



The 1.5 Exchange – Introduction of a new Spacer Technique

Thorsten Gehrke, M.D.



1,5 Stage Exchange ?





St. Petersburg 2017

Rashid Tikhilov

15.00	Infection after THA
-	
16.00	
15.00	Infection Following Hip Replacement: Times They Are All Changing
-	Clive Duncan (Vancouver, Canada)
15.10	
15.10	"Real debridement capabilities of antibiotic-bearing cement spacers: the boundaries of the possible"
-	
15.20	
15.20	One-stage or two-stage THA
-	Thornsten Gehrke (Germany)
15.30	
15.30	Is there a place for ExFix in the treatment of PJI
-	
15.40	Artem Ermakov (Kurgan, Russia)
15.40	Errors in the treatment of periprosthetic infection
-	
15.50	Vasilii Artykh (Saint Petersburg, Russia)



A new concept for Spacer in Two Stage Exchange - The 1.5 Stage Exchange



Thorsten Gehrke
ENDO-Klinik, Hamburg





1,5 stage exchange

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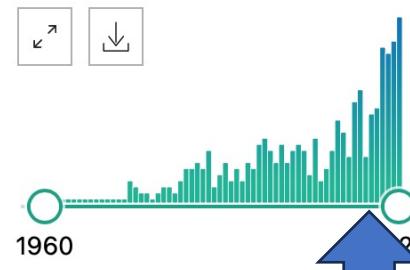
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353 results

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RESULTS BY YEAR



TEXT AVAILABILITY

- Abstract
- Free full text
- Full text

ARTICLE ATTRIBUTE

- Associated data



1.5-Stage Exchange Arthroplasty for Total Knee Arthroplasty Periprosthetic Joint Infections.

Cite Hernandez NM, Buchanan MW, Seyler TM, Wellman SS, Seidelman J, Jiranek WA.
J Arthroplasty. 2021 Mar;36(3):1114-1119. doi: 10.1016/j.arth.2020.09.048. Epub 2020 Oct 9.
PMID: 33162276

The purpose of this study was to outline a novel technique to treat TKA PJI. We define **1.5-stage exchange** arthroplasty as placing an articulating spacer with the intent to last for a prolonged time.
...Four had progressive radiolucent lines, but there ...

1.5-Stage Versus 2-Stage Exchange Total Hip Arthroplasty for Chronic Periprosthetic Joint Infections: A Comparison of Survivorships, Reinfections, and Patient-Reported Outcomes.

Cite Nace J, Chen Z, Bains SS, Kahan ME, Gilson GA, Mont MA, Delanois RE.
J Arthroplasty. 2023 Jul;38(7S):S235-S241. doi: 10.1016/j.arth.2023.02.072. Epub 2023 Mar 5.
PMID: 36878441 Review.

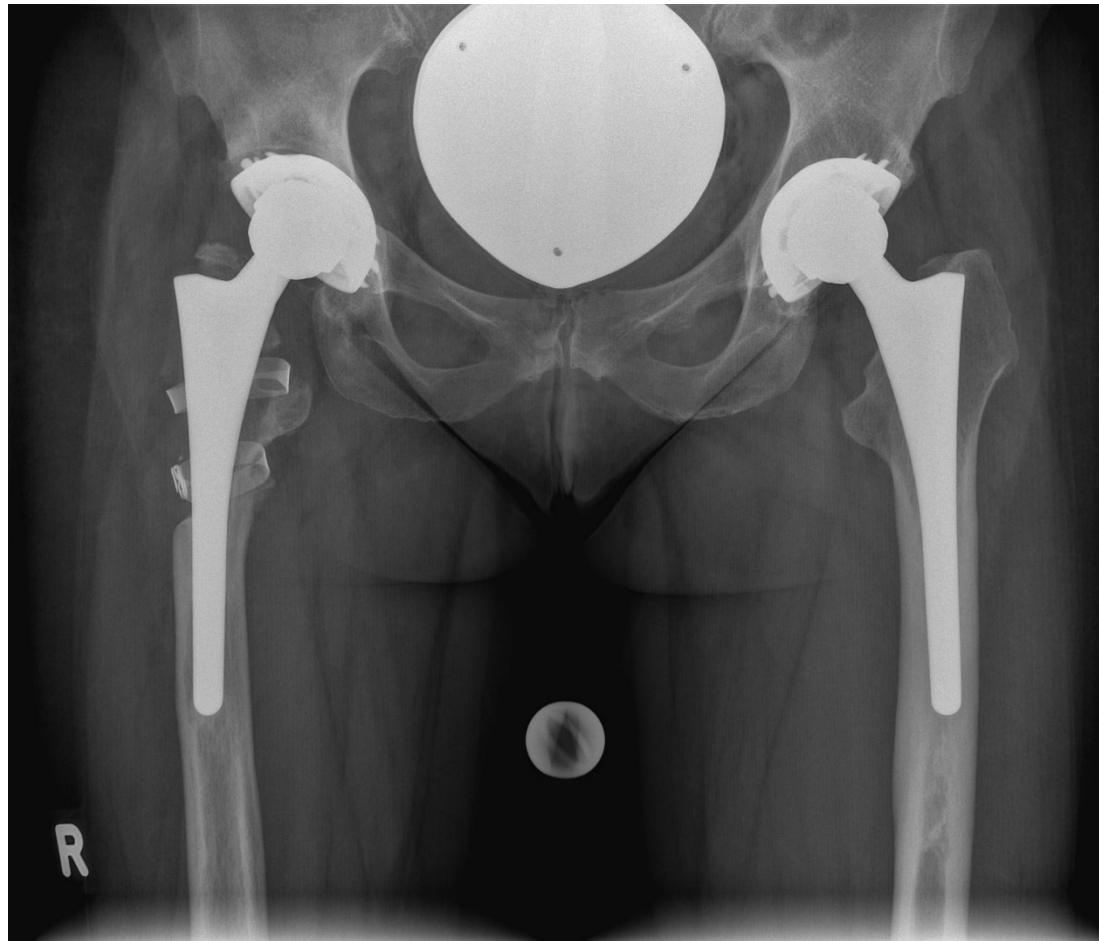
METHODS: We reviewed a consecutive series of **1.5-stage** or planned **2-stage** THAs. A total of 123



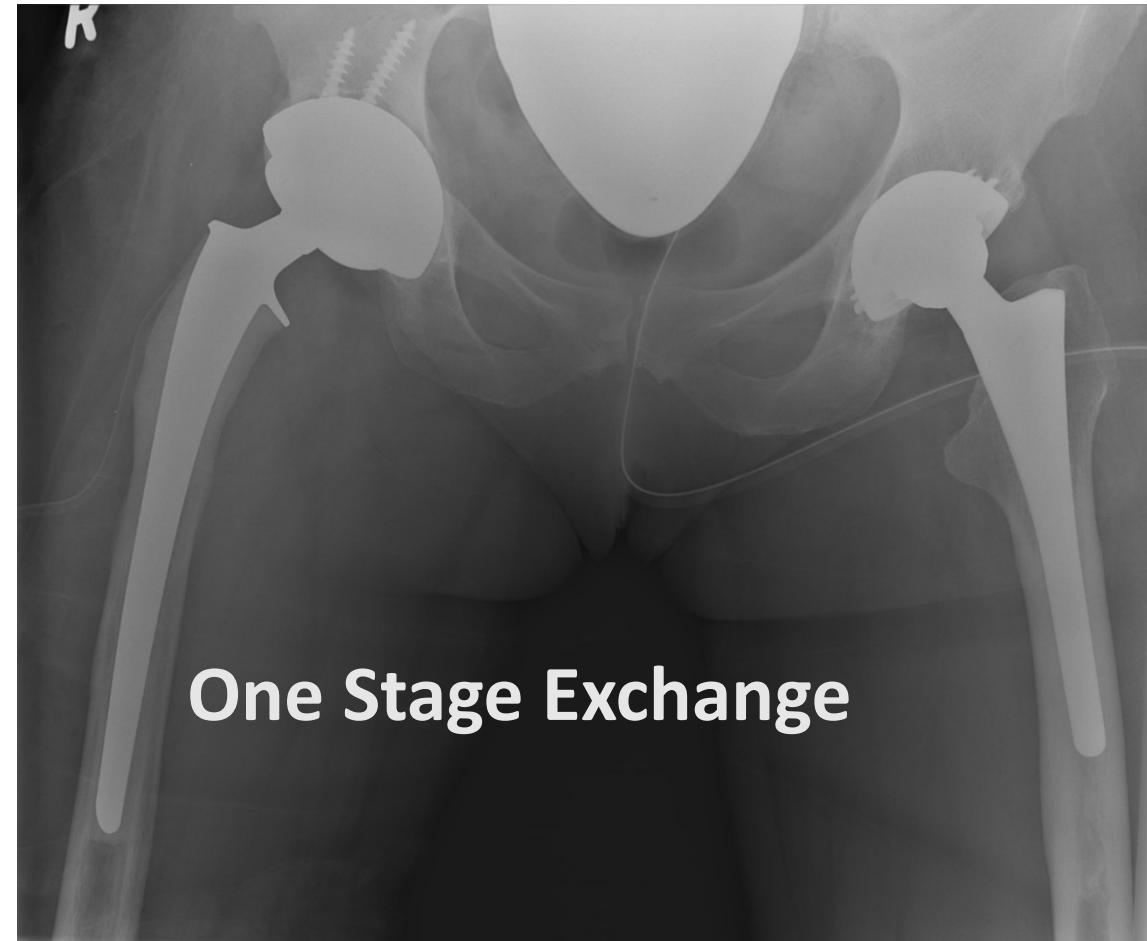
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Tantal Revision + Double Mobility Cup



preoperative



postoperative

One Stage Exchange

Case Report Paul, 34 Years

Diagnosis:

- Dysplasia Arthritis left hip

History:

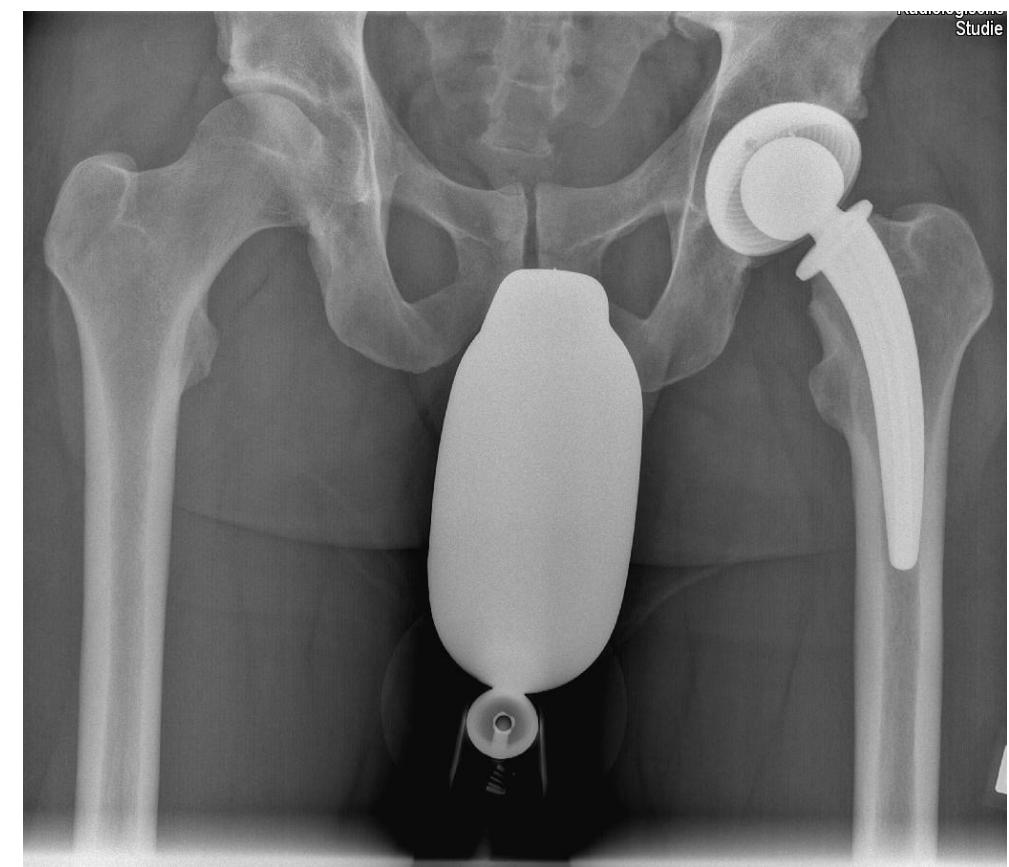
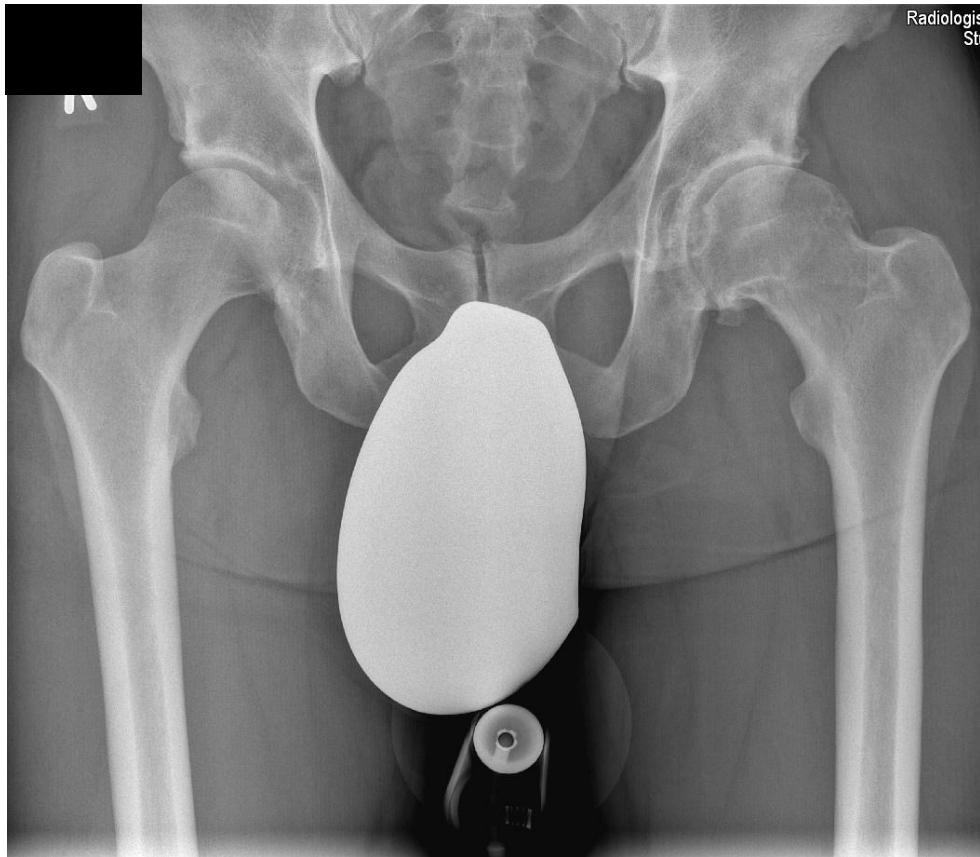
- Pain since years, Maximal walking duration 1 hour, continuous pain killer

Examination

- BMI 26.1, Ex/Flex 0-0-80°, Abd/Add 10-0-5°, Ero/Iro 5-0-5°, strong rotating pain



Case Report Paul, 34 years



17.08.2021: Implantation of a cementless short stem

Case Report Paul, 34 years

History 06/22:

- Increasing pain after some month, Swelling, severe pain, Night pain, shivering, fever

Microbiology:

- Aspiration left hip 7.6.2022: **Cutibacterium acnes**, Leucocyte Esterase Test: bloody tinged, Cell Count: **43.581, PMN %: 94,9 %**, Alpha Defensin: 1,3

Therapy 10/22:

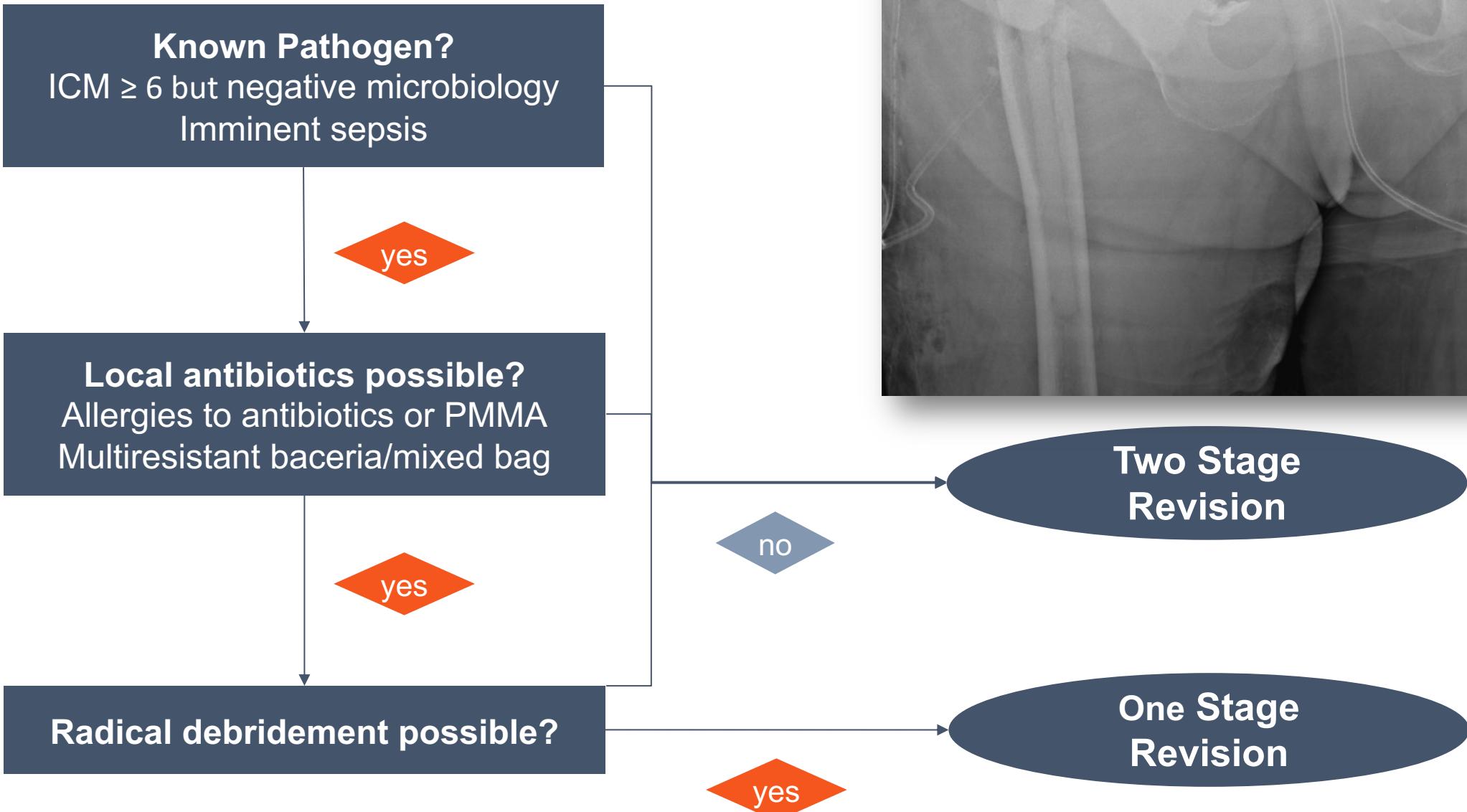
- **One Stage Exchange (Gentamicin, Clidamycin and Vancomycin in the bone cement)**
- **Systemic Therapy: Penicillin G i.v. 4 x 5 Mio IE / 24 h for 21 days; Oral Therapy: Clindamycin p.o. 3 x 600 mg / 24 h for 28 days)**

Biopsies:

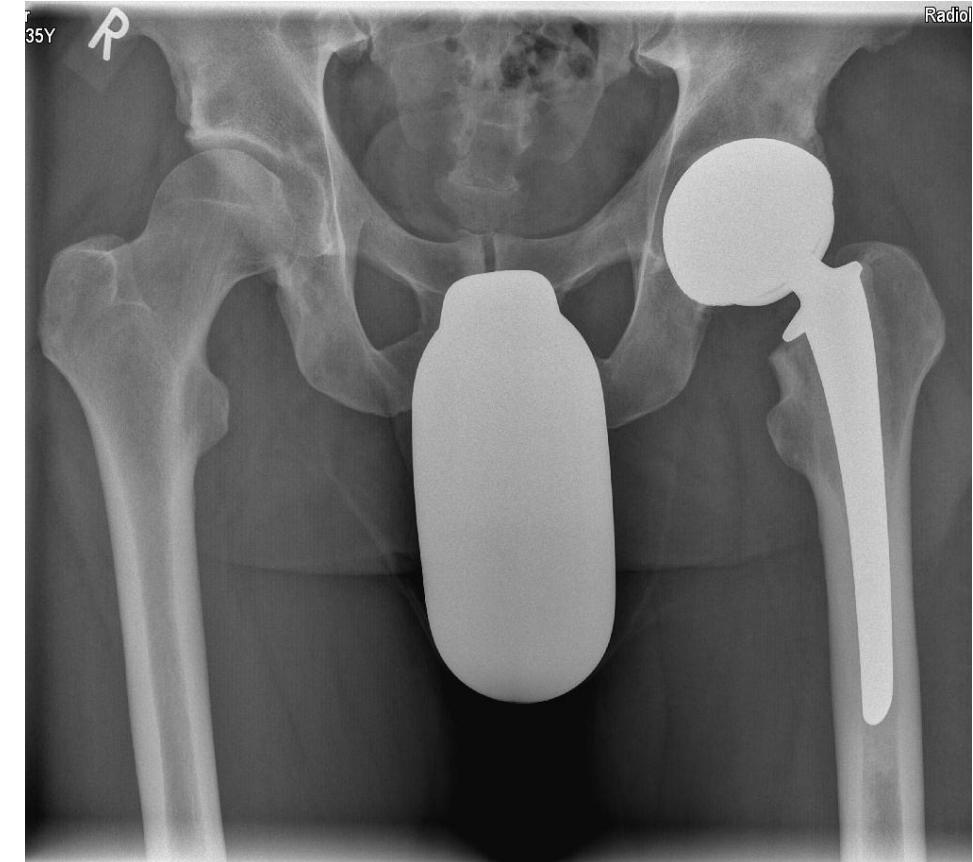
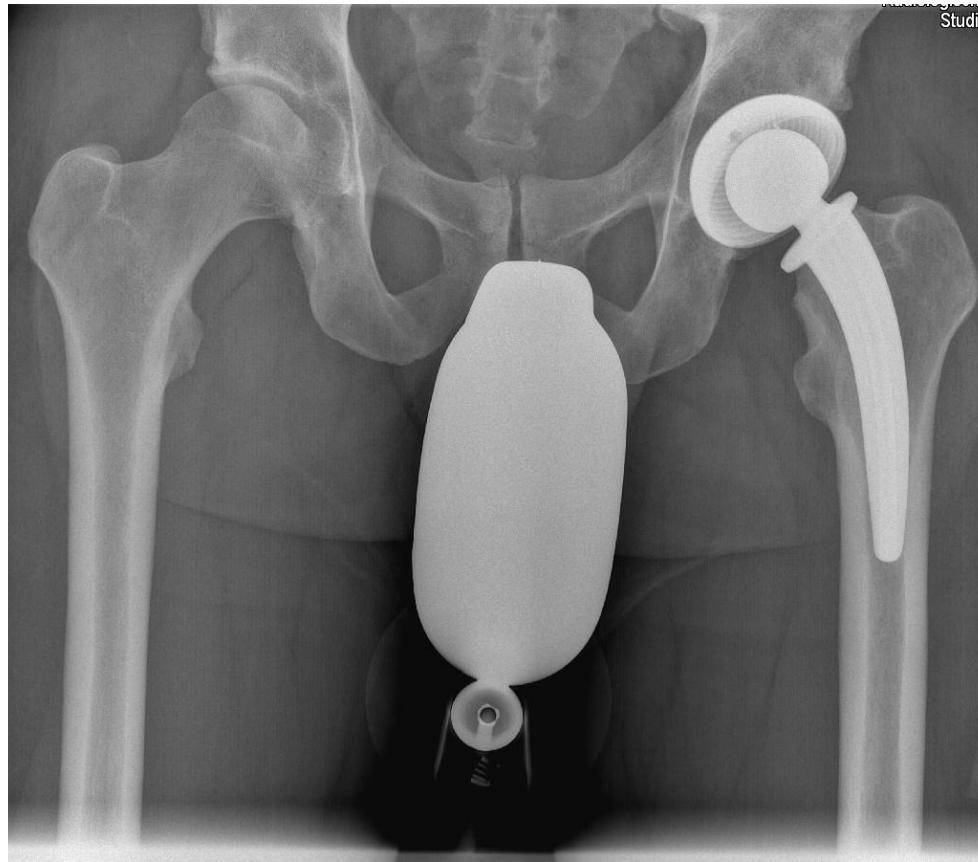
- **Cutibacterium acnes** in several samples

Therapy

Indications for 2-Stage Revision



Case Report Paul, 34 Years



One Stage Exchange

- Local antibiotic therapy: Copal G (1 g Gentamycin + 1g Clindamycin) + 2 g Vancomycin

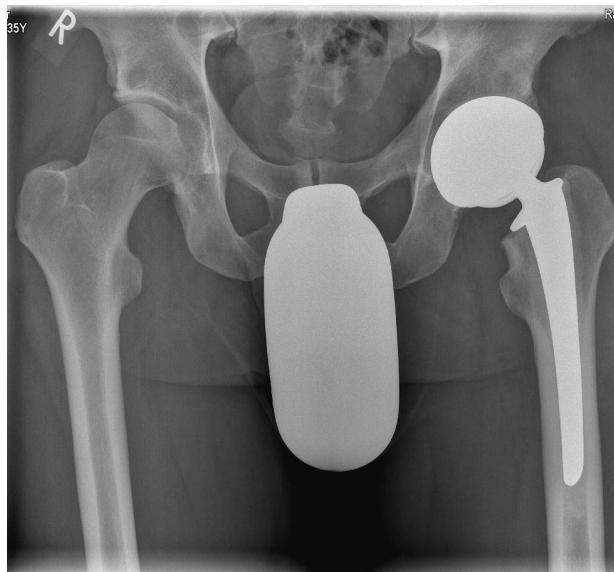
Case Report Paul, 35 Years

01/23:

- 3 month after surgery pain and limitation of ROM, Swellling, Night sweat

Microbiology:

- Aspiration left hip 31.01.2023: **No growth, Culture negative**(Culture + multiplex PCR), Leucocyte Esterase: **3-fold positive**, Cell Count: **14.256**, PMN%: **72**, Alpha-Defensin: **1,9**, CRP:**52 mg/l**



Therapy 03/23:

- Open Biopsy
- Intraoperative Samples:
- **No growth, Culture negative**

Case Report Paul, 35 Years

26.04.2023 : Two Stage Exchange with the ENDO Spacer

Systemic antibiotic therapy: (**Vancomycin, Rifampicin p.o. 2 x 450 mg/24h, Unacid i.v. 4 x 3 g/day** for 21 days)

- Oral Antibiotic therapy : **Levofloxacin p.o. 2 x 500 mg/24h + Rifampicin p.o. 2 x 450 mg/24h** for 6 weeks)
- intraoperative Samples 26.4.2023:
- **No Growth, Culture negative**
- **Intraoperatively macroscopically severe infection !**

Spacer-Types

1. Hand-made



2. Molds



3. Preformed



4. Modular



None of them
fulfill all
requirements!

Spacer Complications

Spacer-dislocation	10 - 17 %
Spacer-fracture	10 %
Femoral fracture	14 %
Renal Toxicity	6 %
Persistence of Infection	up to 27 %

Tsung JD, Rohrsheim JA, Whitehouse SL, Wilson MJ, Howell JR. Management of periprosthetic joint infection after total hip arthroplasty using a custom made articulating spacer (CUMARS); the Exeter experience. J Arthroplasty 2014 Sep;29(9):1813-8.

Jung J, Schmid NV, Kelm J, Schmitt E, Anagnostakos K. Complications after spacer implantation in the treatment of hip joint infections. Int J Med Sci 2009; 6(5):265-273.

Salvati EA, Callaghan JJ, Brause BD, Klein RF, Small RD. Reimplantation in infection: elution of gentamicin from cement and beads. Clin Orthop. 1986;207:83-93

Springer BD, Lee GC, Osmon D, Haidukewych GJ, Hanssen AD, Jacofsky DJ. Systemic safety of high-dose antibiotic-loaded cement spacers after resection of an infected total knee arthroplasty. Clin Orthop Relat Res. 2004;427:47-51

Charaterization of Outcomes of 2-Stage Exchange Arthrolastyin the Treatment of Prosthetic Join Infections. Ford AN, Holzmeister AM, Rees HW, Belich PD. J Arthroplasty. 2018 Jul;33(7S):S224-S227.



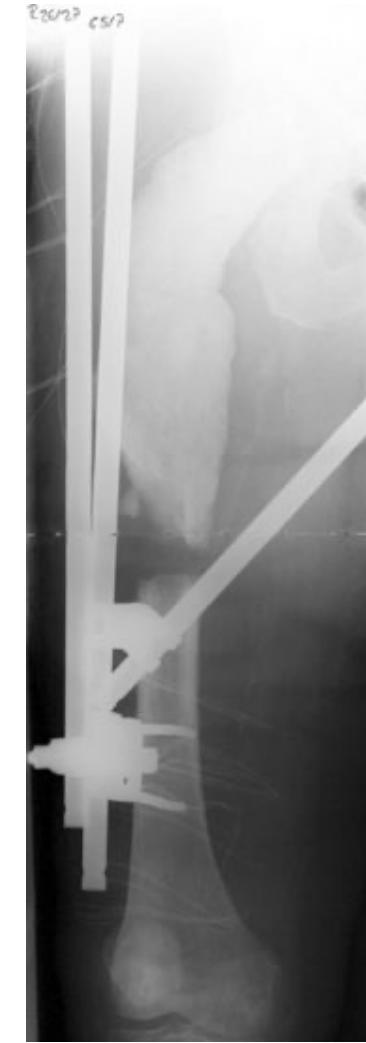
Spacer Variations / Complications

A



B

Spacer Complications



What's a 1.5 Stage Exchange

- A functional articulating spacer with antibiotic loaded bone cement
- Designed for a longer intervall between first and second stage
- Full weight Bearing possible
- Easy to remove



Surgical Technique

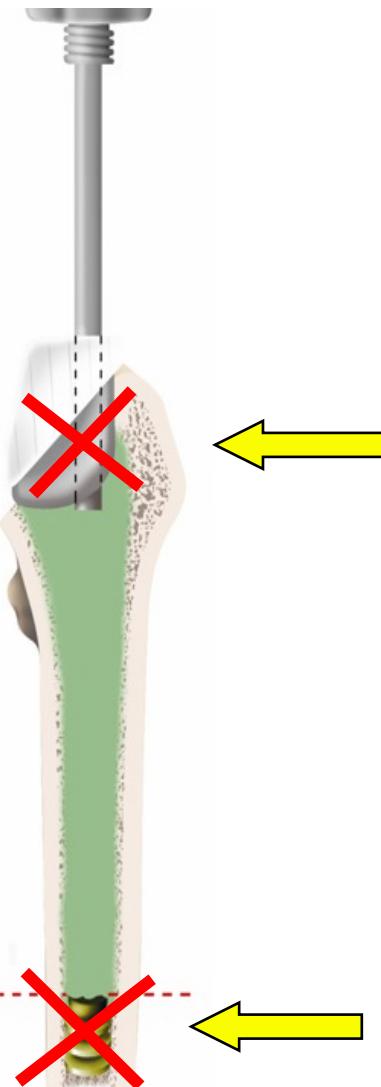


Cemented Stem



ALAC

»Bad« Cementing Technique

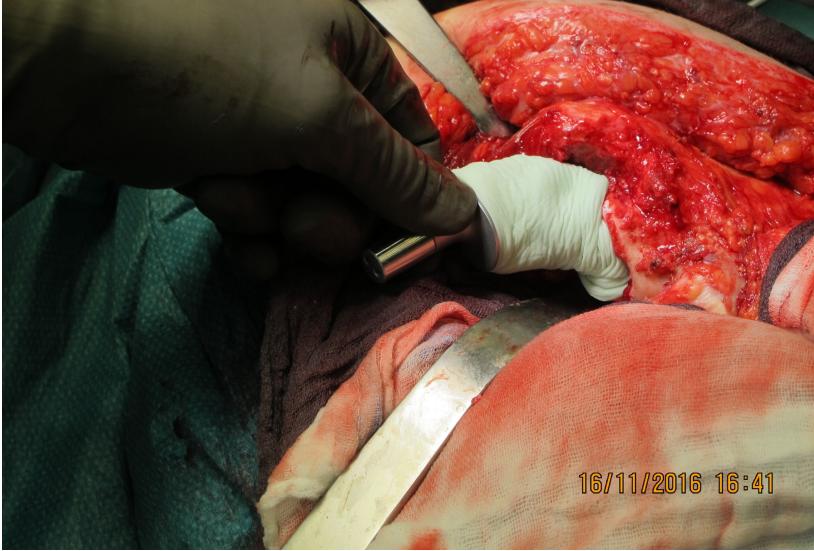
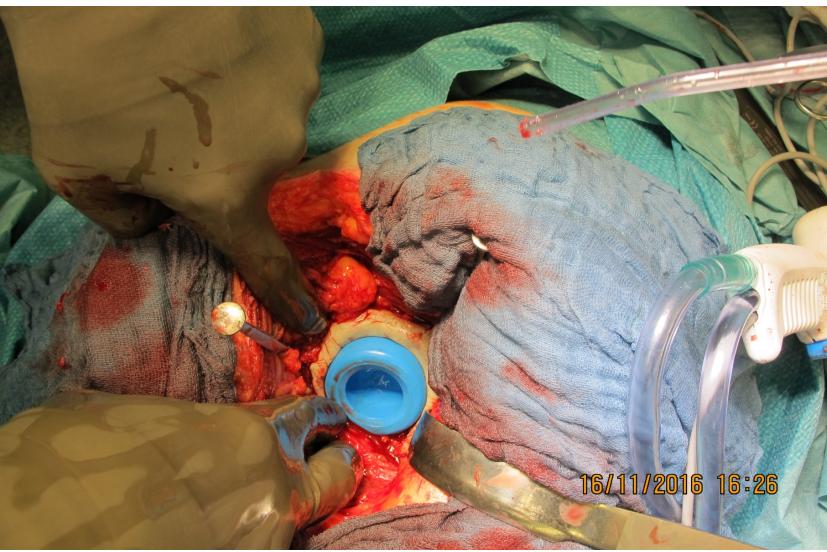


Opposite of modern cementing technique

- No distal cement plug
- No cement gun
- No proximal seal
- No pressurizing
- No vacuum bone cement

Covering of femoral component with cement

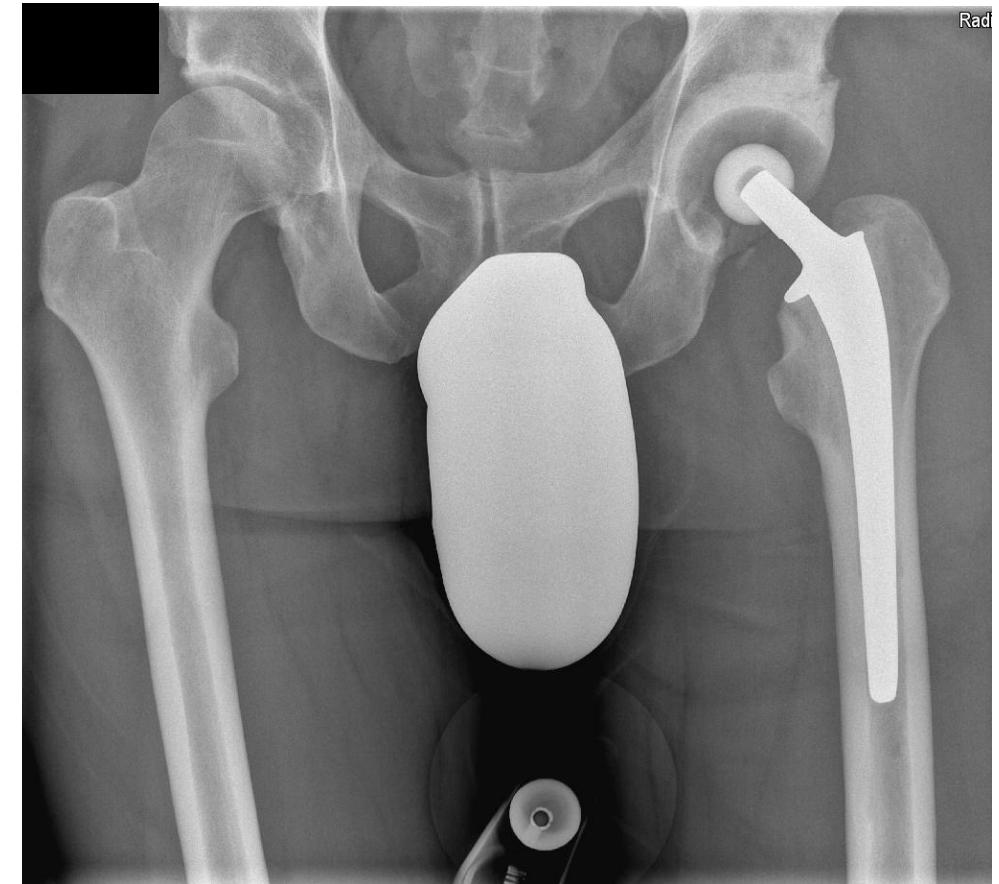
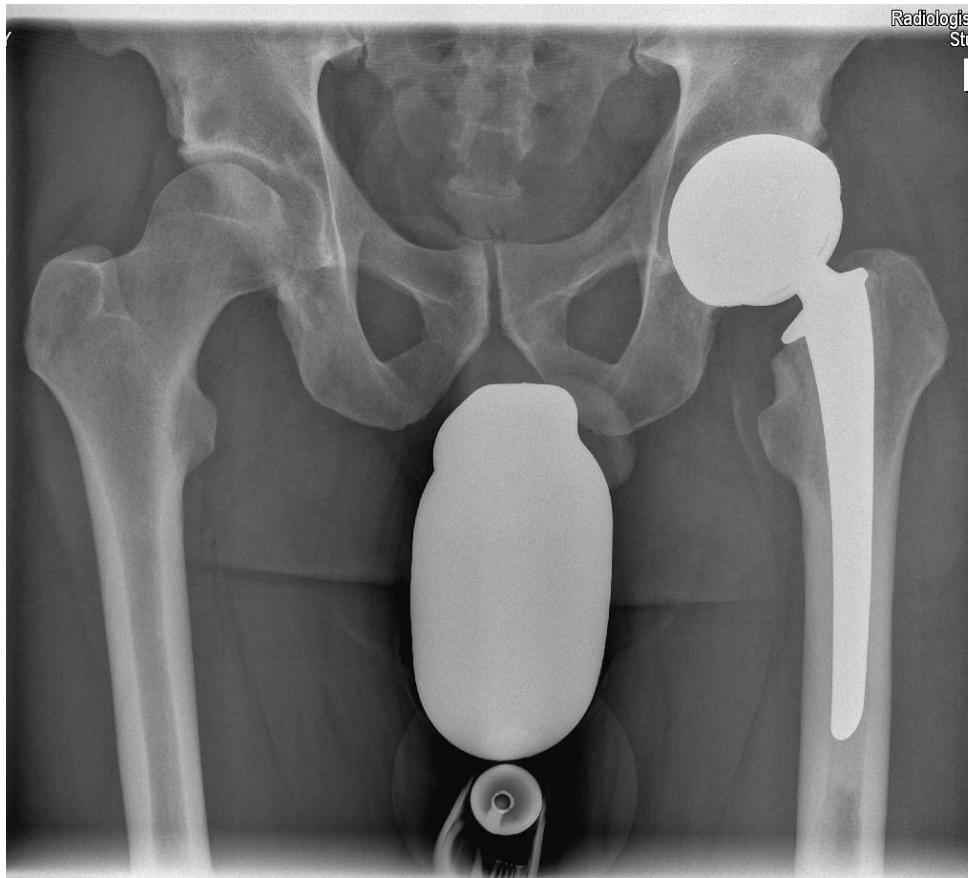
Insertion of cement/prosthesis at end of application period (@ 4-6 minutes)



ENDO-Spacer



Case Report Paul, 35 Years



Two Stage Exchange with the Endo Spacer (Gentamicin + Clindamycin + Vancomycin)

Case Report Paul, 35 Years

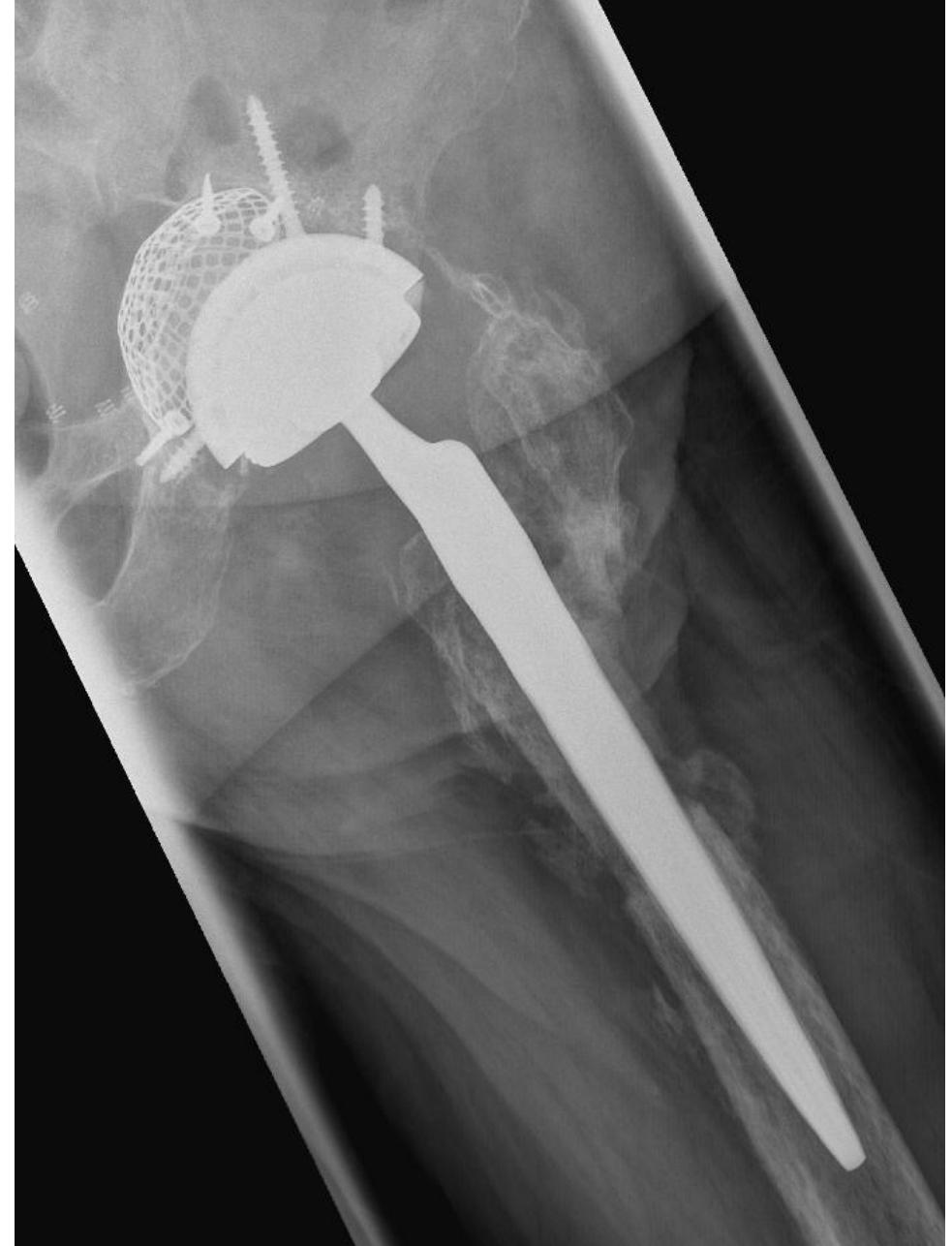
14.06.2023: **Reimplantation**, acetabular Reconstruction with a TM Revision Cup

- **Antibiotic Therapy:** **Vancomycin, Rifampicin** p.o. 2 x 450 mg/24h, **Unacid** i.v. 4 x 3 g/24h,
- intraoperative Samples:
- :
- **No Growth, Culture Negative**

Case report Mr. P.



7/ 2020



Mr. P., 78 years

- **History:**
- Primary hip implantation left + right 2004 (Barcelona) because of steroid-induced necrosis of the femoral head
- **Other diagnoses:**
 - History of cardiac arrhythmia, depression
 - No known allergies

2019
Pain left hip
Wear?





PPI with multiresistant bacteria and fungi

After 11 septic and aseptic revisions

The Surgery: 11.08.2020

Explantation of all foreign material

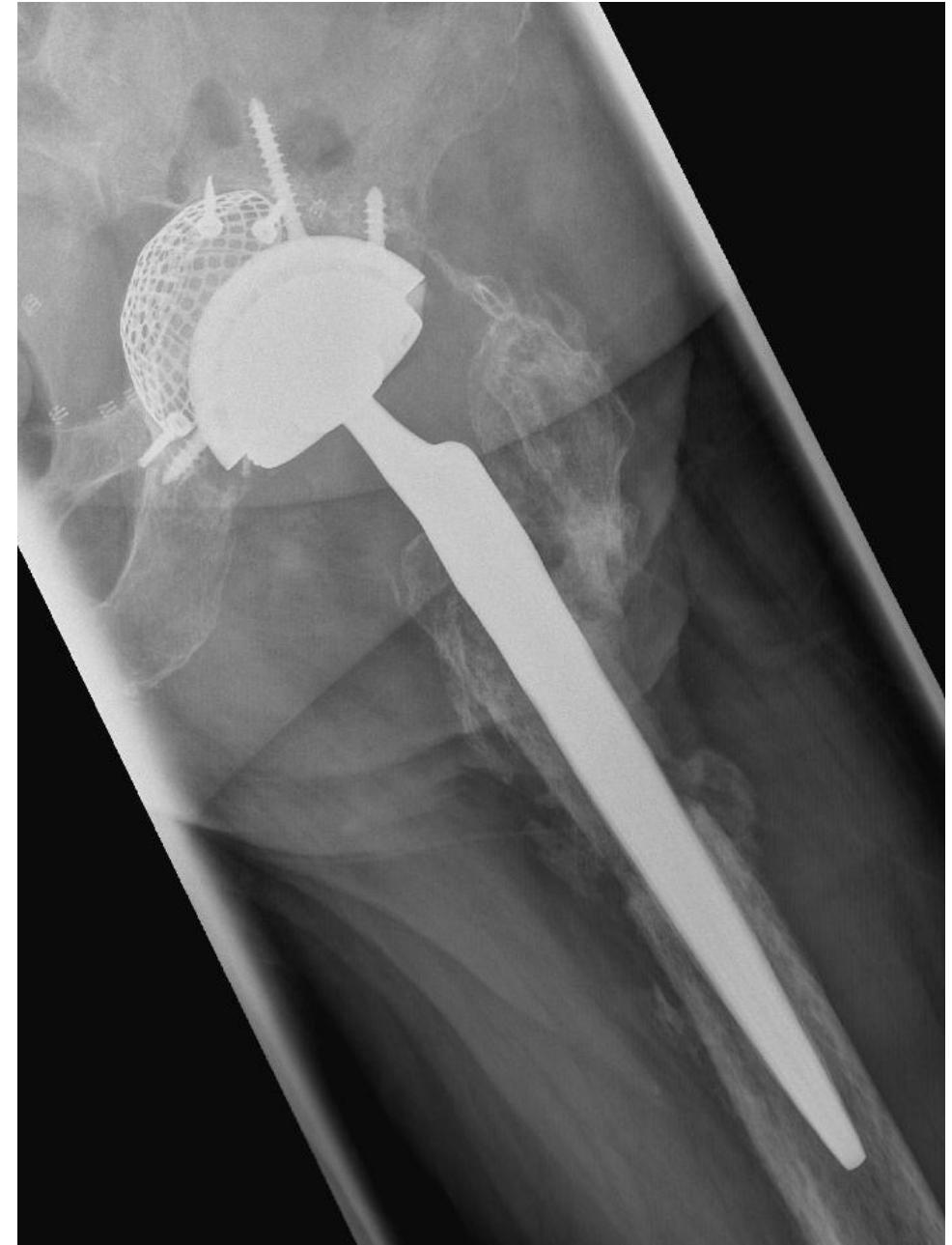
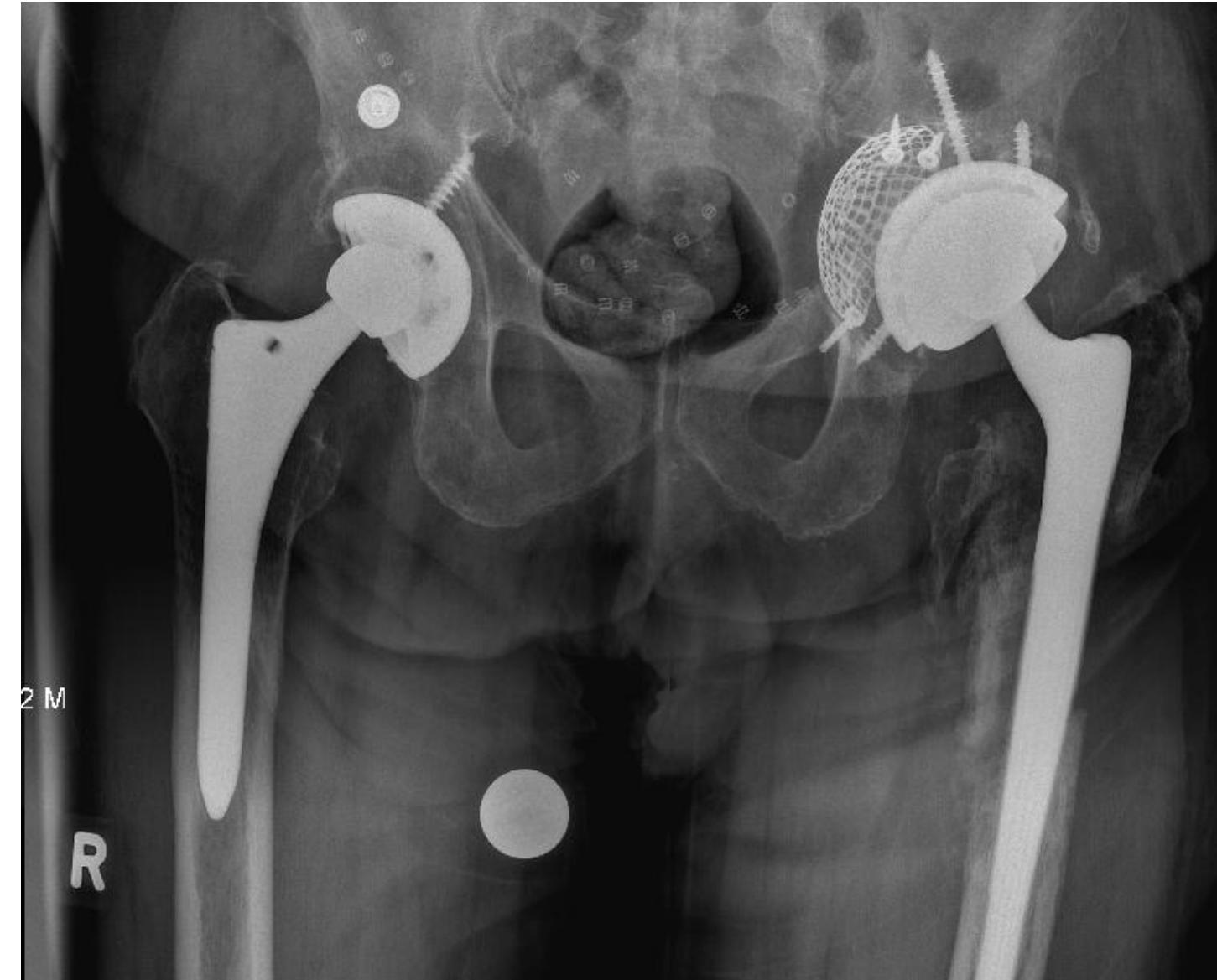
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Debridement

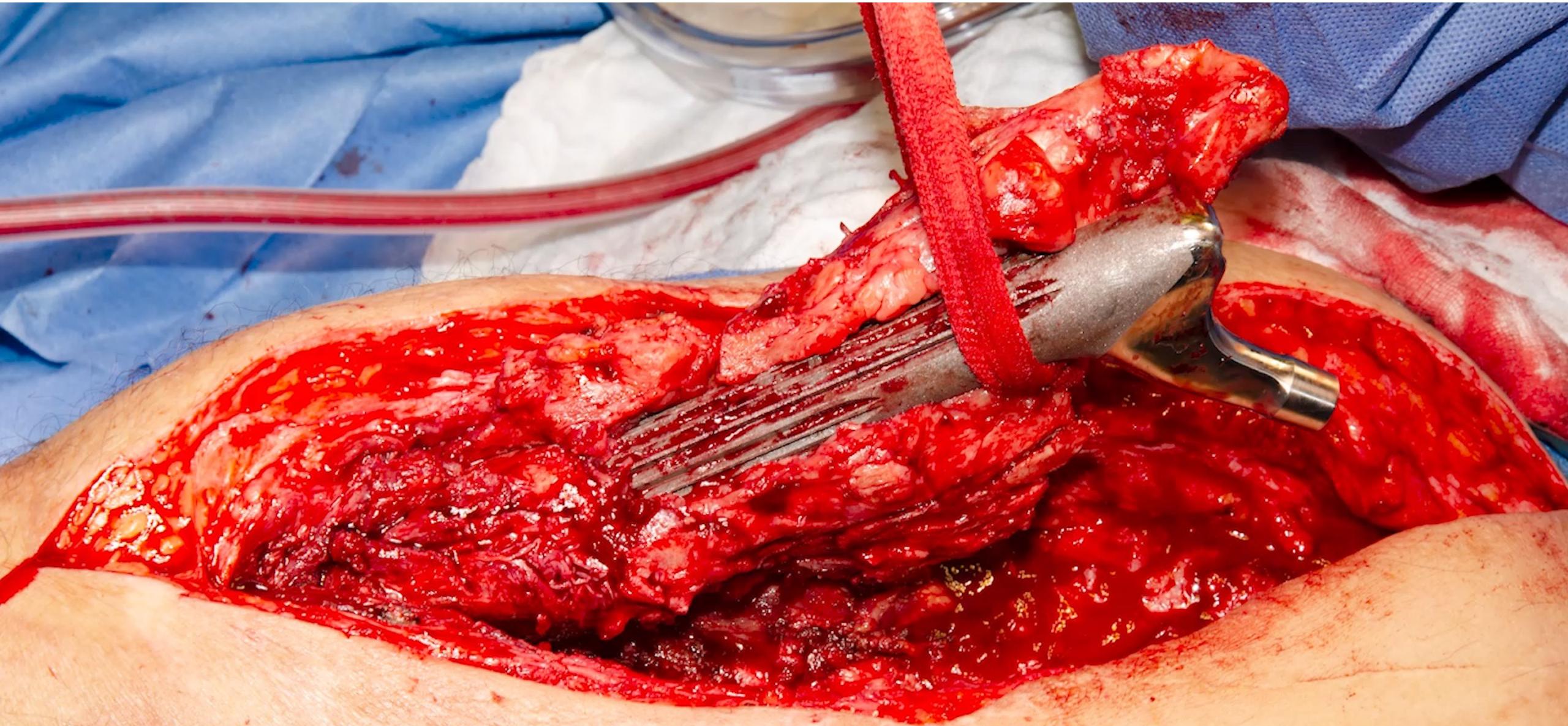
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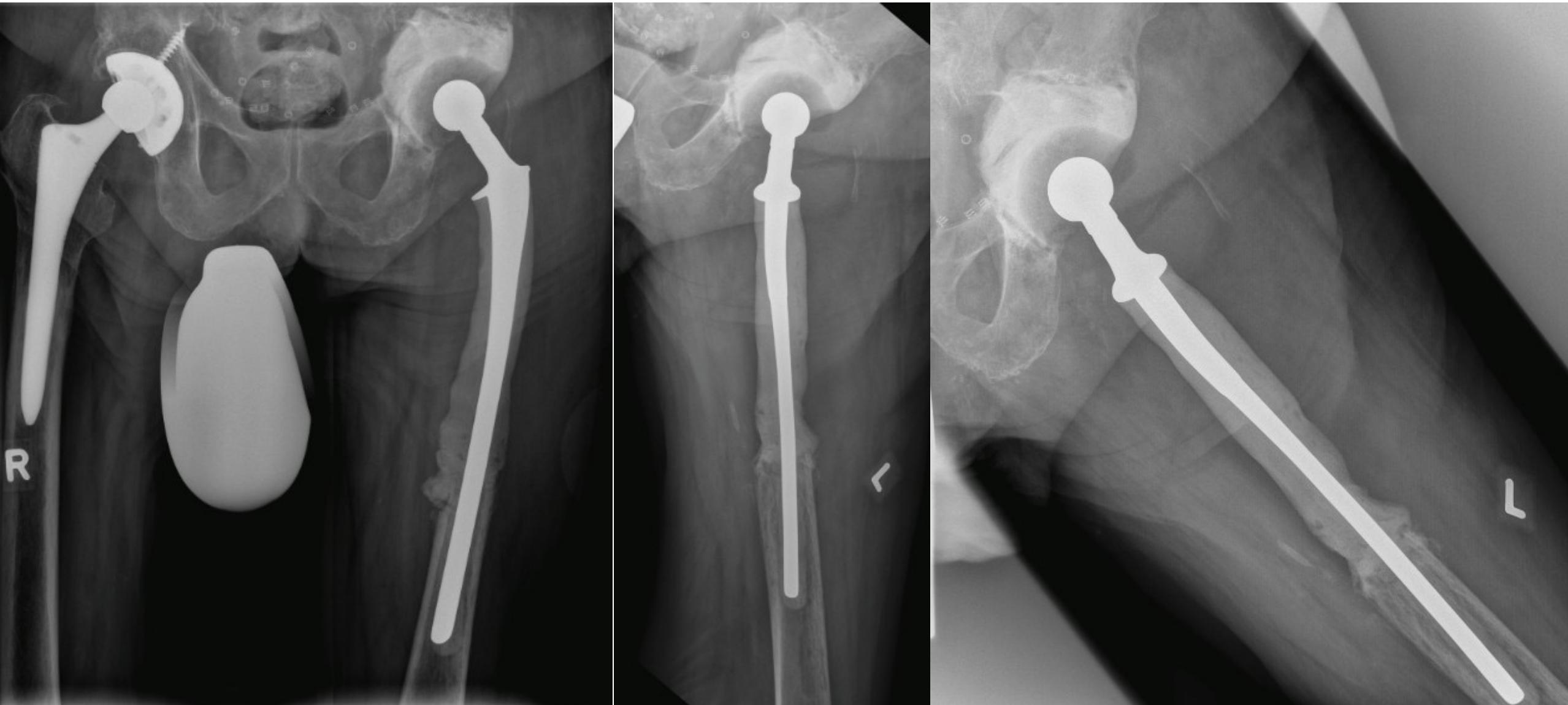
Spacer Implantation (ENDO Spacer)





Surgical Strategy?

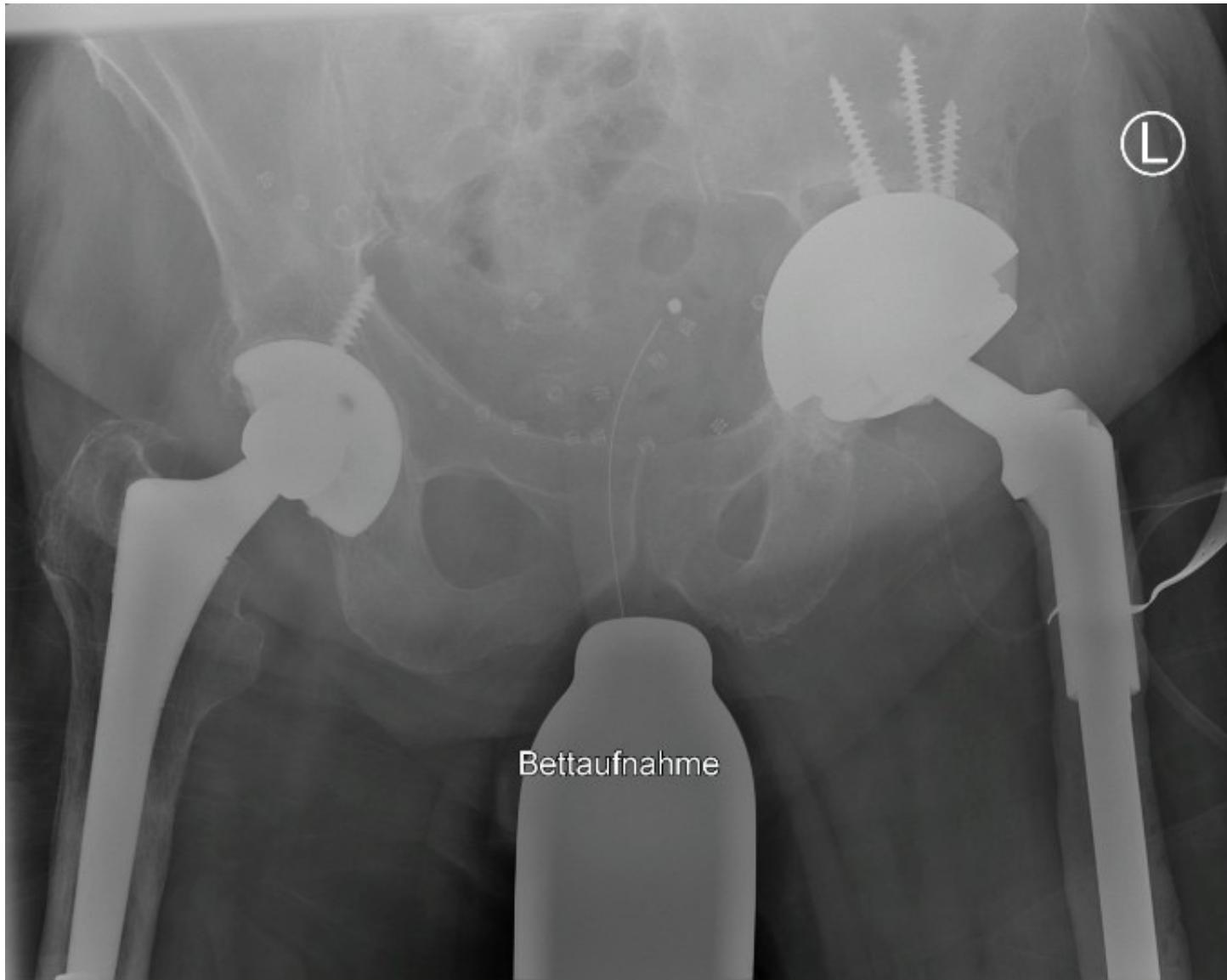






Interval?





Email from 2nd of March 2021

„Apreciado Prof Dr. GEHRKE

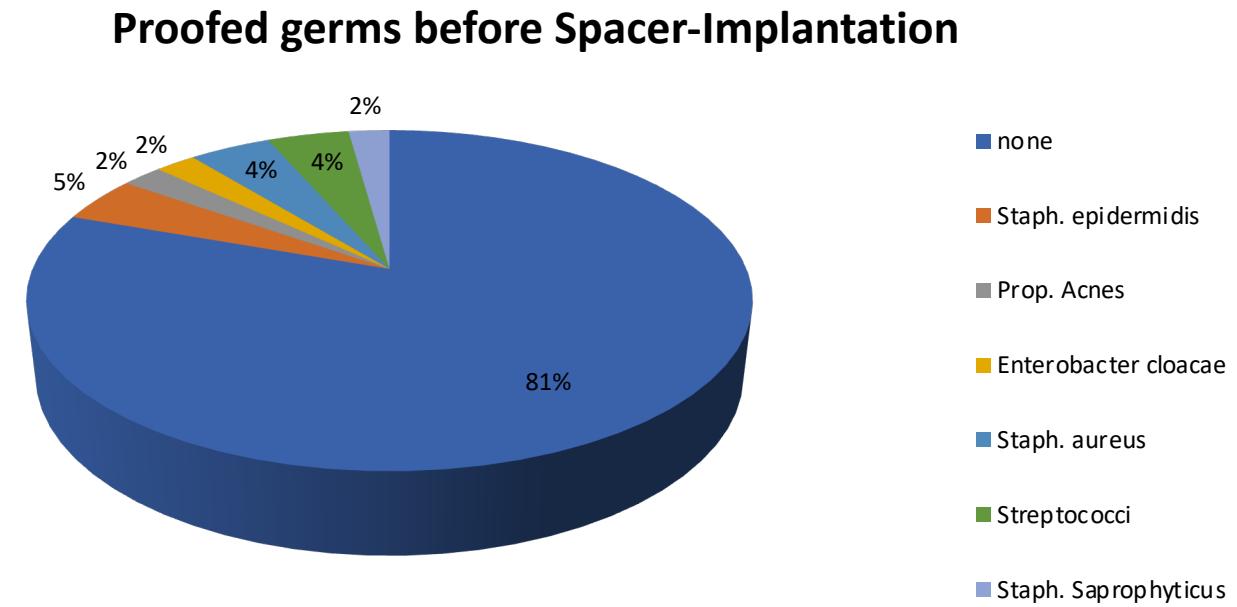
Just send to you information about my situation

I am **currently very well, without pain in my hip, the scar is in perfect condition**

Without fever or headache. There is not signal of bacteria“

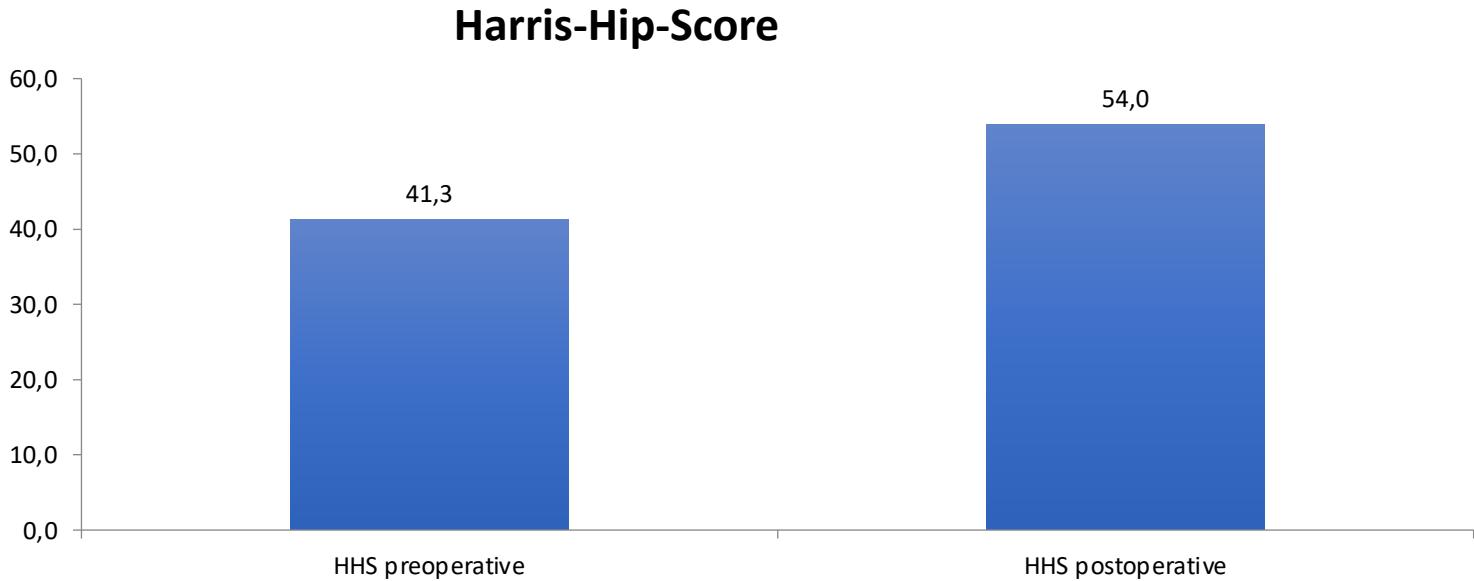


Results



- N=152, pre-operative no germ in 135 cases
- Mean spacer time 52 days

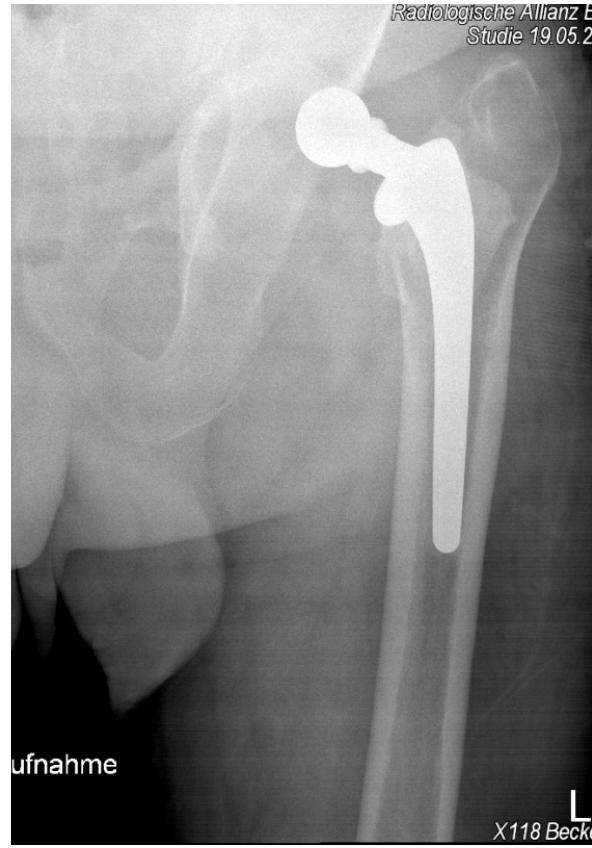
Results



- Harris Hip score before and after spacer implantation
- Reimplantation in every case

Results - Complications

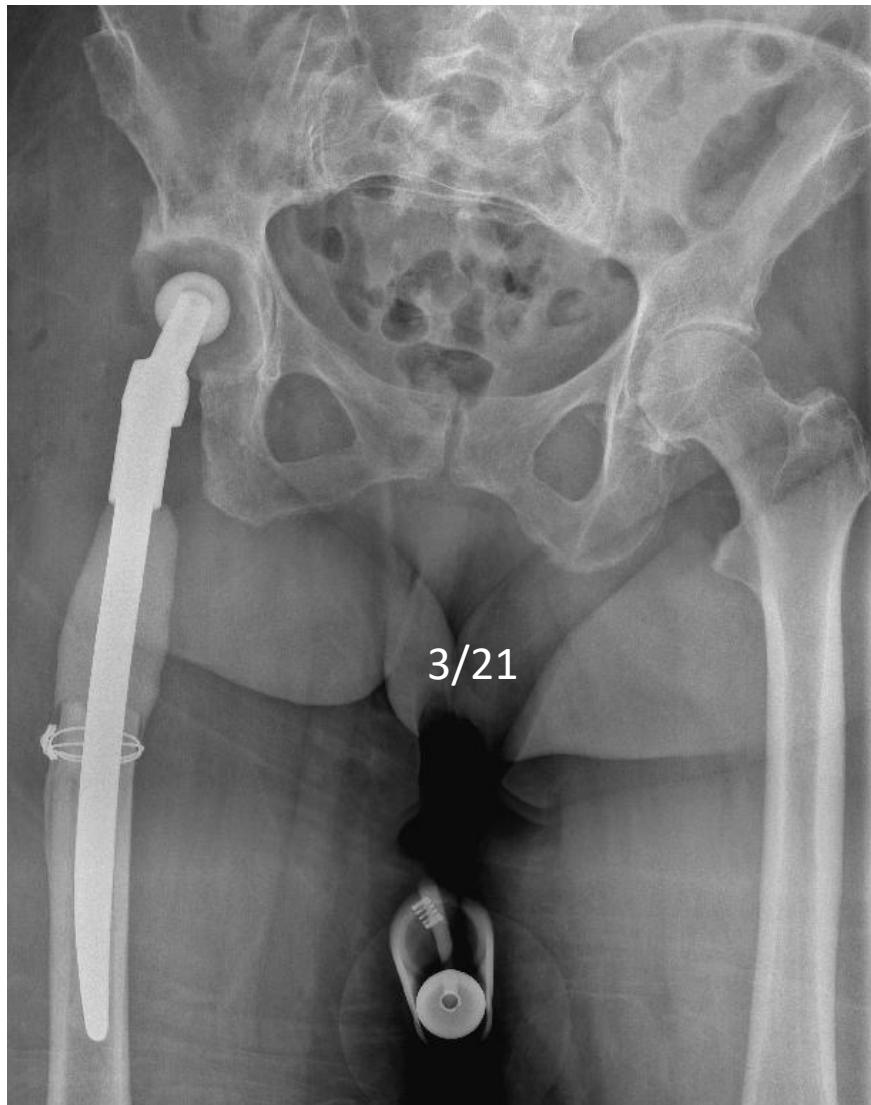
	N	%
Dislocation	2/153	1,3
Persistence PJI	4/153	2,6
Wound healing problems	4/153	2,6
Fracture GT	1/153	0,6
Thrombosis	2/153	1,3
Cup Loosening	1/153	0,6



Complication: Dislocation



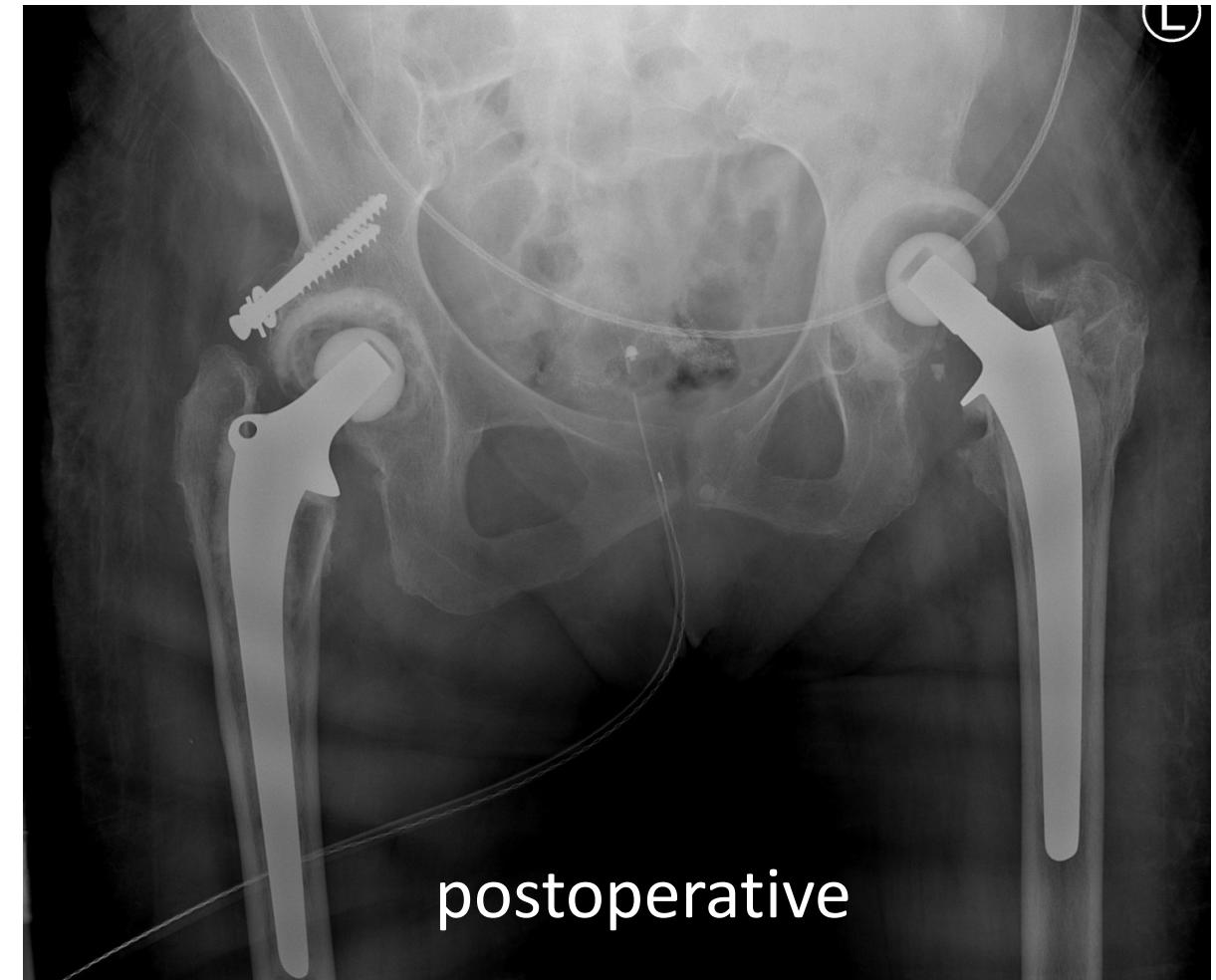
Complication: Cup Dislocation



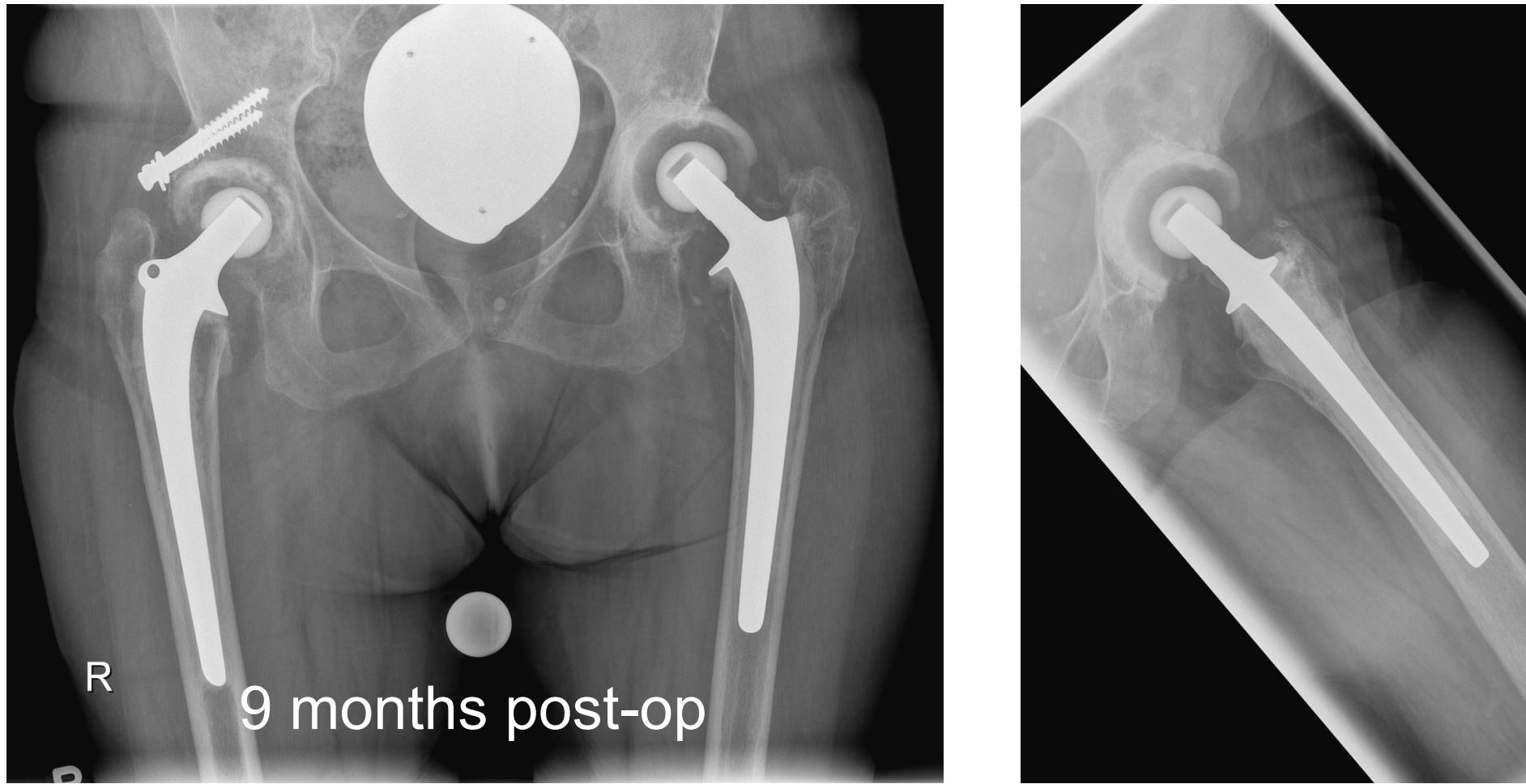
06/2021: Reimplantation with Tantal Cup and Cemeneted Modular MP Stem



Concern: WEAR?



Concern: WEAR?



Delay of reimplantation due to cardiac complications



Concern: WEAR?

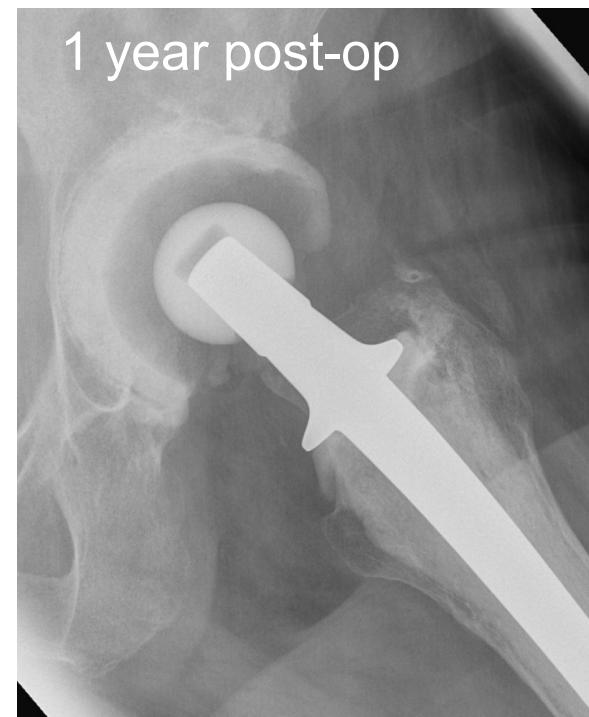
1 day post-op



9 months post-op



1 year post-op



- No wear detectable 12 months postoperative
(Histology)

Cost effectiveness



Preformed Spacer: app. 900 USD

ENDO Spacer : app. 500 USD



1.5 Exchange - Spacer

- Can leave for a longer interval
- Patient can be fully mobilized with full weight bearing
- Allow the soft tissue to recover before reimplantation
- Allows uncemented reimplantation
- Allow the patient to recover (physically and mentally)

3rd day



4th day



The ENDO-Spacer:

- safe therapy option in 2-stage septic revision surgery
- easy implantation with a “bad” cementing technique
- early mobilization with full weight bearing
- low dislocation rate
- easy removal
- easy reimplantation
- cost effective

