #4

Medical record file and/or photos belong to a patient treated by the speaker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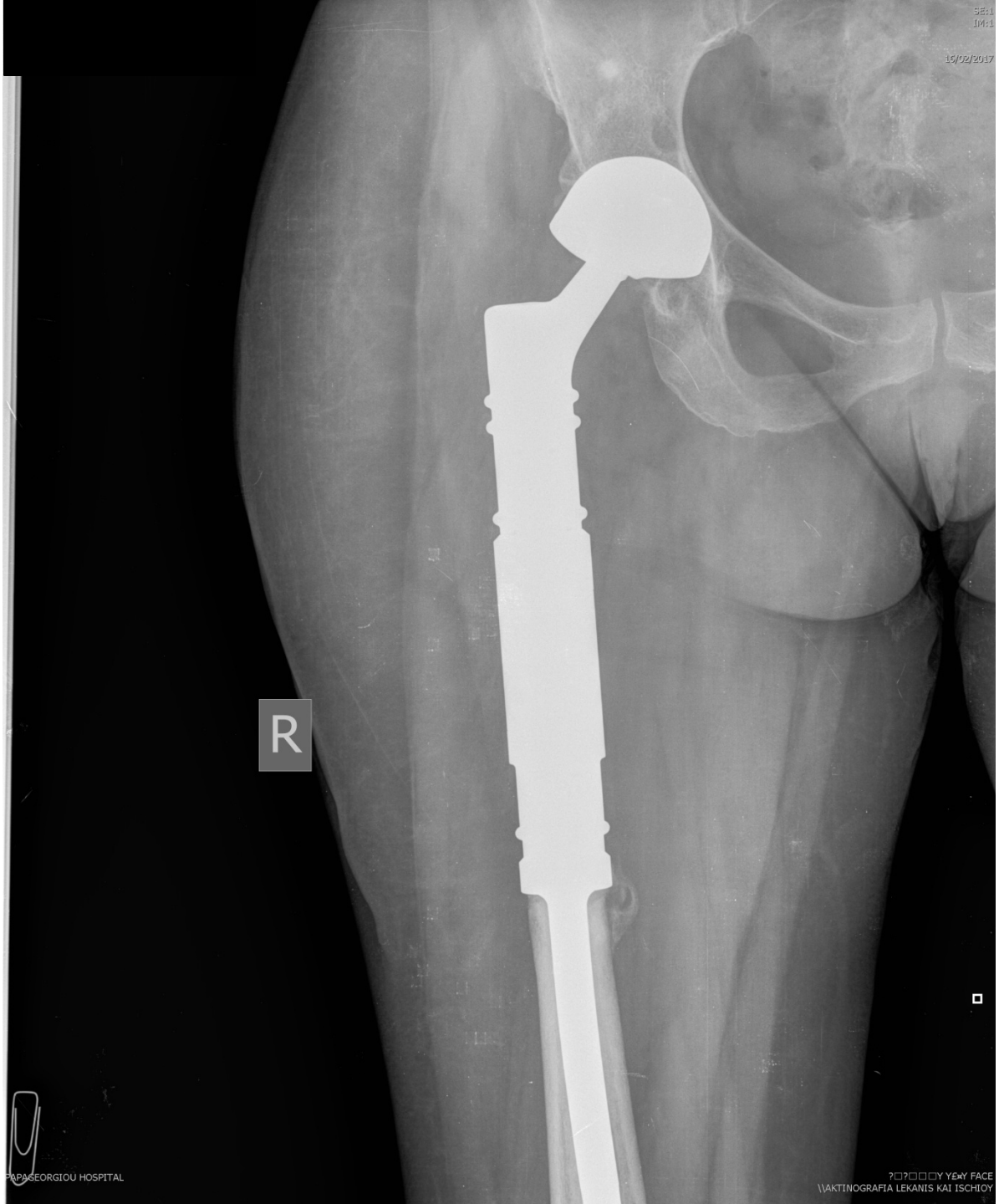
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Surgical Technique

Intramedullary Nailing is contra-indicated!

It can only be taken into consideration in selected cases.

- **Biermann JS et al.** National Comprehensive Cancer Network Bone Cancer Panel. Bone Cancer. J Natl Compr Canc Netw. 2010 Jun;8(6):688-712.
- **Hogendoorn PCW on behalf of the ESMO/EUROBONET Working Group.** Bone sarcomas: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. Ann Oncol 2010;21 Suppl 5:204-13.

Case #5

Medical record file and/or photos belong to a patient treated by the speaker


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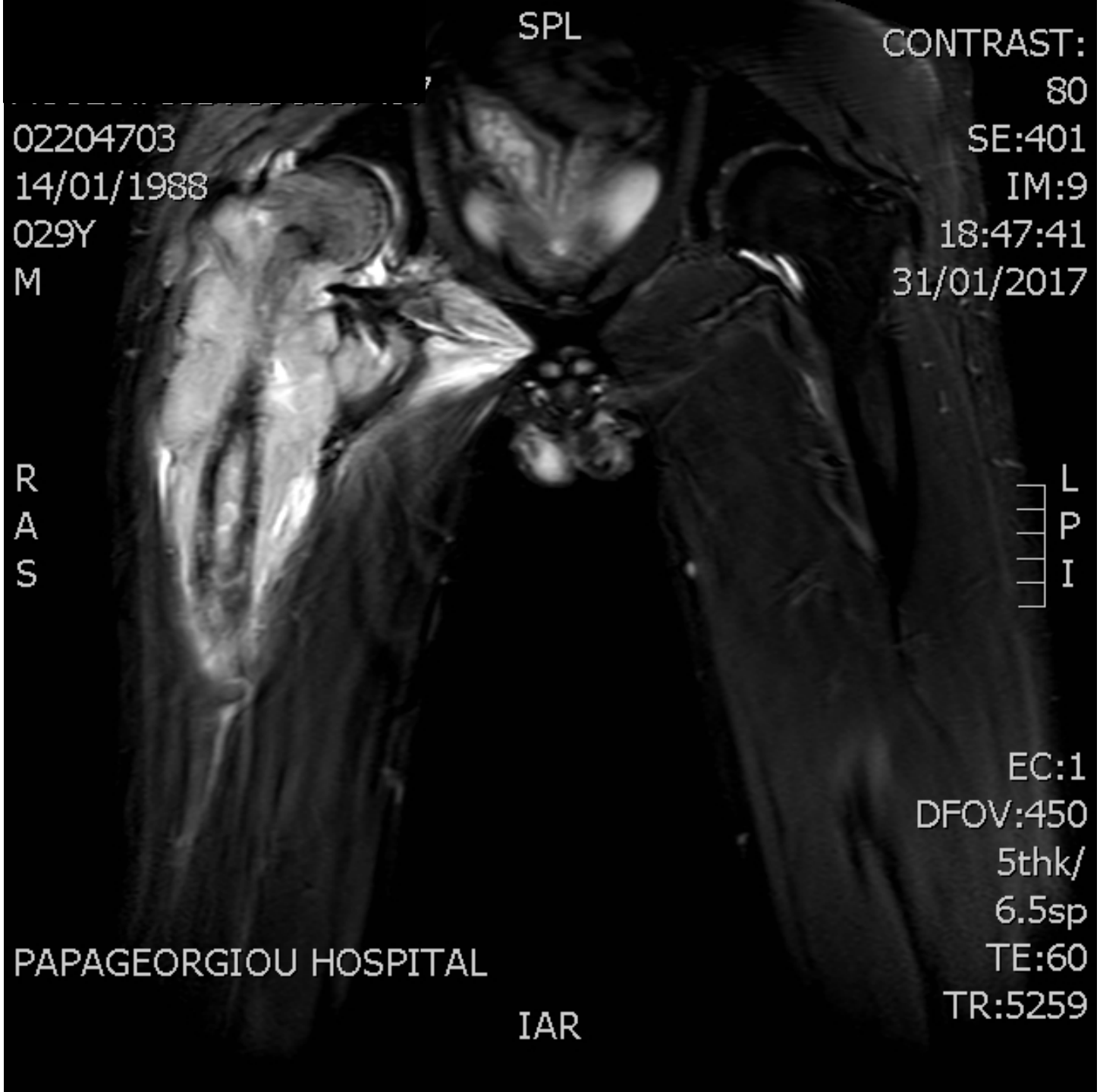
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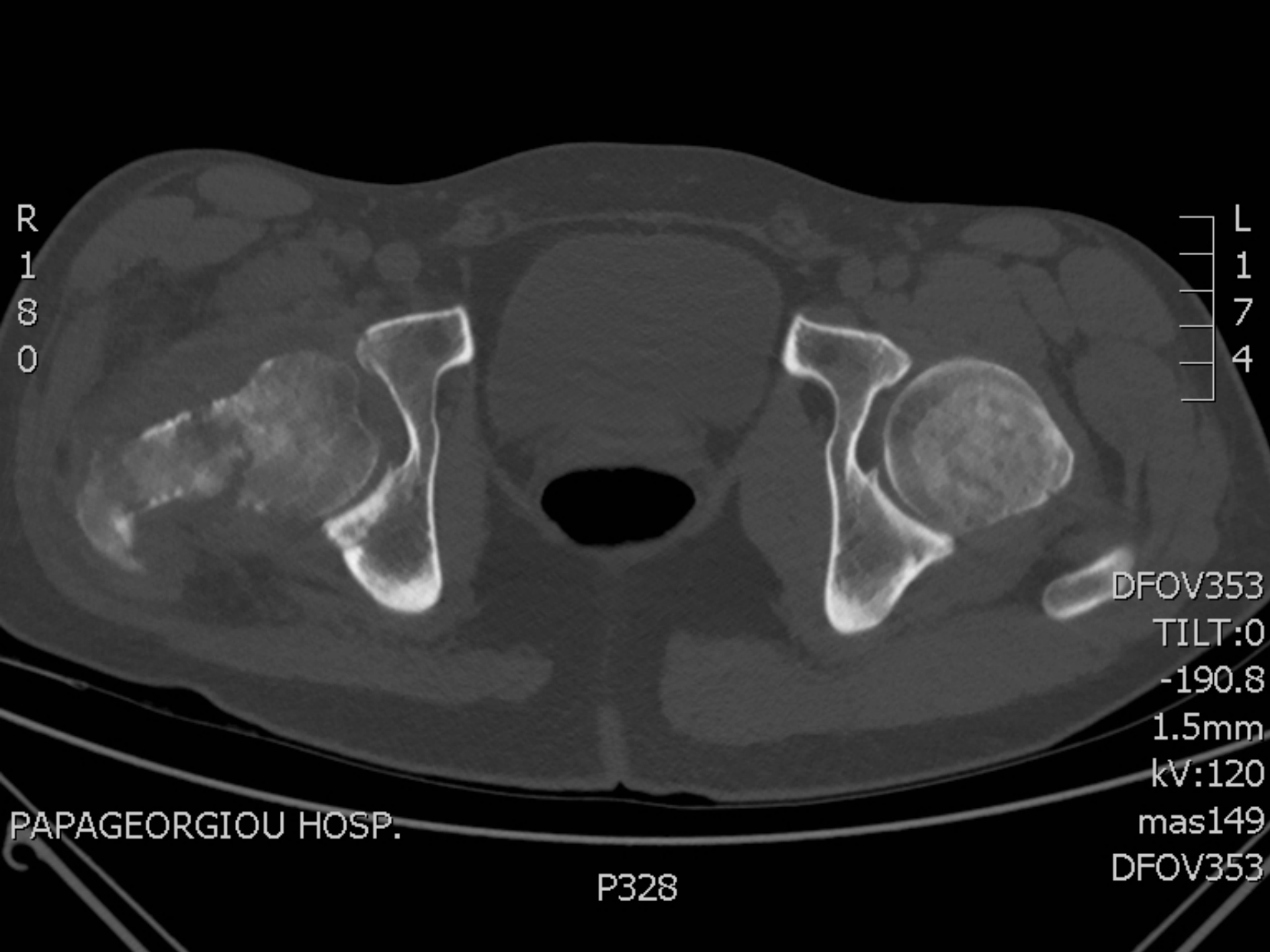
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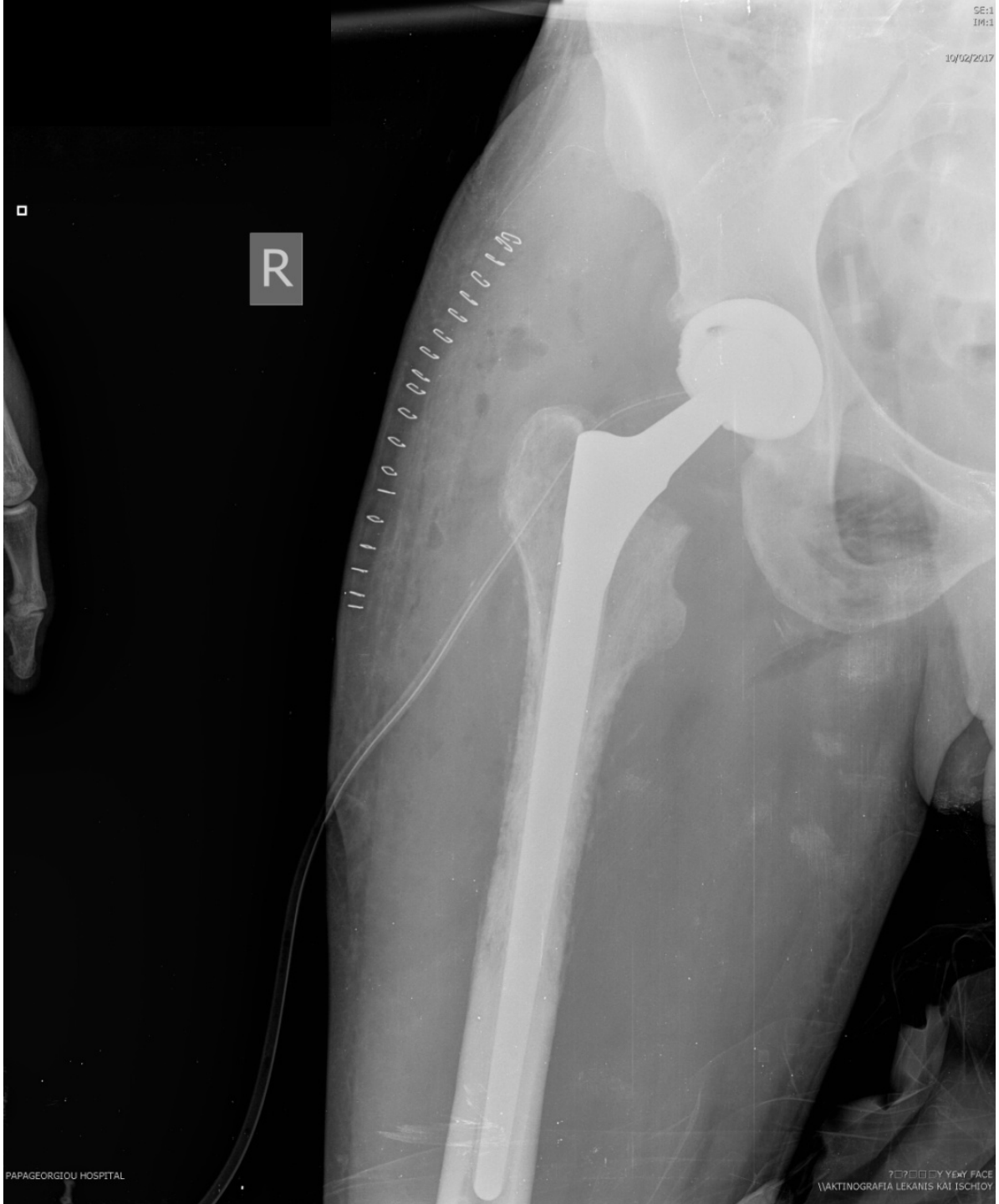
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Surgical Technique

- **Chemo-sensitive tumors may need neo-adjuvant preoperative chemotherapy.**
- **Wide excision should be performed right away, when the tumor is not chemo-sensitive.**
- **In some cases, the only "viable" option is amputation.**

- **Hogendoorn PCW on behalf of the ESMO/EUROBONET Working Group**. Bone sarcomas: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. Ann Oncol 2010;21 Suppl 5:204-13.
- ***Bramer JA, Abudu AA, Grimer RJ, Carter SR, Tillman RM.*** Do pathological fractures influence survival and local recurrence rate in bony sarcomas? Eur J Cancer. 2007 Sep;43(13):1944-51

Surgical Technique

Intralesional or bulk excision or tumor "reduction" are NOT surgical options.

- **Song WS, Jeon DG, Kong CB, Cho WH, Lee SY.** Outcome of re-excision for intralesionally treated parosteal osteosarcoma. J Surg Oncol. 2011 Mar 1;103(3):264-8.
- **Hanna SA, Whittingham-Jones P, Sewell MD, Pollock RC, Skinner JA, Saifuddin A, Flanagan A, Cannon SR, Briggs TW.** Outcome of intralesional curettage for low-grade chondrosarcoma of long bones. Eur J Surg Oncol. 2009 Dec;35(12):1343-7.
- **Jeon DG, Lee SY, Kim JW.** Bone primary sarcomas undergone unplanned intralesional procedures - the possibility of limb salvage and their oncologic results. J Surg Oncol.
- **Ayerza MA, Muscolo DL, Aponte-Tinao LA, Farfalli G.** Effect of erroneous surgical procedures on recurrence and survival rates for patients with osteosarcoma. Clin Orthop Relat Res. 2006 Nov;452:231-5.
- **Laus M, Zappoli FA, Malaguti MC, Alfonso C.** Intralesional surgery of primary tumors of the anterior cervical column. Chir Organi Mov. 1998 Jan-Jun;83(1-2):43-51.
- **Ozaki T, Hillmann A, Hoffmann C, Rübe C, Blasius S, Dunst J, Jürgens H, Winkelmann W.** Significance of surgical margin on the prognosis of patients with Ewing's sarcoma. A report from the Cooperative Ewing's Sarcoma Study. Cancer. 1996 Aug 15;78(4):892-900.
- **"Eretria" Workup Group Consensus Meeting**

Case #7

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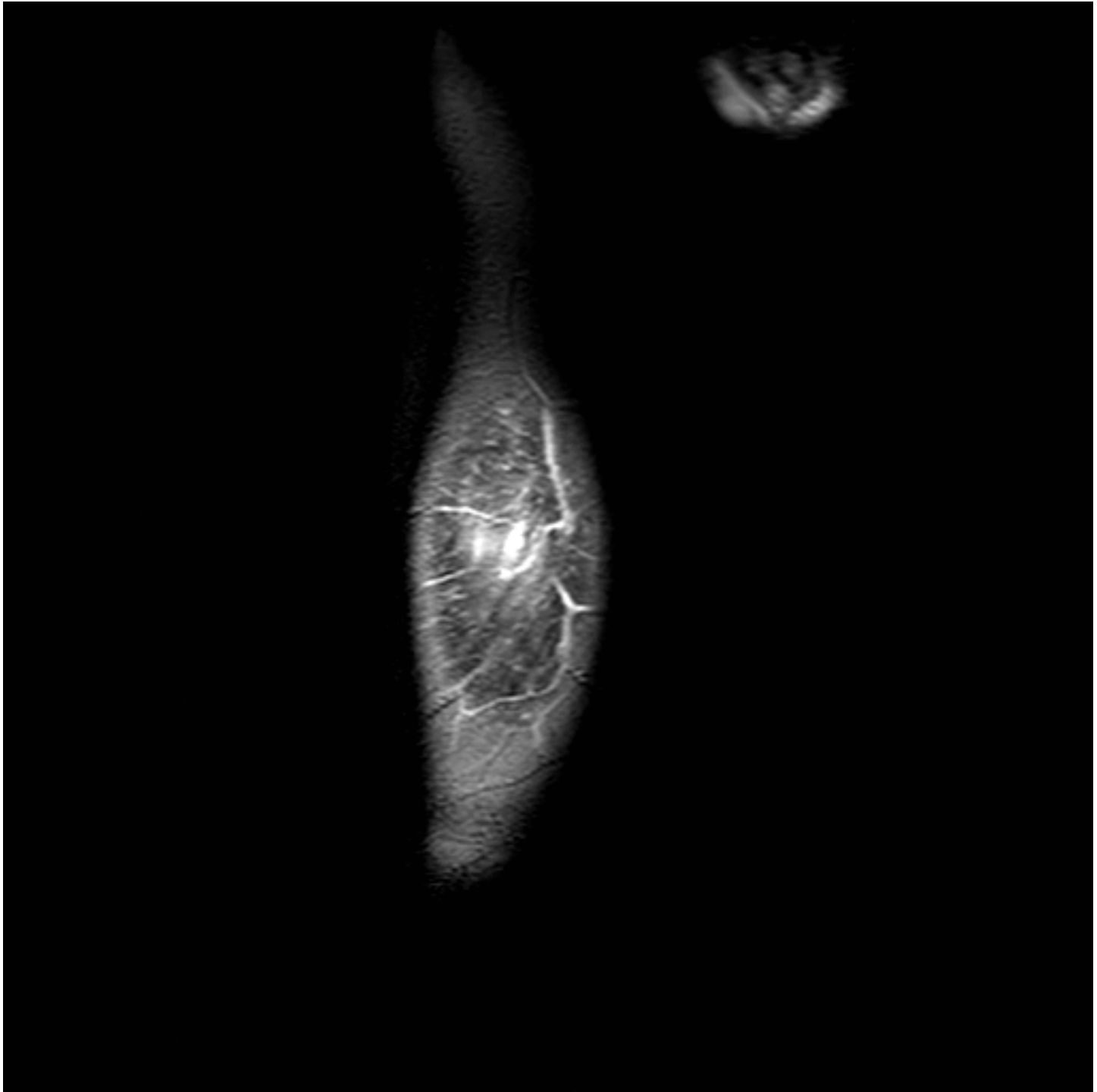
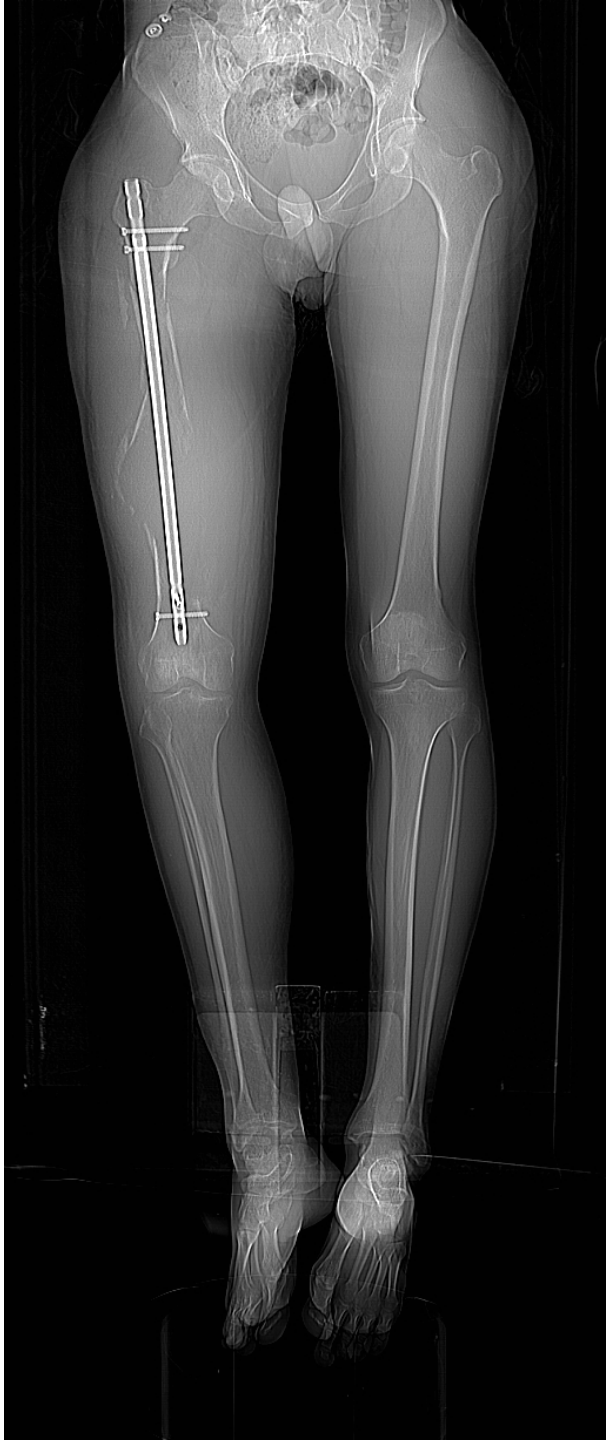
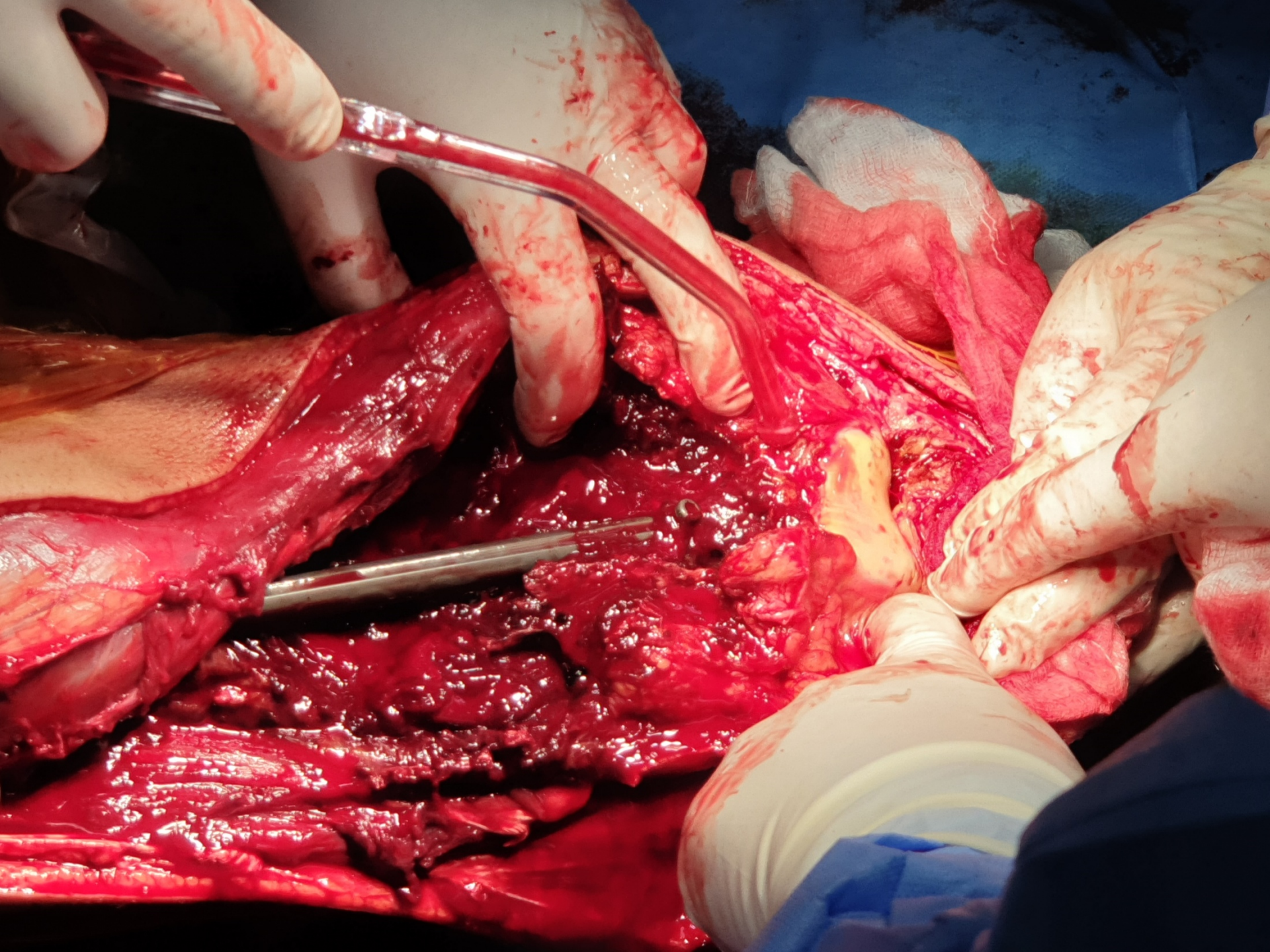
4 months postop
R

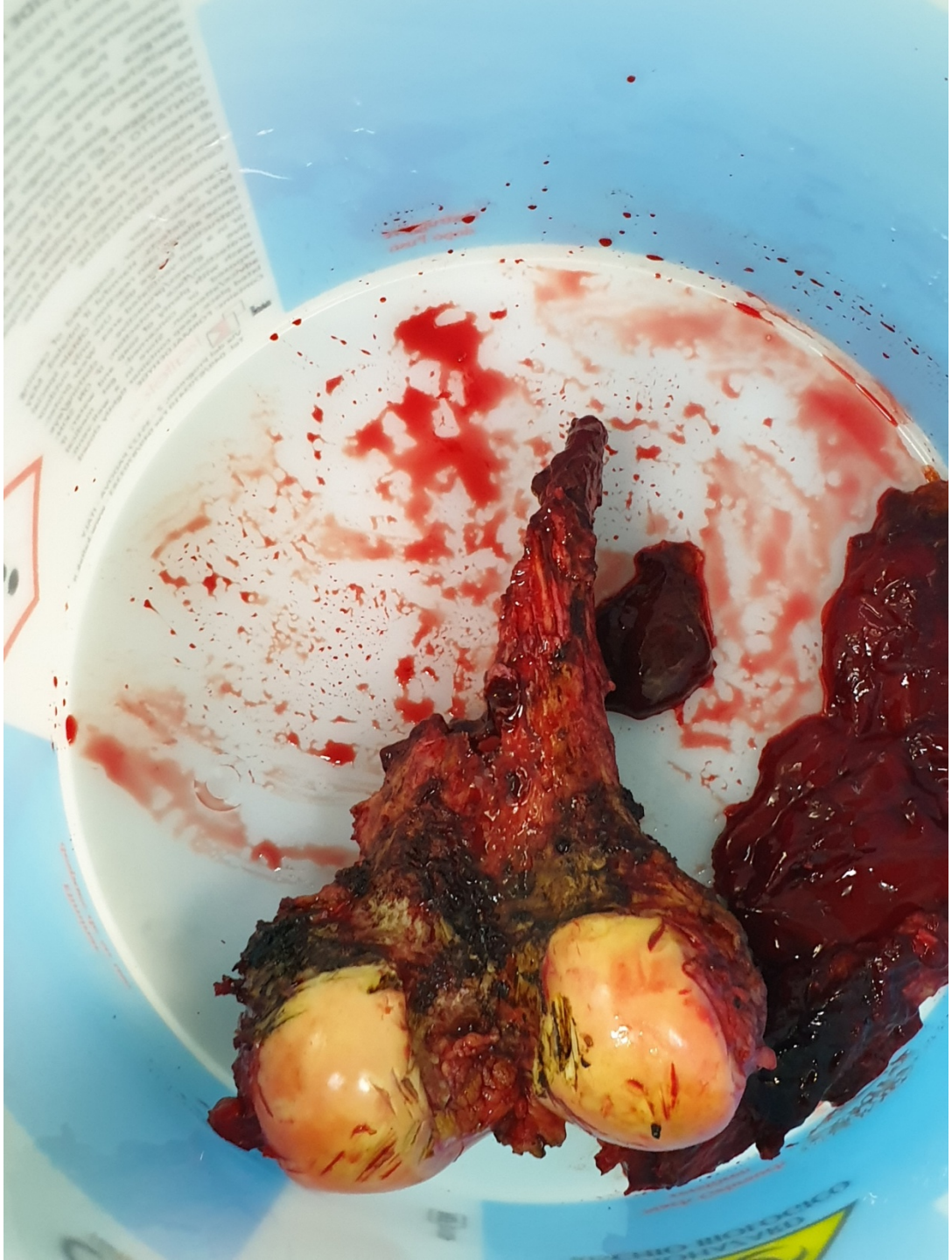

R
6 months postop

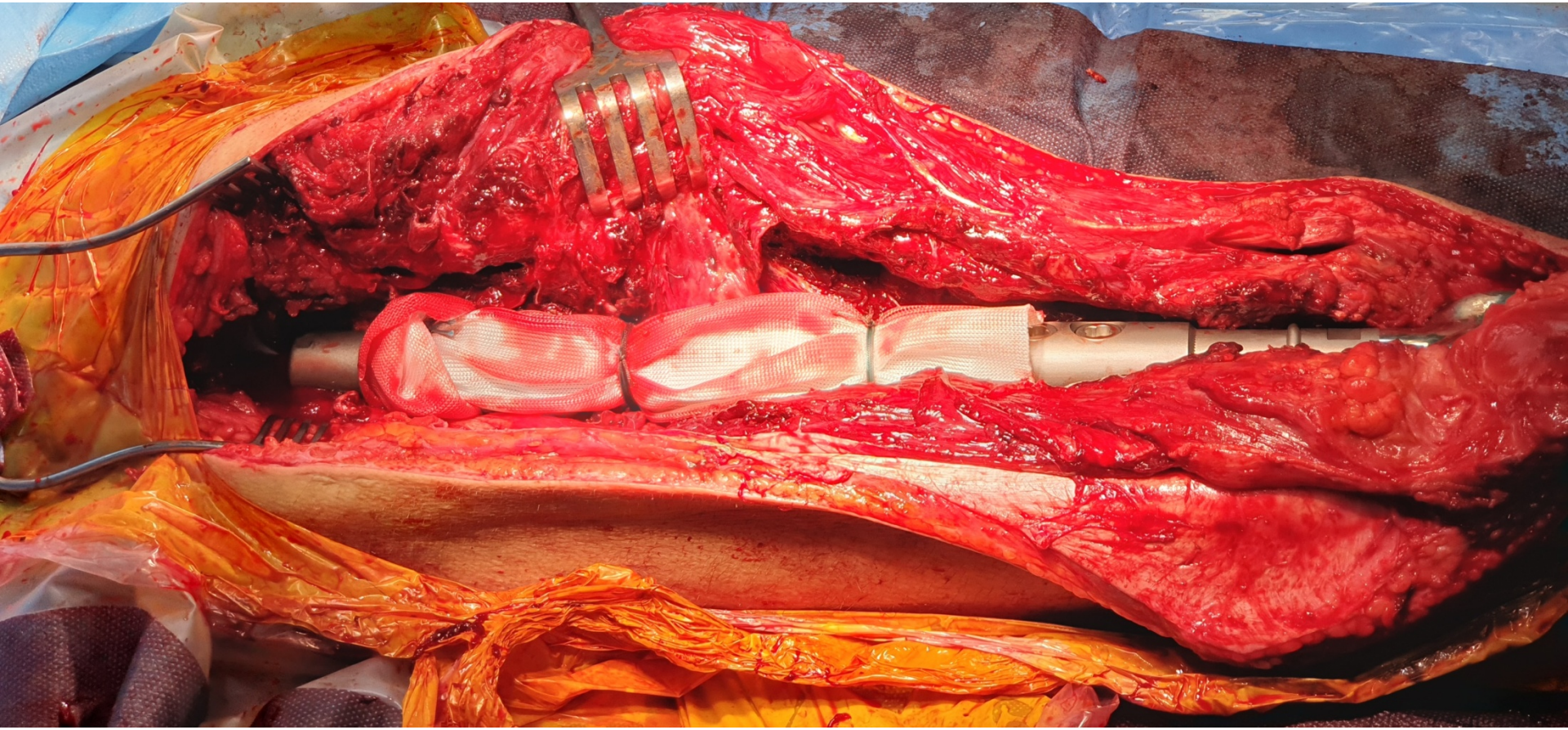

R

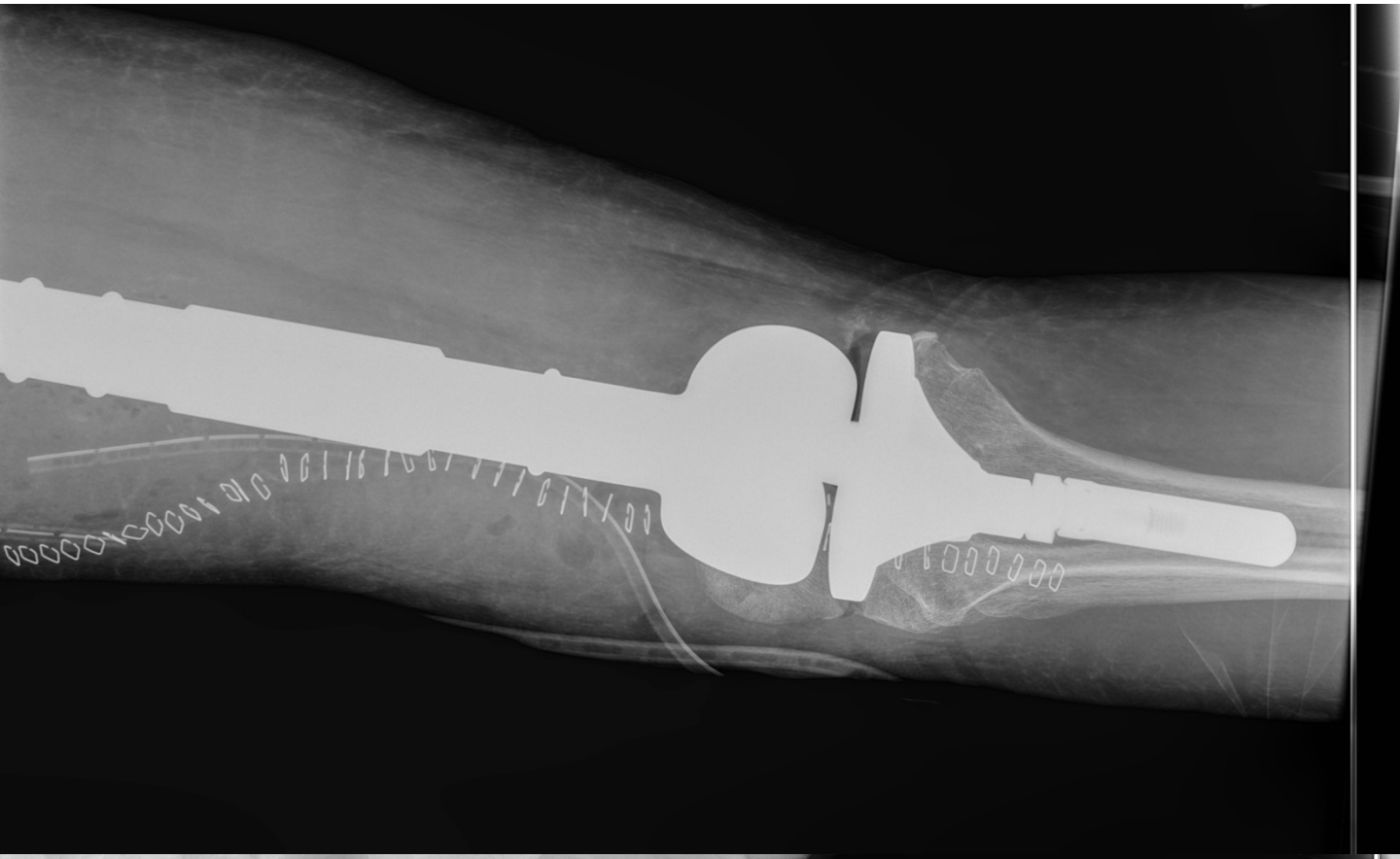


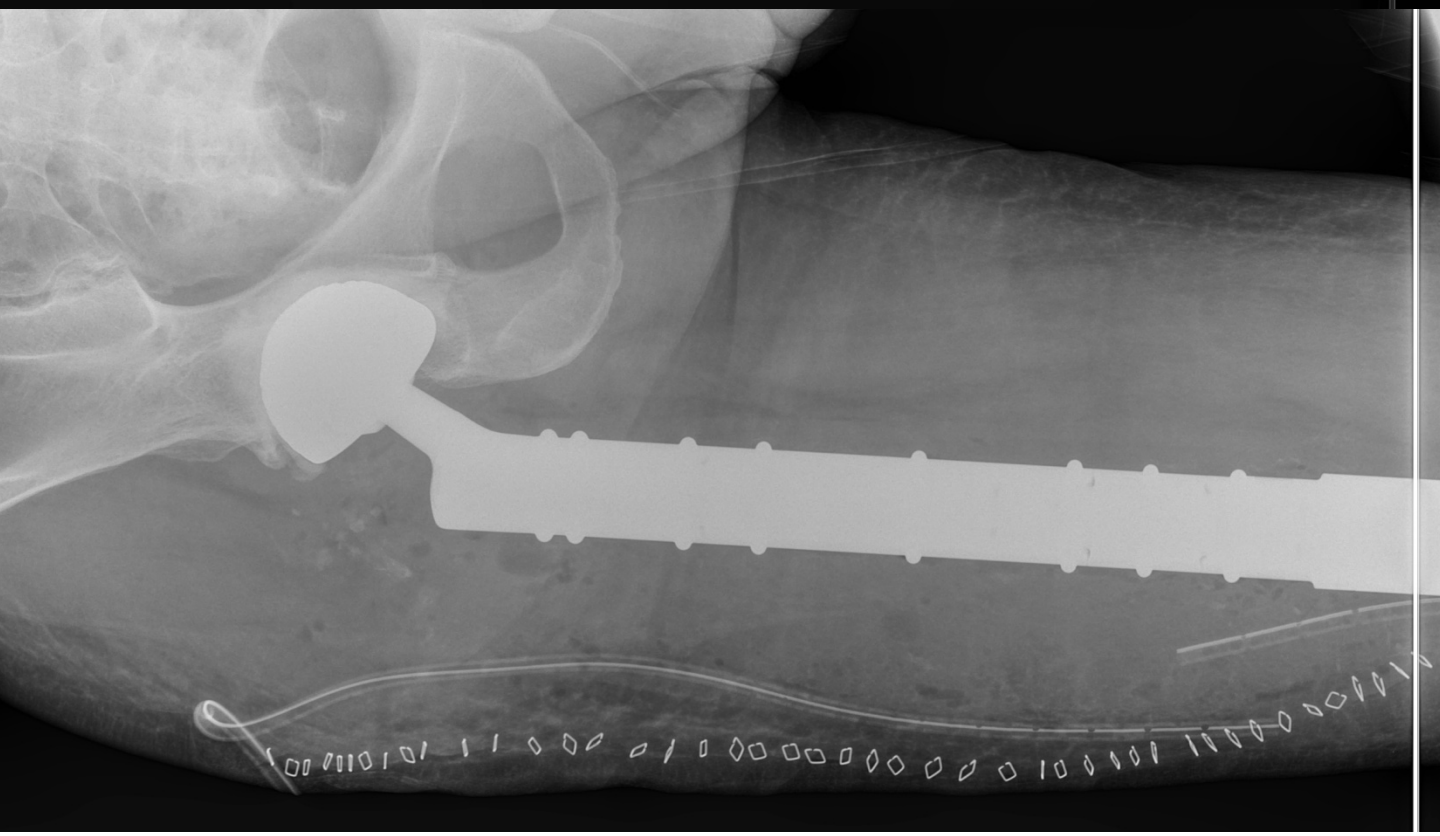












Surgical Technique

We never use an Esmarch bandage!
Just elevate the limb for 10 minutes!

The Tourniquet should always be deflated prior to wound closure.

Case #8

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Surgical Technique

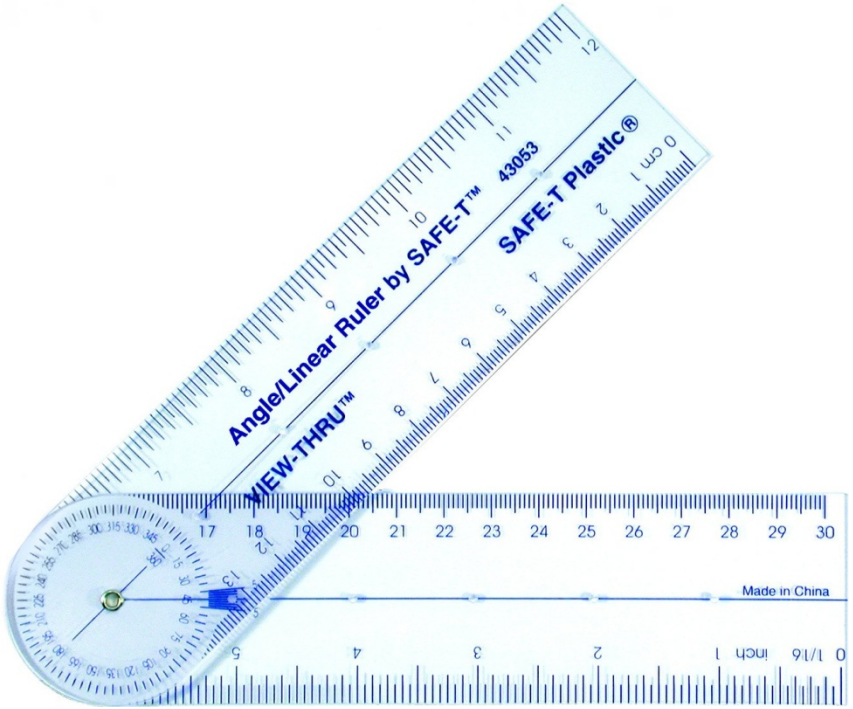
Use Water for Injection and not Saline

Surgical instruments should be replaced following the resection of the tumor.

Surgical Technique

Incision length should be kept to minimal

Surgical exposure should follow the longitudinal axis of the limb.



Surgical Technique

Perform meticulous hemostasis

Blood drainage placement is not an excuse for incomplete hemostasis.

Surgical Technique

Always plan ahead

Remove the biopsy incision scar

Case #9

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Medbar
SKIN MARKER - INCH


DISCARD AFTER USE
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Case #10

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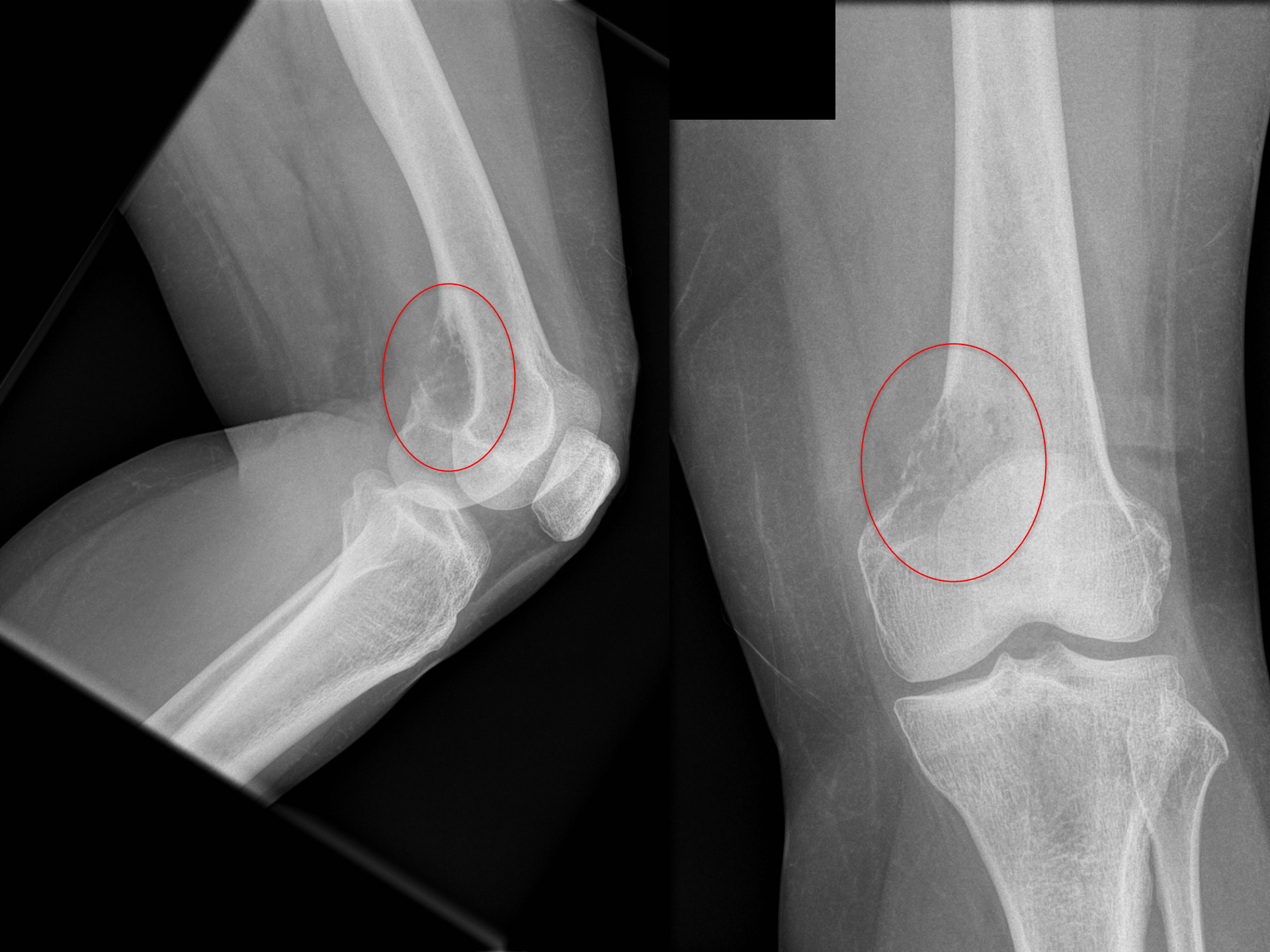
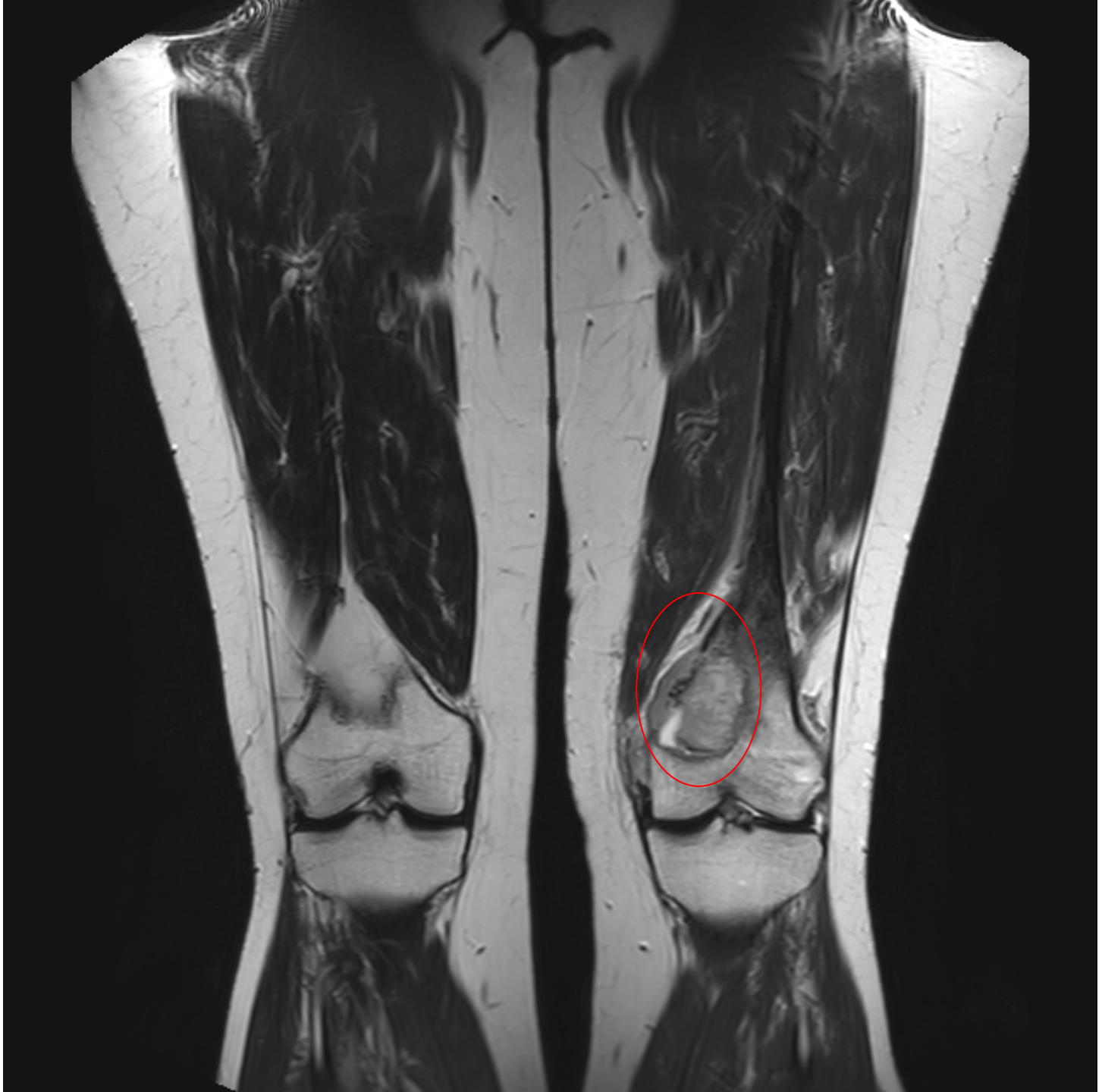
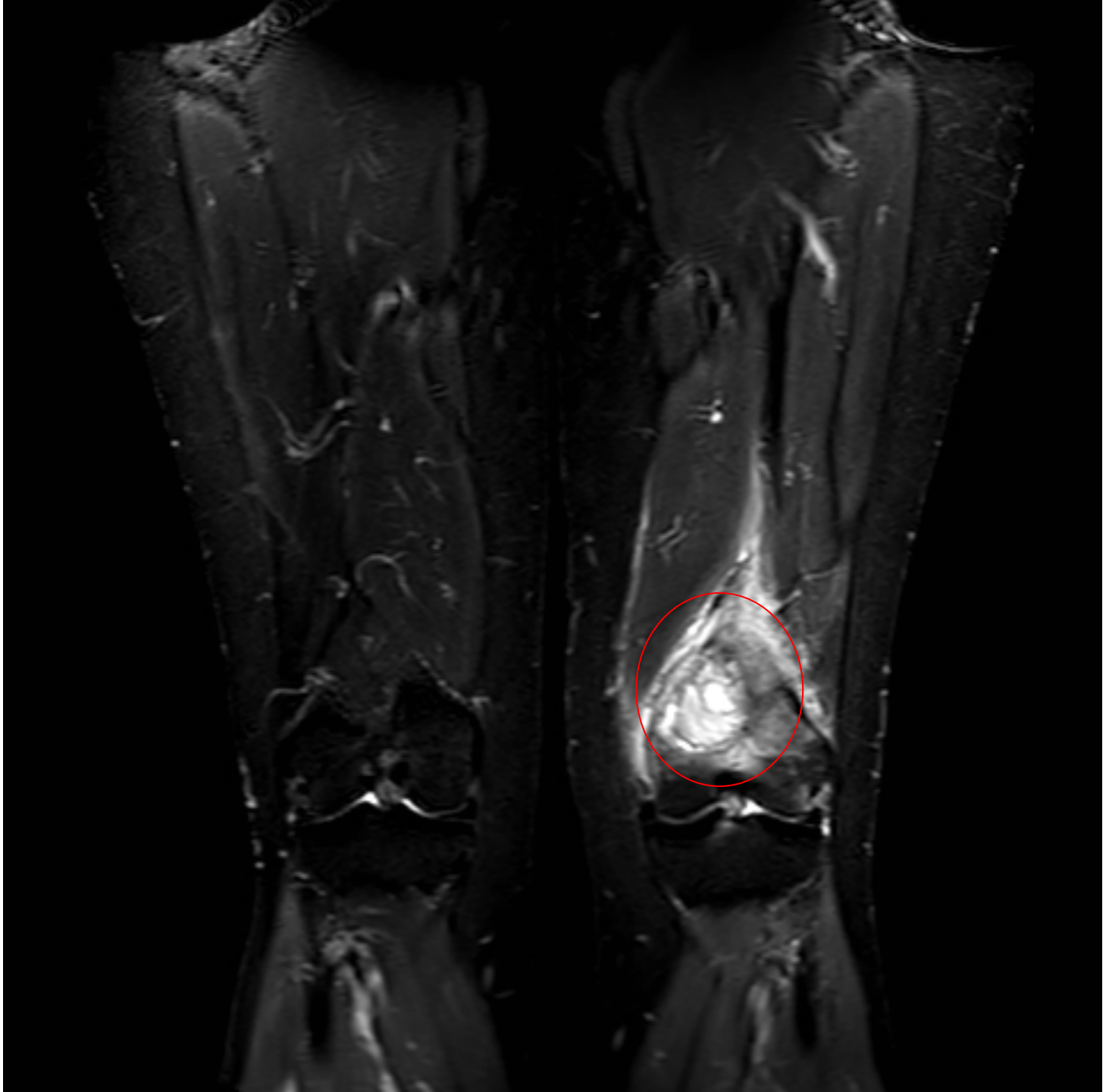
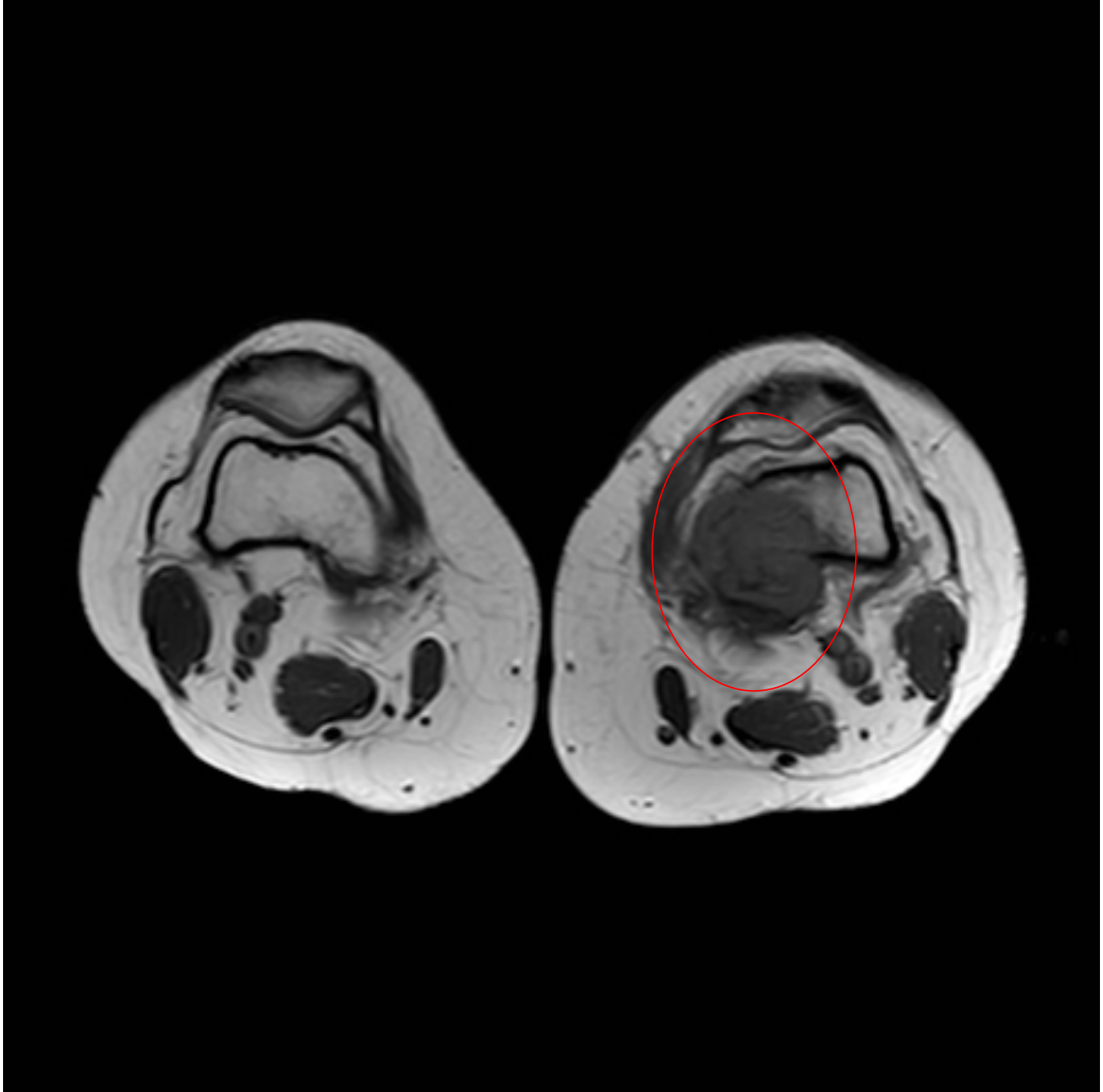
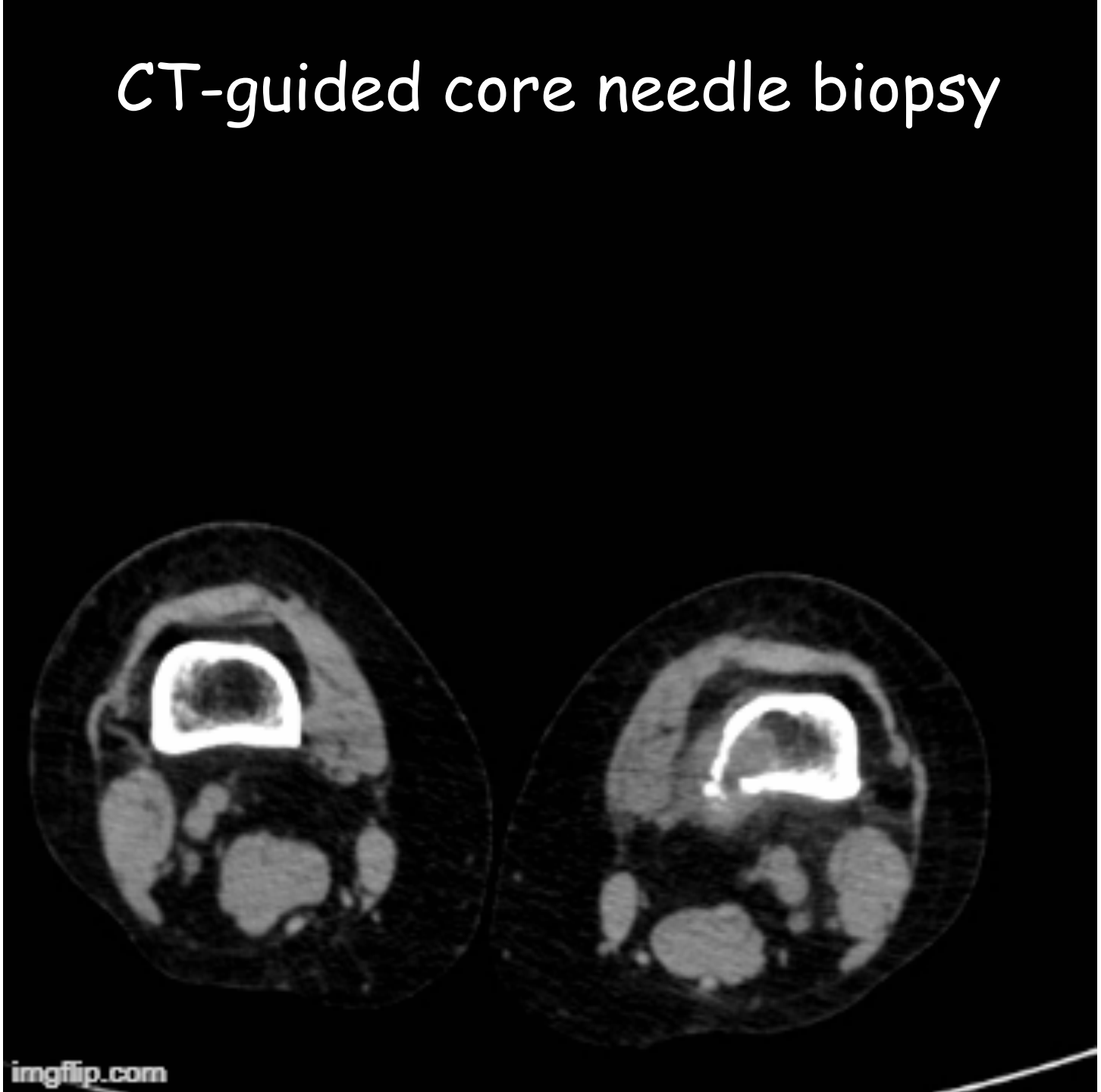


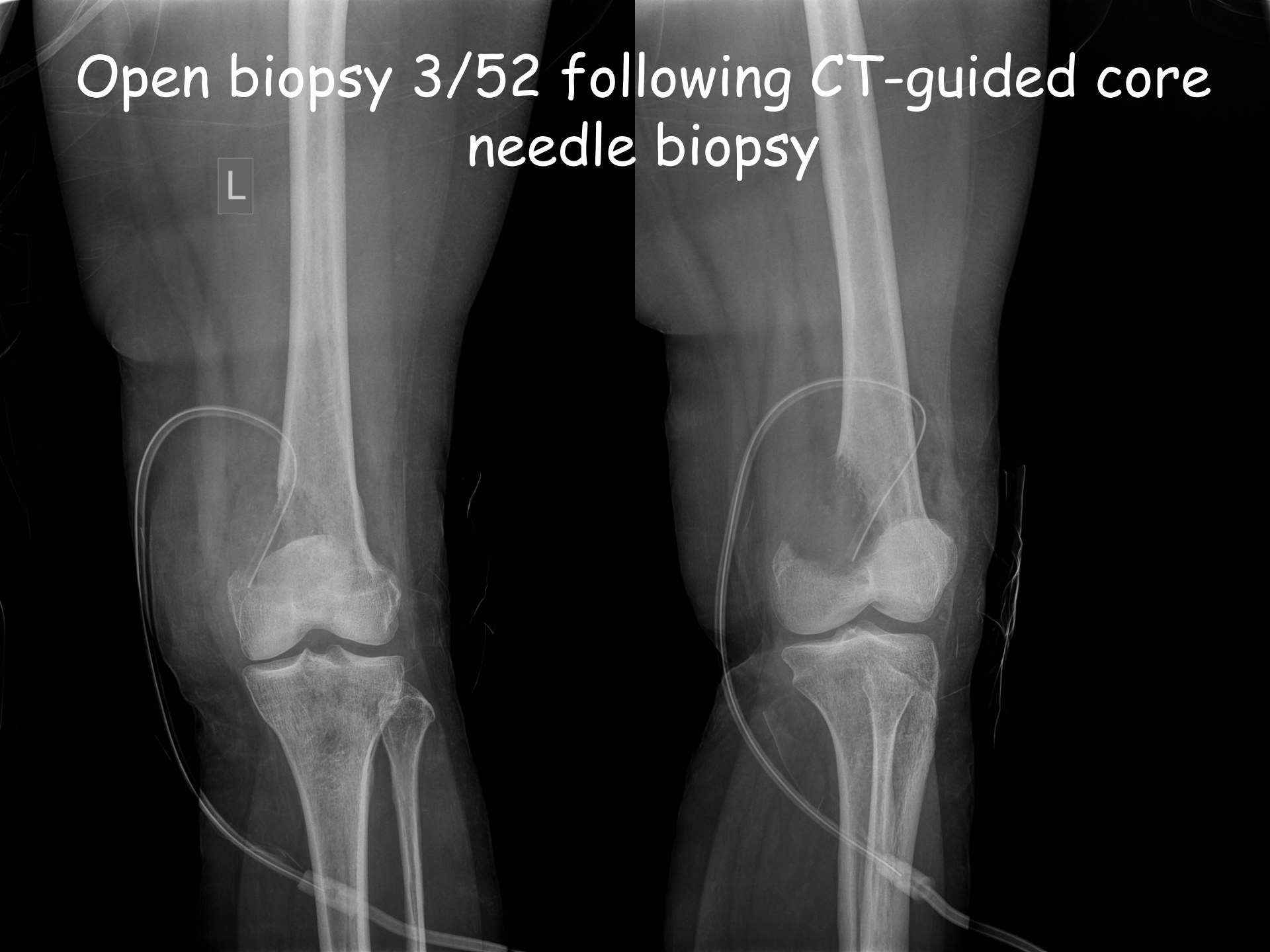


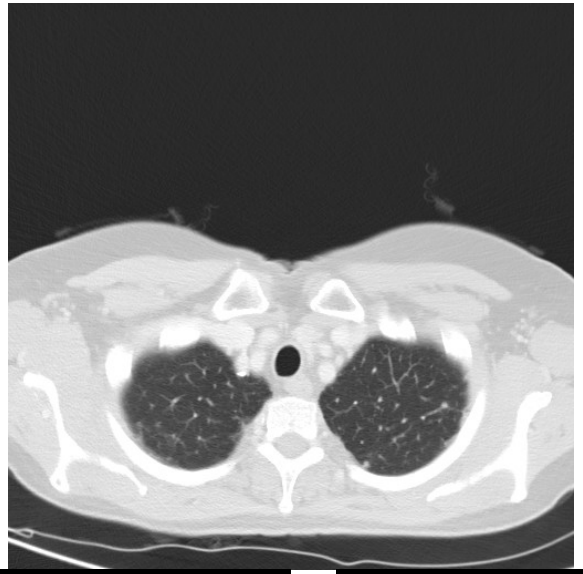
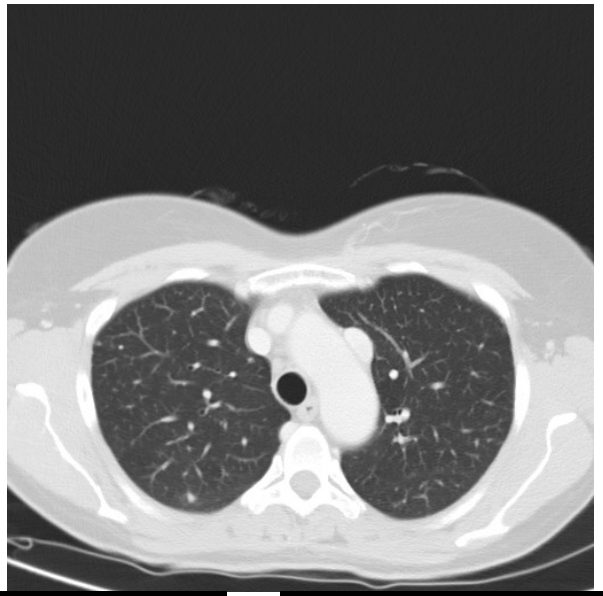
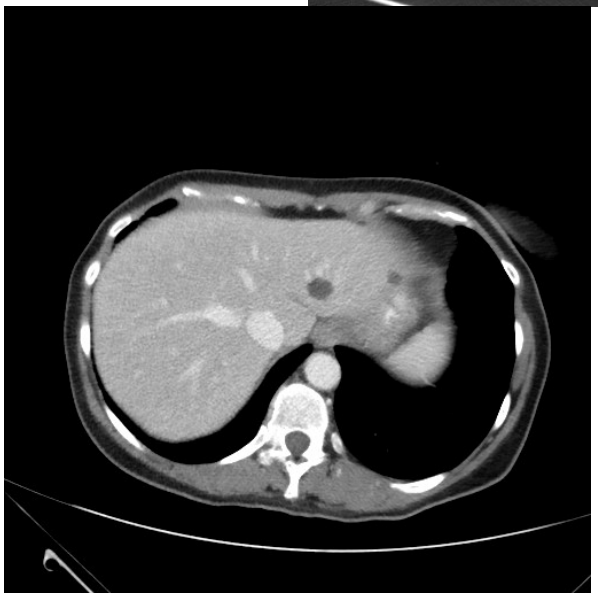


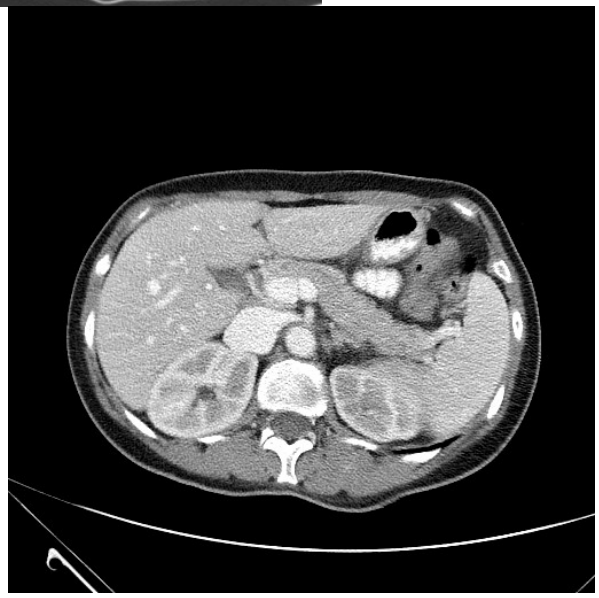


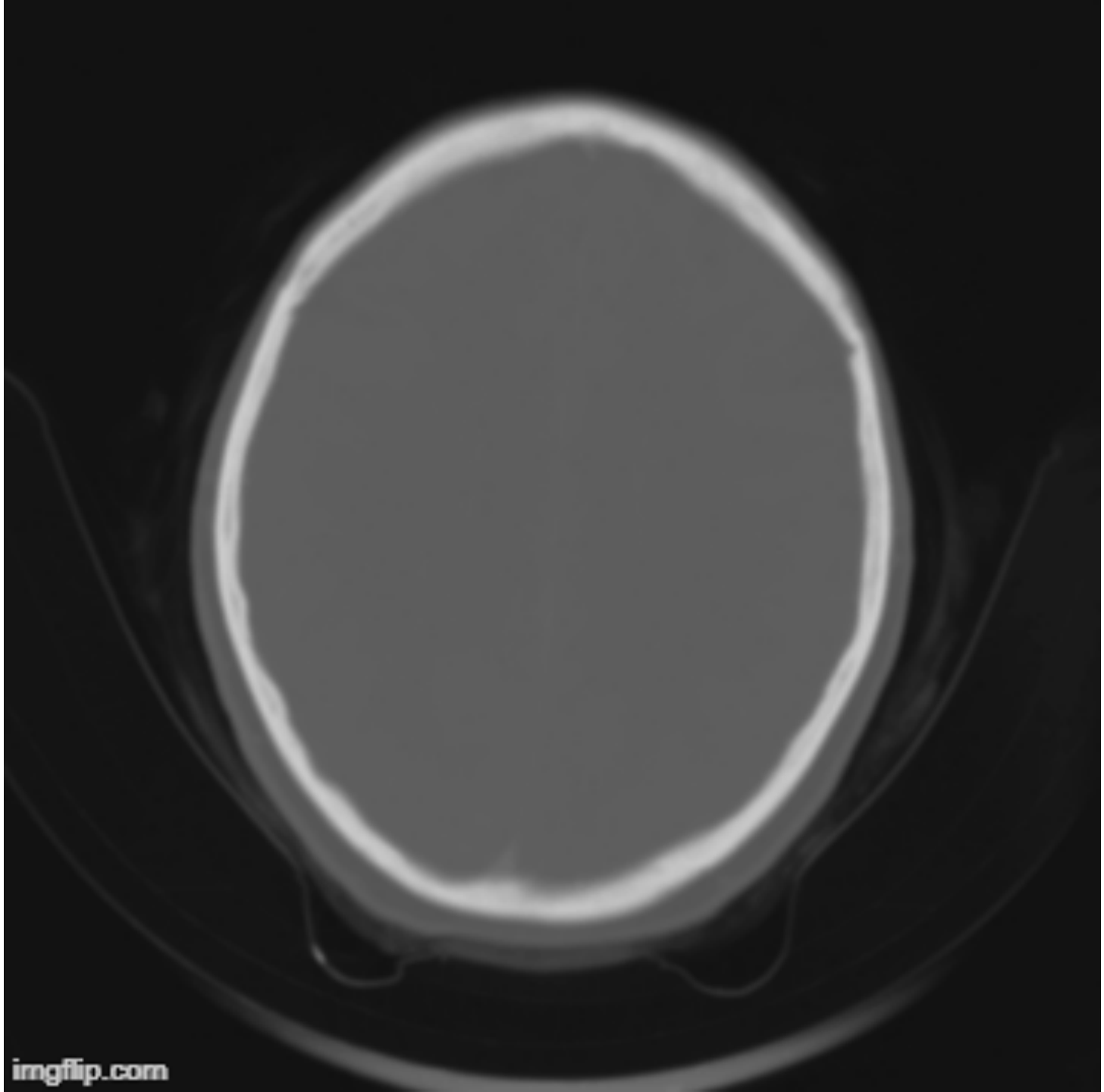
CT-guided core needle biopsy




Open biopsy 3/52 following CT-guided core needle biopsy
L




imgflip.com


1 month since chemo initiation
L

1 month since chemo initiation


1 month since chemo initiation
R

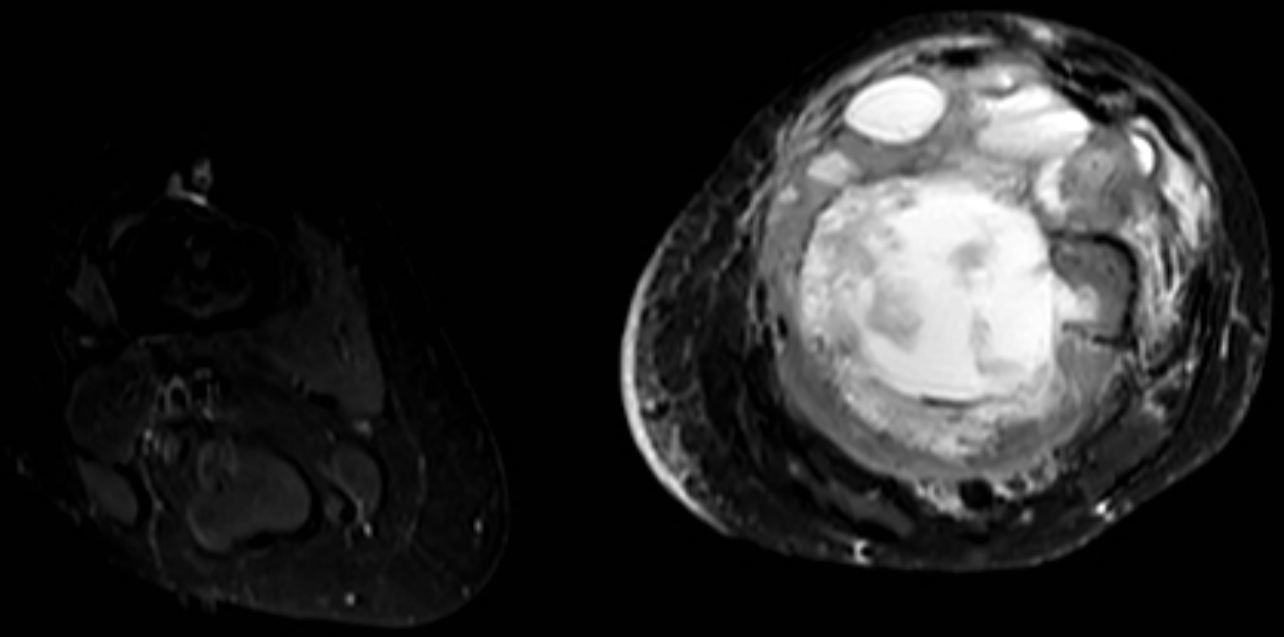

1 month since chemo initiation
imgflip.com


1 month since chemo initiation

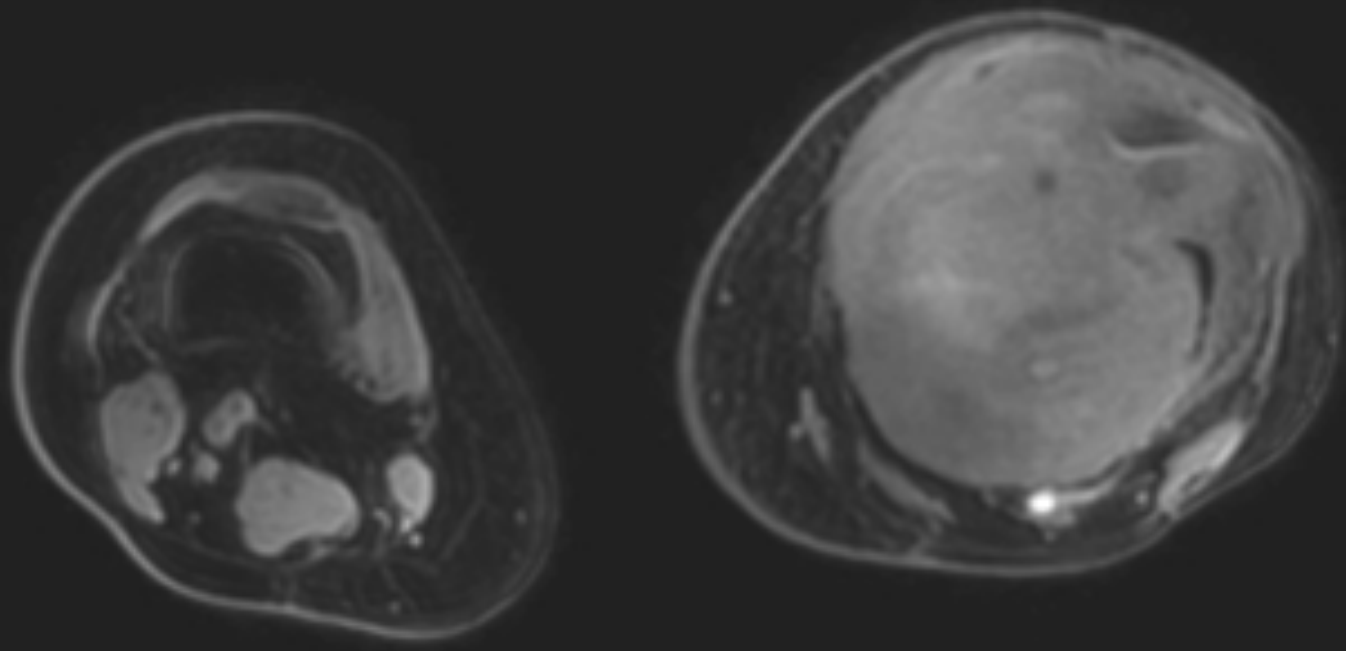

1 month since chemo initiation


1 month since chemo initiation

1 month since chemo initiation



1 month since chemo initiation




3 months since chemo initiation


3 months since chemo initiation


L

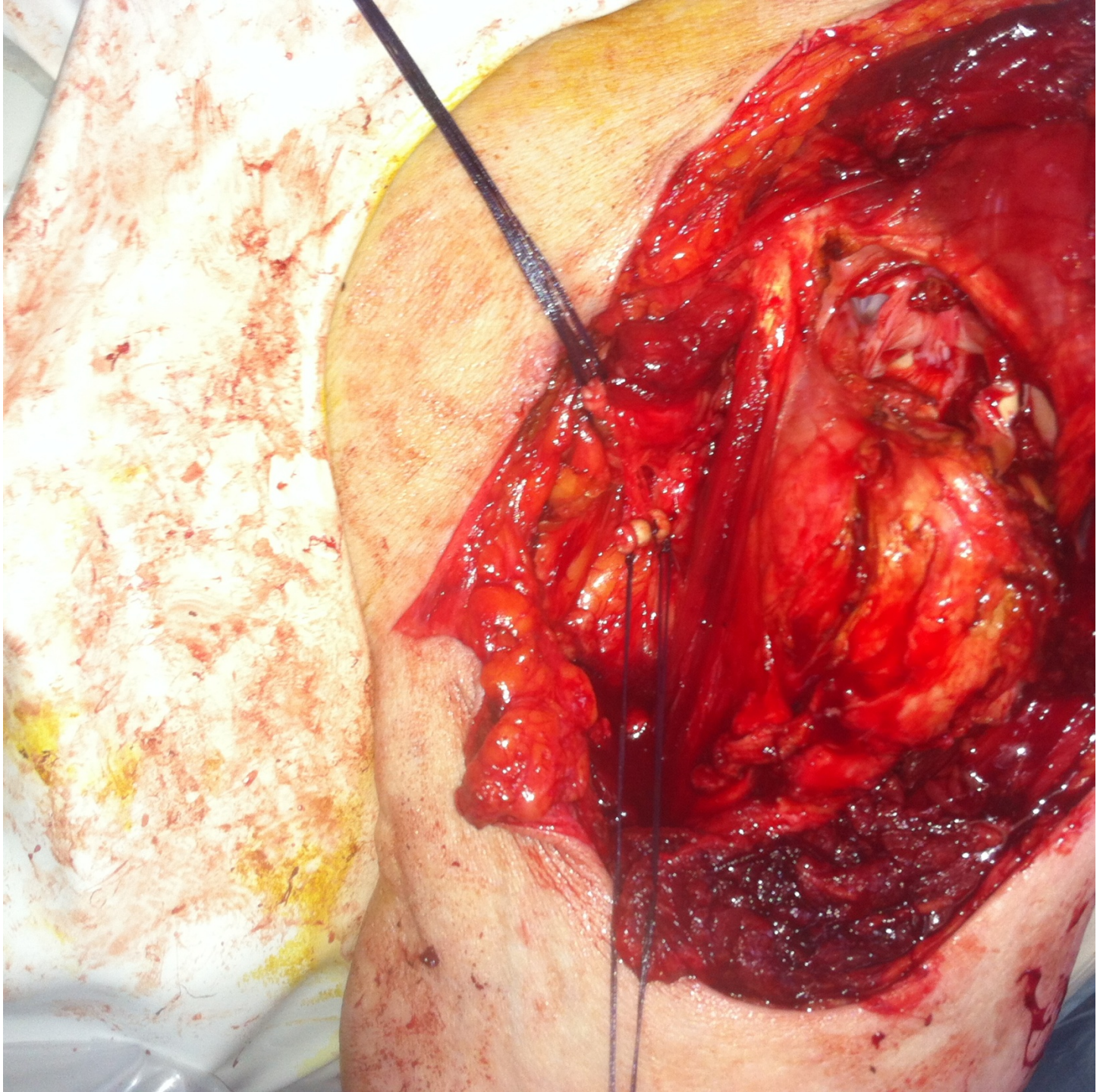

4 months since chemo initiation
imgflip.com

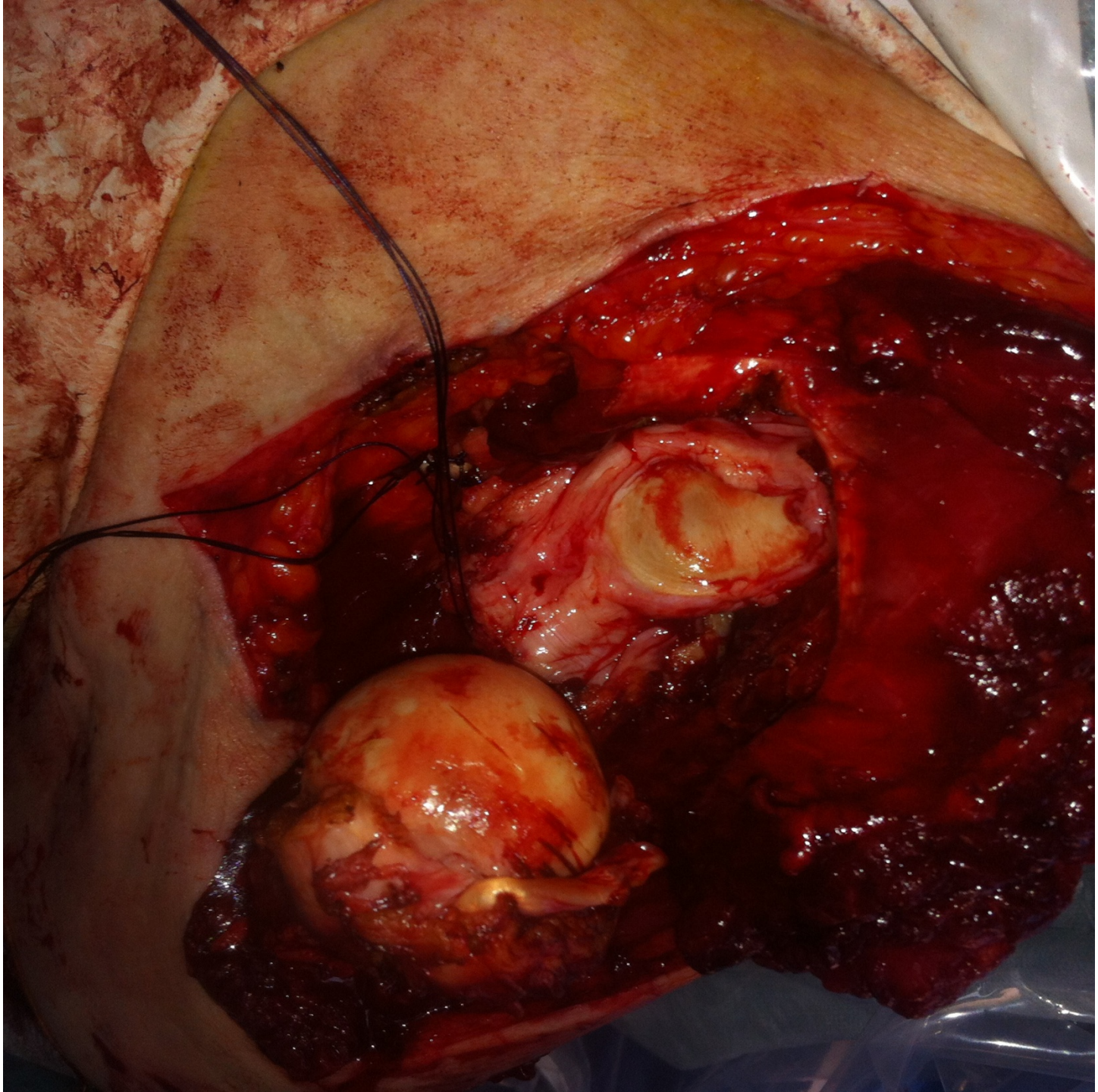

P152
CONTRAST:
SE:11
IM:312
10:49:46
10/04/2018
F
R
7
0
L
7
0
DFOV139
TILT:0
-315.1
1.5mm
kV:120
mas486
DFOV139
PAPAGEORGIOU HOSP.
P291

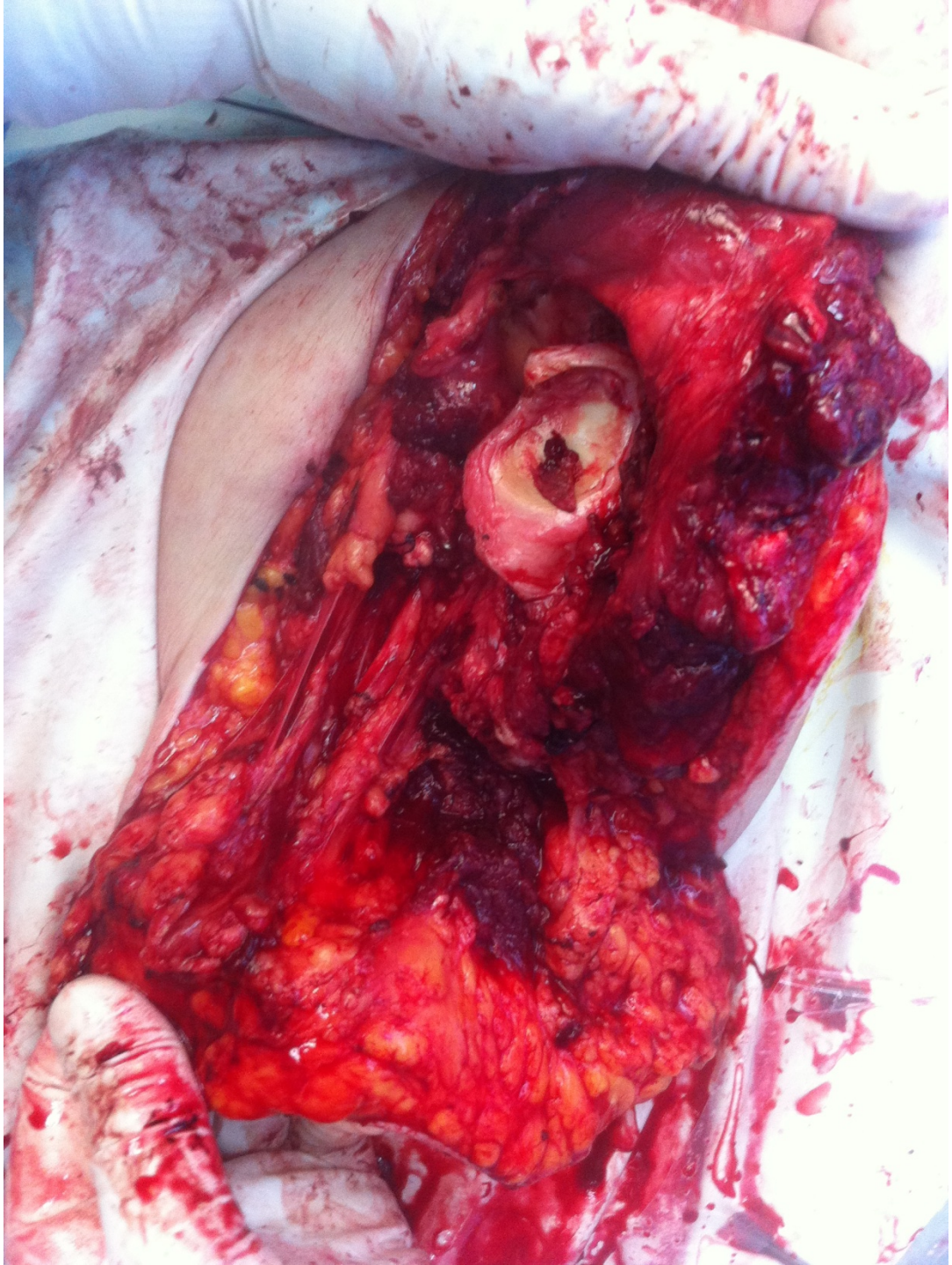

SA
SL
SP.
IP
:ORGIOU HOSP.
IR

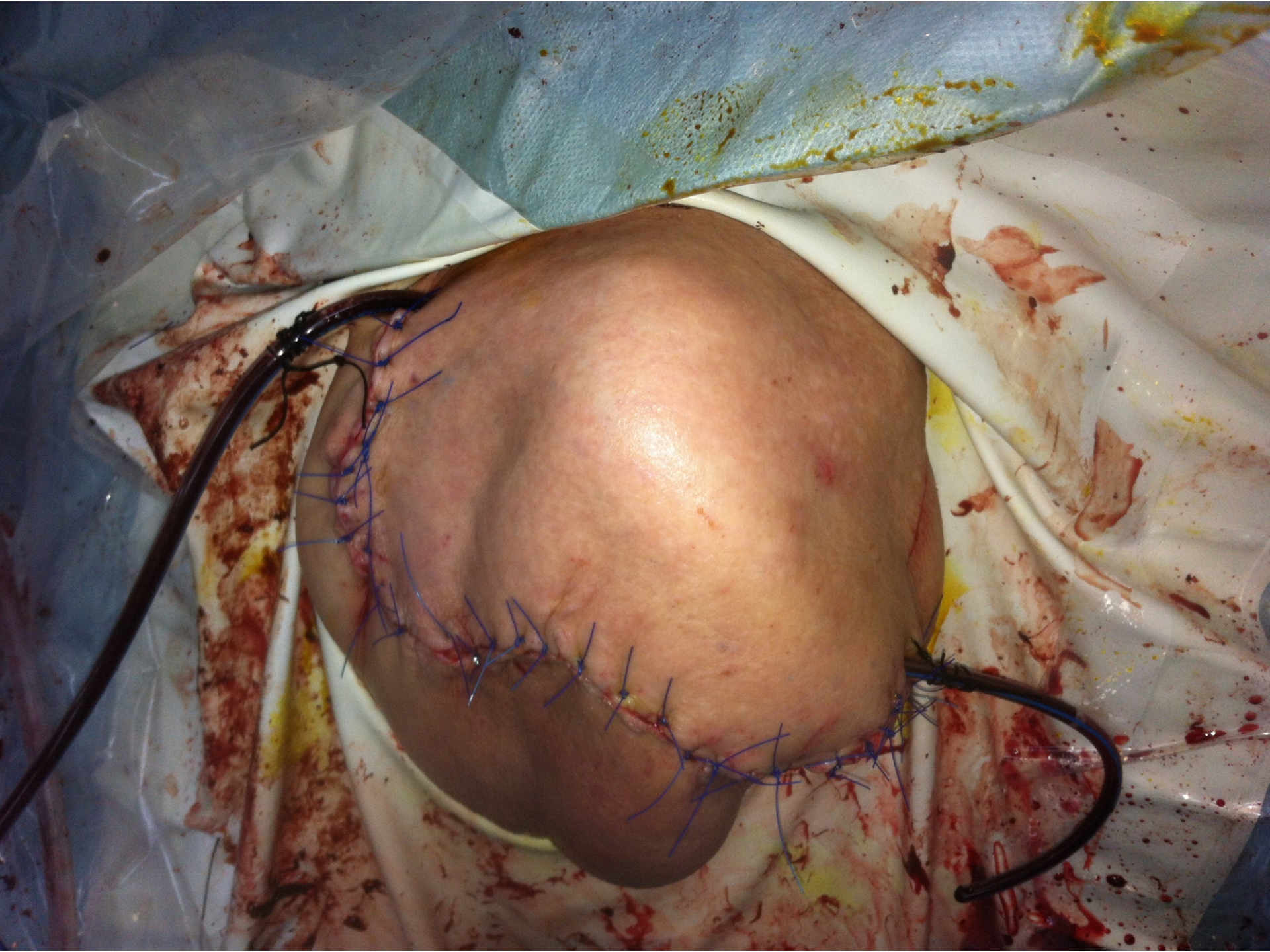
Case #11

Medical record file and/or photos belong to a patient treated by the speaker

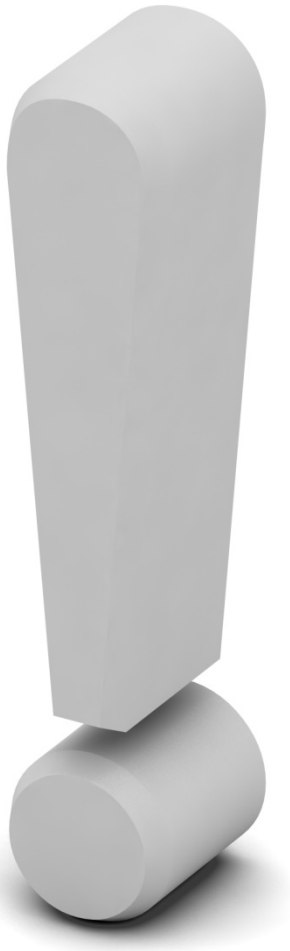








Surgical Technique



Meticulous wound closure. Avoid necrotic areas.

Use skin sutures instead of Stapler.

Case #12

Medical record file and/or photos belong to a patient treated by the speaker

Pathology Report

Pathology Report

Take an imprint from the remaining "healthy" stump.

- **Grimer R et al.** UK Guidelines for the Management of Bone Sarcomas. Sarcoma. 2010;2010:317462.
- **Hogendoorn PC; ESMO/EUROBONET Working Group, Athanasou N et al.** Bone sarcomas: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. Ann Oncol. 2010 May;21 Suppl 5:v204-13.

Pathology Report

Keep a detailed record of the operation.

Mark with a suture the excised specimen.

- **Grimer R et al.** UK Guidelines for the Management of Bone Sarcomas. Sarcoma. 2010;2010:317462.
- **Hogendoorn PC; ESMO/EUROBONET Working Group, Athanasou N et al.** Bone sarcomas: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. Ann Oncol. 2010 May;21 Suppl 5:v204-13.

Pathology Report

Is the final pathology report in harmony with the initial biopsy?

Have we achieved adequate surgical margins?

Hogendoorn PC; ESMO/EUROBONET Working Group, Athanasou N et al. Bone sarcomas: ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up. Ann Oncol. 2010 May;21 Suppl 5:v204-13.

Follow- up

Follow-up

Extremely Important

Timely discovery of local recurrence and/or metastases

Re-operation and/or chemo- and/or radiotherapy

Follow-up

Local imaging (CT- and/or MRI-scan)

Chest CT-scan

Whatever else is deemed necessary

Follow-up

For 0-18 months postoperatively

Every 3 months

Follow-up

For 18-36 months postoperatively

Every 4 months

Follow-up

For 36-60 months postoperatively

Every 6 months

Follow-up

For 60-… months postoperatively

Every 12 months

Take Home Messages…

Take Home Messages…

When a patient with a musculoskeletal tumor is treated by expert surgeons and in designated Centers of excellence, recurrence rate is <10%

Increased local recurrence rates may be expected if:

- The patient is being treated in a non-designated Oncological center
- Excision margins are not "clear"

Clark MA, Thomas JM. Amputation for soft-tissue sarcoma. Lancet Oncol 2003; 4: 335–42

Take Home Messages…

When treating patients with Musculoskeletal Tumors, we must obey 2 rules

Take Home Messages…

Obey the Guidelines for the Treatment of patients with Musculoskeletal Tumors

RULE #1

Take Home Messages…

Obey Rule #1

RULE #2

Thank you…