

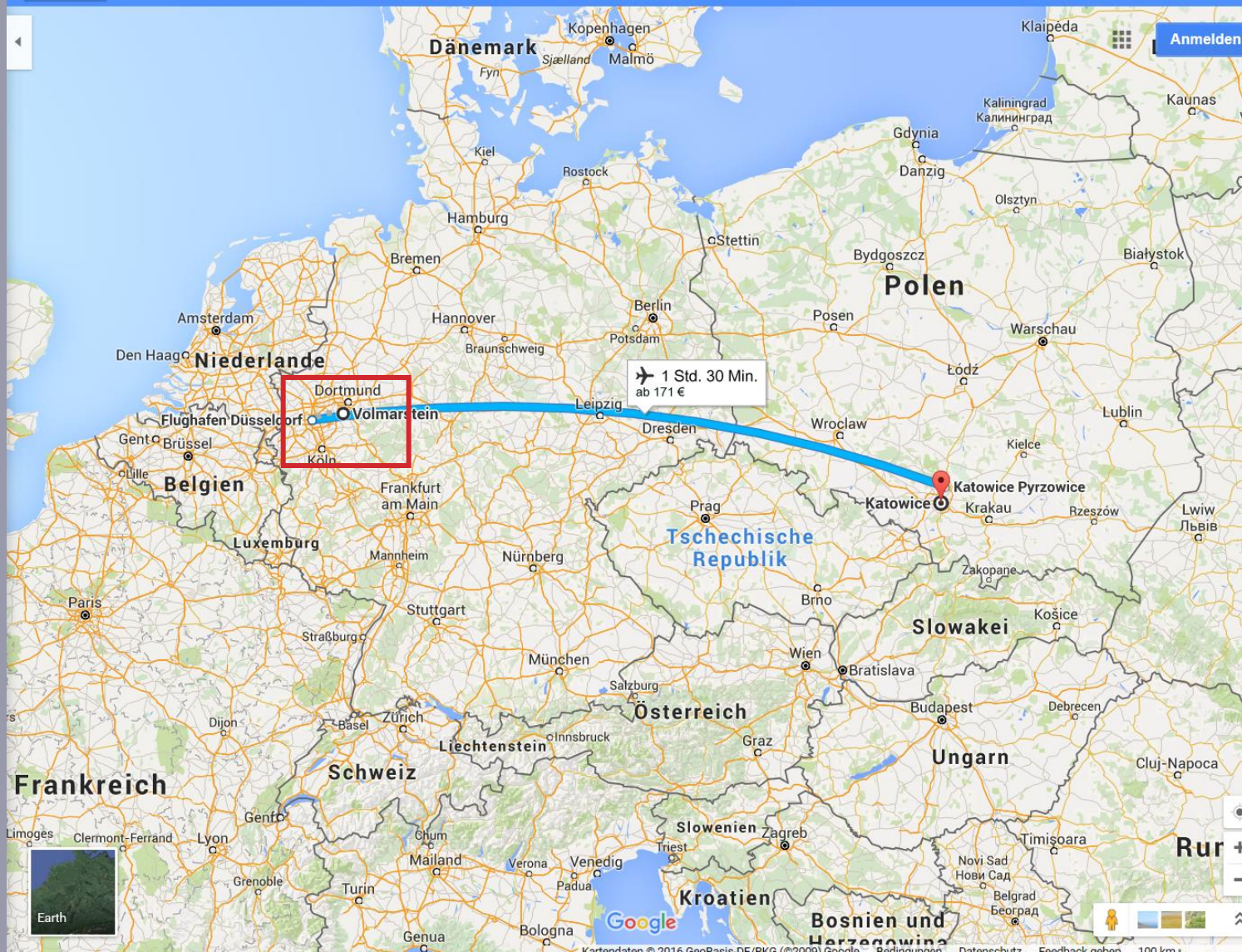


## **Hip Revision last line therapy**

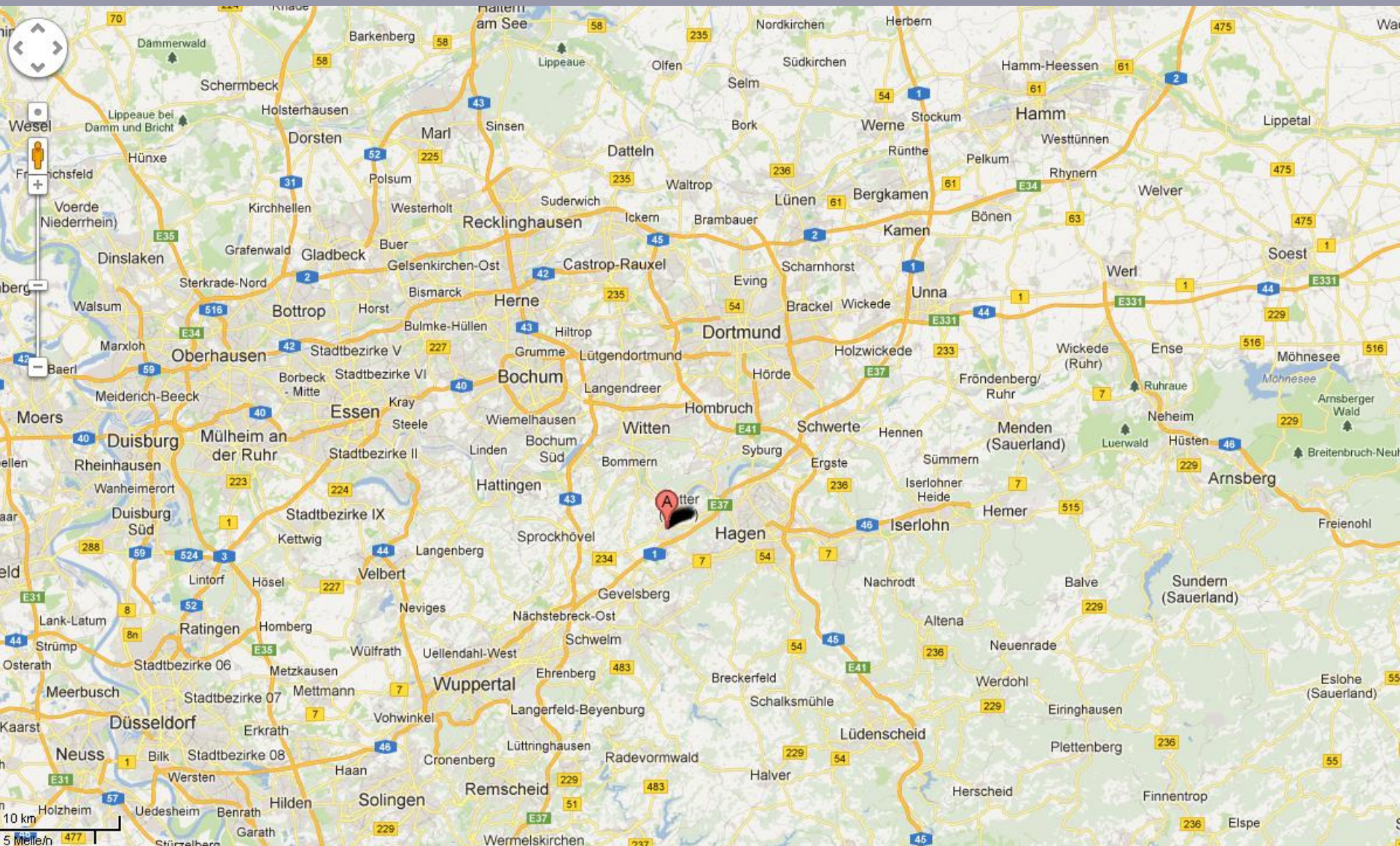
**Dr. med. Martin Wessling, MBA**

Consultant, Tumor- und Revision Surgery  
Orthopädische Klinik Volmarstein, Germany  
WesslingM@esv.de

# VOLMARSTEIN ???

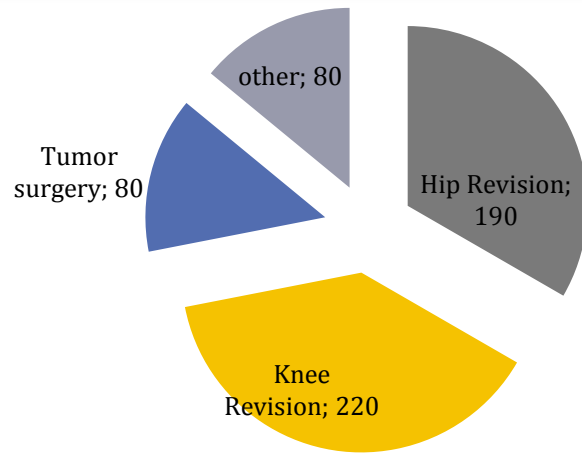


# VOLMARSTEIN ???





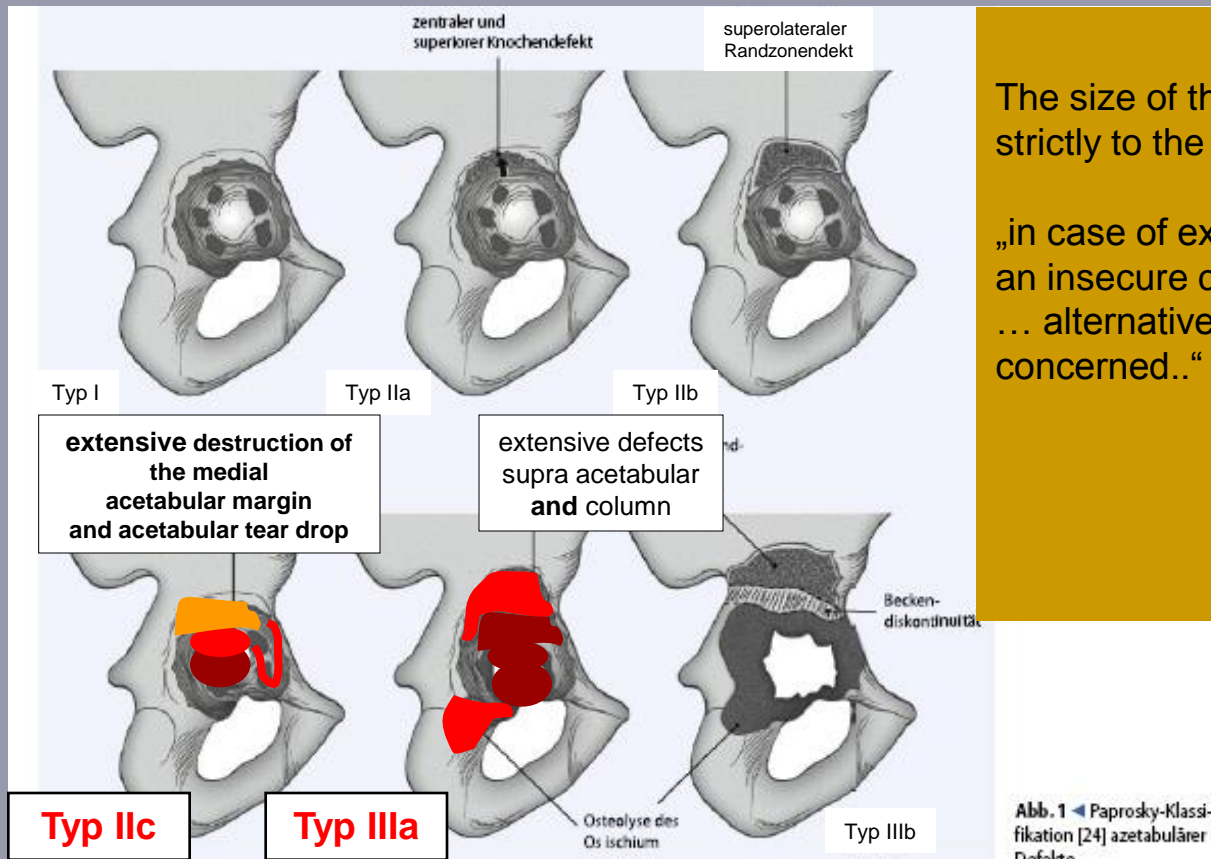
Department of Tumor- und Revision Surgery  
Orthopädische Klinik Volmarstein, Germany  
-average cases per year-



**Prof. Dr. med. Carsten Gebert**

Head of Tumor- und Revision Surgery  
Orthopädische Klinik Volmarstein, Germany  
gebertc@esv.de

# PROBLEMS



The size of the bone defect correlates strictly to the long-term follow up:

„in case of extensive bone loss due to an insecure contact to the revision cup ... alternative treatment should be concerned..“

Abb. 1 ◀ Paprosky-Klassifikation [24] azetabulärer Defekte

Udomkiat P, Dorr LD, Won YY, Longjohn D, Wan Z (2001) Technical factors for success with metal ring acetabular reconstruction. J Arthroplasty 16:961–969

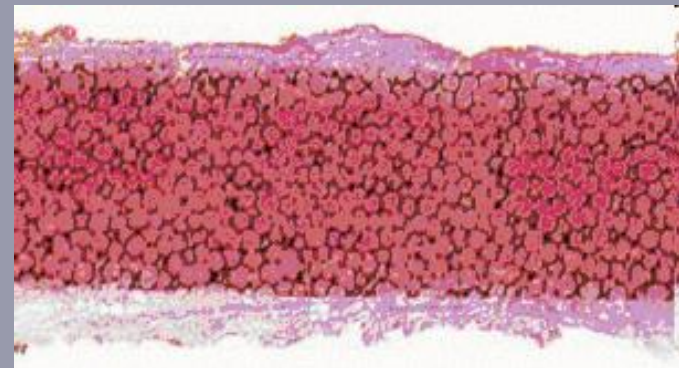
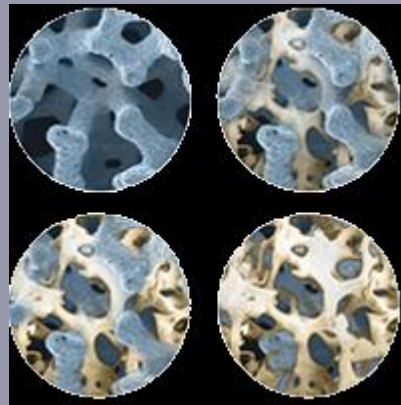
Perka C, Ludwig R (2001) Reconstruction of segmental defects during revision procedures of the acetabulum with the Burch-Schneider anti-protrusion cage. J Arthroplasty 18:568–574

# BUT HOW TO FIX IT ?

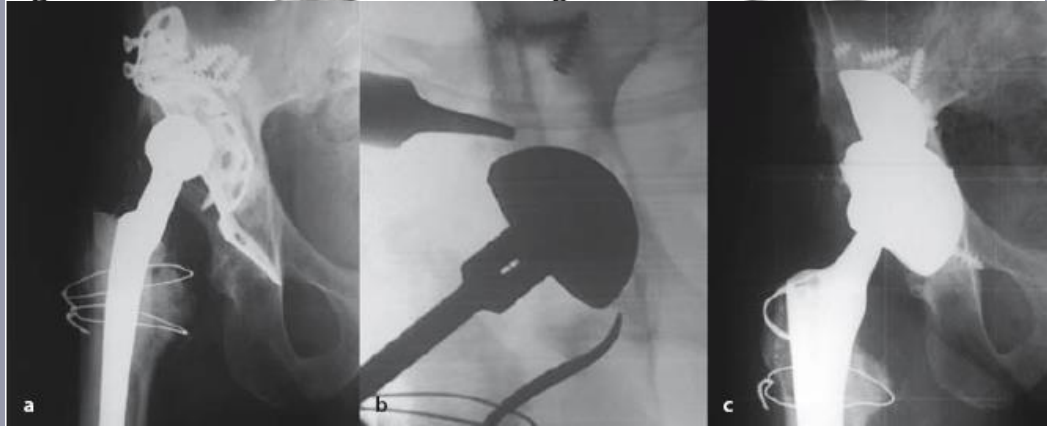
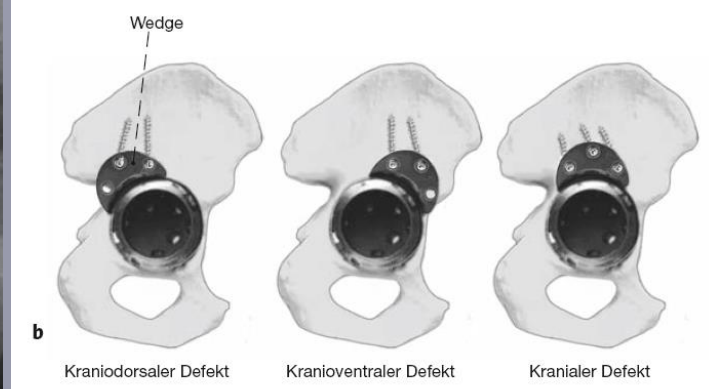
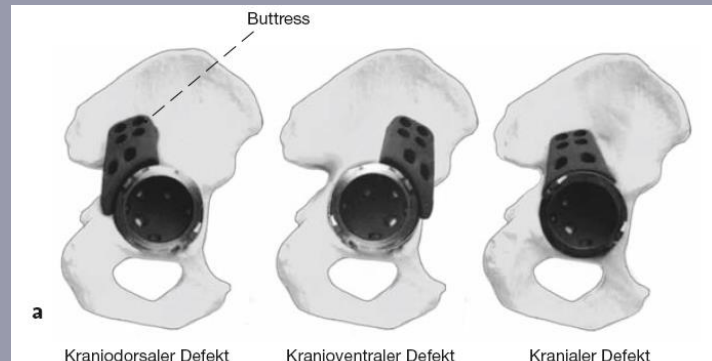
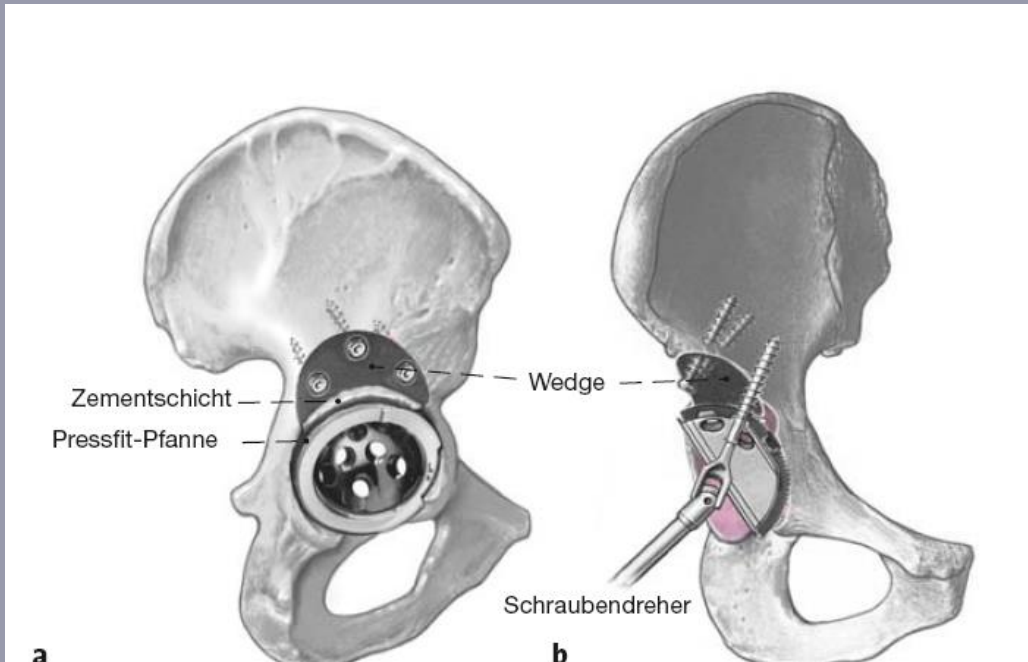


*"Nurse, get on the internet, go to SURGERY.COM, scroll down and click on the 'Are you totally lost?' icon."*

# TRABECULAR METAL

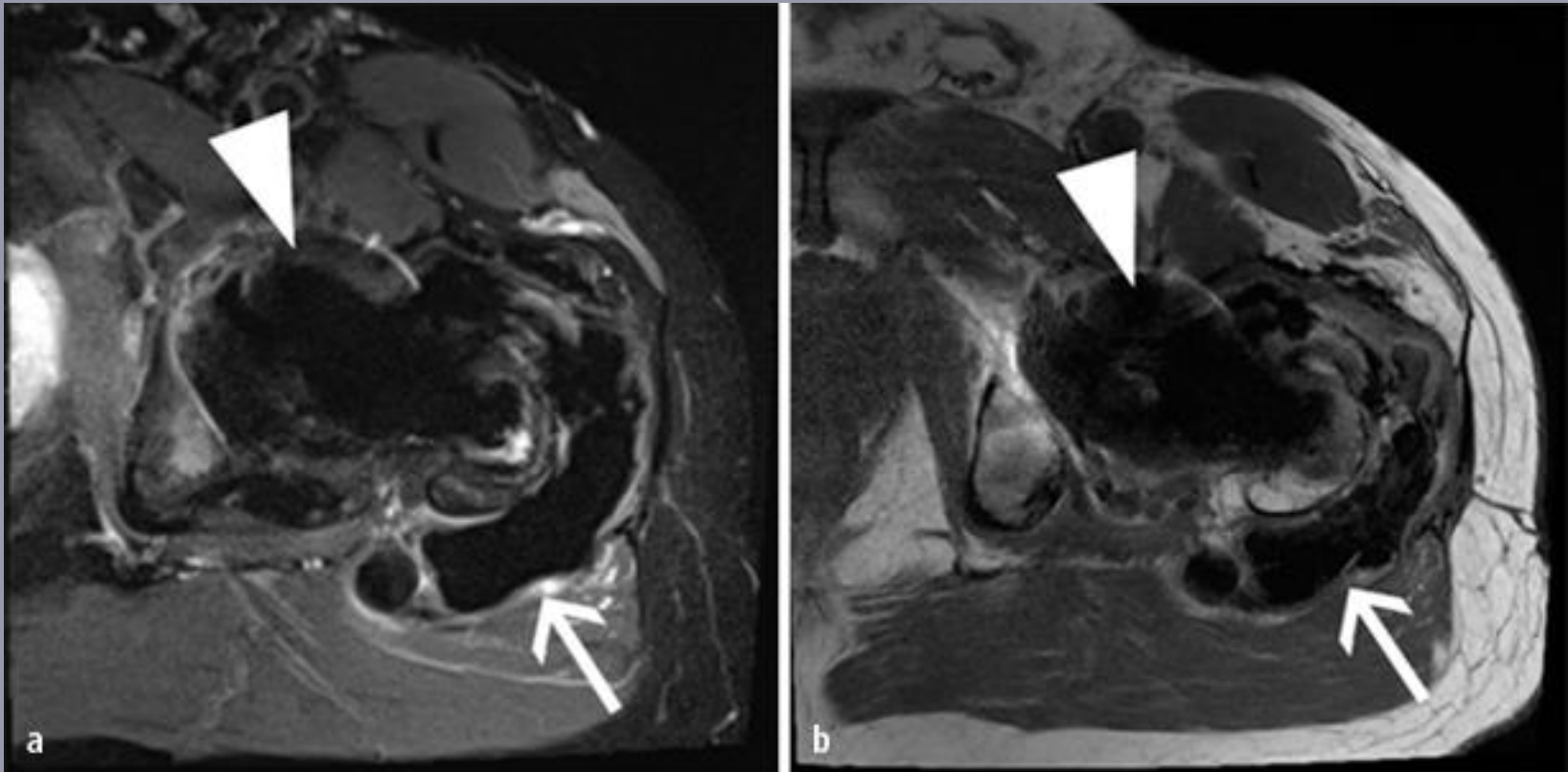


# TRABECULAR METAL



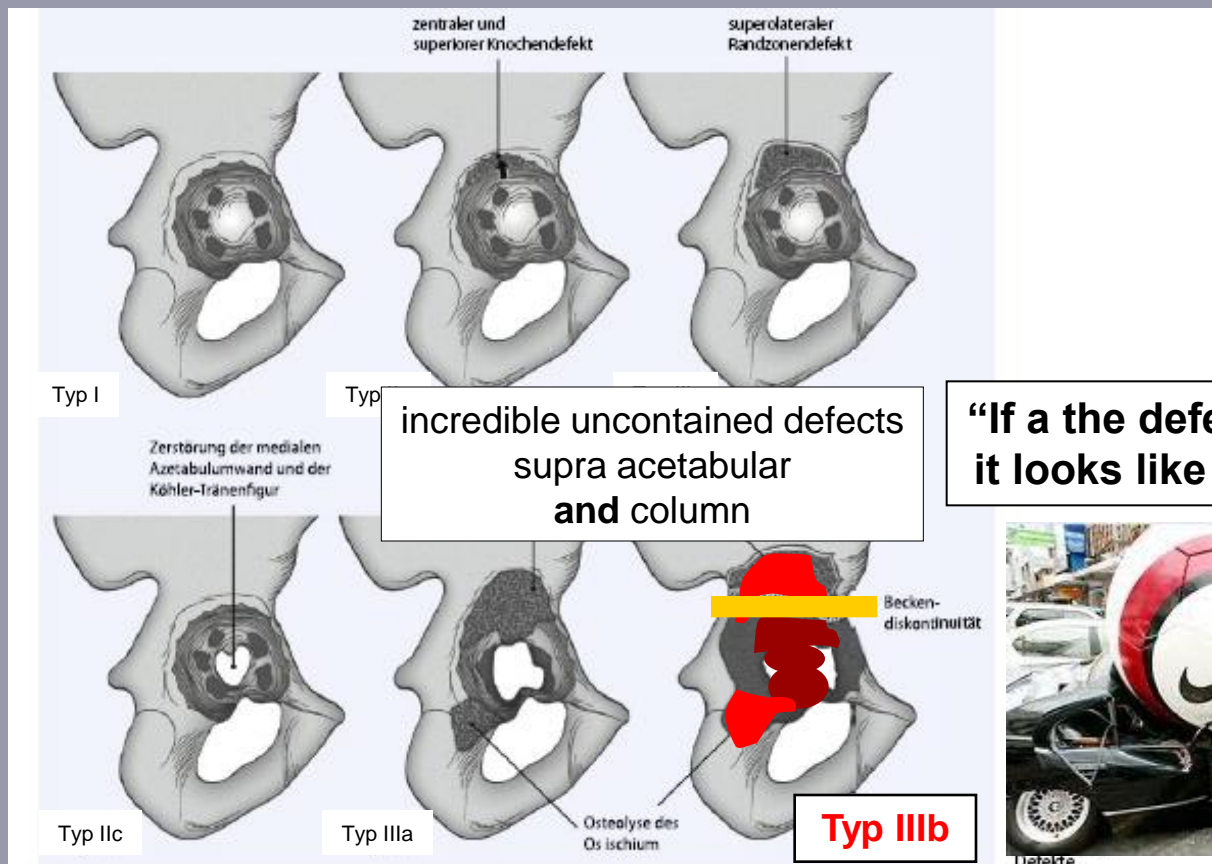


## TRABECULAR METAL



**micro movement may due to enormous metallosis**

# PAPROSKY TYP IIIB



incredible uncontained defects supra acetabular and column

“If a the defect is big enough, it looks like tumor surgery...”



Goal: reconstruction of the anatomy ???

**Table I.** Results following surgical treatment of pelvic discontinuity (NR, not reported)

| Author/s                         | No of hips with discontinuity | Type of reconstruction                                | Mean follow-up (yrs) (range) | Revision rate         | Clinical score*   | Comments   |
|----------------------------------|-------------------------------|---|------------------------------|-----------------------|---|--|
| Berry et al <sup>4</sup>         | 27                            | Anti-protrusio cage, anterior-posterior plating       | 3 (0.2 to 7)                 | 9/27 (33%)            | 16/27 (60%) satisfactory result (based on own criteria) | 9 failures: 4 aseptic acetabular loosening, 4 recurrent dislocations. 1 deep infection (1.3 yrs)   |
| Goodman et al <sup>7</sup>       | 10                            | Anti-protrusio cage                                   | 3.3                          | 5/10 (50%)            | NR  | Complications: 3 rings loosened, 2 ring flange fractures, 3 dislocations, 1 deep infection requiring resection replacement   |
| Sporer et al <sup>8</sup>        | 16                            | Cage, plate, allograft                                | 5 (2 to 8)                   | 5/16 (31%)            | MP: 3.7 to 6.8  | 44% overall loosening rate Complications: 4 sciatic nerve palsies, 1 dislocation, 1 deep infection   |
| Eggl et al <sup>6</sup>          | 7                             | Ganz ring, anterior-posterior plating                 | 8 (4.5 to 11)                | NR                    | MP: 7.5 to 13.2. HHS: 33 to 73                          | 1 ischial nerve palsy, 1 recurrent dislocation, 1 loose cup requiring revision, 1 intra-op femoral shaft fracture  |
| Stiehl et al <sup>11</sup>       | 10                            | Bulk structural allograft, anterior-posterior plating | 6.9                          | 6/10 (60%)            | NR  | Cementless cups that rested on a bulk allograft had high failure rates. Used extensile triradiate approach with high dislocation rate  |
| Taunton et al <sup>10</sup>      | 57                            | Custom Triflange                                      | 6.3 (2 to 18)                | 20/57 (30%)           | HSS 74.8 post-op  | 3 triflange failures (5.3%): 1 aseptic loosening, 2 deep infection resections. 81% had a stable triflange component with a healed pelvic discontinuity, 98% free of revision for aseptic loosening at latest follow-up       |
| DeBoer et al <sup>5</sup>        | 20                            | Custom Triflange                                      | 10 (7.4 to 13)               | No components revised | HHS 41 to 80  | 6/20 hips dislocated (30%), 6 hips underwent reoperation: 5 for dislocation, 1 for partial sciatic nerve palsy due to loose screws   |
| Kosashvili et al <sup>12</sup>   | 26                            | Trabecular Metal™ cup/cage                            | 3.7 (2 to 5.6)               | NR                    | HHS 46.6 to 76.6  | 2 dislocations, 1 deep infection, 1 peroneal nerve palsy   |
| Sporer et al <sup>9</sup>        | 20                            | Trabecular Metal™ cup, augments, distraction          | 4.5 (2 to 7)                 | 1/20 (5%)             | MP: 3.3 to 9.6  | 1 revision for aseptic loosening at 9 months, 4 patients had radiographic loosening with no pain, complications: 1 colonic perforation, 1 vascular injury (femoral artery), 1 greater troch fracture 1 superficial infection |
| Sporer and Paprosky <sup>5</sup> | 13                            | Trabecular Metal™ cup/augments, distraction           | 2.6 (1 to 3)                 | No components revised | MP: 6.1 to 10.3   | 1 patient demonstrated acetabular loosening due to screw breakage  |

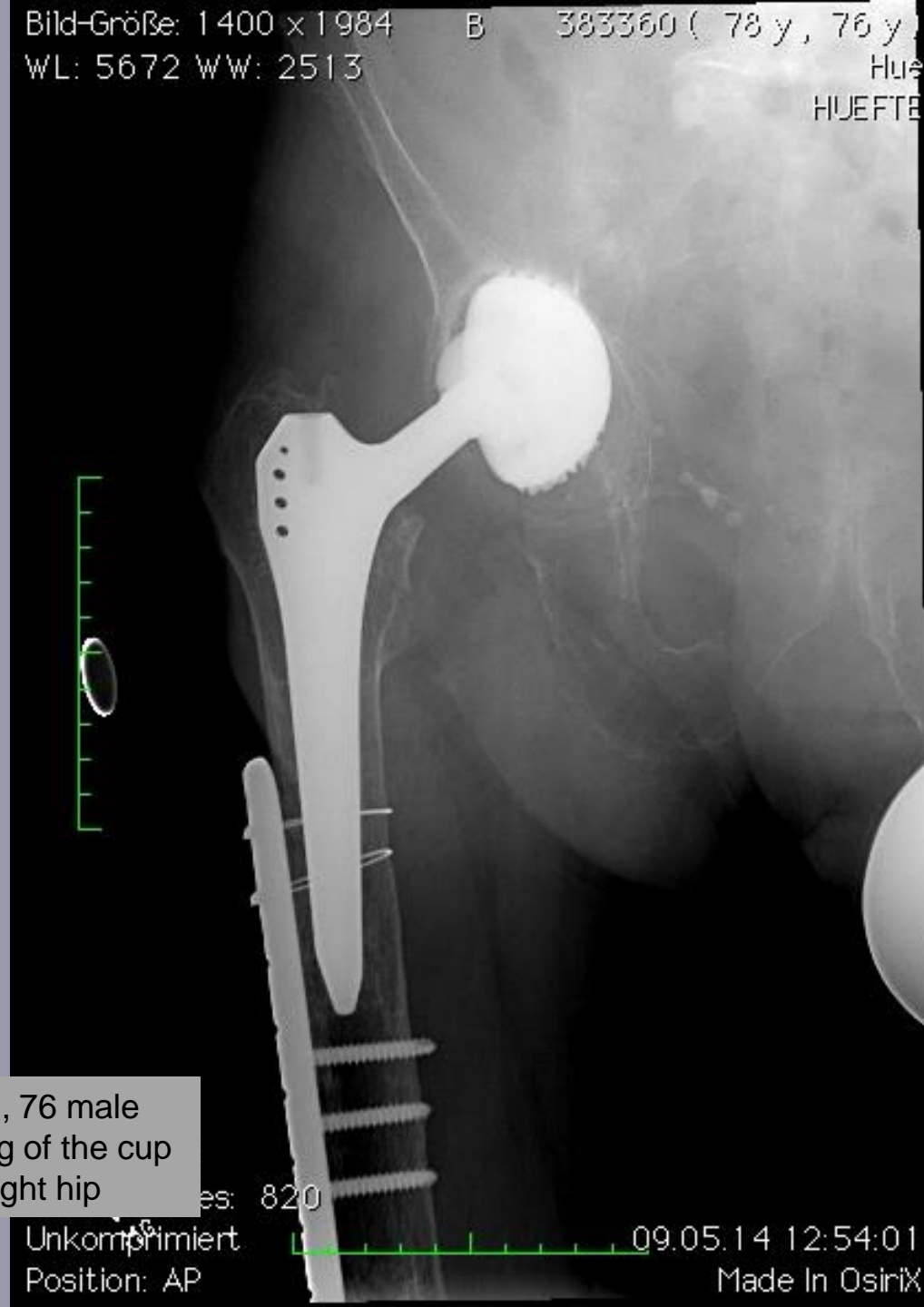
\* HHS, Harris hip score, MP, Merle d'Aubigne-Postel score

Bild-Größe: 1400 x 1984  
WL: 5672 WW: 2513

B 383360 ( 78 y , 76 y )

Hue

HUEFTE



S.W., 76 male  
loosening of the cup  
Right hip

es: 820

Unkomprimiert  
Position: AP

09.05.14 12:54:01

Made In OsiriX

Bild-Größe: 1011 x 2034 ( 78 y , 76 y )

WL: 5488 WW: 1878

Hue

HUEFTE



Zoom: 30%

B: 1/P Series: 1152

Unkomprimiert 14.05.14 10:42:48

Position: AP

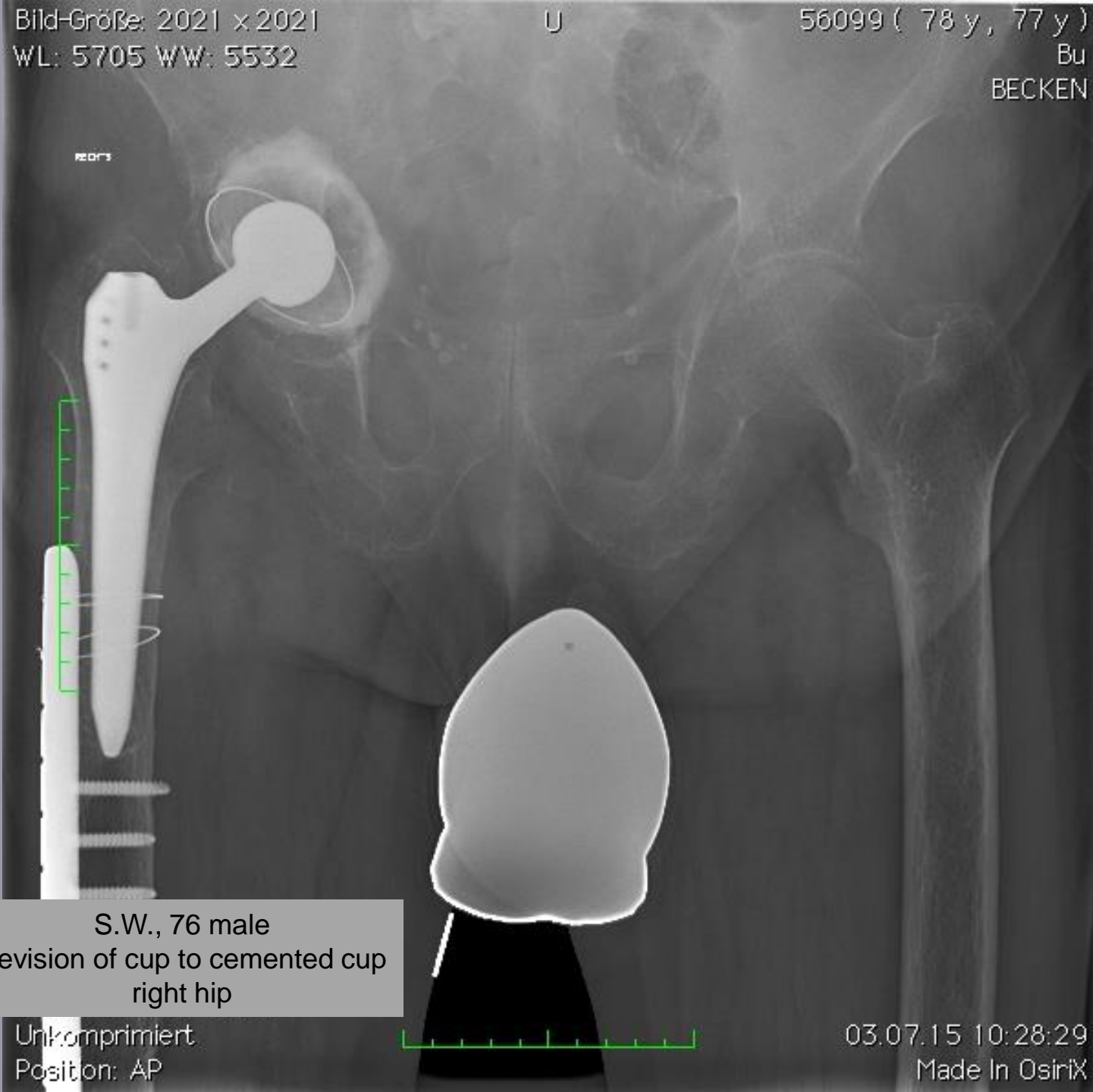
Made In OsiriX

Bild-Größe: 2021 x 2021  
WL: 5705 WW: 5532

U

56099 ( 78 y, 77 y )

Bu  
BECKEN



S.W., 76 male  
Revision of cup to cemented cup  
right hip

Unkomprimiert  
Position: AP



03.07.15 10:28:29  
Made In OsiriX

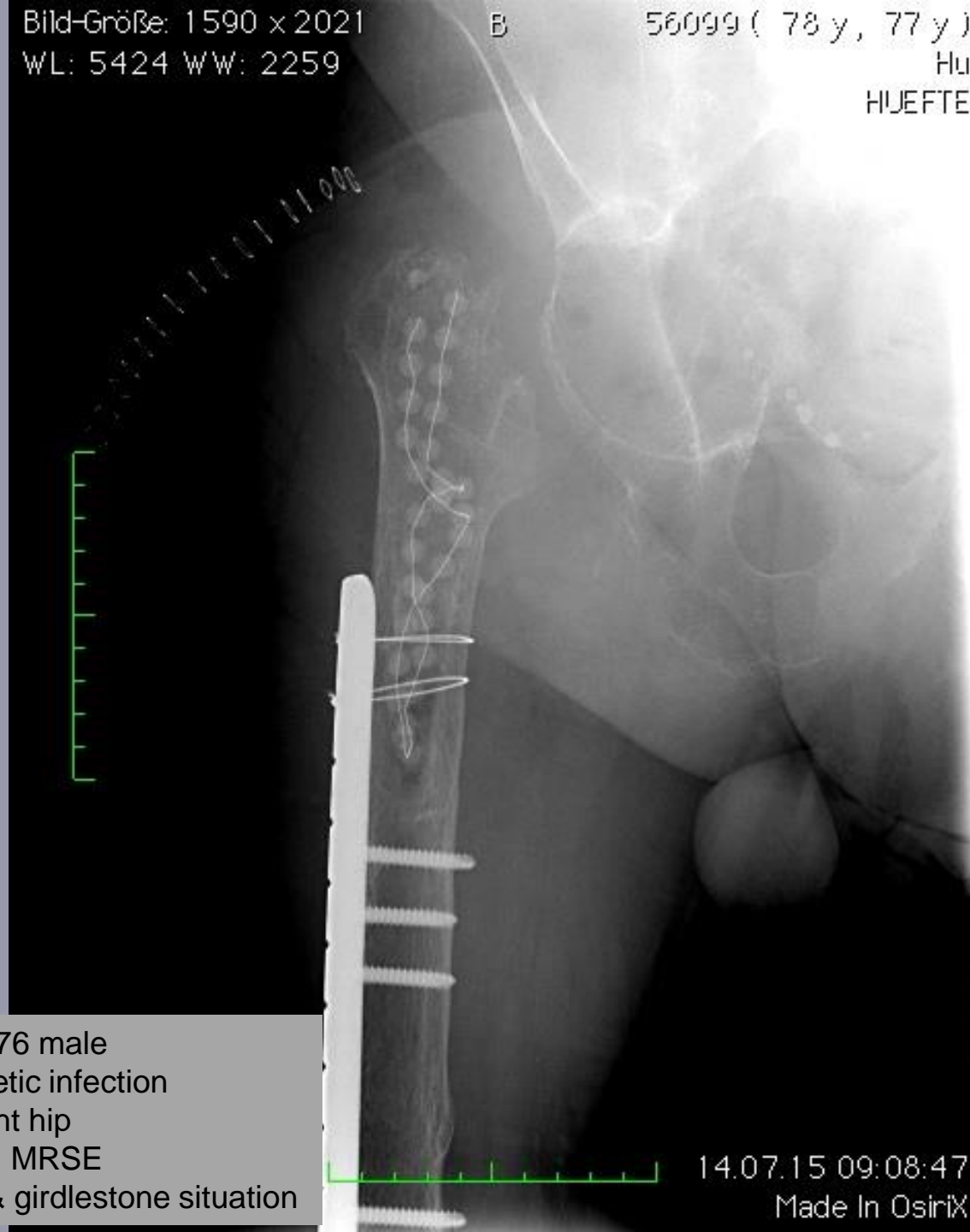
Bild-Größe: 1590 x 2021  
WL: 5424 WW: 2259

B

56099 ( 78 y , 77 y )

Hu

HUFEITE



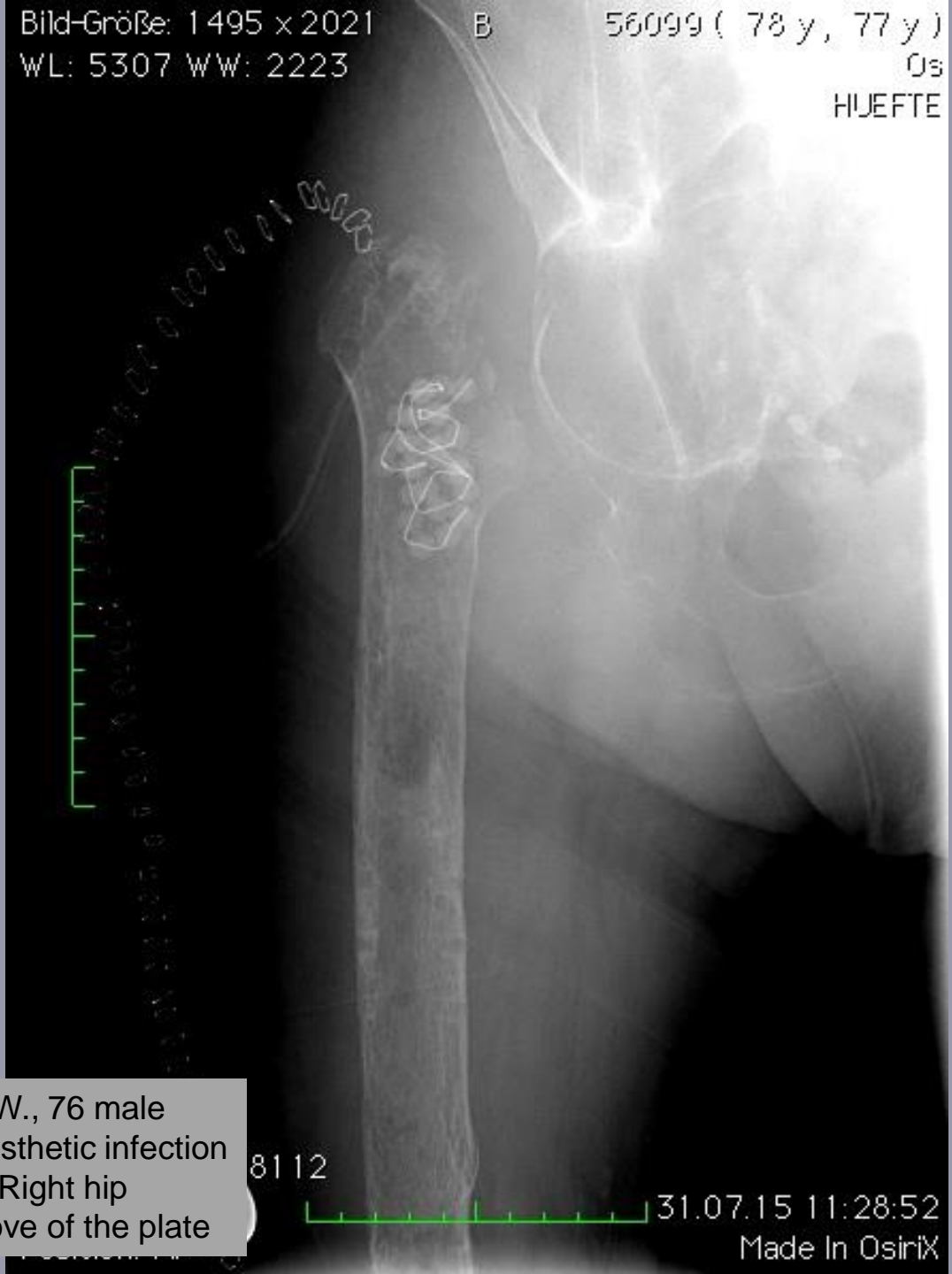
S.W., 76 male  
periprosthetic infection  
Right hip  
Germ: MRSE  
two-stage revision & girdlestone situation

14.07.15 09:08:47

Made In OsiriX

Bild-Größe: 1495 x 2021  
WL: 5307 WW: 2223

B 56099 ( 78 y, 77 y )  
Os  
HUEFTE



S.W., 76 male  
periprosthetic infection  
Right hip  
Remove of the plate

8112

31.07.15 11:28:52

Made In OsiriX





R

L

Zoom: 117% Winkel: -R: 0°, SH: 0°

B: 1 S.W., 76 male Series: 5

Unk CT-scan

Schichtdicke: 1.00 mm Position: -136.16 mm

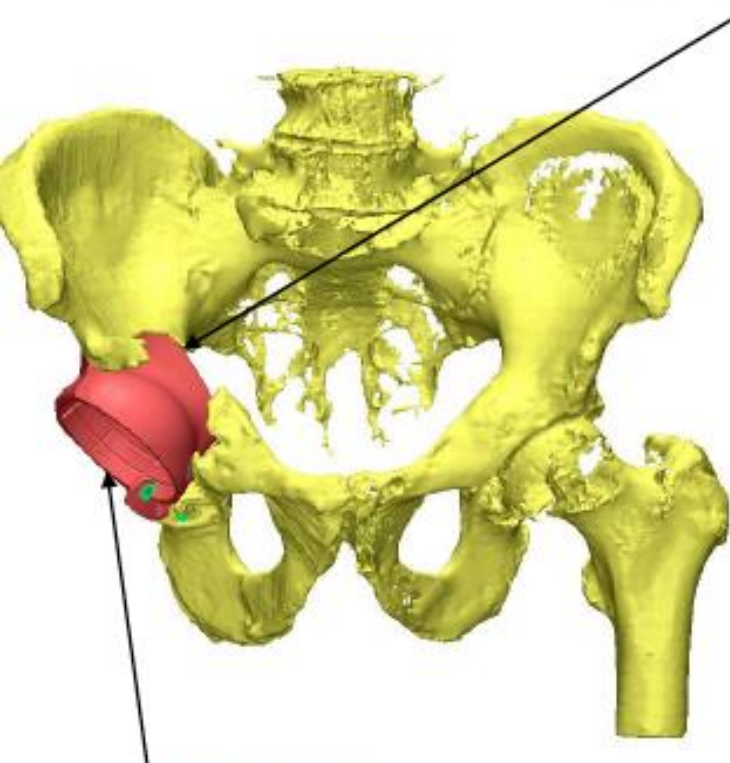
04.08.15 11:25:15

Made In OsiriX

# Design

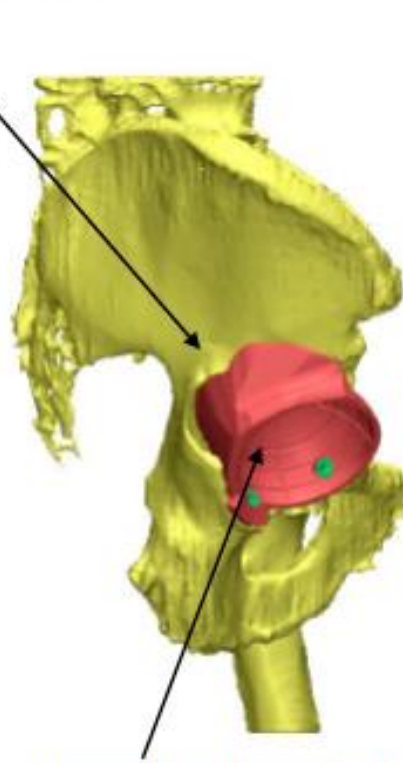
Abstützung am Acetabulum und Führung  
für Ø8mm Schraube

Verschraubung vollständig durch Pfanne



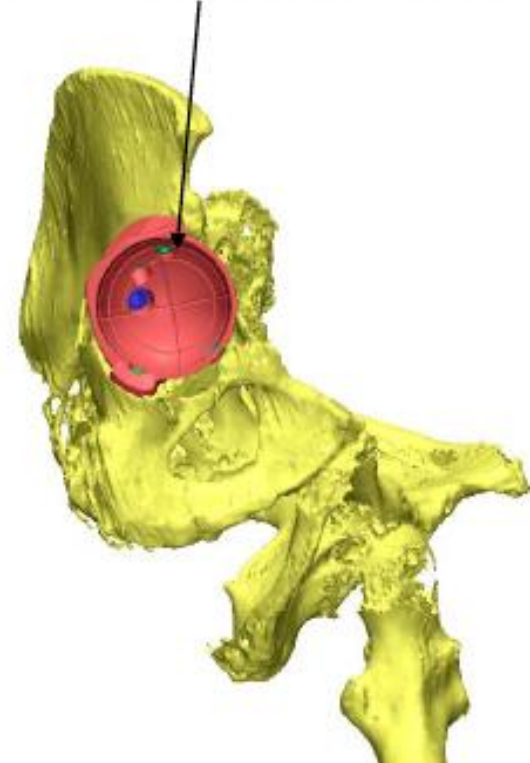
Zementnuten

Frontalansicht



Pfannendurchmesser 58/63mm

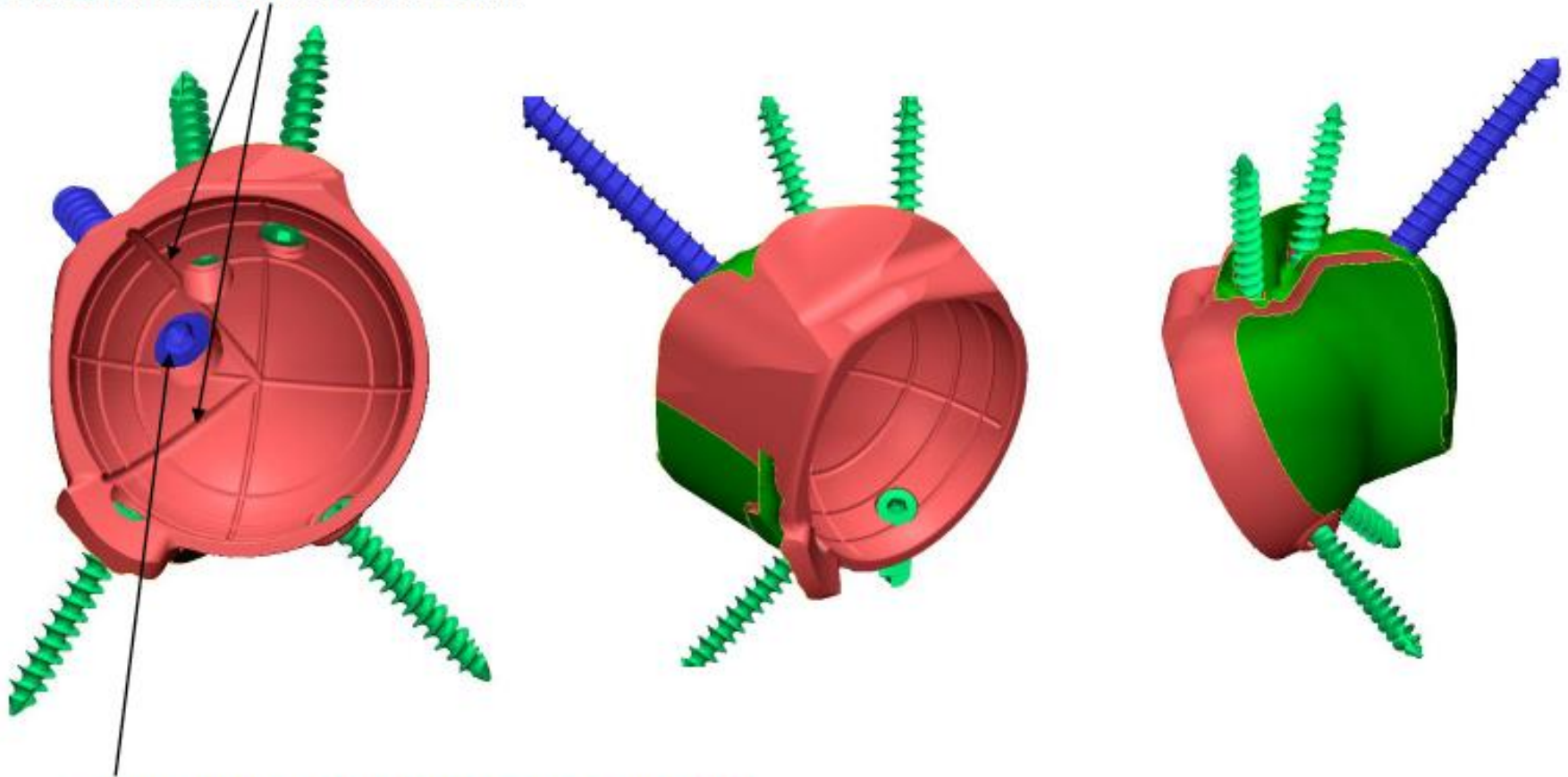
Ansicht von rechts



Isometrische Ansicht

# Implantatdesign

2 zusätzliche Zementauslaufnuten Ø2mm



Ø8mm Schraube wird mit Konterschraube gesichert

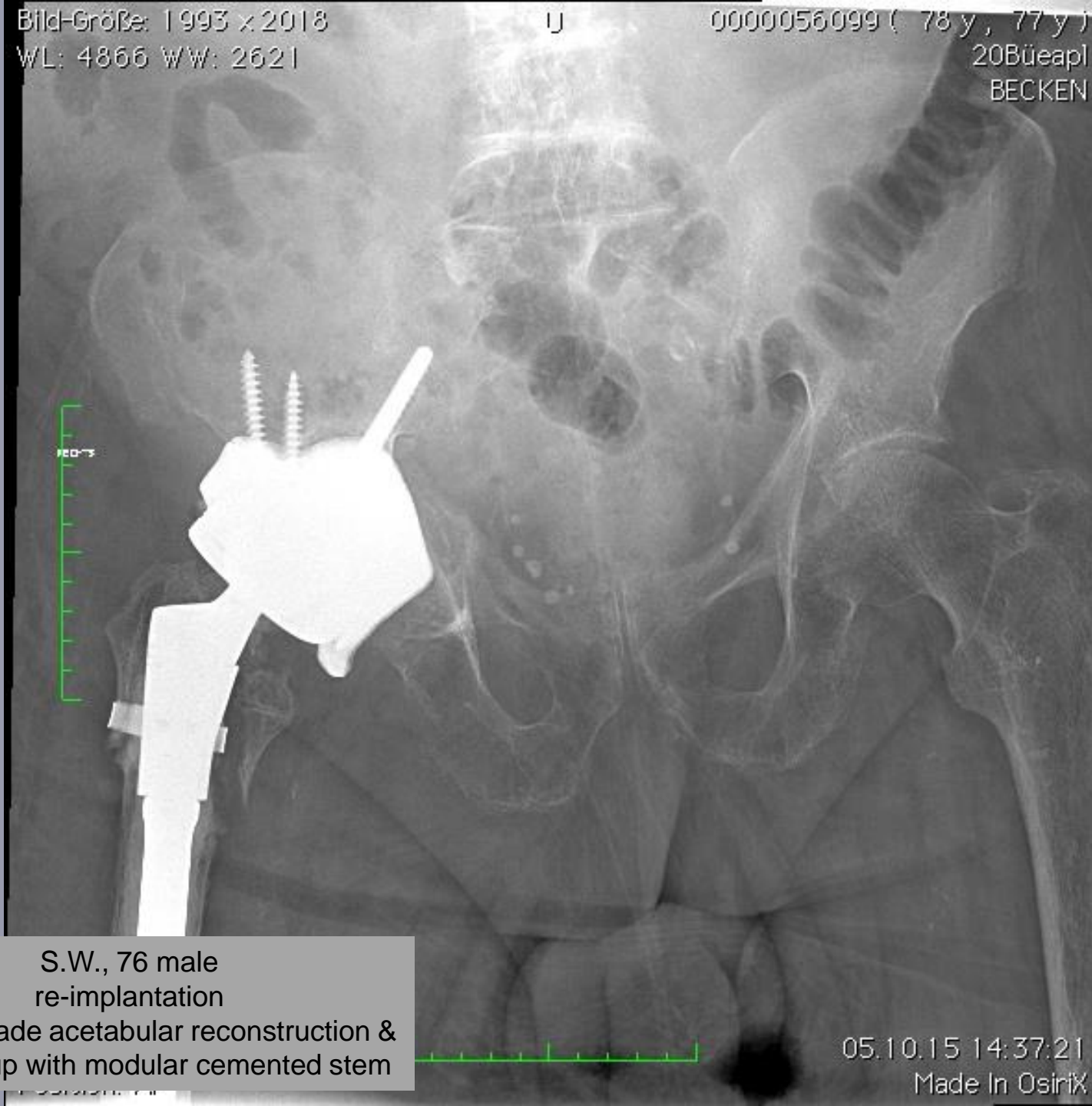
Ø6,5mm Schraube werden nicht zusätzlich gesichert

Bild-Größe: 1993 x 2018  
WL: 4866 WW: 2621

IJ

0000056099 ( 78 y , 77 y )  
20Büeapl  
BECKEN

marstein  
angelische Stiftung



S.W., 76 male  
re-implantation

Custom-made acetabular reconstruction &  
tri-polar cup with modular cemented stem

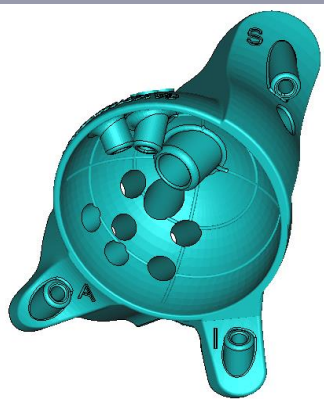
05.10.15 14:37:21

Made In OsiriX

# OUR SHORT TERM RESULTS

4 CASES FOR SPEZIAL INDICATION

| Patient | Gender | OP       | Age          | Implants   | F-up month | # prior Surgery | Infection | Tumor | VAS | Support    |
|---------|--------|----------|--------------|--|------------|-----------------|-----------|-------|-----|------------|
| S.R.    | m      | 30.09.15 | <b>77,73</b> | CT-Beckenteilersatz, MUTARS RS                               | 4          | <b>6</b>        |           | Yes   | 0   | 2 Rollator |
| R.H.    | f      | 07.07.15 | <b>76,58</b> | CT-Beckenteilersatz, MUTARS RS, Z.n. LUMIC                   | 4          | <b>5</b>        |           | No    | 0   | 1          |
| H.R.    | m      | 16.12.14 | <b>72,34</b> | CT-Glenosphäre   | 13         | <b>6</b>        |           | Yes   | 1   | 0          |
| K.D.    | f      | 19.11.14 | <b>75,67</b> | CT-Beckenteilersatz, prox. Femur, Z.n. Pseudotumor/Metallose | 12         | <b>3</b>        |           | No    | 0   | 0 1 cruch  |



## Follow up

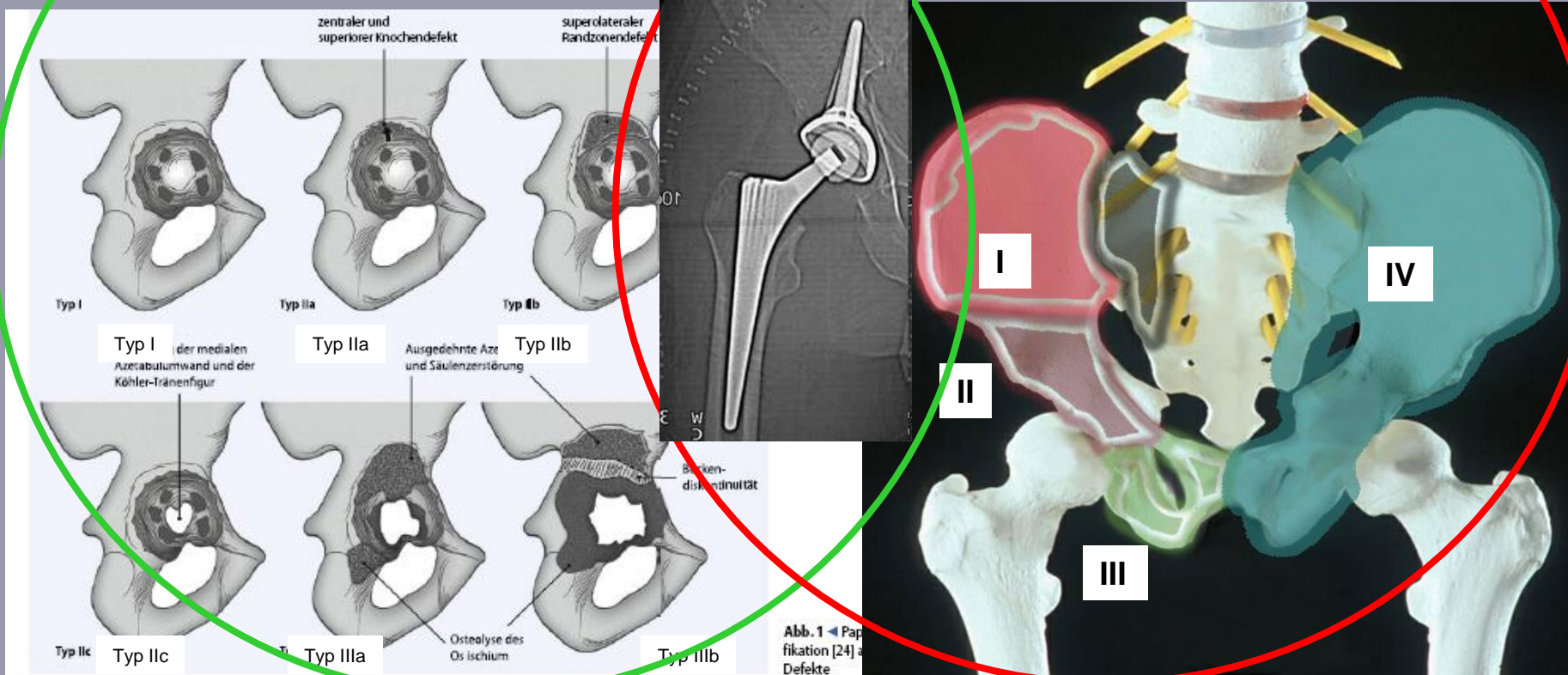
|      |       |
|------|-------|
| mean | 8,25  |
| min  | 4,00  |
| max  | 13,00 |

Up to now no complications

# LARGE ACETABULAR DEFECTS

## Revision surgery

## Tumor surgery



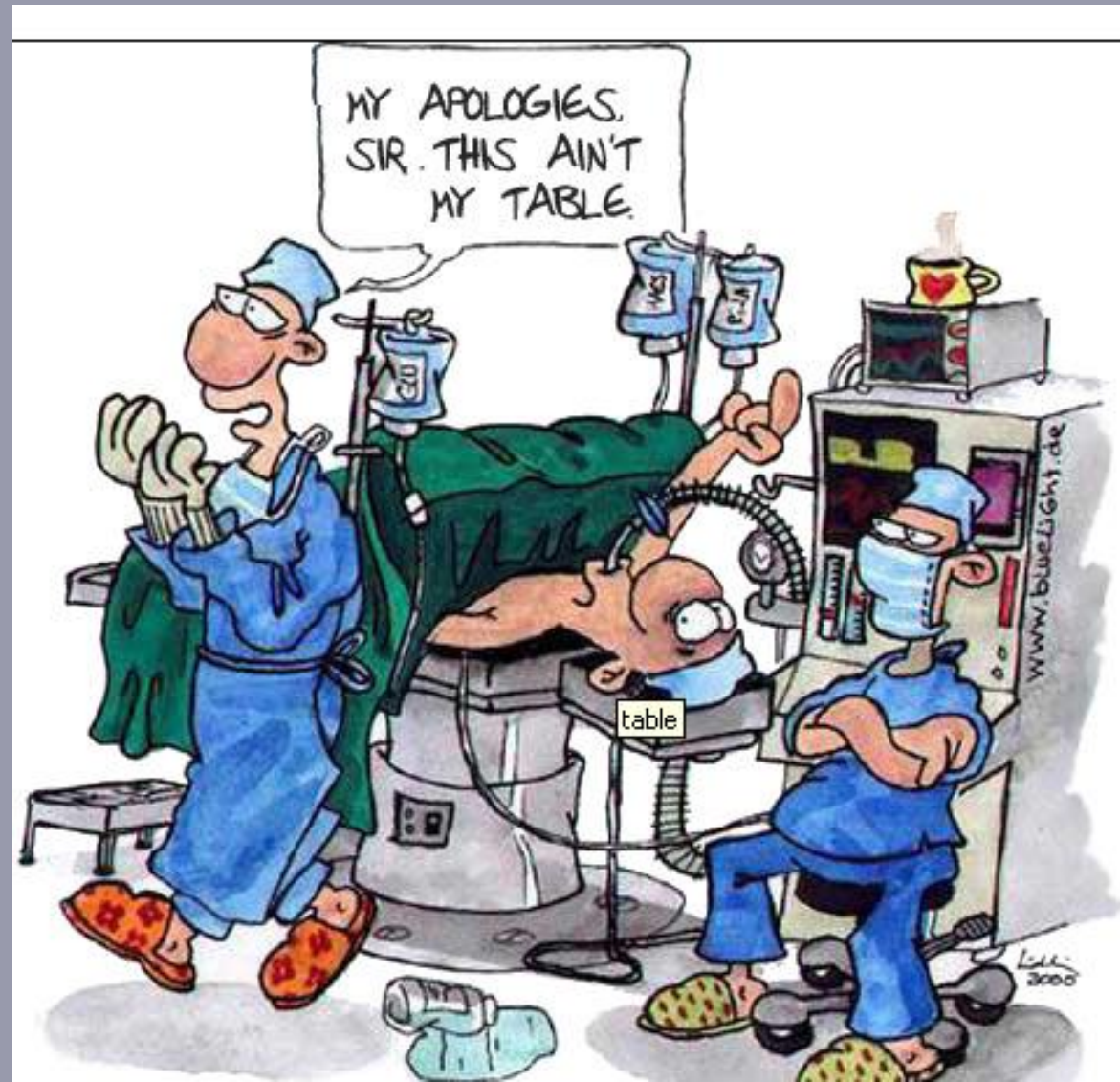
Goal: reconstruction of the function

# PELVIC SURGERY IS CHALLENGING !

| Study                           | Method                                       | Alive/Deceased                        | Complications | Function-Comments  |
|---------------------------------|--|---------------------------------------|---------------|--|
| Enneking et al <sup>8</sup>     | Arthrodesis                                  | 13/3                                  | 25 %          | 3–10 cm shortening, Trendelenberg gait, poor cosmesis              |
| Aboulafia et al <sup>1</sup>    | Saddle prosthesis                            | 9/8                                   | 40 %          | All required gait assist device                                    |
| Johnson <sup>14</sup>           | Steinmann pins and cement                    | 1/1                                   | 50 %          | Mild Trendelenberg gait  |
| Apffelstaedt et al <sup>3</sup> | Resection, pseudarthrosis                    | Approximately 40% survival at 5 years | 47 %          | All needed crutches or wheelchair                                  |
| Gradinger et al <sup>10</sup>   | Custom prosthesis                            | 5/4                                   | 55 %          | Only one patient fully weightbearing as tolerated                  |
| Uchida et al <sup>24</sup>      | Constrained THA/prosthesis                   | 9/7                                   | 30 %          | All required cane/ wheelchair                                      |
| Windhager et al <sup>26</sup>   | Allograft, custom, or saddle                 | 10/11                                 | 33 %          | Worst results with saddle and allograft, no independent ambulators |
| Mankin et al <sup>17</sup>      | Allograft                                    | 3/3                                   | 40 %          | All required revision  |
| Marco et al <sup>18</sup>       | Steinmann pins or screws and cement          | 11/44                                 | 31 %          | At 3-month followup, 25 patients were community ambulators         |
| Harrington <sup>11</sup>        | Autoclaving (4) or allograft (10)            | 12/2                                  | 21 %          | 2 needed cane, 3 with Trendelenberg gait                           |
| Satcher et al (current study)   | Autoclaving and/or Steinmann pins and cement | 9/6                                   | 33 %          | 6 required cane or crutch  |

THA = total hip arthroplasty

# SO DO ONLY THE SMALL AND SIMPLE THINGS ???





Defect Reconstruction Type P I-IV  
(Mega-)prothesis ?

**Goal: reconstruction of the anatomy ???**



Patients : N=24

|                   |    |    |
|-------------------|----|----|
| male              | 11 |    |
| female            |    | 13 |
| Age at diagnosis  |    | 42 |
| Follow-up (Month) |    | 62 |

**53% Revisions!**

- 15-45% wound healing problems
- 23-35% aseptic loosening
- 12-38% Infection



# Revision implant Schöllner Pfanne

## Die Rekonstruktion großer segmentaler Knochen- defekte mit der Sockelpfanne – Einflussfaktoren auf das Migrations- und Lockerungsverhalten

The Reconstruction of Extended Acetabular Bone Defects in Revision Hip Arthroplasty – Risk Factors for Migration and Loosening Using the Pedestal Cup

Autoren S. Tohtz<sup>1</sup>, H. Katterle<sup>2</sup>, G. Matziolis<sup>1</sup>, T. Drahn<sup>1</sup>, C. Perka<sup>1</sup>

Institute <sup>1</sup> Klinik für Orthopädie, Charité – Universitätsmedizin Berlin, CMSC, Berlin  
<sup>2</sup> Radiologie, Spreewaldklinik Lübben

Tohtz S et al. Die Rekonstruktion großer ... Z Orthop Unfallchir 2007; 145: 176–180

HÜFTENDOPROTHETIK

215

### Die Sockelpfannenoperation bei acetabulären Defekten nach Hüftpfannenlockerung. Ein progress report

C. Schoellner<sup>1</sup>, D. Schoellner<sup>2</sup>

<sup>1</sup> Orthopädische Universitäts- und Poliklinik Mainz  
<sup>2</sup> ehem. Chefarzt der Orthopädie am Krankenhaus der  
Augustinerinnen, Köln



small foreign body, short lever arm, no alternation of load

**BUT**

**no modularity, no correction of rotation in situ possible**





small foreign body, short lever arm, no alternation of load,  
silver coating is possible, correction of malrotation after stem  
implantation is possible

**BUT**

**Up to now only mid term results ar available**

Bild-Größe: 2021 x 2021  
WL: 5772 WW: 5454

U

374773 ( 76 y , 74 y )

Bu-Hue-Lau

BECKEN



K.G., 74 male  
periprosthetic infection &  
dislocation left hip  
  
two previous revision

16.12.13 11:47:38

Made In OsiriX

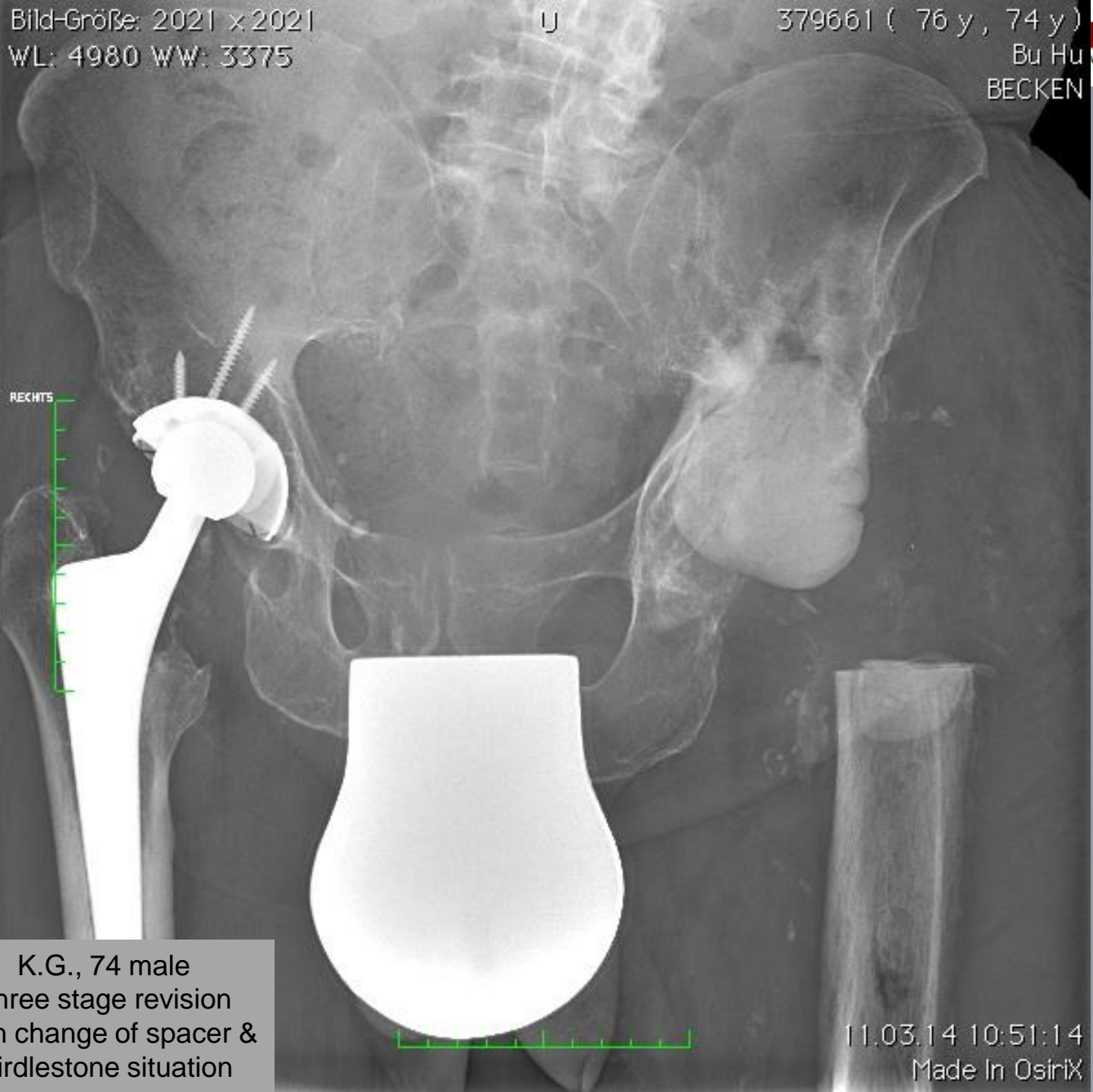
Bild-Größe: 2021 x 2021  
WL: 4980 WW: 3375

U

379661 ( 76 y , 74 y )

**Lmarstein**  
evangelische Stiftung

Bu Hu  
BECKEN



K.G., 74 male  
Three stage revision  
With change of spacer &  
Girdlestone situation

11.03.14 10:51:14  
Made In OsiriX

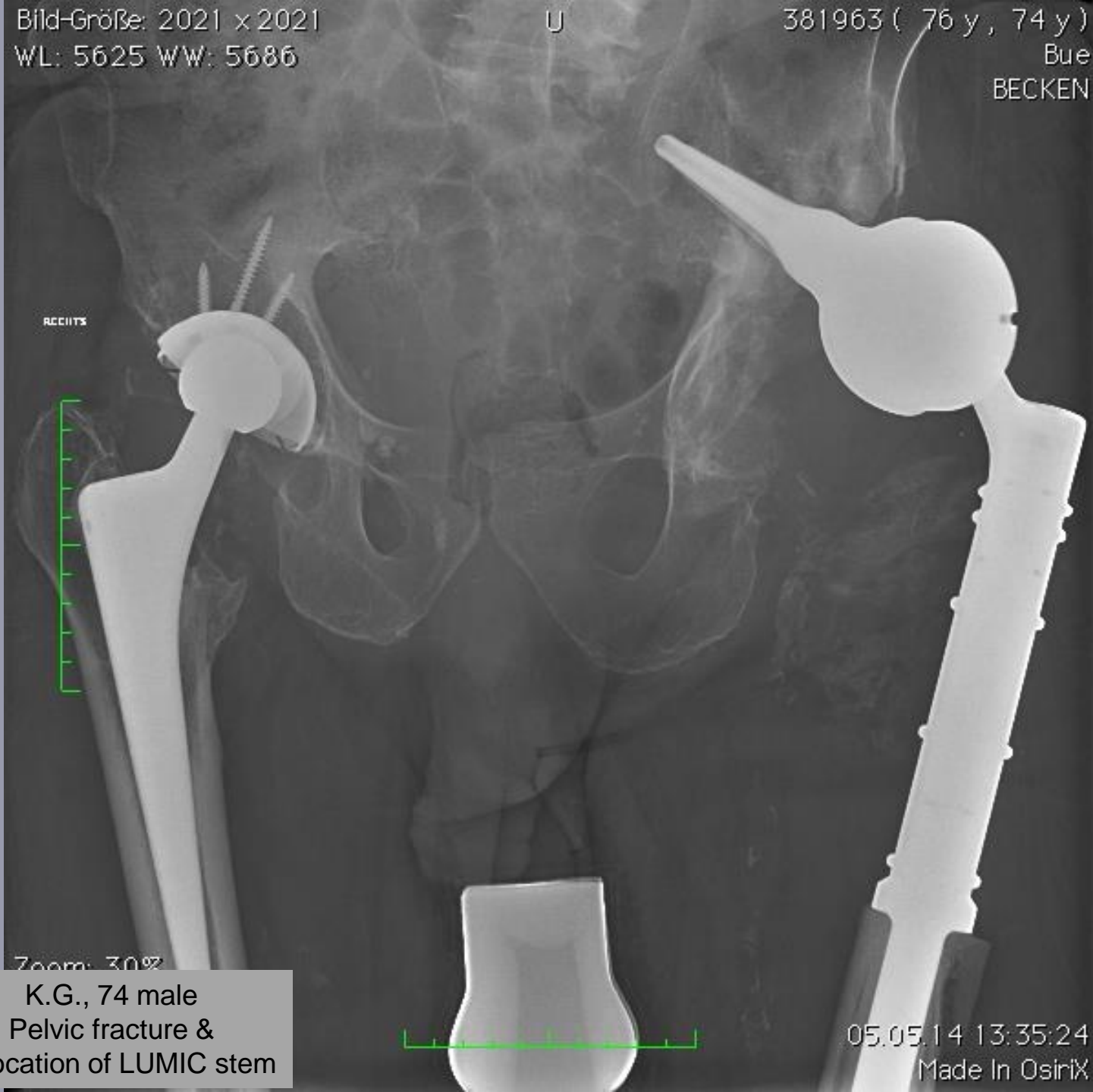
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WL: 5625 WW: 5686

U

381963 ( 76 y , 74 y )

**Lmarstein**  
Evangelische Stiftung

Bue  
BECKEN

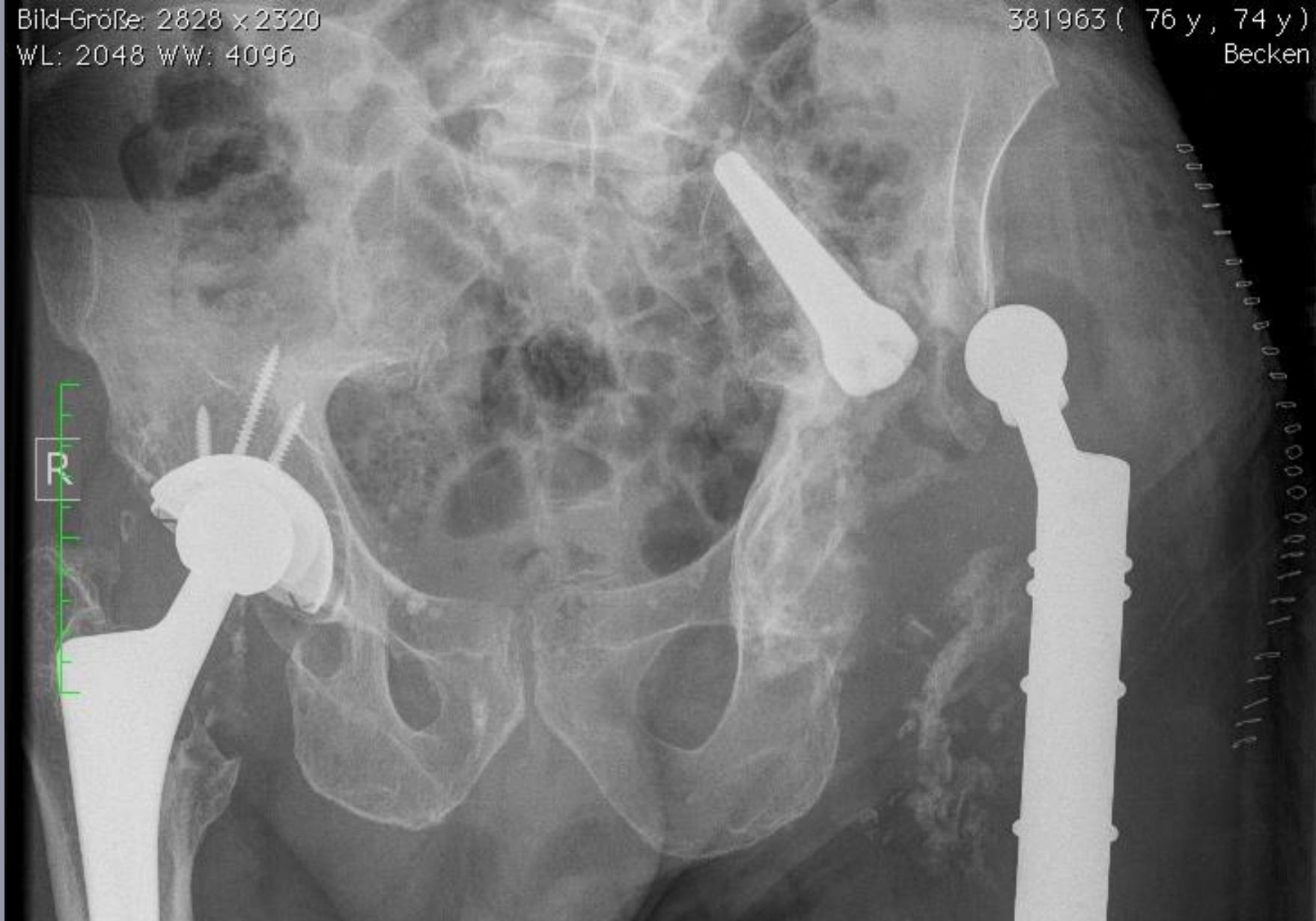


RECHTS

Zoom: 30%

K.G., 74 male  
Pelvic fracture &  
dislocation of LUMIC stem

05.05.14 13:35:24  
Made In OsiriX



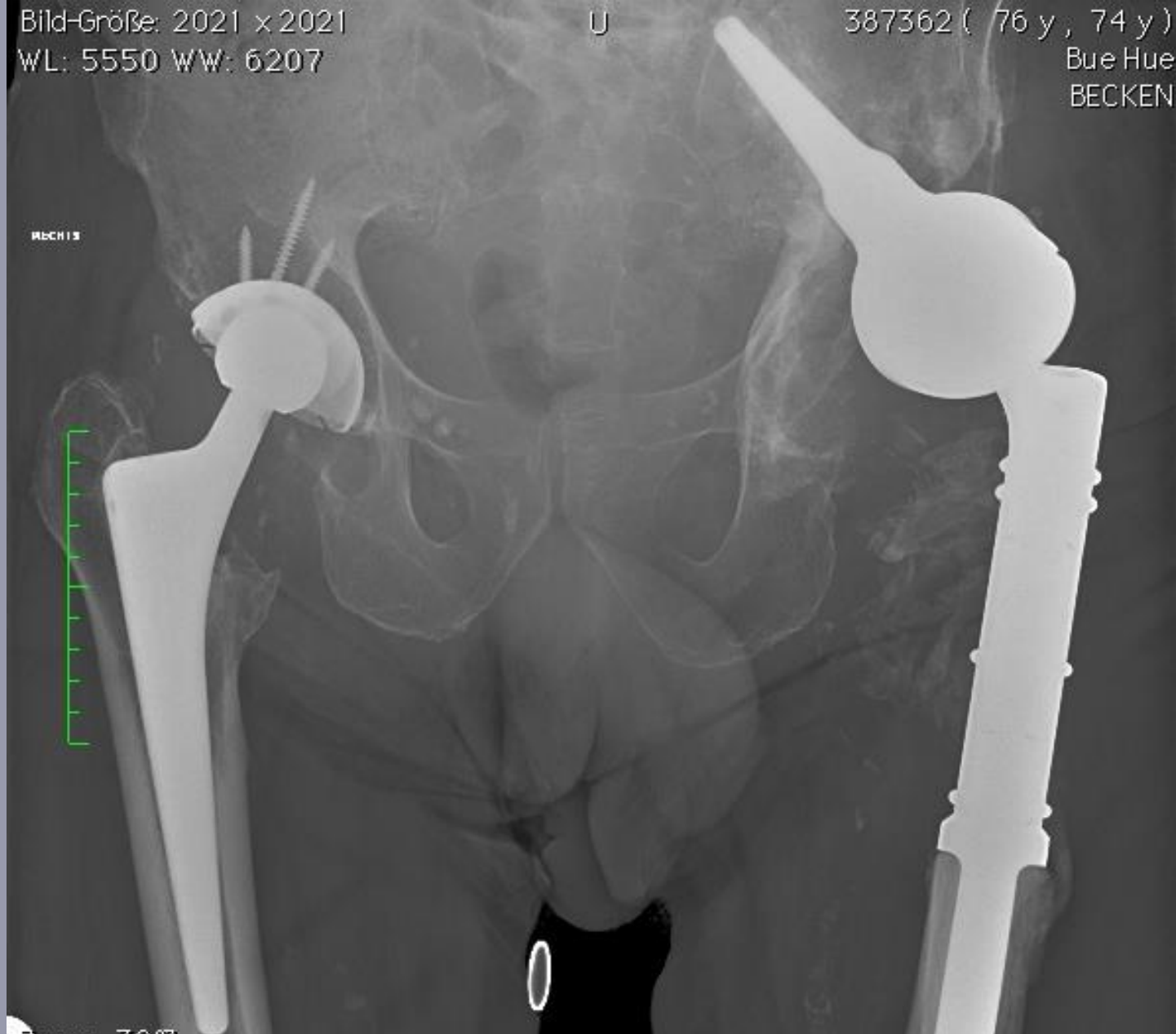
K.G., 74 male  
Revision of LUMIC stem &  
Girdlestone situation &  
MUTARS prox. Femur

Bild-Größe: 2021 x 2021  
WL: 5550 WW: 6207

U

387362 ( 76 y , 74 y )

Bue Hue  
BECKEN



RECHTS

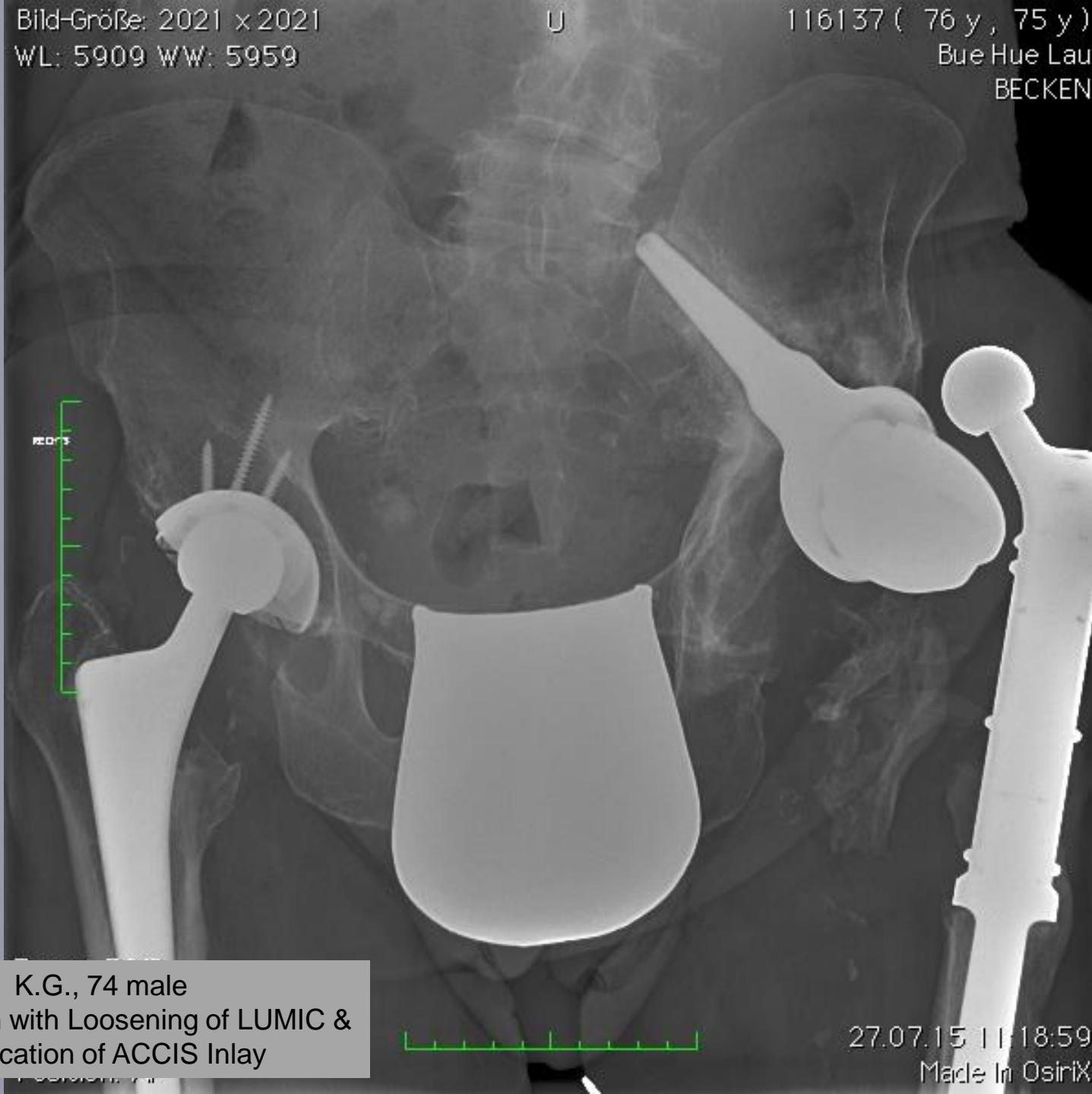


Zoom: 30%

K.G., 74 male  
Re-implantation of LUMIC&  
MUTARS prox. Femur (shorten of the leg)

07.08.14 13:41:53  
Made In OsiriX



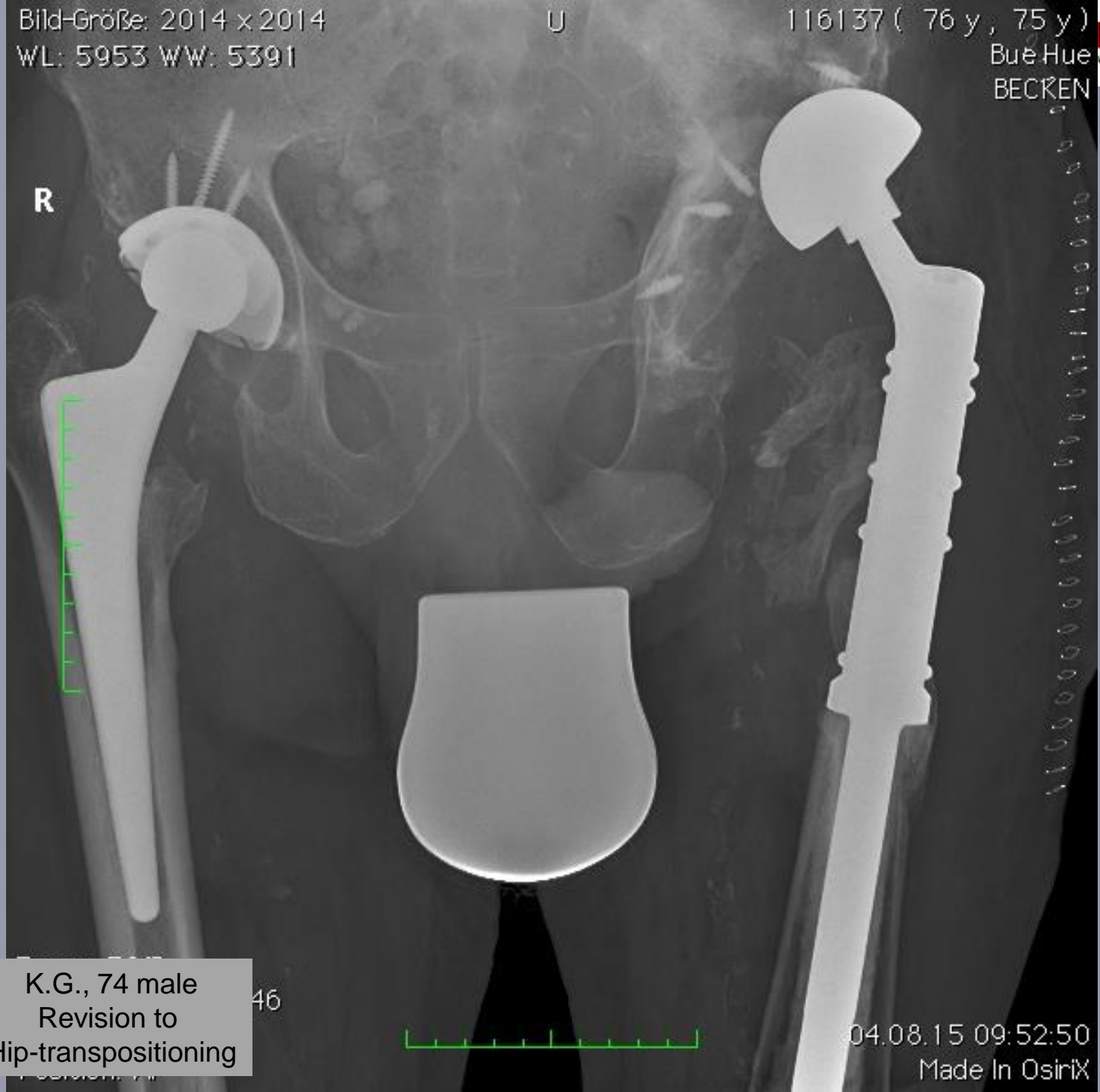


K.G., 74 male

Re-infection with Loosening of LUMIC &  
Dislocation of ACCIS Inlay

27.07.15 11:18:59

Made In OsiriX



K.G., 74 male  
Revision to  
Hip-transpositioning

46

# OUR SHORT TERM RESULTS

## 9x Lumic in 8 Patiens

| name       | gender | OP-Date  | age | tumor   | enneking classification             |
|------------|--------|----------|-----|---|-------------------------------------|
| G.R. right | male   | 08.02.11 | 22  | osteosarcoma III                                  | IIB                                 |
| G.R. left  | male   | 13.04.11 | 22  | osteosarcoma III                                  | IIB                                 |
| O.E.       | female | 12.01.10 | 71  | chondrosarcoma II-III                             | IIB                                 |
| A.D.       | male   | 22.01.13 | 59  | periacetubalar chondroblastoma                    | benigne aggressive                  |
| B.A.       | female | 16.02.10 | 60  |   |                                     |
| W.S.       | male   | 22.10.13 | 61  | NOS G III Acetabulum                              | IIB                                 |
| K.M        | male   | 06.08.13 | 23  | Osteosarcoma G III dist Femur left Stage IIB      | total femur replacement left 1/2012 |
| H-W.S.     | male   | 06.01.14 | 62  | haemangiopericytoma G II periacetabular Stage Iib | enneking classification             |
| L.J.       | male   | 01.07.68 | 45  | Teratoma  | III                                 |



### Follow up

|      |      |
|------|------|
| mean | 34,5 |
| min  | 12   |
| max  | 48   |

# OUR SHORT TERM RESULTS

| complication  | Re-operation  | chemotherapy                           | hospital stay | operation time |
|---|---------------|--|---------------|----------------|
| no  |               | postoperative                          | 45            | 265            |
| luxation  | 2             | postoperative                          | 52            | 117            |
| no  |               | no                                     | 42            | 190            |
| no  | no            | no                                     | 30            | 314            |
| 08/2010 aseptic loosening<br>implant infection 12/2015  | 1             |  | 28            | 160            |
| two stage revision with<br>replantation Feb/2016  | 2             | according to EURO-BOSS prä<br>und post | 28            | 230            |
|   | no            | postoperative                          | 28            | 180            |
| multiple metastasis/ proximal<br>humerus resection and<br>Mutars inverse 11/2015 DOD<br>7/2015 after progressive<br>disease | wound healing | no                                     | 50            | 330            |



## Pain: VAS

|      |      |
|------|------|
| mean | 1,45 |
| min  | 0,00 |
| max  | 2,30 |

## Enneking-Score

|      |       |
|------|-------|
| mean | 17,29 |
| min  | 11,00 |
| max  | 23,00 |

# THE SLIDE TO REMEMBER

Success of hip revision surgery  
depends on the correct indication (bone stock)  
as well as on exact pre-operative planning!

- custom-made acetabular prosthesis show promising results
- strict indication for pedestal cup
- advice for modular stems and tripolar-system

**Plan your operation and operate your plan !**



**Be aware:**  
  
**in 3D-printing  
You will get  
exact  
what you have  
planed !**



# RE-REVISION SURGERY ?

at least it is not boring

