

ACETABULAR COMPLEX REVISION WITH CEMENTED DUAL MOBILITY SOCKET 10 years of follow up



INTRODUCTION

INTRODUCTION

- **THA** Excellent clinical results (Learmonth ID, Lancet 2007)
- **Number of revision THA (rTHA) increase** (Kurtz S, JBJS Am 2007) :
 - By 2030, the demand for **primary** THA is estimated **to grow by 174%** (572,000 THA) in USA
 - The demand for hip **revision** procedures is projected **to double** by the year 2026
- **THA revision** projected to **grow by 137%** (in the USA through 2030)

EPIDEMIOLOGY

The projected number of **primary total hip arthroplasty** (THA) and total knee arthroplasty (TKA) procedures in the United States from 2005 to 2030.

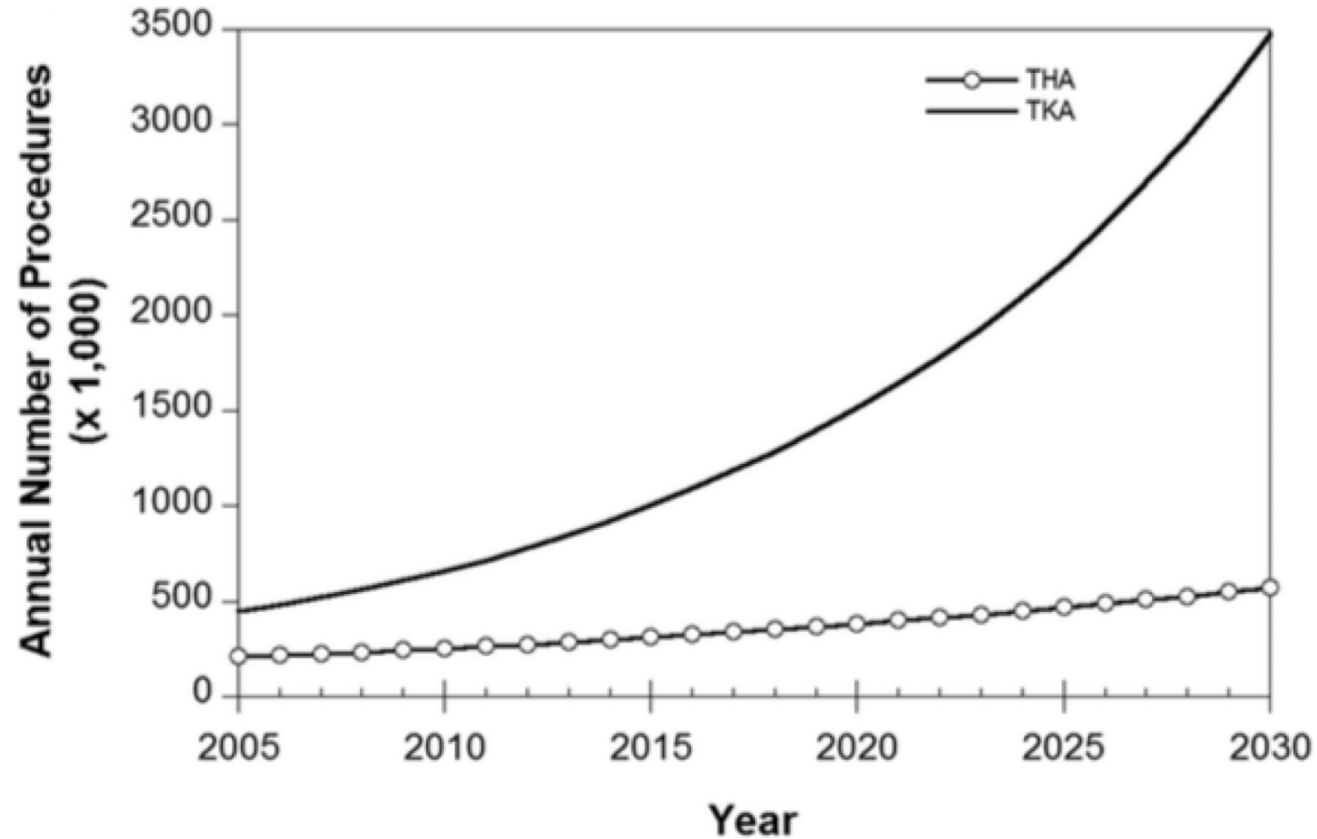


Fig. 1

The projected number of primary total hip arthroplasty (THA) and total knee arthroplasty (TKA) procedures in the United States from 2005 to 2030.

Kurtz S, JBJS Am 2007

EPIDEMIOLOGY

The projected number of **revision total hip arthroplasty** (THA) and total knee arthroplasty (TKA) procedures in the United States from 2005 to 2030.

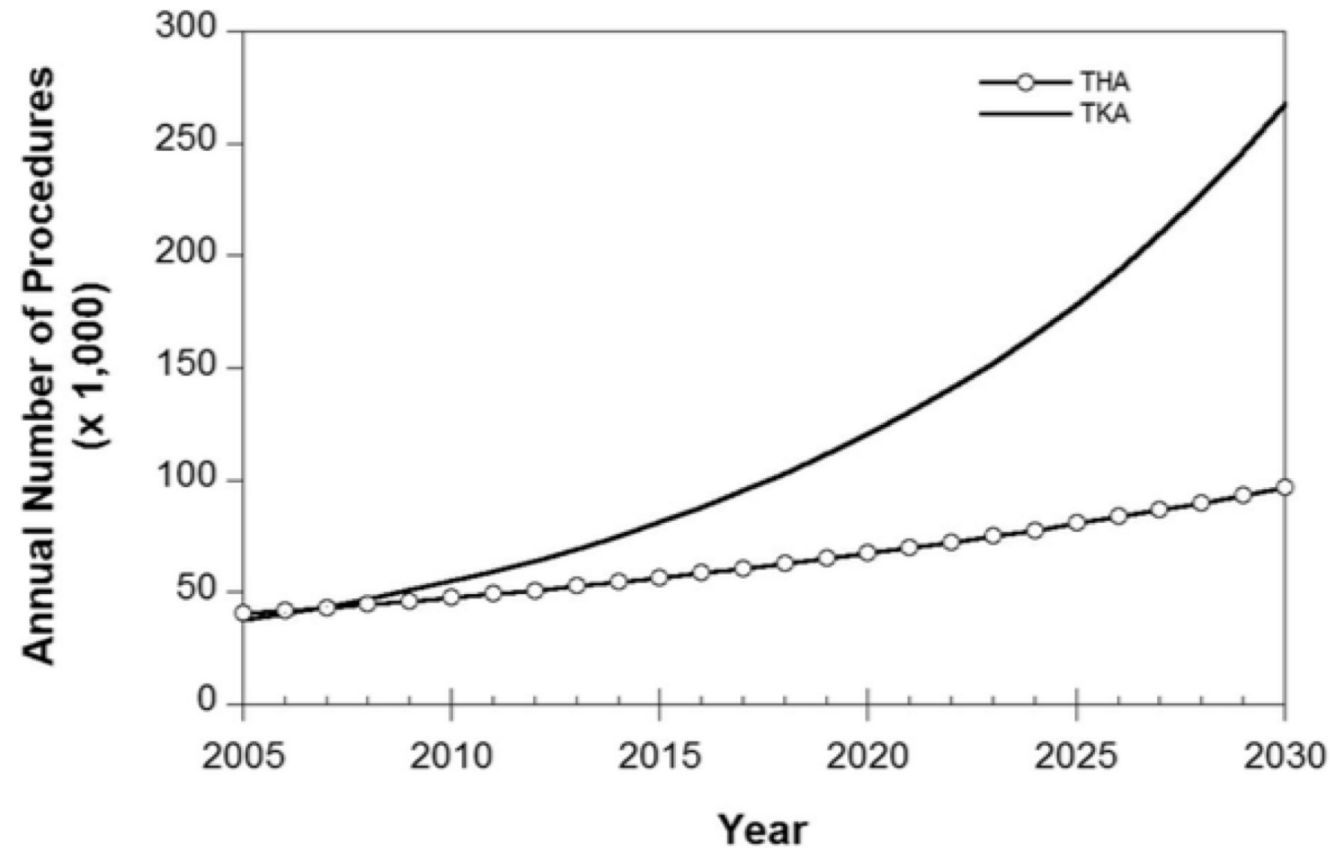


Fig. 2

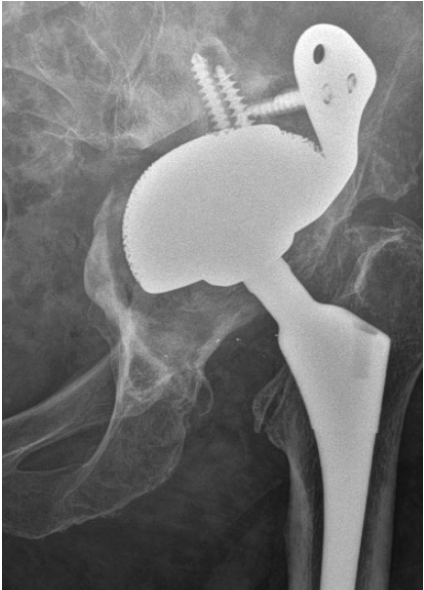
The projected number of revision total hip arthroplasty (THA) and total knee arthroplasty (TKA) procedures in the United States from 2005 to 2030. Kurtz S, JBJS Am 2007

PROBLEMATIC

rTHA,

is a complex orthopaedic procedure

Two **problems** for the surgeon :



**ASEPTIC
LOOSENING
(1,5-17%)**

**INSTABILITY
(10-25%)**

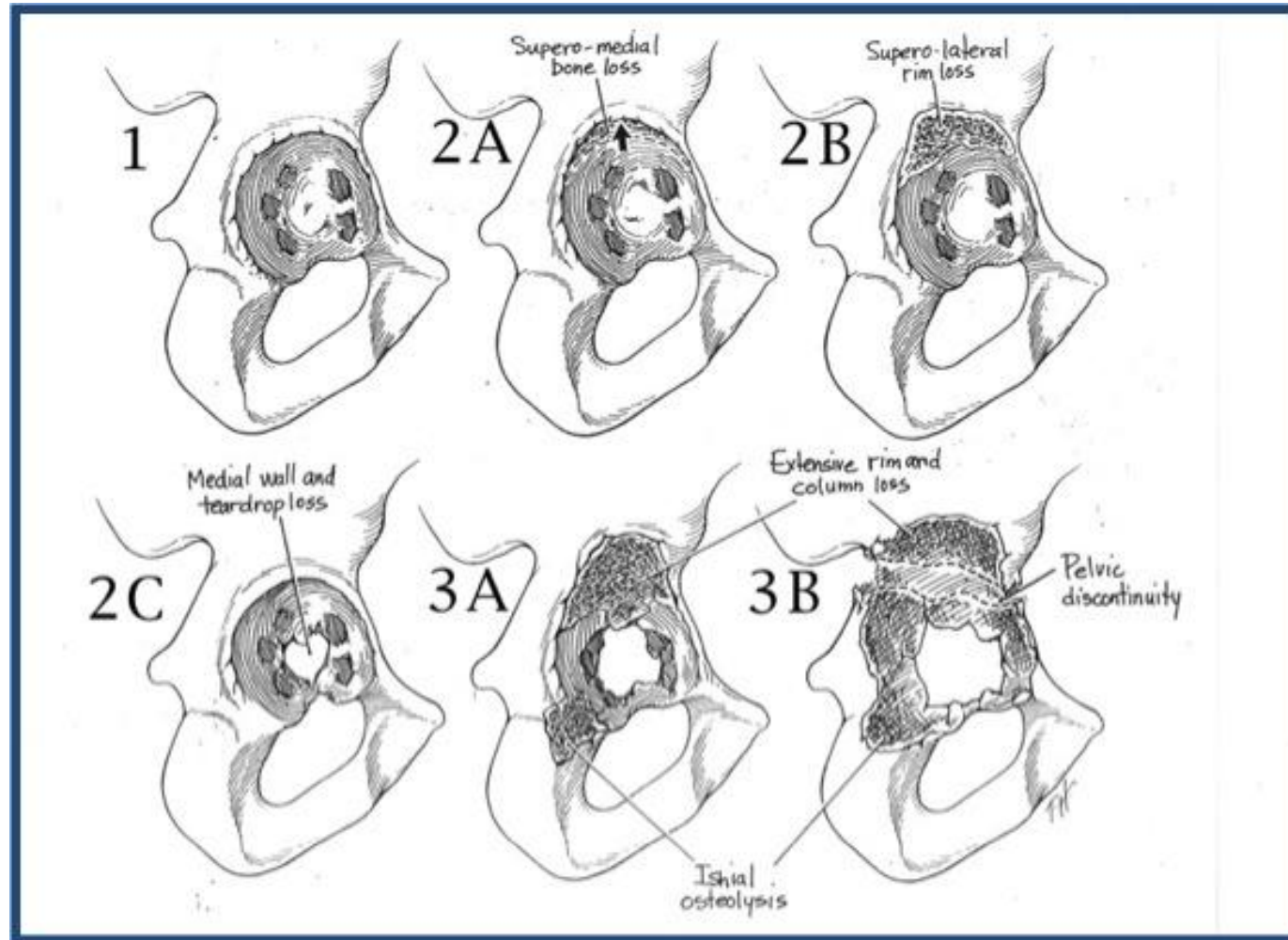


Problematic

- The management of **acetabular bone loss** in revision total hip arthroplasty can be **challenging**
- **Severe acetabular bone loss** and **pelvic discontinuity** (PD) present particular **challenges** in revision total hip arthroplasty (Hipfl 2017)
- In the presence of **severe acetabular bone loss** , the **inherent stability** of the acetabular component is **compromised**, resulting in persistent micromotion across the acetabulum and subsequent **implant-loosening**

Acetabular bone loss and pelvic discontinuity

Paprosky Classification



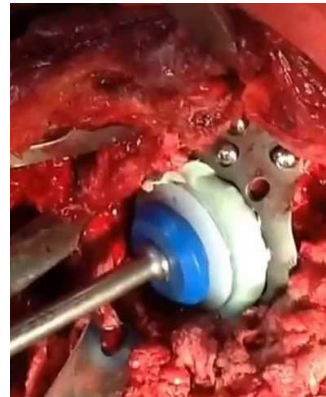
Procedures for acetabular revision with bone loss

- **ACETABULAR RECONSTRUCTION**

Allograft (morcellized, structural, massive)

Metal Ring + Cemented socket

Trabecular Metal™



- **REPLACEMENT**

Jumbo Cup (Mega Cup) diameter > 66mm ♂ / > 62 ♀



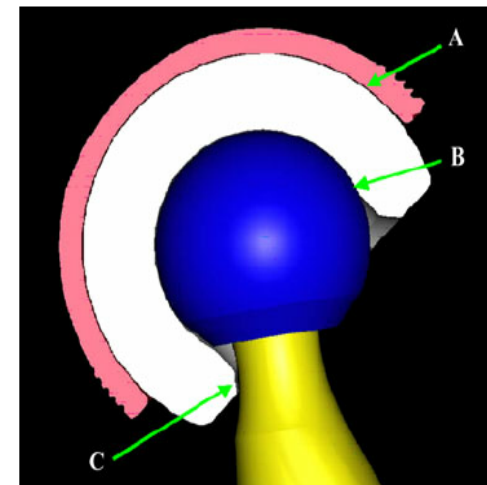
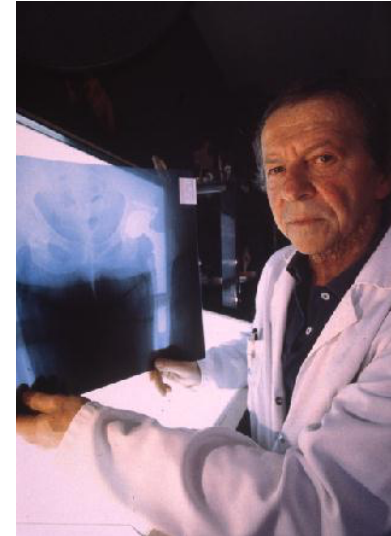
DUAL MOBILITY (DM) SOCKET

- **Pr Gilles Bousquet**

(CHU Saint Etienne France 1975)

- **3 components / 3 joints :**

- Acetabular socket (cementless / cemented)
- Poly liner (free in acetabular component)
- Metal Head (22,2mm)



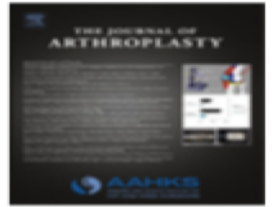
DUAL MOBILITY in revision



Contents lists available at [ScienceDirect](#)

The Journal of Arthroplasty

journal homepage: www.arthroplastyjournal.org



AAHKS Symposium

Dual-Mobility Constructs in Revision Total Hip Arthroplasties

Matthew P. Abdel, MD *

Department of Orthopedic Surgery, Mayo Clinic, Rochester, MN

In revision THAs, Dual-Mobility constructs offer lower rates of dislocations and re-revisions for dislocations in the midterm.

(Abdel 2018 The Journal of Arthroplasty)

DUAL MOBILITY in revision

Clin Orthop Relat Res (2010) 468:3248–3254
DOI 10.1007/s11999-010-1404-7

SYMPOSIUM: PAPERS PRESENTED AT THE 2009 CLOSED MEETING OF THE INTERNATIONAL
HIP SOCIETY

The Use of a Cemented Dual Mobility Socket to Treat Recurrent Dislocation

**Moussa Hamadouche MD, PhD, David J. Biau MD,
Denis Hutten MD, Thierry Musset MD,
François Gaucher MD**

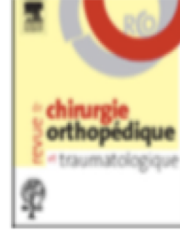
The use of a **cemented dual mobility** socket has provided **restoration of hip stability in 96% of patients** presenting with recurrent dislocation, **with less mechanical complication and loosening rates than have been reported with constrained systems.**

DUAL MOBILITY in revision



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MÉMOIRE ORIGINAL

Prévention des luxations par la double mobilité lors de reprises d'arthroplasties totales de hanche[☆]

Postprosthetic dislocation prevention in total hip revision surgery using a dual mobility design

R. Philippot^{a,*}, P. Adam^a, M. Reckhaus^b, F. Delangle^a, F.-X. Verdot^a,
G. Curvale^b, F. Farizon^a

^a EA 4338, laboratoire de physiologie de l'exercice, département de chirurgie orthopédique, centre hospitalier et universitaire de Saint-Étienne, 42055 Saint-Étienne cedex 2, France

^b Service de chirurgie orthopédique et traumatologique, hôpital de la Conception, 13385 Marseille cedex, France

Acceptation définitive le : 18 mai 2009

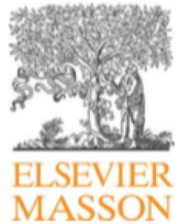
Dual mobility cups provided a dislocation rate of only **3.7% in revision THA, comparable** to the one reported with standard implants **for primary THA.**

Revision THA using a dual mobility cup confirms that this design provides **stability, at least up to medium term.**

With **7-year survivorship** of 96%±3.2, the dual mobility design appears to **provide better fixation than the constrained or tripolar cups often recommended in these indications.**

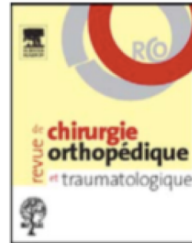
DUAL MOBILITY in revision

Revue de chirurgie orthopédique et traumatologique (2011) 97, 794–800



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EM|consulte
www.em-consulte.com



MÉMOIRE ORIGINAL

Prothèse de révision avec reconstruction acétabulaire par armature métallique et cupule double mobilité cimentée[☆]

Revision total hip arthroplasty using a reconstruction cage device and a cemented dual mobility cups

L. Schneider^{a,*}, R. Philippot^{a,b}, B. Boyer^a, F. Farizon^{a,b}

^a Service d'orthopédie et traumatologie, hôpital Nord, CHU de Saint-Étienne, 42055 Saint-Étienne cedex 2, France

^b EA 4338, laboratoire de physiologie de l'exercice, CHU Saint-Étienne, 42055 Saint-Étienne cedex 2, France

Acceptation définitive le : 3 octobre 2011

96 revisions, with massive bone loss
Mean follow-up of 41 months (range, 1-101 months)

Ten dislocations (10.4%)

No intraprosthetic dislocations (IPD)

One revision for aseptic loosening and another for septic loosening

The **survival rate at 8 years was 95.6%** (95% CI, 93.3-97.7%) and 99.3% (95% CI, 98.9-99.6%) if the endpoint was **aseptic acetabular exchange**.

NOVAE STICK SERF



The logo for SERF, featuring a stylized orange and black circular icon followed by the word "serf" in a bold, lowercase, sans-serif font.

SERF, Décines, FRANCE)

Cemented DM

Stainless Steel 316L

UHMWPE Poly liner

Nine Sizes (45-61mm)

PATIENTS & METHODS

PATIENTS & METHODS

- **Retrospective study**
- **CHU Nord Saint Etienne (2002-2010)**
- **All patients for acetabular revision with cemented DM in acetabular metal ring**
- **3 types of metal ring : Kerboull Plate, Burch Schneider, ARM[®] Serf**

Patients

77 rPTH (74 patients) included (50 Womens, 24 Mens) 69,8 years (34 ; 88)

Mean follow-up **10,7 years** (2,1 ; 16,2)

At last follow-up :

- **34 patients** (45,9 %) **died** (35 implants) with 105,9 months (26 ; 164) follow up, without surgery between revision and death.
- **40 patients** (54 %) **alive** (42 implants), with 148,1 months (102 ; 195) follow up
- 1 patient was lost to follow up

Etiology of acetabular revision

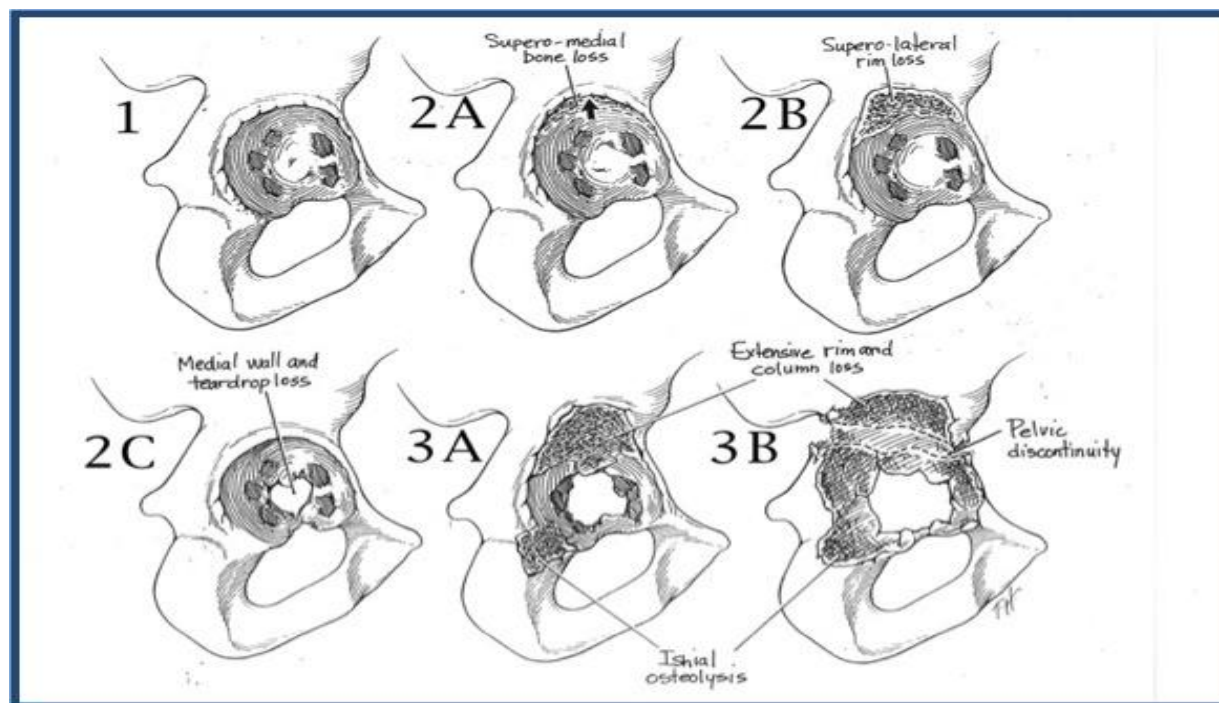
- **Acetabular isolated Loosening** (41,5%),
- **Bipolar Loosening** (22%),
- **Reimplantation after infection** (12,9%),
- **Recurrent dislocation** (9%)



Acetabular Aseptic Bone Loss

PAPROSKY Classification:

- 27.3% IIIB
- 28,6% IIIA
- 23,4% IIC
- 15,6% IIB
- 5,2% IIA



Number of previous surgery : 2,15 (1:6)

Acetabular Metal Ring, Allograft and socket

Dual Mobility socket **NOVAE[®] STICK** (Serf, Décines, France), **cemented** (Palacos Genta) on **3** types of **acetabular metal ring**, according to acetabular bone loss.

- 59 **Kerboull Plate** (SERF, Décines, FRANCE) : **Paprosky IIC-IIIA**
- 5 **Burch Schneider** (ZIMMER BIOMET, Warsaw, USA) : **Paprosky IIIA-IIIB**
- 13 **ARM[®]** (SERF, Décines, FRANCE) : **Paprosky IIIA-IIIB**



Allograft Morcelized with **bone bank** in 98,7% cases (76 revisions)

Metal-polyethylene (**metal/PE**)

Polyethylene liner UHMWPE with metal head **22,2mm** in 42 cases (54,5%) or **28mm** in 35 cases (45.4%).



Surgical Procedure

- **Postero lateral approach** for all patients
- **Acetabular metal ring choice** according to **pre operative CT Scan**, and **final choice** by acetabular bone loss during the surgery

Clinical and Radiological Evaluation

Clinical Evaluation

- **45 Days** after surgery, **3 months**, **6 months**, **1 year**, and **2 or 3 years**
- **Functionnal Hip Score** (pré op, 1 year, and every 2-3 years)

Score Postel Merle d'Aubigné (**PMA**), Harris Hip Score (**HHS**), Charnley Score

Radiological Evaluation

- Standard **Xray Pelvis and Hip**

RESULTS

Clinical outcome

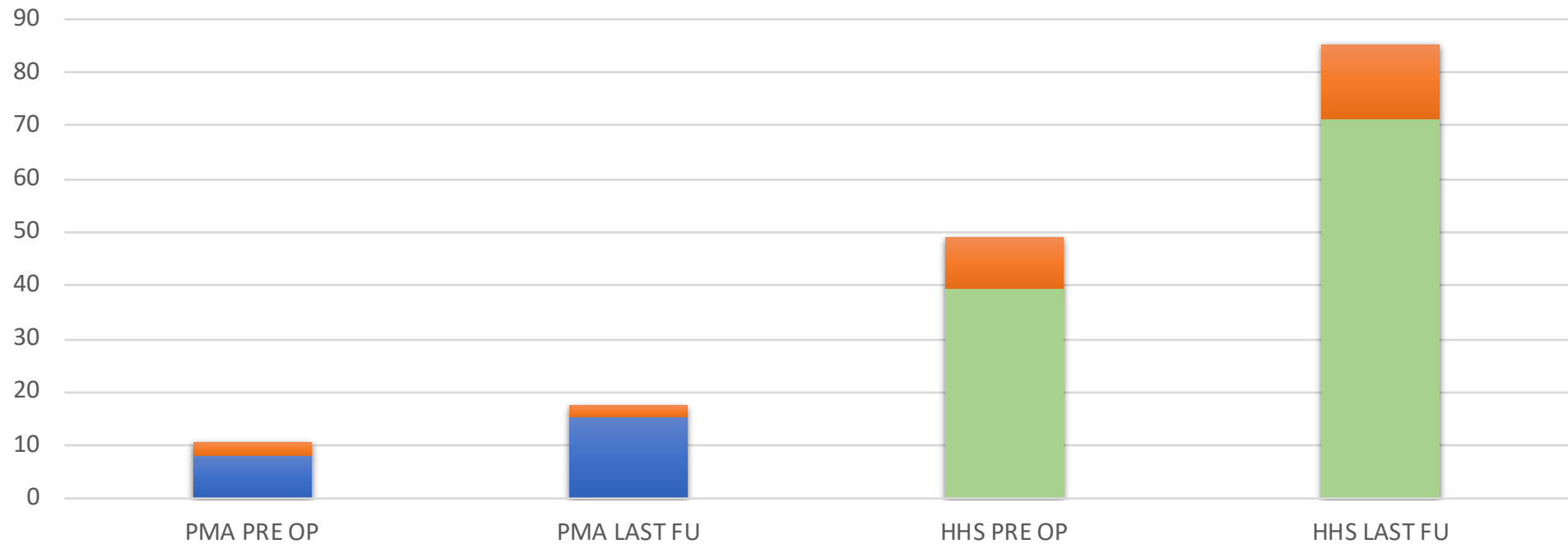
Pre operative **PMA Score** : 8,15 +/- 2,59 (7,56 : 8,74) IC 95% / Last follow up : 15,38 +/- 2,2 (14,89 : 15,88) IC 95%

Improvement of 7,23 +/- 3,21 (p < 0,05)

Pre operative **Harris Hip Score (HHS)** : 39,53 +/- 9,62 (36,77 : 42,29) IC 95%,
Last follow up : 71,33 +/- 14,04 (67,30 : 75,37) IC 95%

Improvement of 31,79 +/-17,92 (p < 0,05).

Clinical outcome



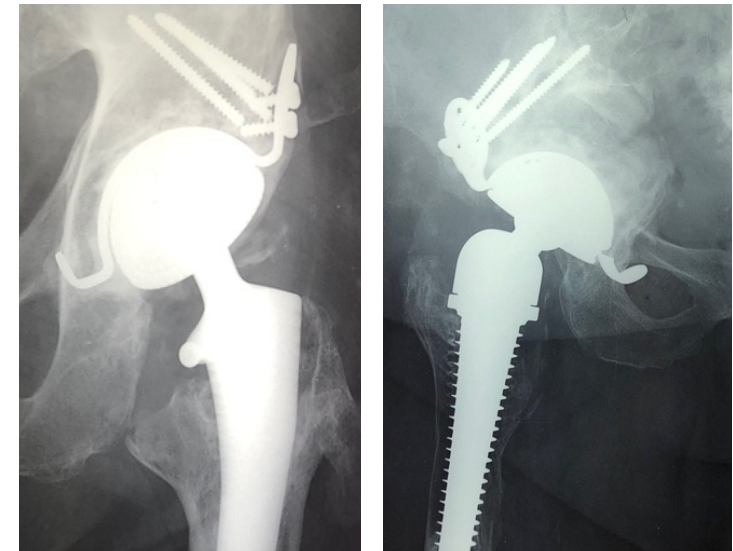
Pre operative and last follow up PMA : and HHS score

Complications

Sixteen patients (16 patients/17 implants) with complications (19 cases of complications) : 21,62%.

Fourteen **Womens** and Two **Mens**, 76 yo (52 ; 92)

- **Twelve complications cases** need **surgical procedure** (15,6%) at **76,1 months (0,5 : 173)**
 - Six cases (7,8%) needs **changement of acetabular implant** (detail on next slide)
 - Six cases **without changement of implants** (detail on next slide)
- **Seven complications cases without surgical procedure**
 - 4 closed reductions after dislocation
 - 2 ruptures of materials (1 rupture of screws, and 1 rupture of hook kerboull plate)
 - 1 fracture with nonunion of greater trochanter



Complications

Six cases (7,8%) needs **changement of acetabular implant** :

- 3 aseptic loosening
- 1 septic loosening
- 1 for impingement with sciatic nerve with ARM (massive)
- 1 for late sepsis

Six cases **without changements** of implants :

- 3 open reductions for early dislocations
- 1 early sepsis (changement of head and liner)
- 1 surgery for non union of greater trochanter
- 1 evacuation of hematoma

Acetabular Aseptic Loosening

3 / 77 acetabular aseptic loosening : 3,89%

(Kerboull Plate at 7, 10 et 12 years) at 9,6 years (7 : 12)

Three Womens, 66 yo (64 ; 69), BMI 24,5 (22,4 ; 26,1),
with 2 previous surgery (1 ; 3).

No acetabular loosening on Burch Schneider and ARM.

1 septic loosening of ARM : 1,3% (ARM at 11 years).

Acetabular Aseptic Loosening

Acetabular aseptic loosening according to bone loss

Paprosky Classification :

Acetabular aseptic loosening on PAPROSKY :

IIB (8,3%)

IIIA (4,5%)

IIIB (4,8%).

Dislocation

7/74 patients : **Dislocation rate 9,45%**

Early Dislocation/ Late (respectively before and after **3 months** post op)

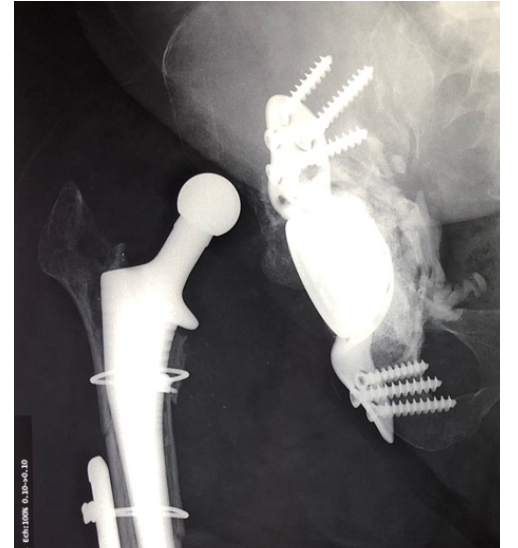
Single Dislocation / Recurrent Dislocation (< 2 dislocations)

Chronic Instability (> 2 dislocations)

Early Dislocation occurs at **37 days (18 : 54)**

Late Dislocation occurs at **338 days (158 : 518)**

Patients characteristics : Womens +++ , 68,3 yo (53 ; 87), BMI 25,7 (19,6 ; 38,3), with 3 previous hip surgery (1 ; 6)



3/7 patients Single Early Dislocation (3,89%) (at 37,6 days) (18 : 40)post op, Open reduction (2/3 cases)

No dislocation after reduction, with 100,6 months follow up (53 : 140)

1/7 patient Single Late Dislocation at 158 days (5months) post op, closed reduction

2/7 patients Two Early Dislocations at 79 days post op (51 : 107) (One open and one closed reduction). No dislocation after reduction, with 182,5 months follow up (180 : 185)

1/7 patient with chronic instability (6 episodes, closed reduction for all)

X rays of 7 patients with dislocation



Chronic instability (Patient A)

Dislocation rate according to bone loss (Paprosky):

No dislocation on IIA, IIB, et IIC

1 dislocation IIIA (4,5% of IIIA)

6 dislocations IIIB (28,6% of IIIB)

All patients with destruction (n=4) or nonunion (n=2) of greater trochanter have dislocated.

Only **one** patient with **destruction of greater trochanter** present **chronic instability (16,7%**
of patients with dysfunction of abduction system).

Dislocation rate according to acetabular metal ring type :

Kerboull Plate : 1,69%

Burch Schneider : 20%

ARM : 38,5%

Dislocation rate according to etiology of acetabular revision :

Post septic reimplantation: 30%

Revision for chronic instability : 14,3%

Revision for aseptic bipolar loosening : 5,9%

Dislocation rate according to number of previous hip revision

3 previous hip surgery (1 ; 6) before revision

Open Reduction / Closed Reduction according to Early / Late dislocation

Open Reduction :

60% of patients with early single dislocation

50% of patients with two early dislocation

0% of late dislocation

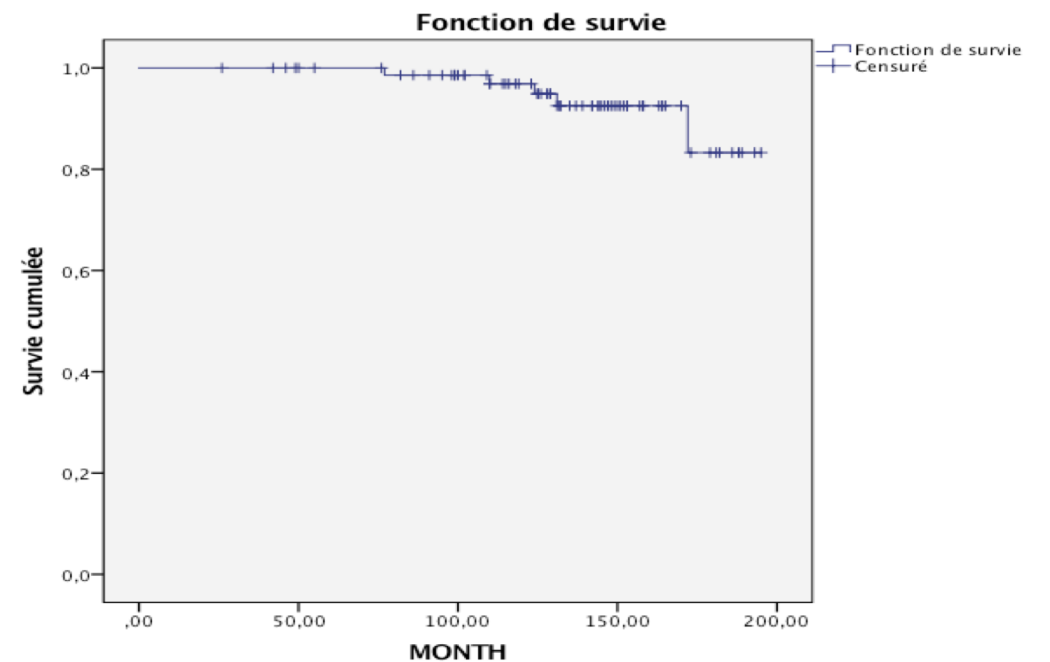
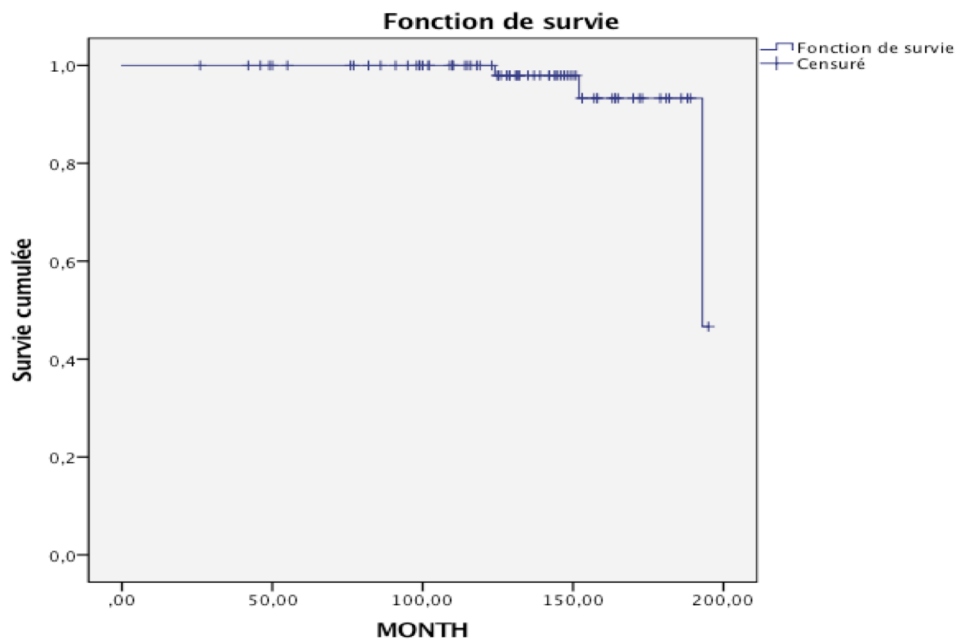
Closed Reduction :

Late dislocation and chronic instability

Survival Rate

At 10 years, survival rate, with explantation for acetabular loosening : 96,1%.

At 10 years, survival rate, with acetabular explantation for all etiology : 93,5%.



Radiological Analysis

Partial **stable** peri-acetabular **radiolucency** , **in zone II** in **4 patients**

Tilt of acetabular component was in post op : **47,16 +/-6,24 (31,9 : 64,2)**, at last FU : **47,36 +/-6,50 (33,38 : 64,32)**.

No patients with **surgical revision for instability** due to **wrong positioning of acetabular implants**

No patients with specific complication of DM : **No IPD (Intra Prosthetic Dislocation)** at last follow up.

Brooker calcification / Heterotopic ossification : 18 cases Brooker I, 4 Brooker II, 7 Brooker III.

Radiological Analysis

Allograft integration (Oswestry classification) : 1 stade 0 (1,3 %), 4 stade I (5,2 %), 2 stade II (2,5 %), 14 stade III (18,2 %), 23 stade IV (29,8 %) et 33 stade V (42,8 %).



DISCUSSION

Clinical and radiological outcome of retrospective study **confirm** our hypothesis :

Cemented DM in acetabular metal ring with allograft is a reliable solution, with low rate of revision for aseptic acetabular loosening or recurrent dislocation, with 10 years mean follow up.

Dislocations are **correlated** with :

- Acetabular bone loss (PAPROSKY III),
- Type of metal ring (ARM) +++
- Dysfunction of hip abductor muscles (nonunion or destruction of greater trochanter)

In comparison of other series of rTHA with DM :

Difficult, Heterogeneous series on this points :

- **Different acetabular metal ring** (Kerboull, Muller, Ganz, Burch Schneider...), **different socket types**
- **Cemented / cementless** DM
- **Severity of bone loss** Heterogeneous (low / massive with pelvic discontinuity)
- **Different classification** of acetabular bone loss (Paprosky, AAOS, SOFCOT)
- **Different etiology of revision** (loosening / instability)
- **Single dislocation** or **chronic instability** are not specified

Acetabular Loosening rate on other series of rTHA

rTHA with DM cup: 0% - 13,5%

Hamadouche & al : 3,9% at 8,2 years (51 patients)

Wegrzyn & al : 1,5% at 7,5 years (61 patients)

Lebeau & al : 6,4%, at 8 years (62 patients)

Our results : **3,89% at 9,6 years (7 : 12)**

rTHA with Standard cup

Kerboull Plate :

Kerboull & al : 5,6% at 8 years (53 patients)

Makita & al : 6,2% at 11 years (65 patients)

Our results with DM on Kerboull: **3,89% at 9,6 years (7 : 12)**

Burch Schneider :

Caroll & al : 6,3% at 8,75 years (60 patients)

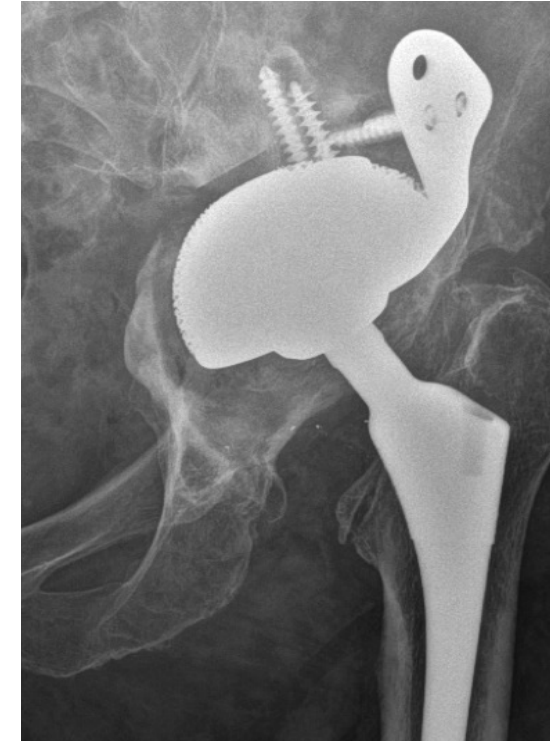
Our results with DM on Burch Schneider : **No acetabular loosening**

ARM :

No data available for ARM , but others massive acetabular metal ring with similar design cup : cage, triflange (Zimmer®)

Hipfl & al : 17% at 5 years

Our results with DM on ARM : **1 septic loosening (1,3%) , no aseptic loosening**



Dislocation rate on other series of rTHA

rTHA with DM cup: 0% - 10,4%

Wegrzyn & al. : 0% at 89 months (61 patients)

Schneider & al. : 10,4% at 41 months (96 patients)

Viste & al. Chronic instability 2% at 7 years

Our results : 9,45% / 1,29 Chronic instability

rTHA with Standard cup

Kerboull Plate :

Makita & al : 1,6 % at 11 years (65 patients)

Assi & al. : 20% at at 6,18 years (29 patients)

Our results with DM on Kerboull : 1,69% at 10,7 years

Burch Schneider :

Ilyas & al. : 9% at 11,5 years (37 patients)

Udomkiat & al. : 23% at 4.6 years (62 patients)

Our results with DM on Burch Schneider : 20% at 10,7 years

ARM :

No data available for ARM , but others massive acetabular metal ring with similar design cup cage, triflange (Zimmer®)

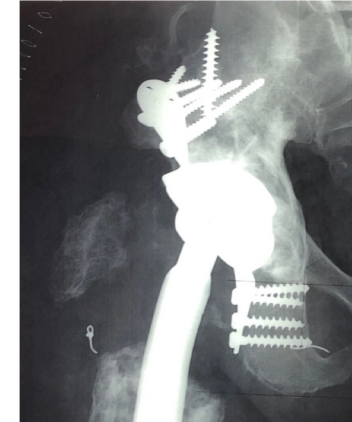
Hipfl & al : chronic instability 6 % (cup cage and triflange) at 5 years (Meta analysis)

Our results with DM on ARM : chronic instability 1,29% at 10,7 years



Rate of **chronic instability** according to **destruction or nonunion of greater trochanter** :

- Our results **with DM cup** : 16,7 %
- Taunton et al. **with standard cup** : 51%



Clin Orthop Relat Res (2012) 470:428–434
DOI 10.1007/s11999-011-2126-1

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SYMPOSIUM: PAPERS PRESENTED AT THE ANNUAL MEETINGS OF THE HIP SOCIETY

Pelvic Discontinuity Treated With Custom Triflange Component

A Reliable Option

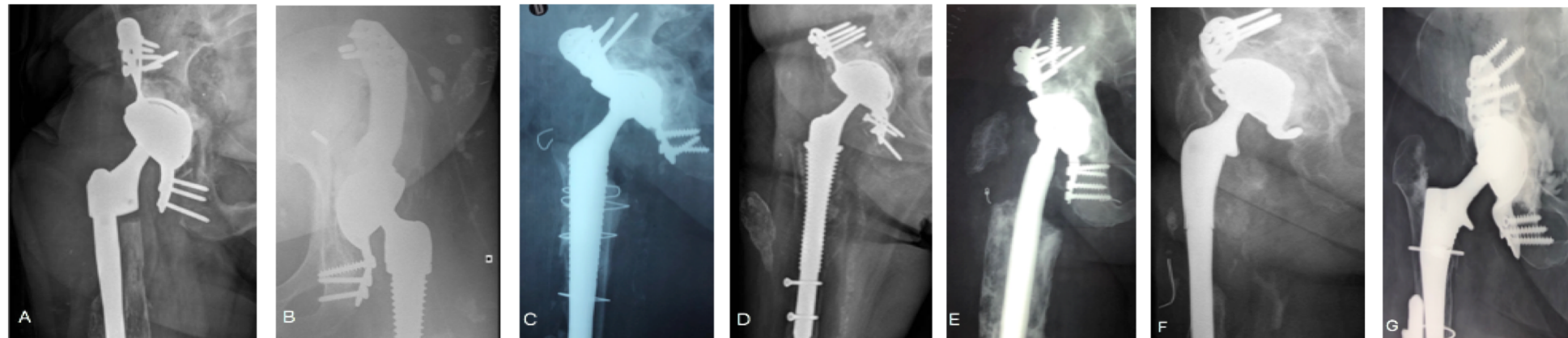
**Michael J. Taunton MD, Thomas K. Fehring MD,
Paul Edwards MD, Thomas Bernasek MD,
Ginger E. Holt MD, Michael J. Christie MD**

Published online: 14 October 2011
© The Association of Bone and Joint Surgeons® 2011

Our **dislocation rate**, seems to be **high** in comparison of other DM series, but we **included patients with massive bone loss** (Paprosky IV, Pelvic discontinuity), **destruction of greater trochanter, for acetabular complex revision.**

No surgical revision for instability due to dysfunction or problem with DM, **No** intra prosthetic dislocation (IPD)

Only 1 patient with chronic instability (1,29%) at 10 Years, with dysfunction of hip abductor muscles (Fig A)



Limitation of our study :

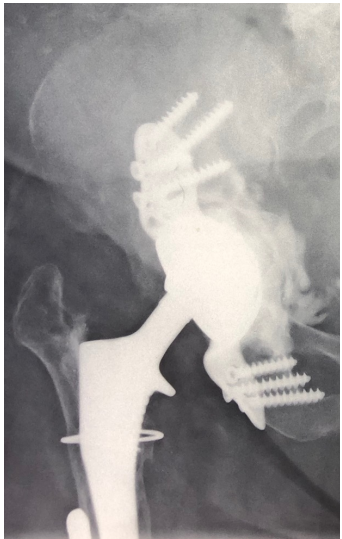
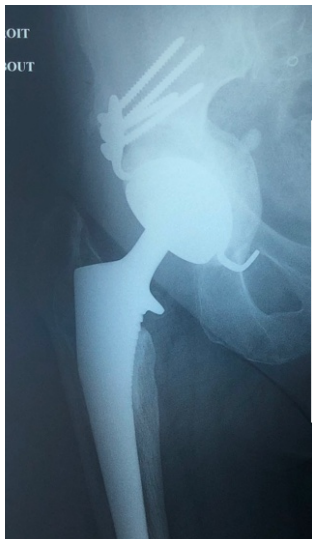
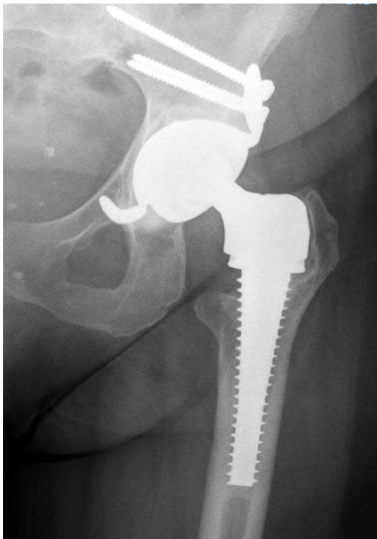
- Retrospective study
- Low number of patients with Burch Schneider (n=5) and ARM (n=13)

Funding statement

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

CONCLUSION

DUAL MOBILITY is a reliable solution for acetabular complex revision (PAPROSKY I-III B), with low rate of acetabular loosening or chronic instability with mean follow up of 10 years.



Clinical cases of rTHA with DM

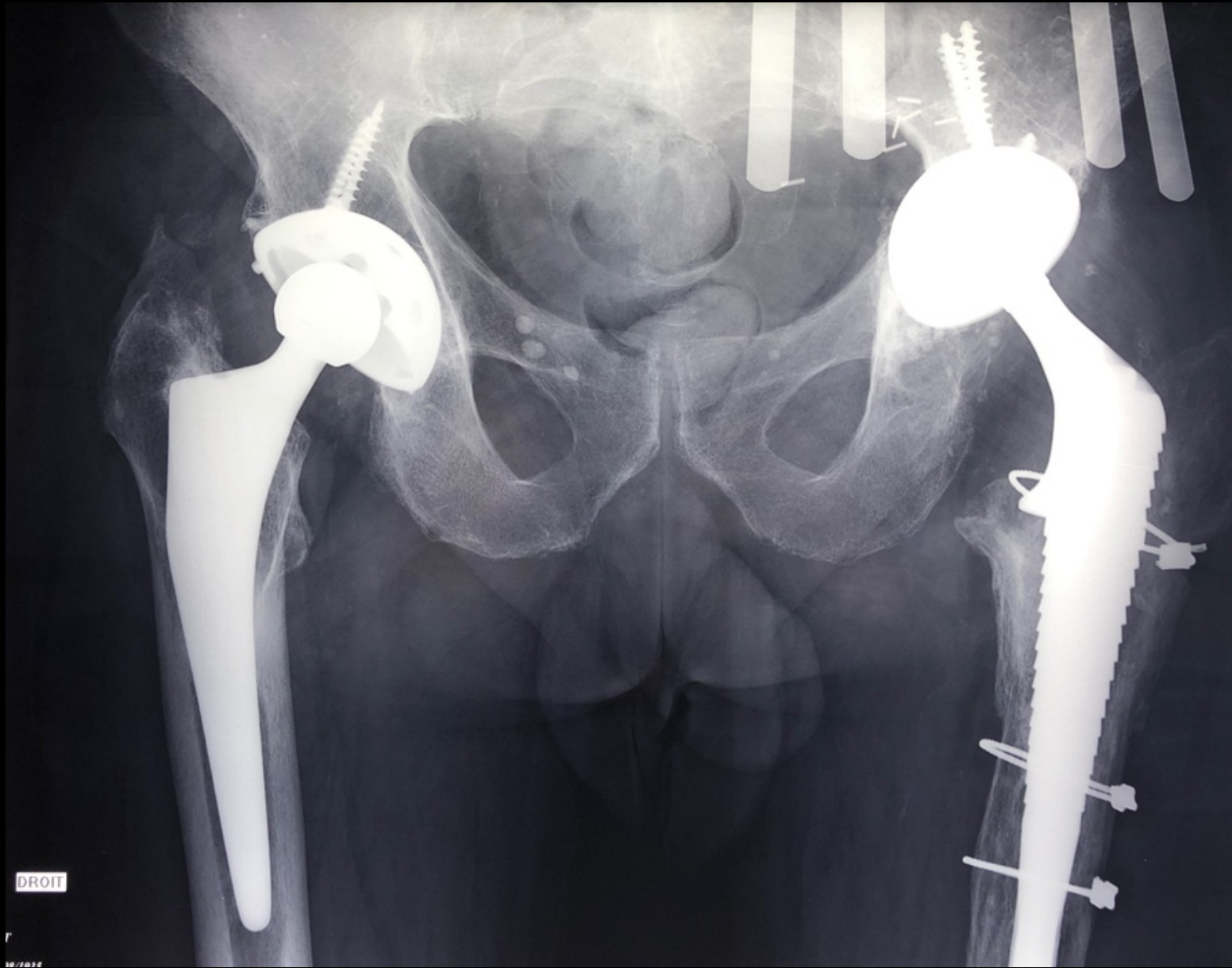
Case N°1



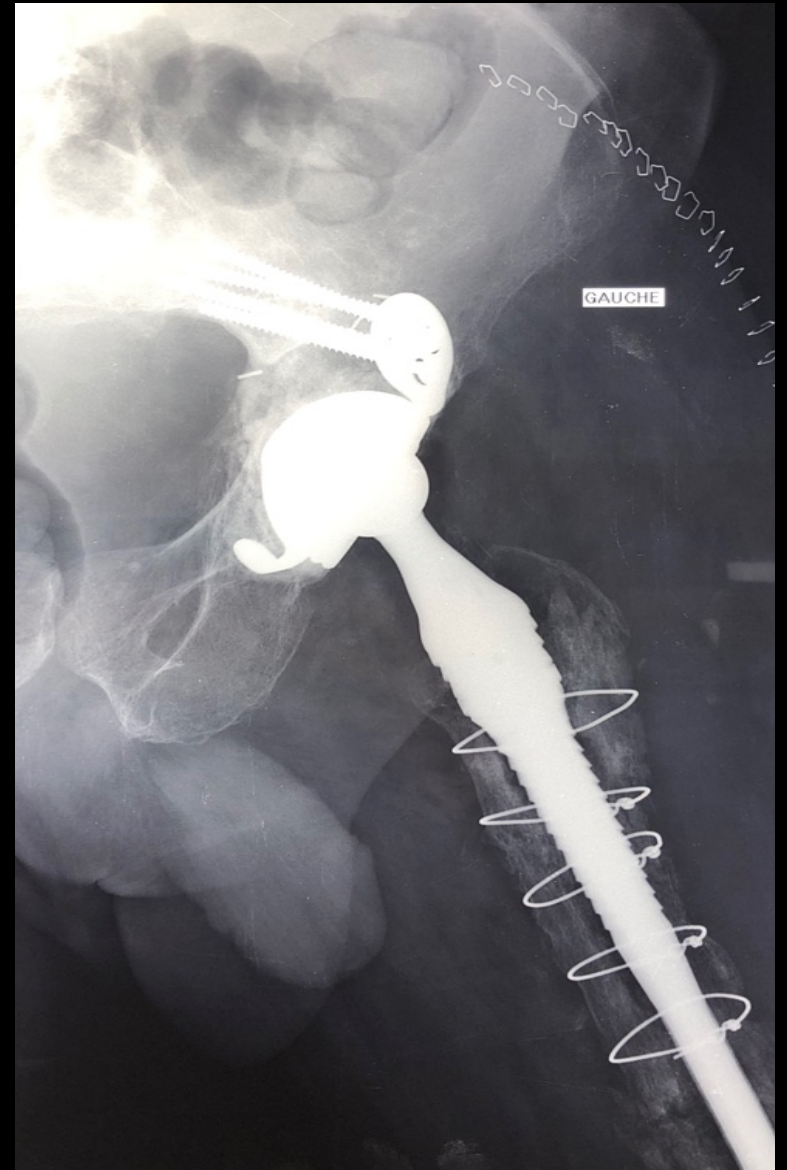
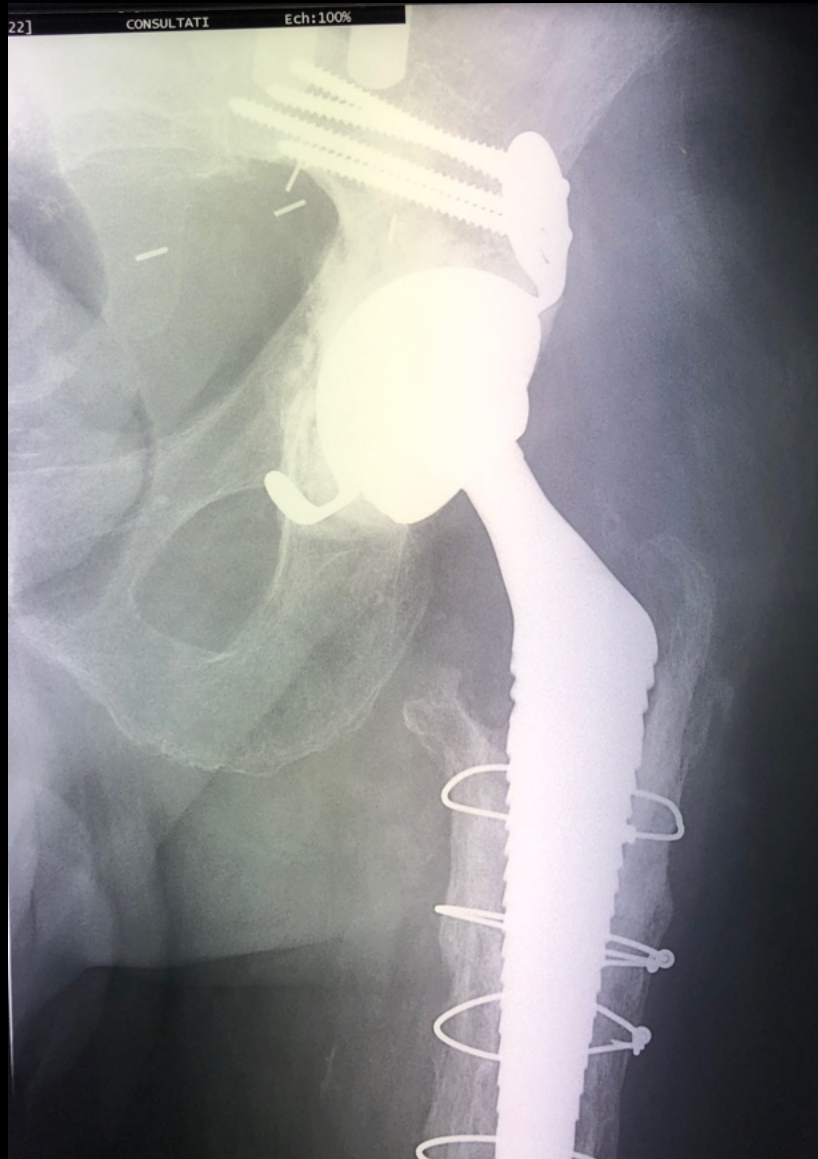


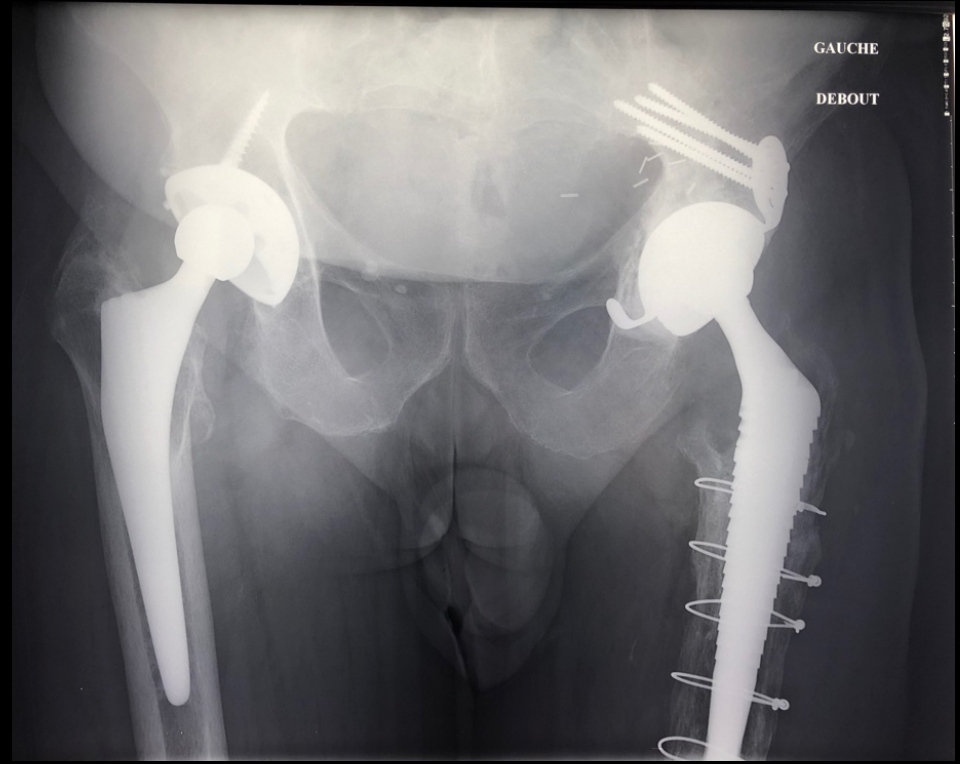
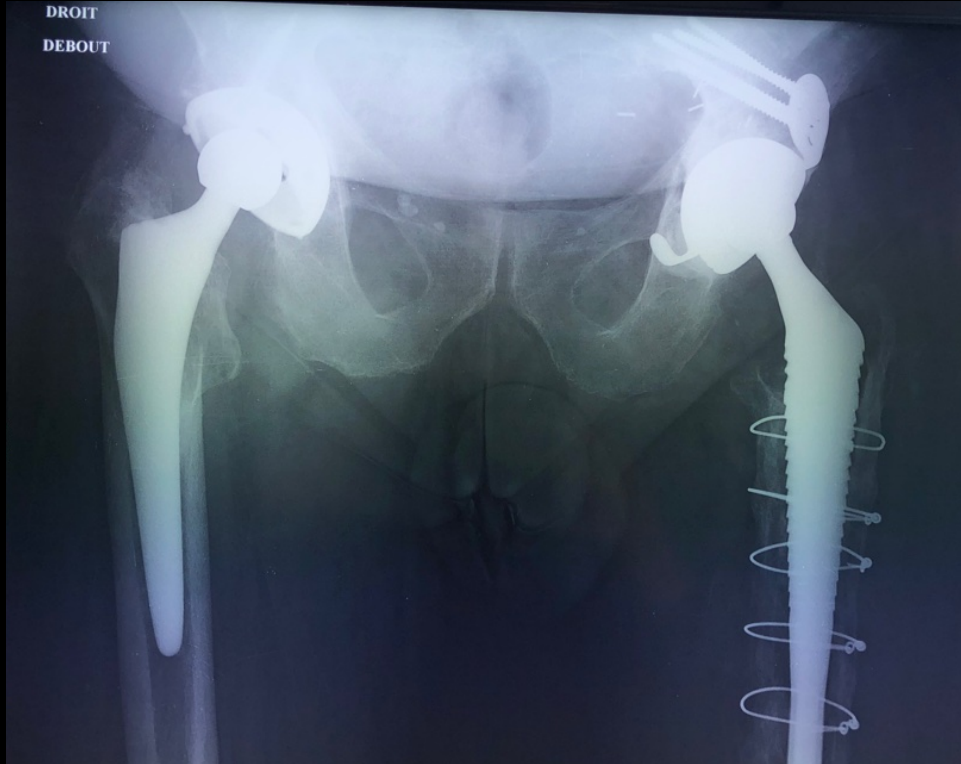
ARM®(SERF)
Radiological
follow up
(14 years)

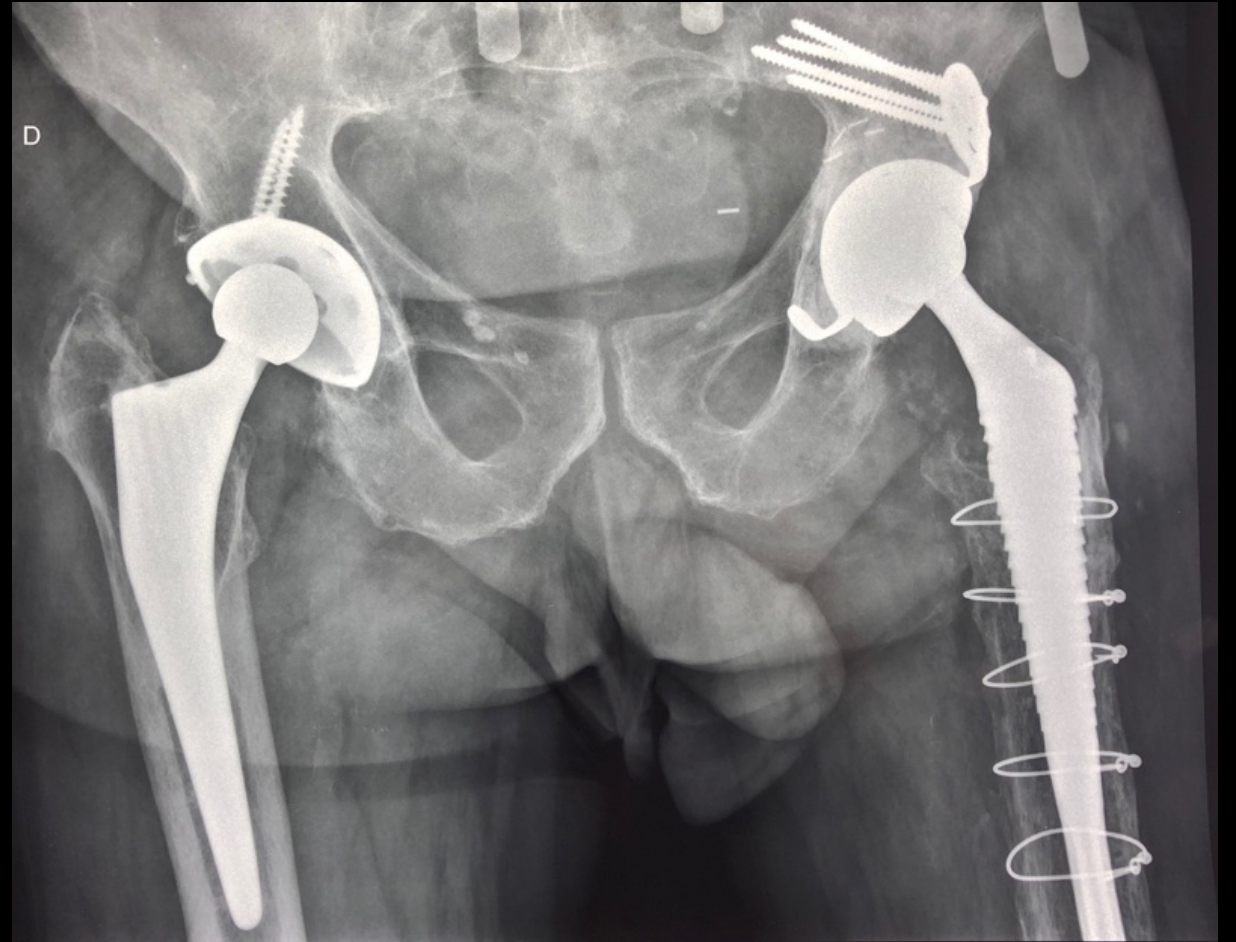
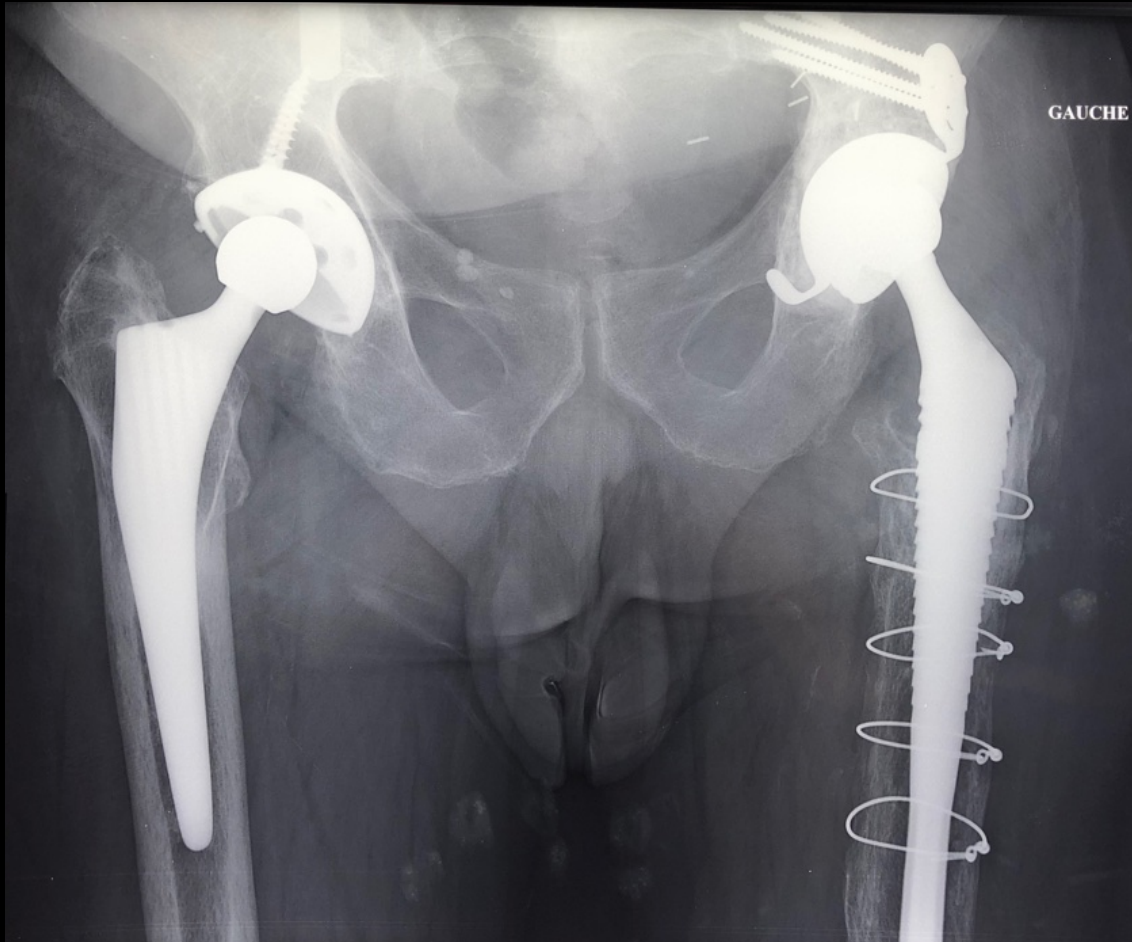
Case N°2







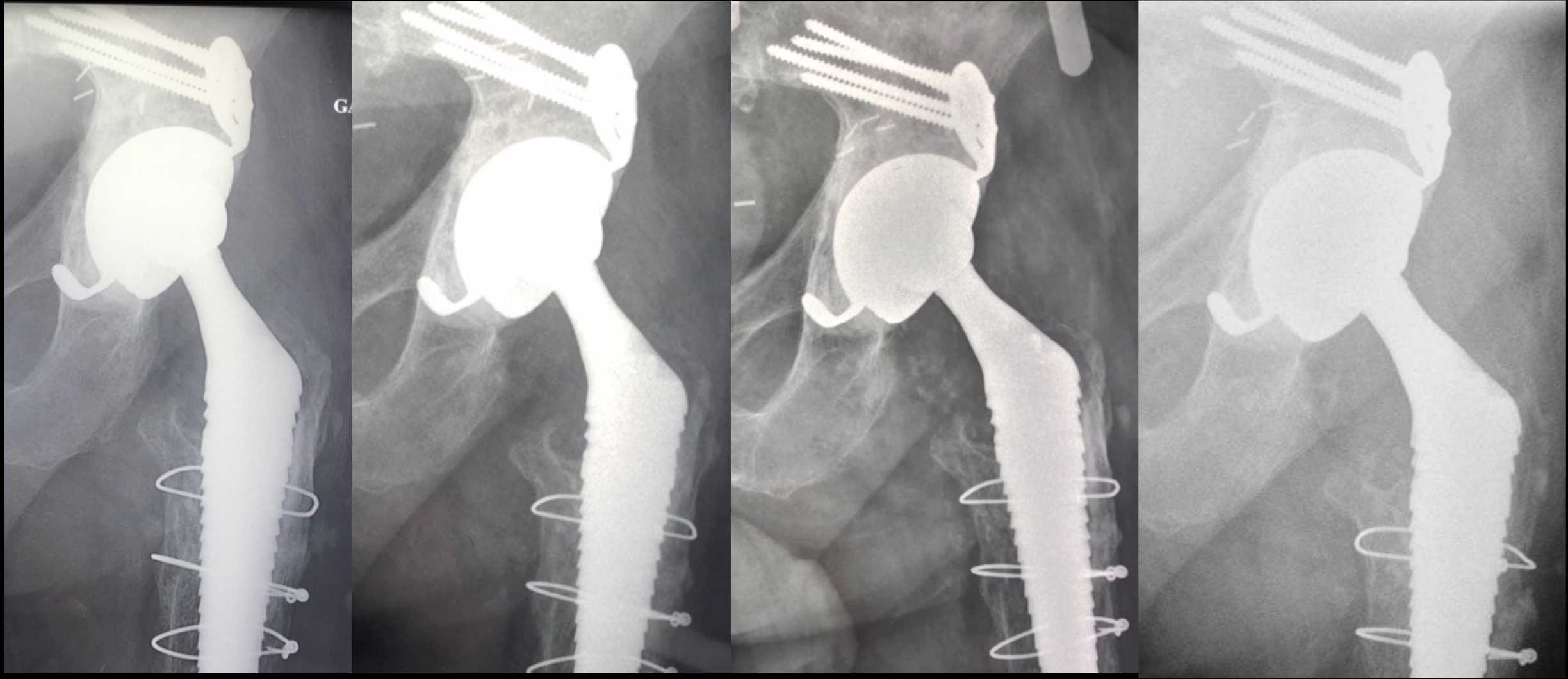




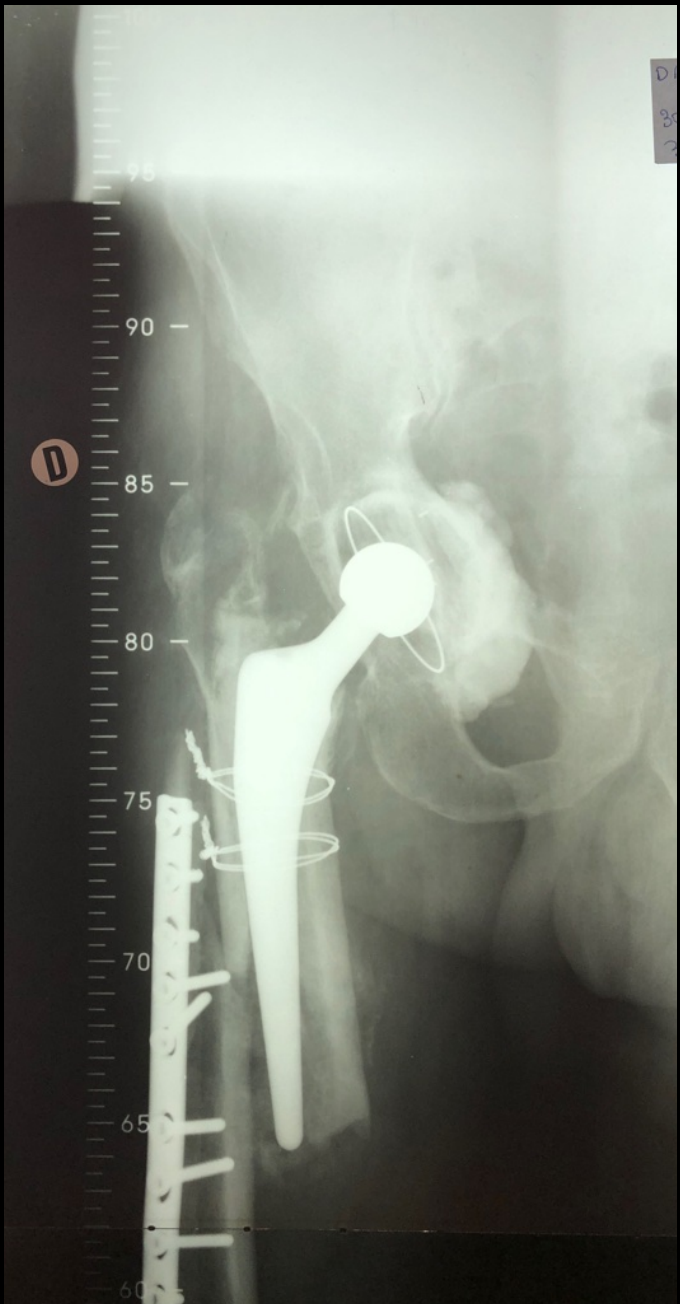
G Couché

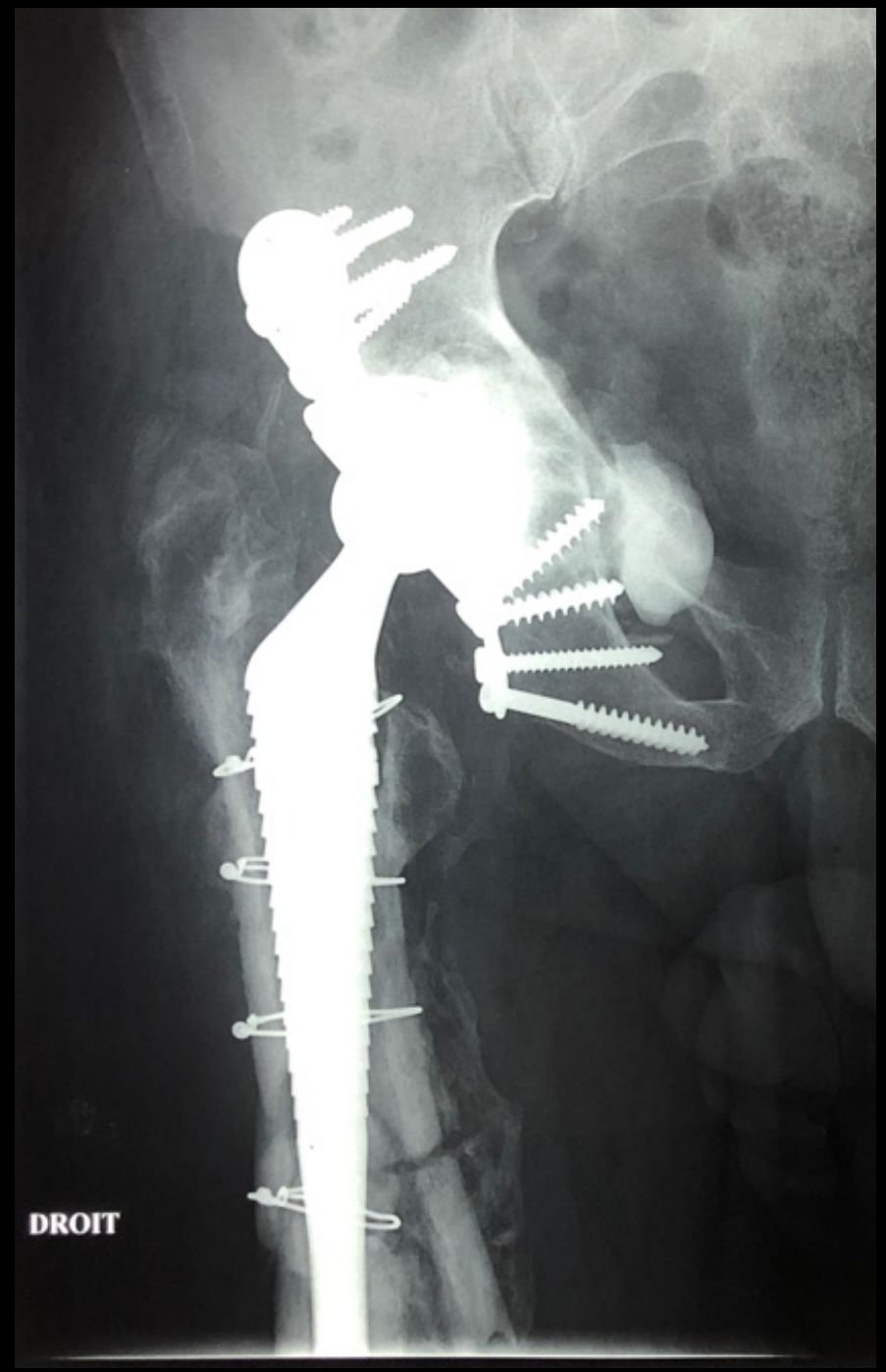
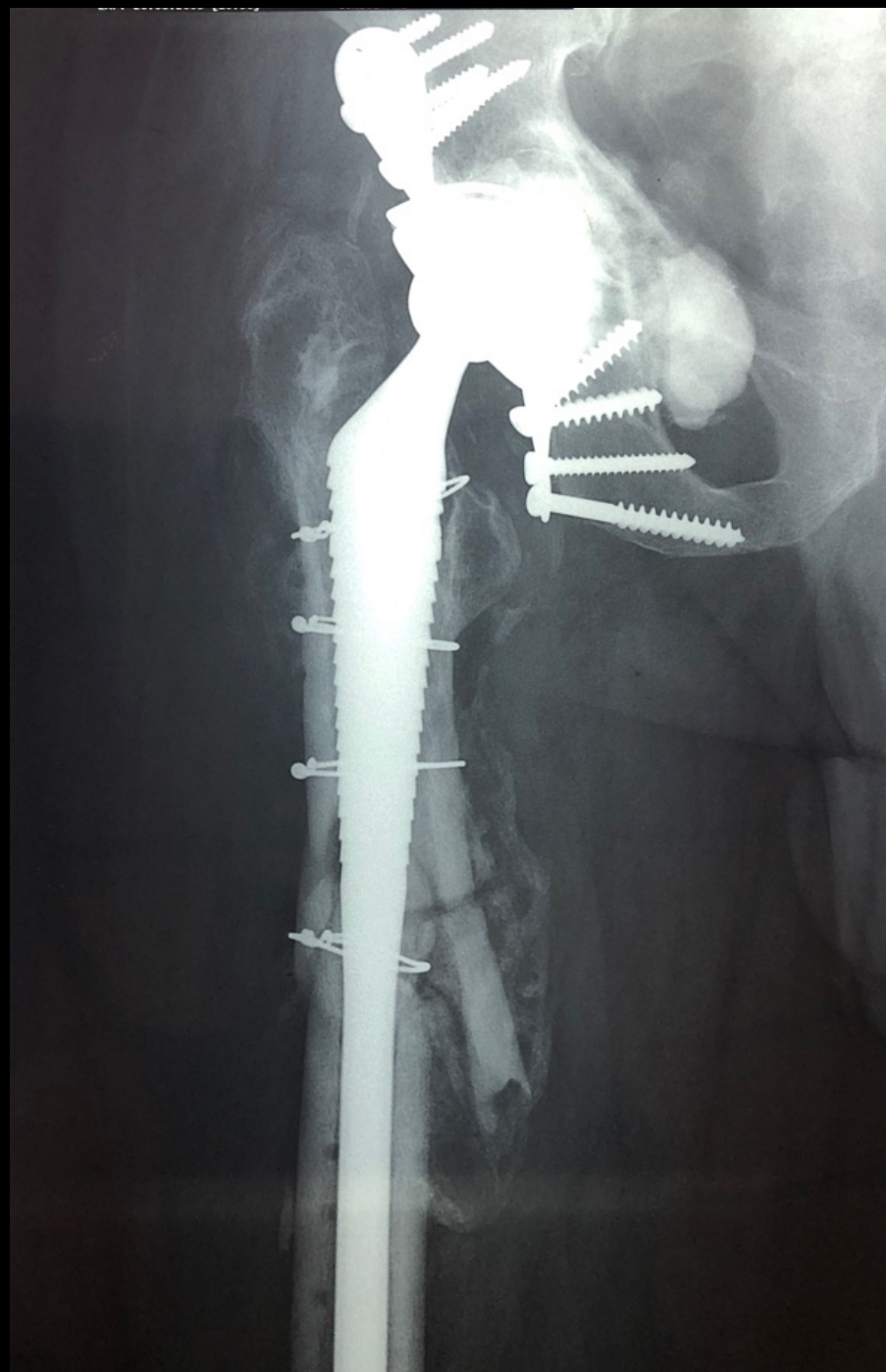


Radiological follow up at 14 years



Case N°3





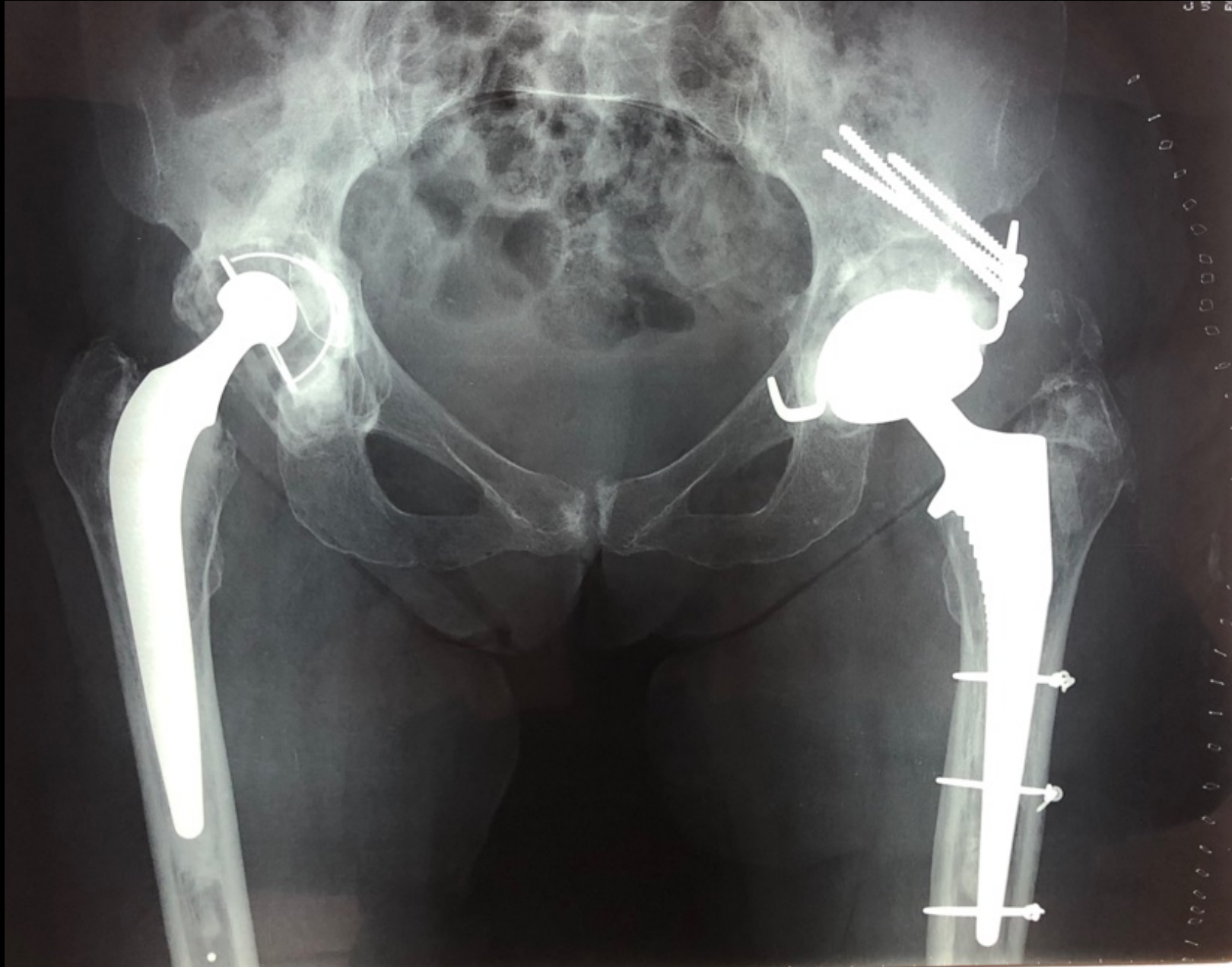
Case N°4



Gauche
Debout

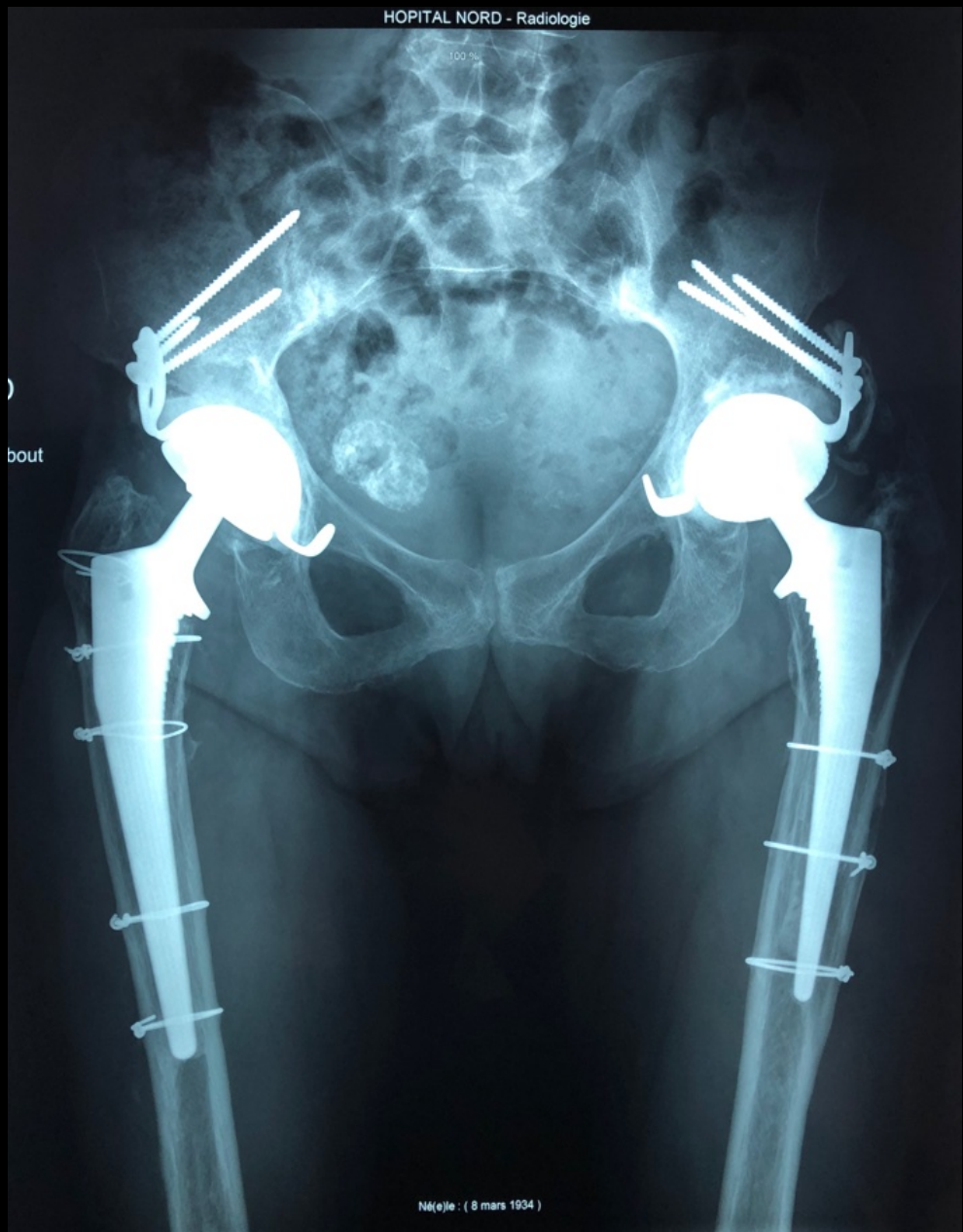


Gauche









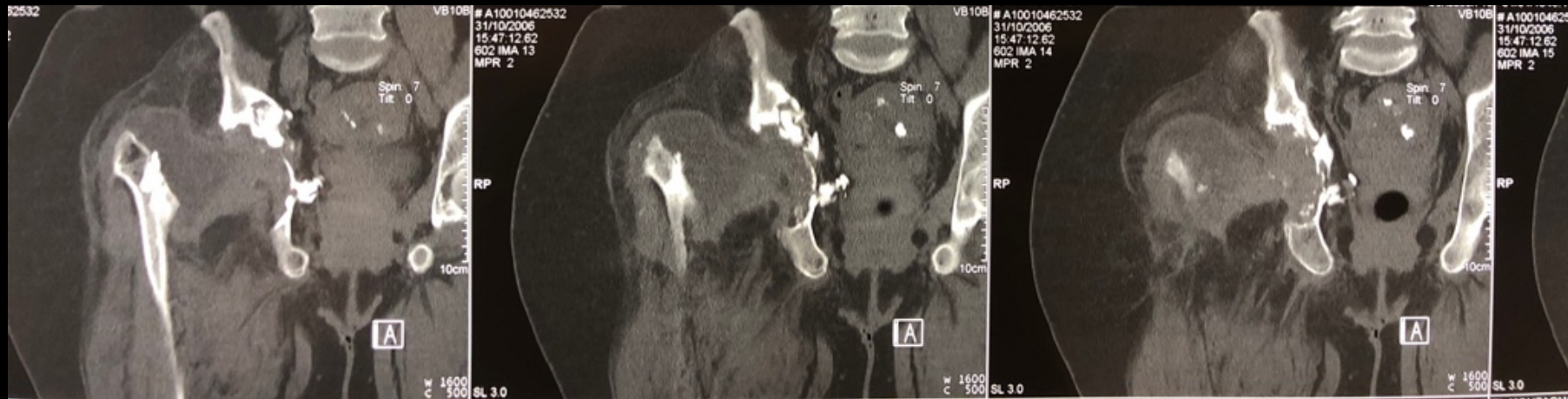
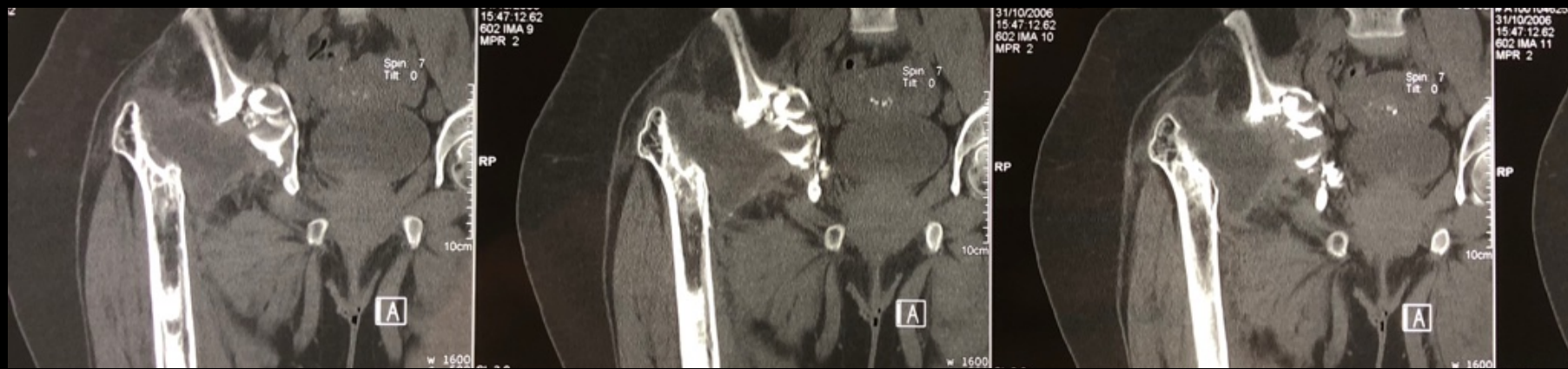
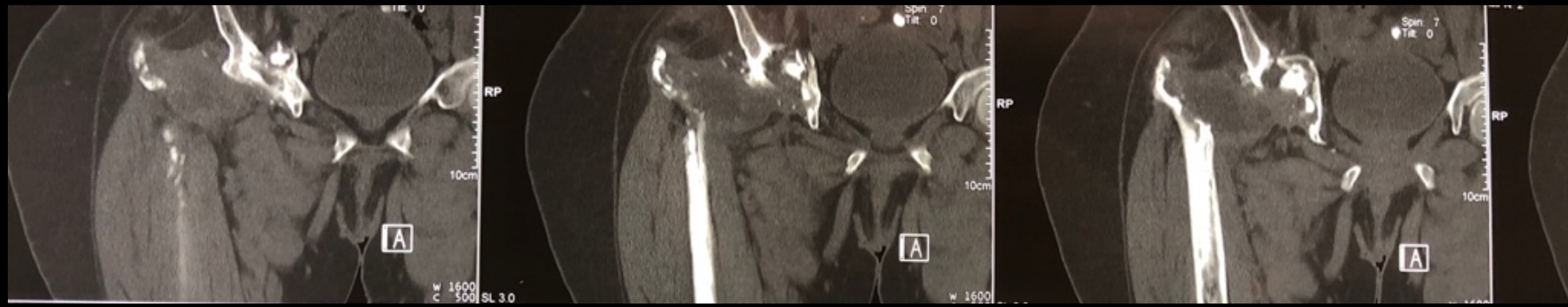
Case N°5



ROIT

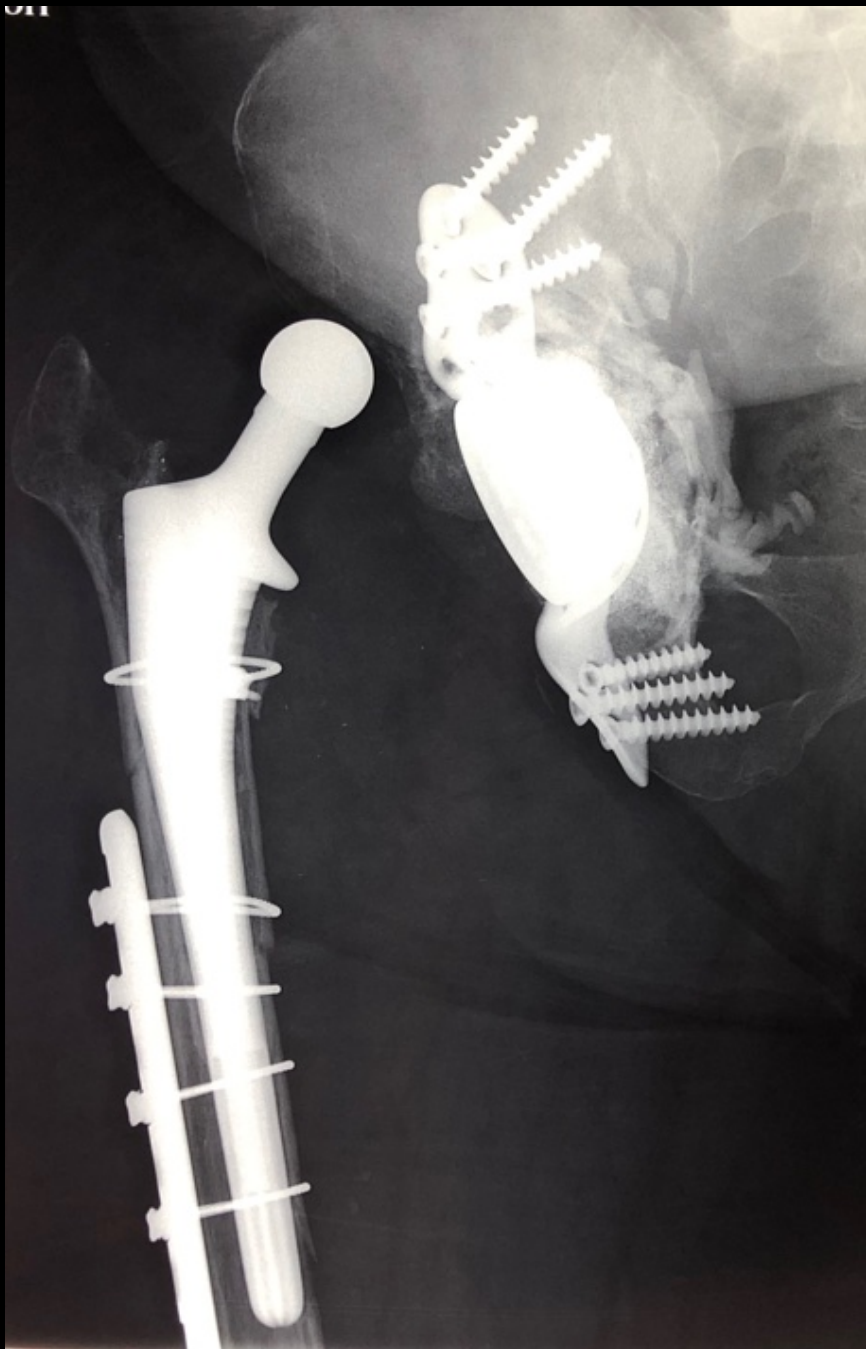
UCHE







DROIT



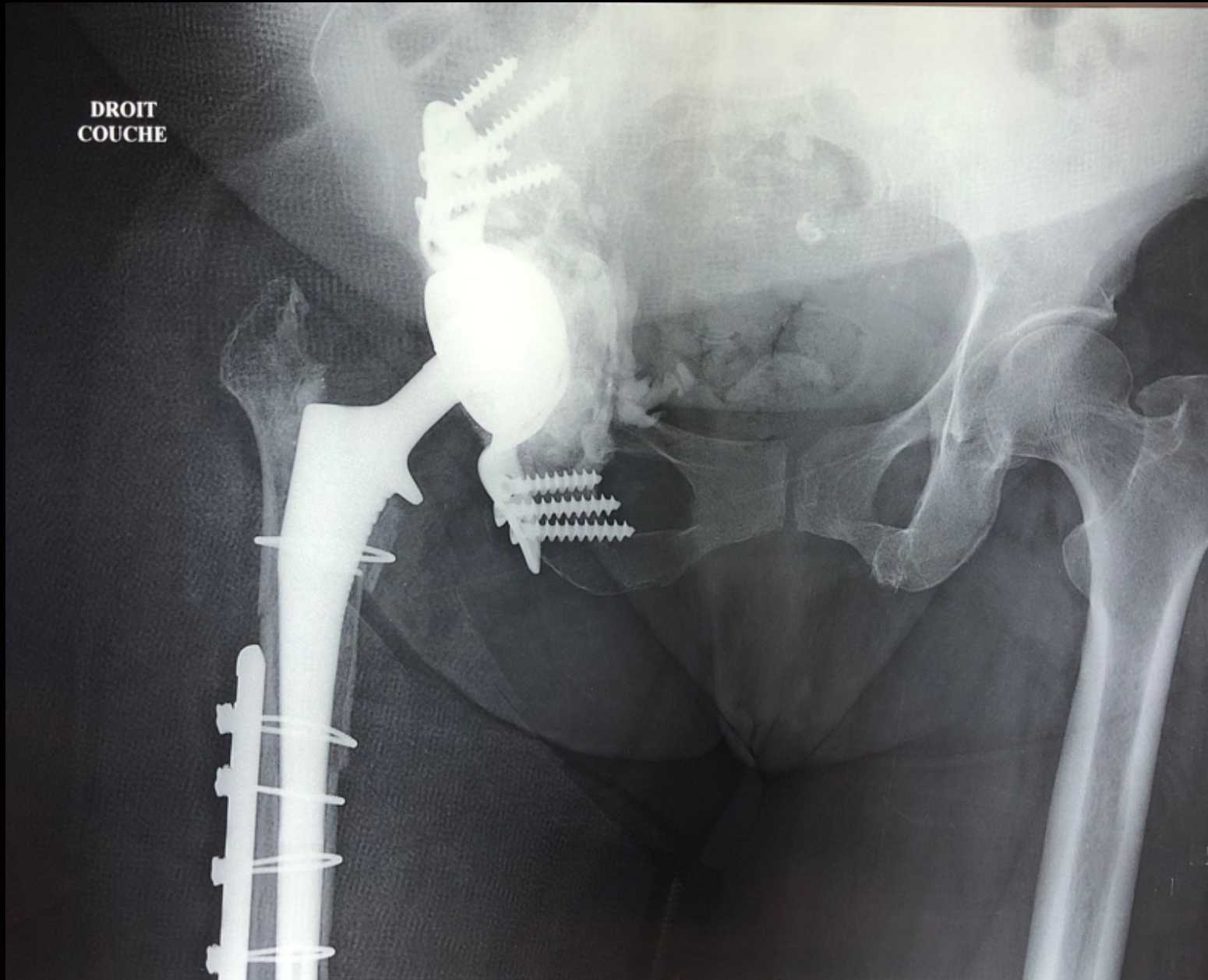
Complication : Early dislocation

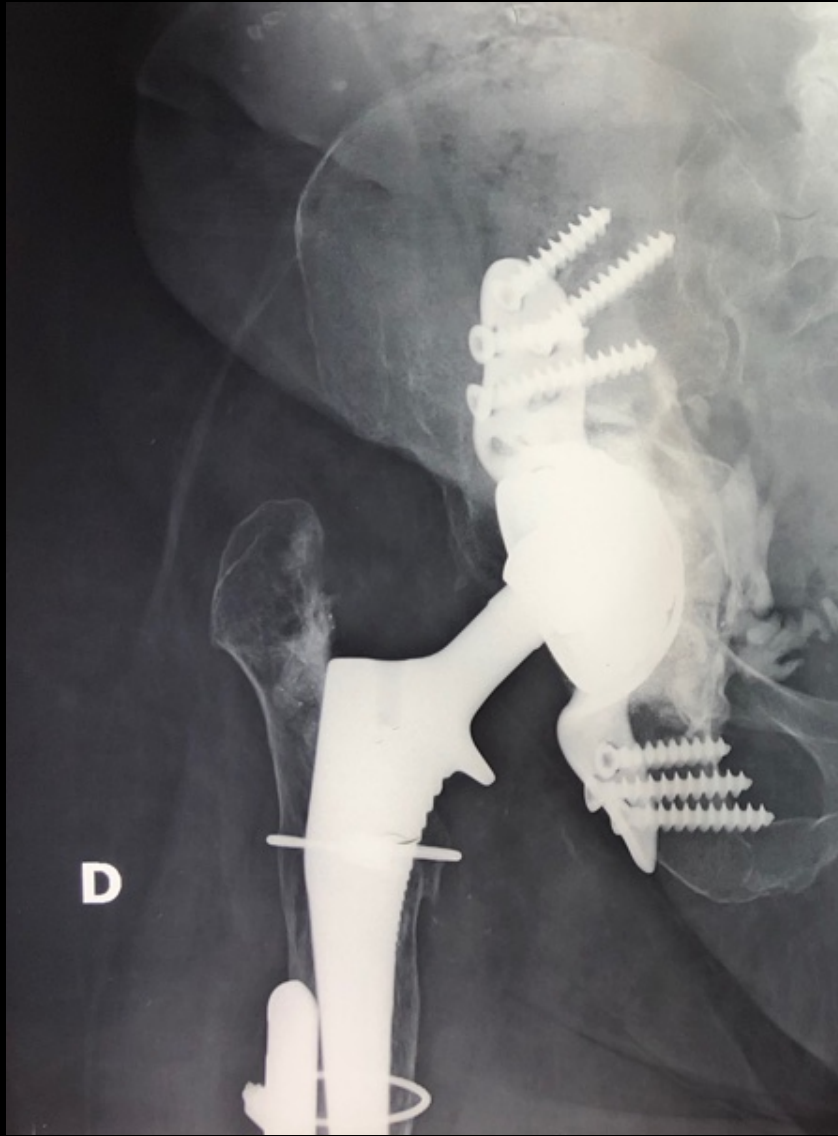
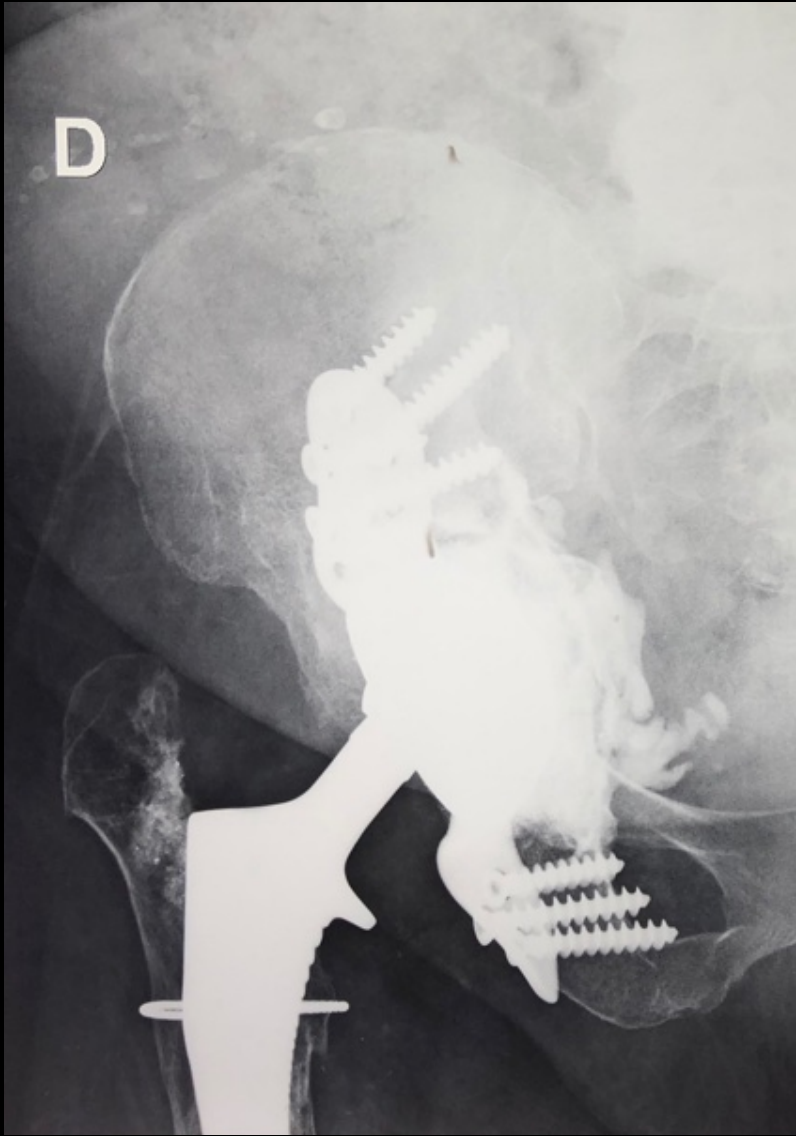
Reduction

Immobilisation with Brace 6 weeks

No recidive ok dislocation with 12 years follow up

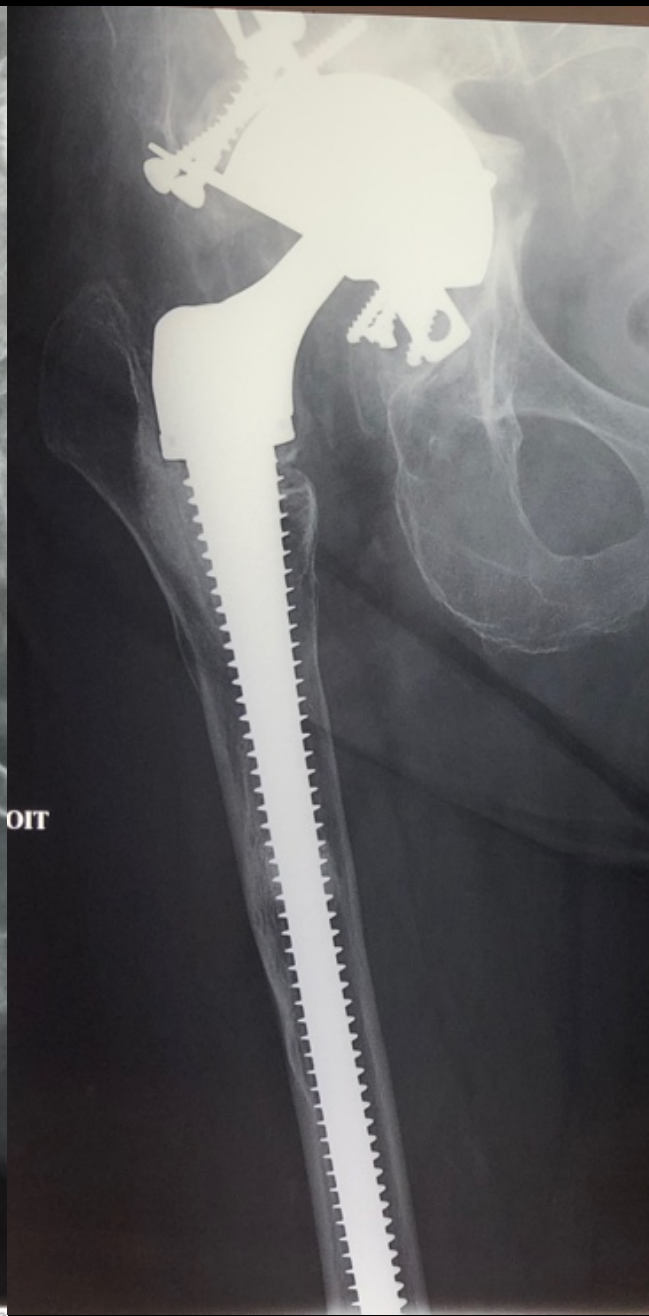
DROIT
COUCHE



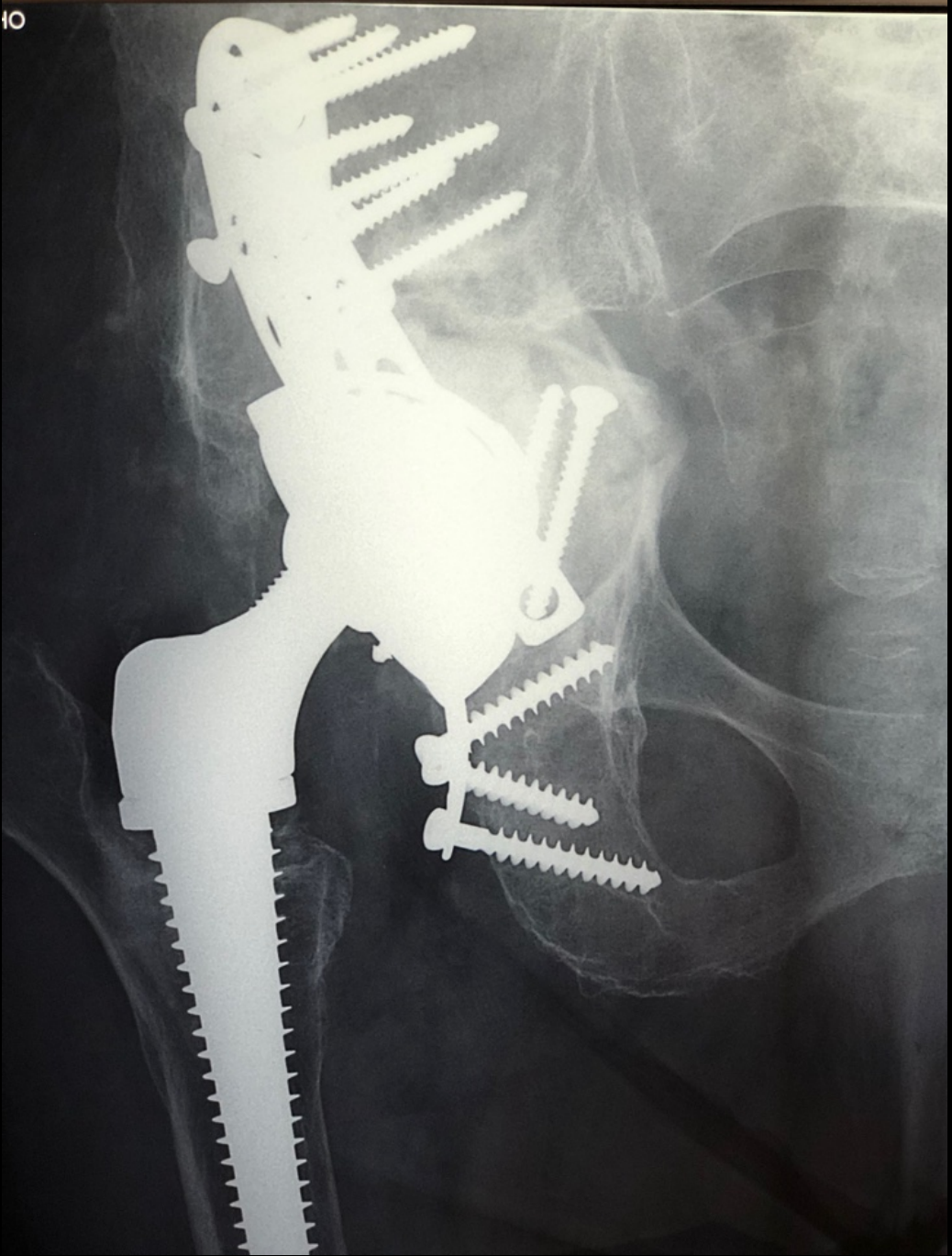


Case N°6



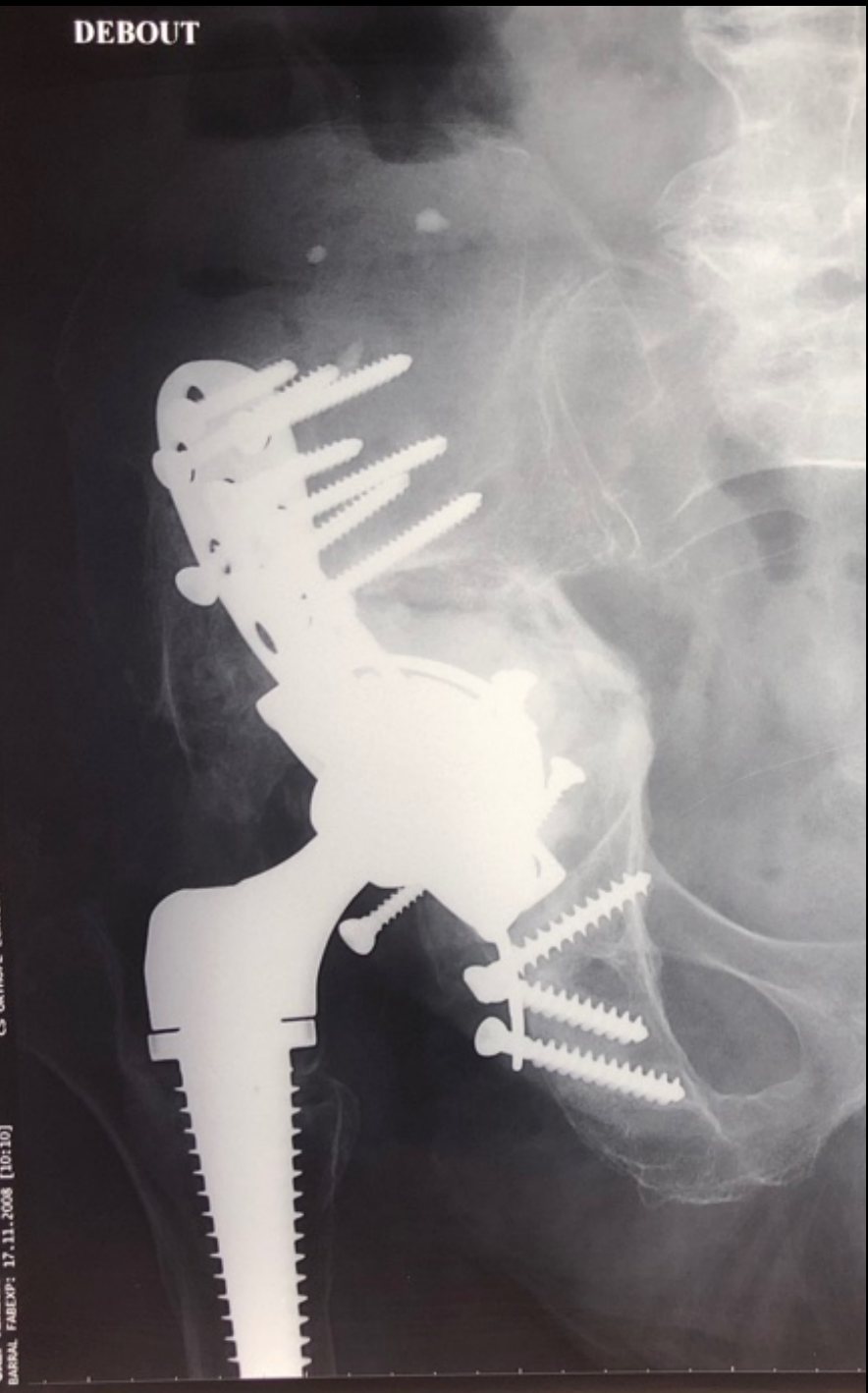






DEBOUT

BARRAL FABEXP: 17.11.2008 [10:10]



CHU BELLEVUE - St ETIENNE- Pr BARRAL CENTRALE

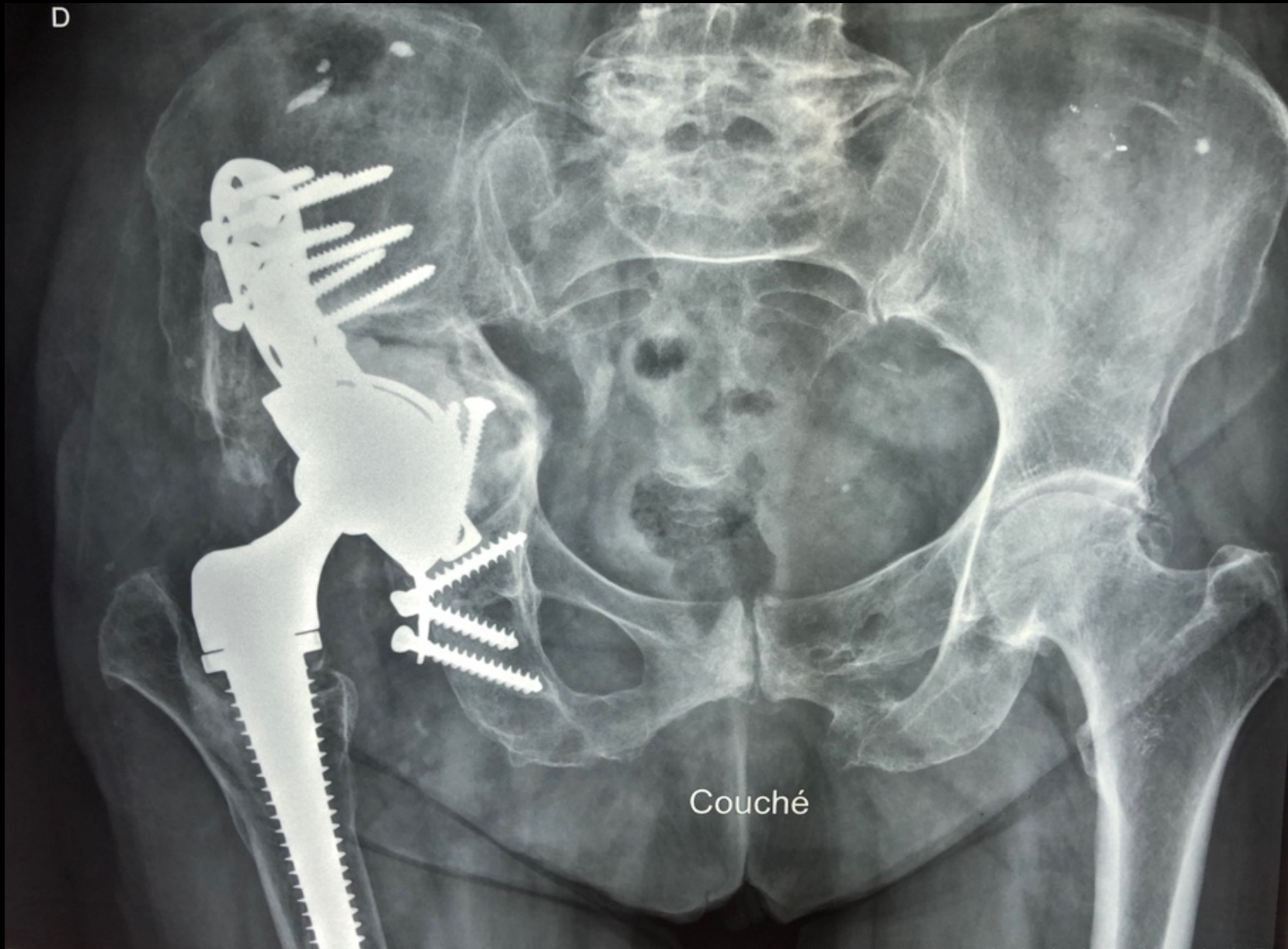
0508 027

DROIT
DEBOUT

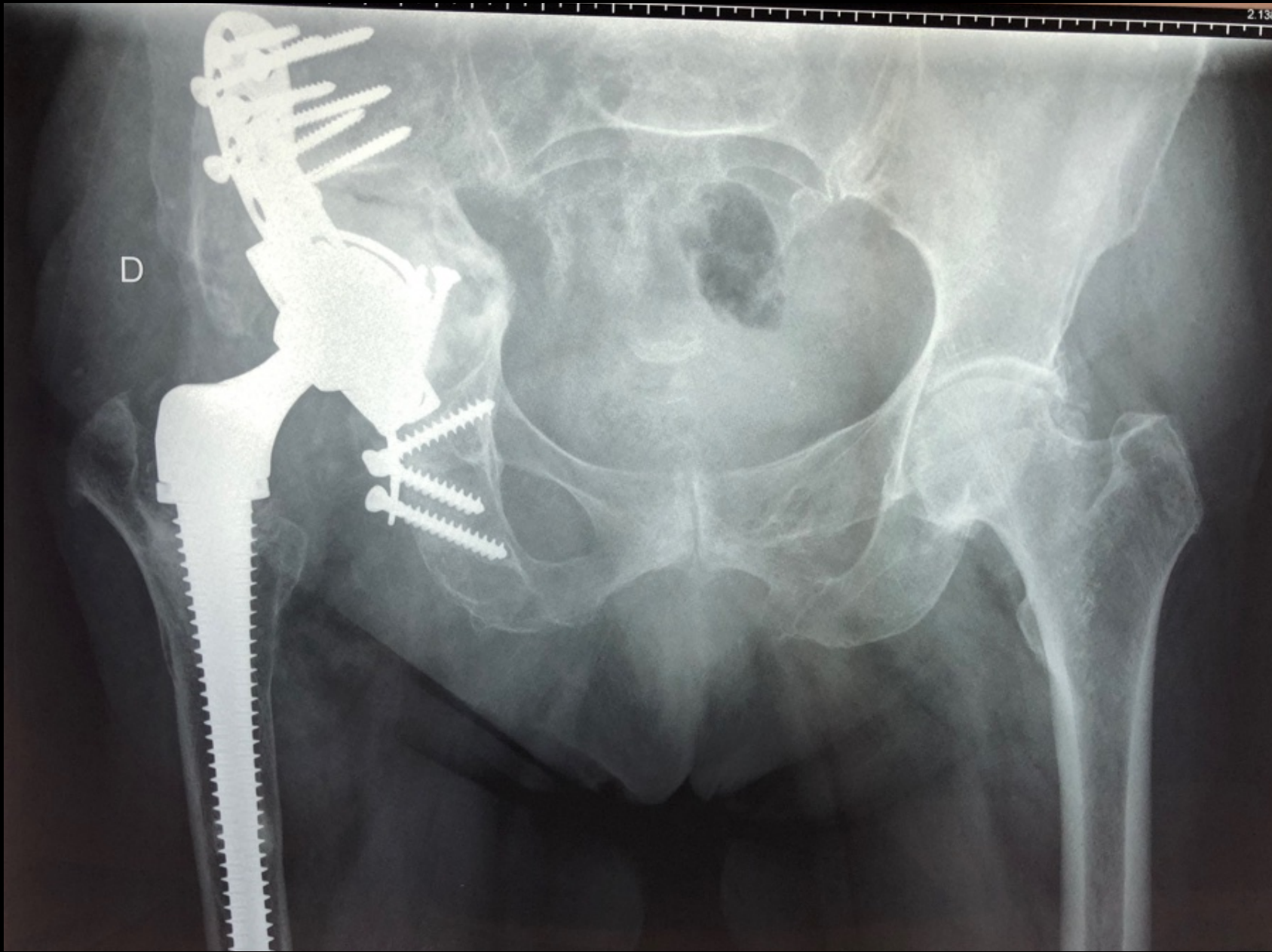


1.3N#0.6+0.43 7T1.5

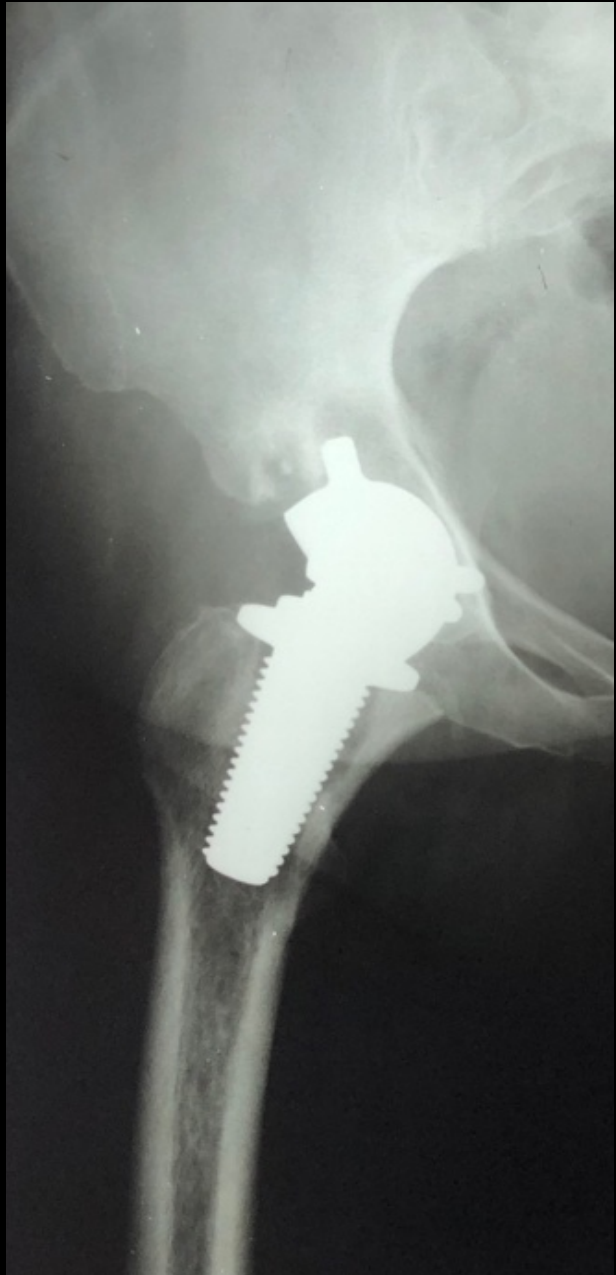
D

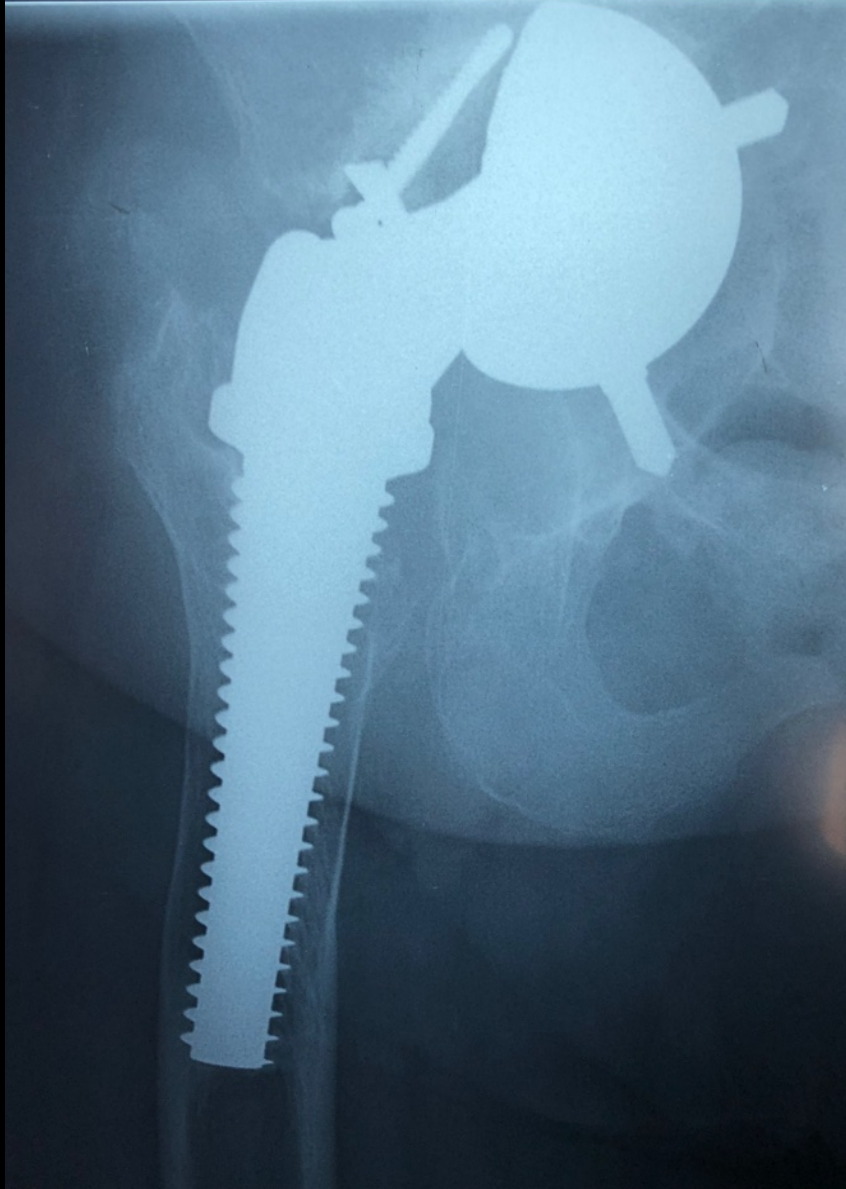


Couché

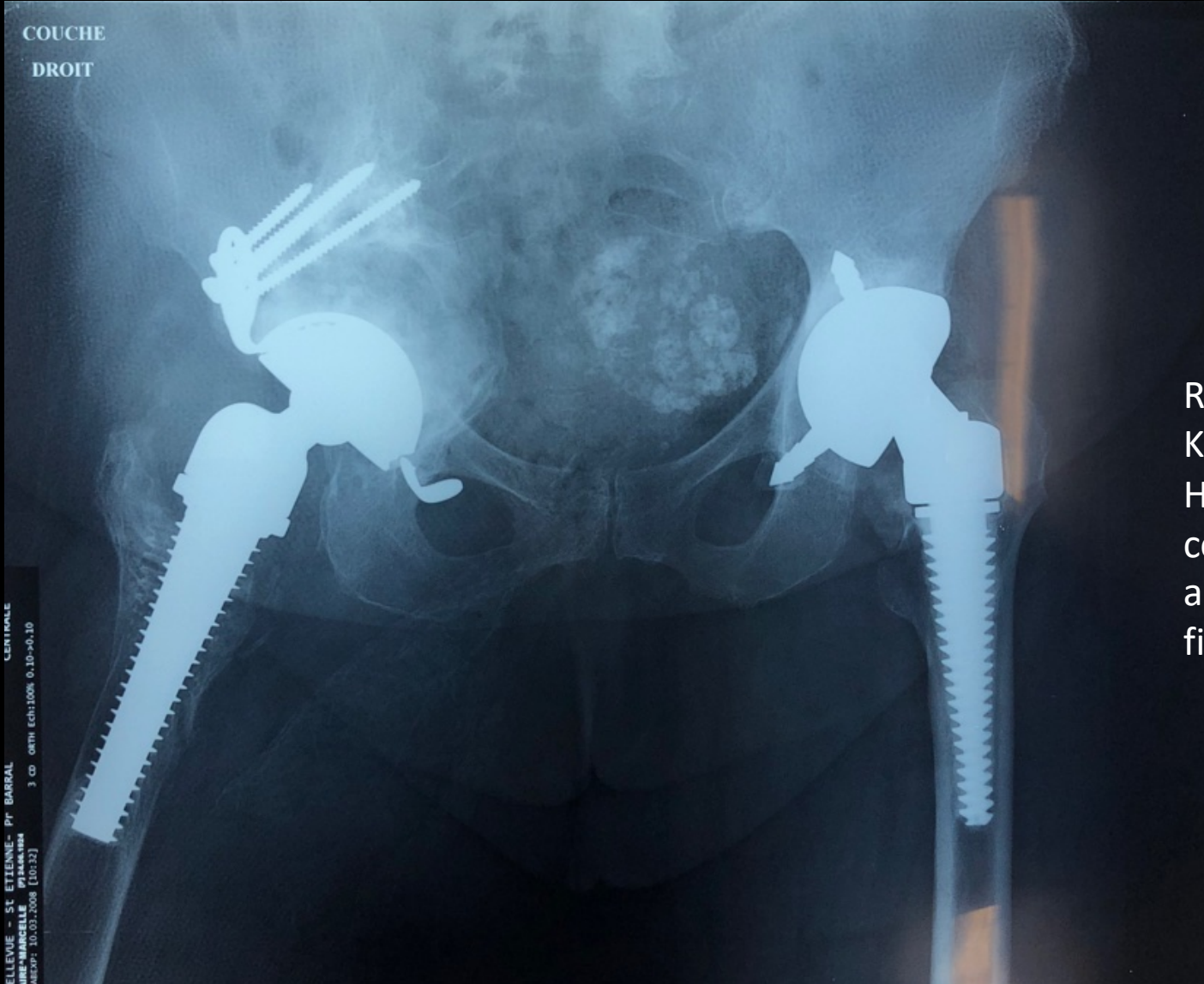


Case N°7





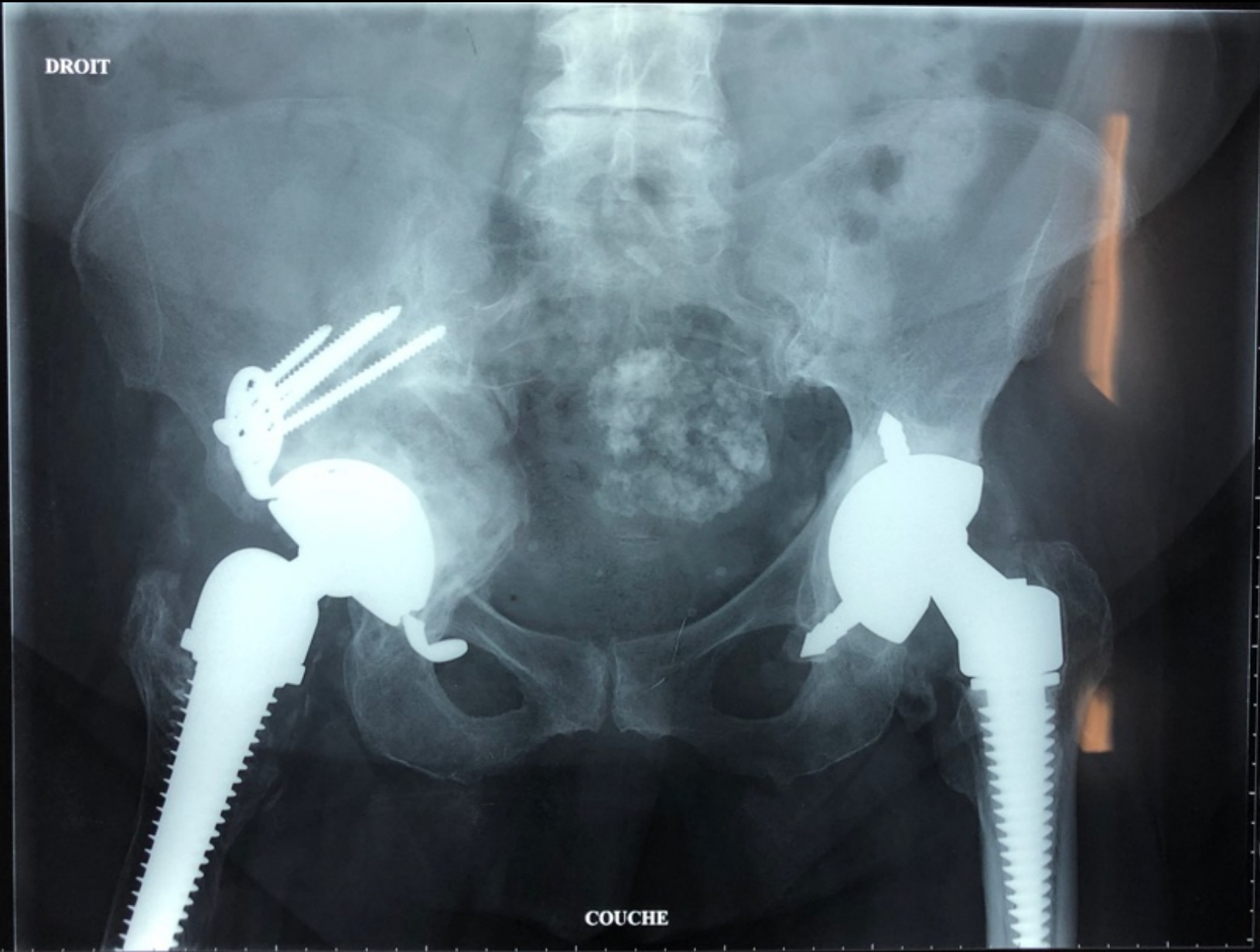




Rupture of
Kerboull plate
Hook, without
consequences on
acetabular
fixation

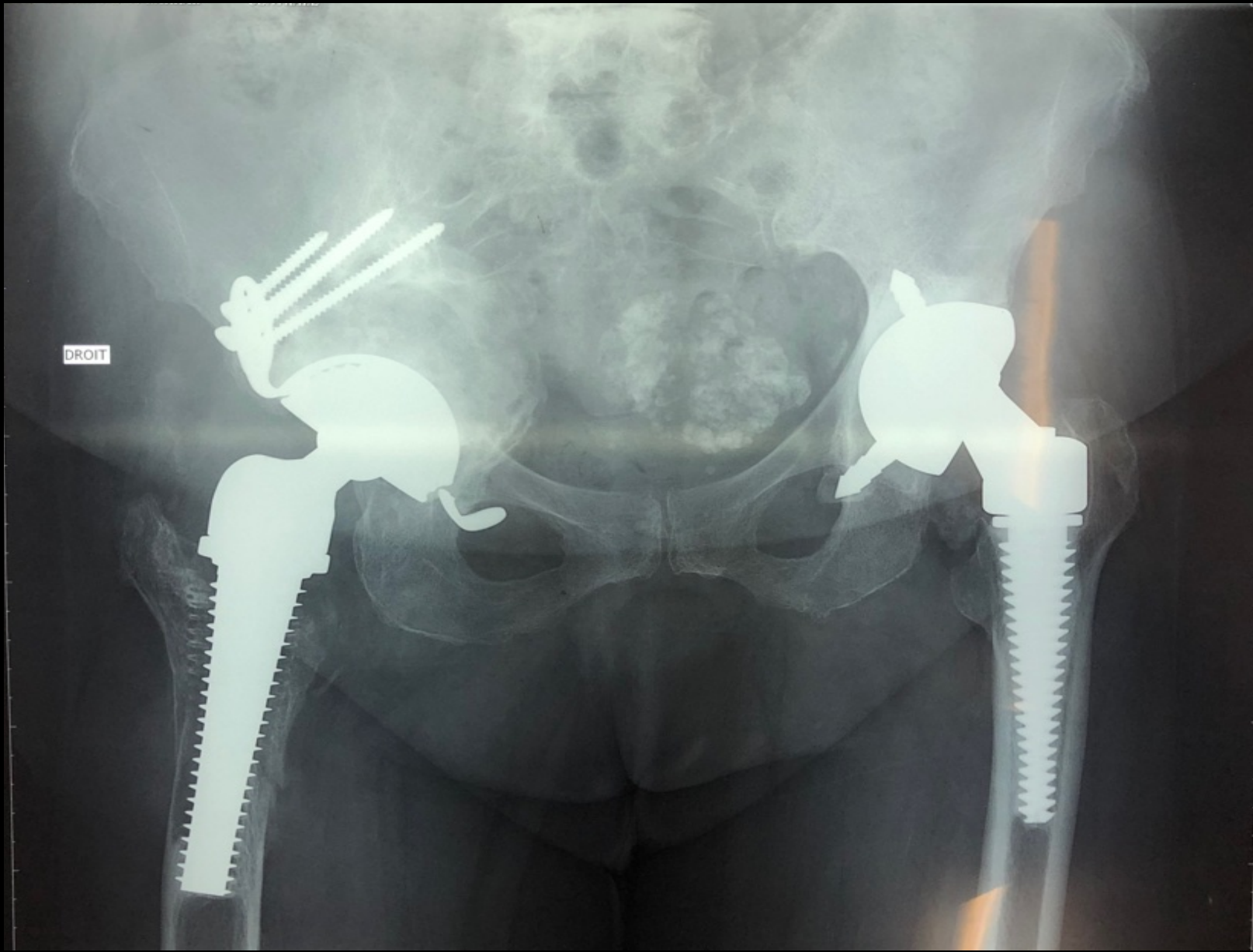
Ro500 062

CHU BELLEVUE - PU - 42000 ST ETIENNE



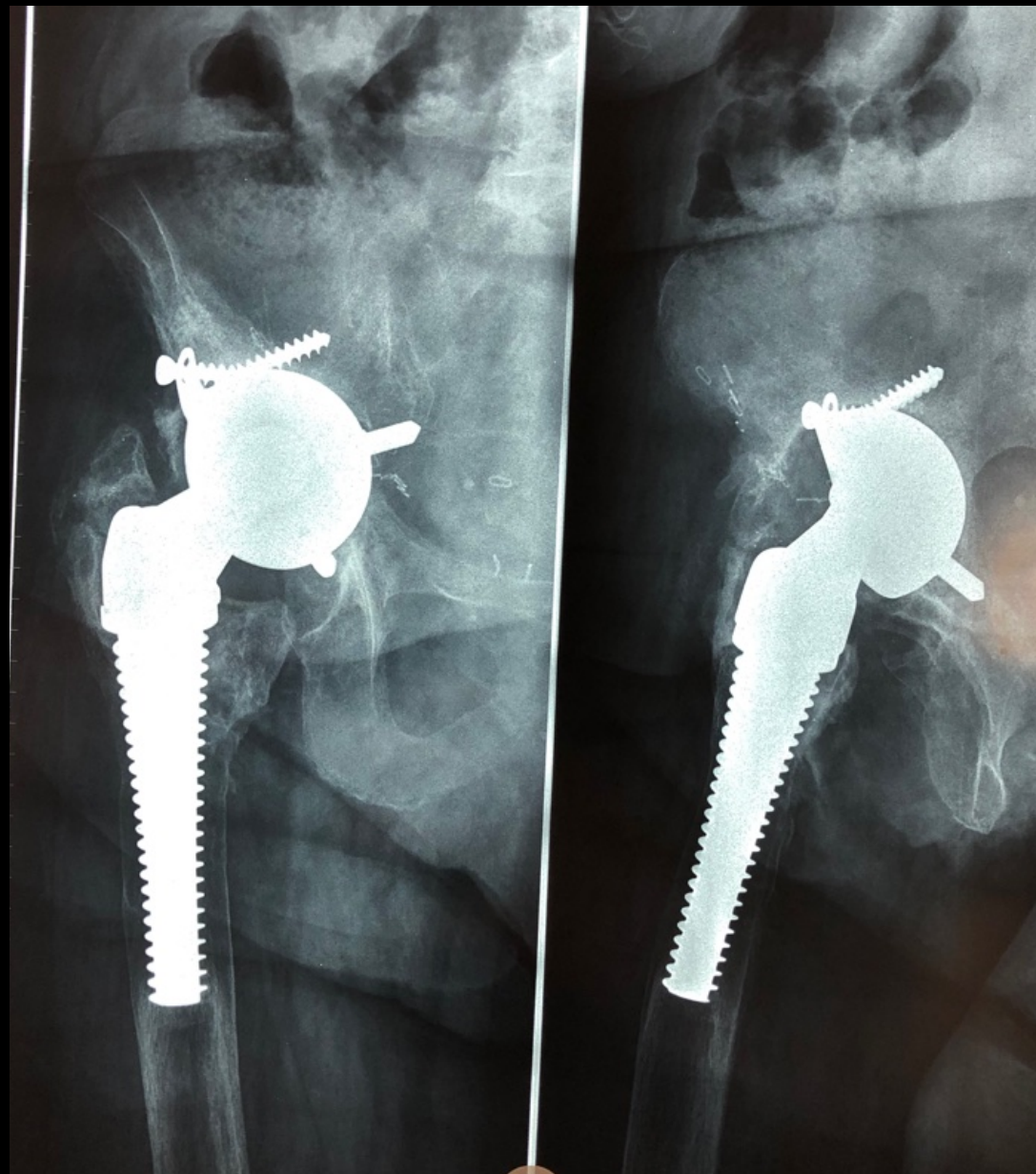
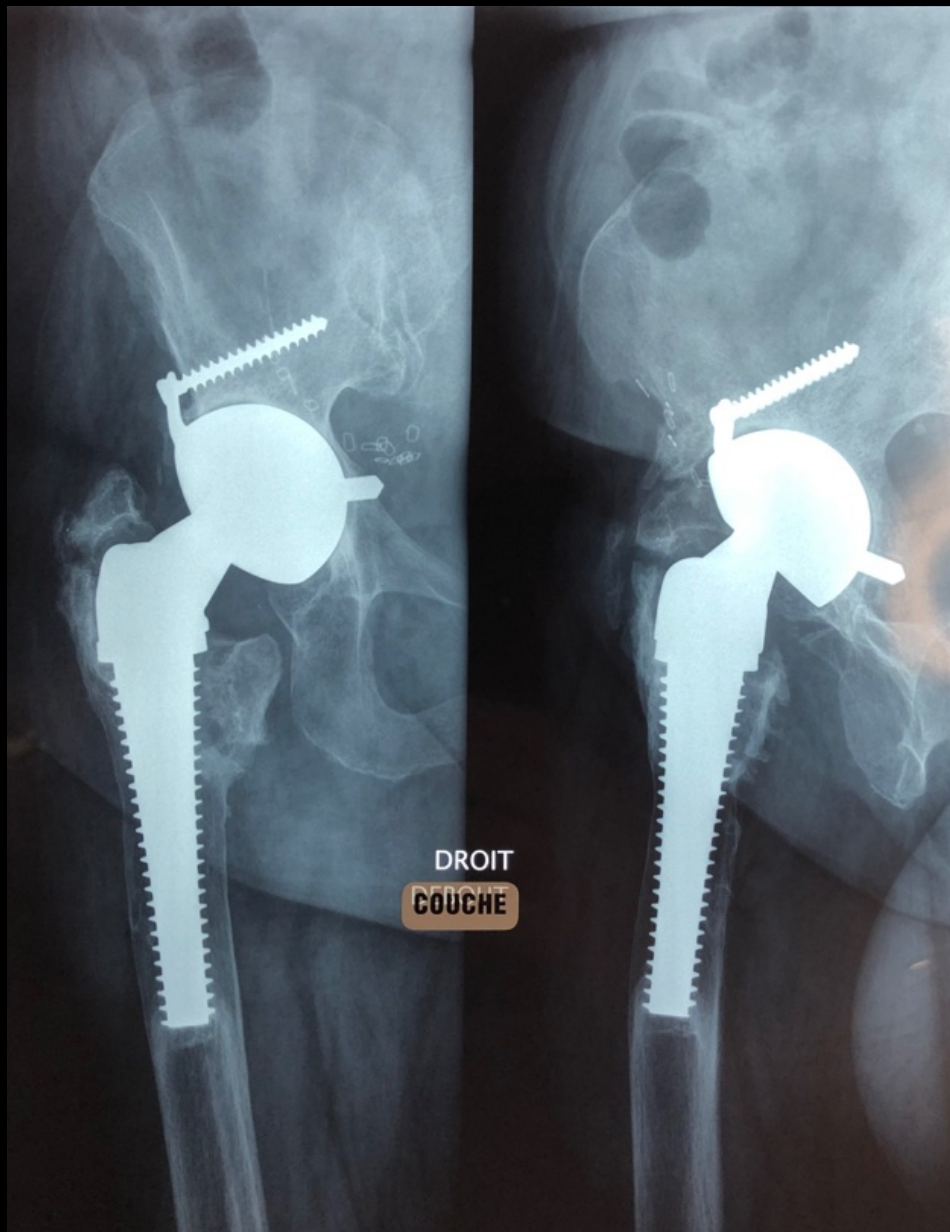
DROIT

COUCHE



DROIT

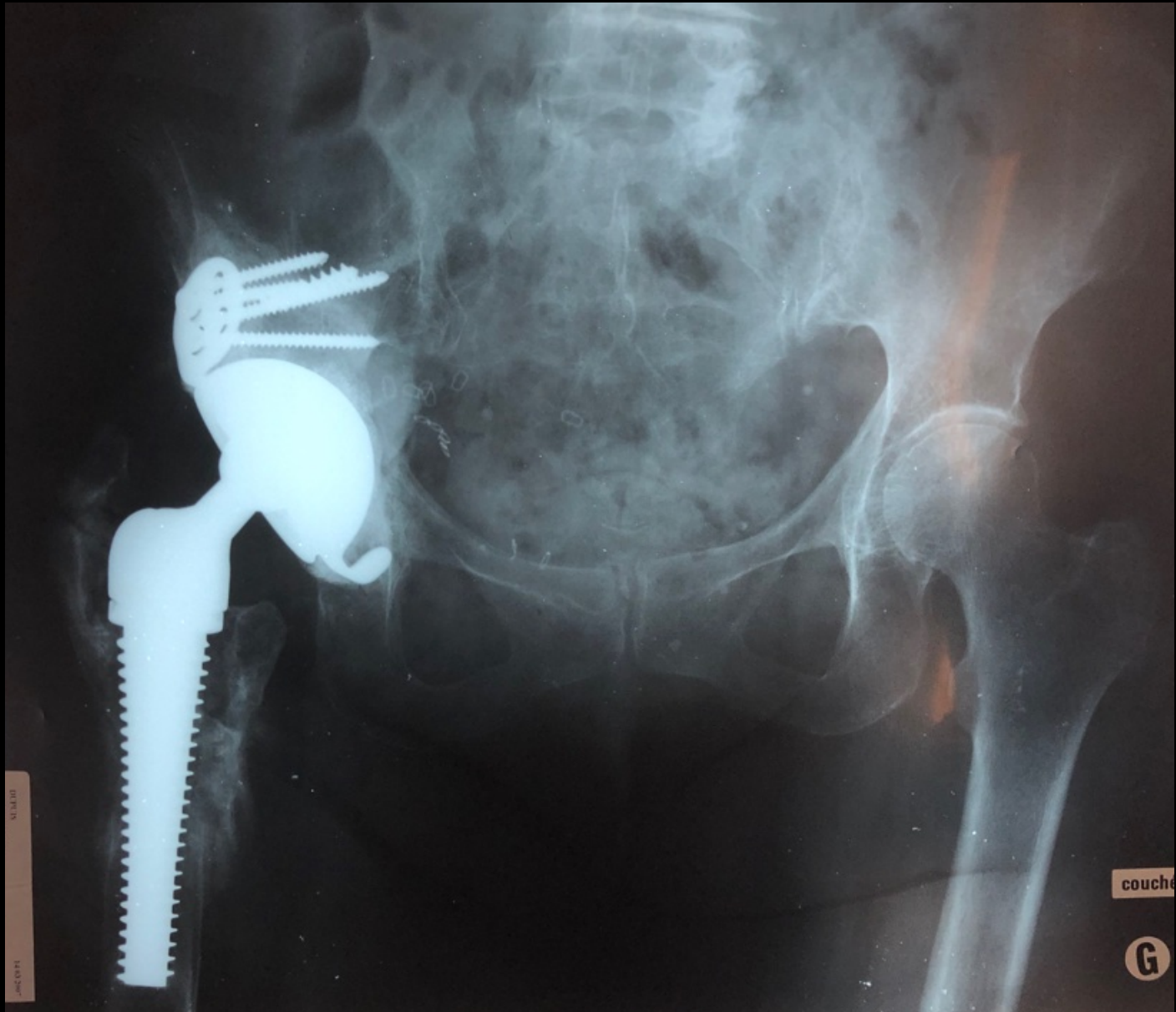
Case N°8





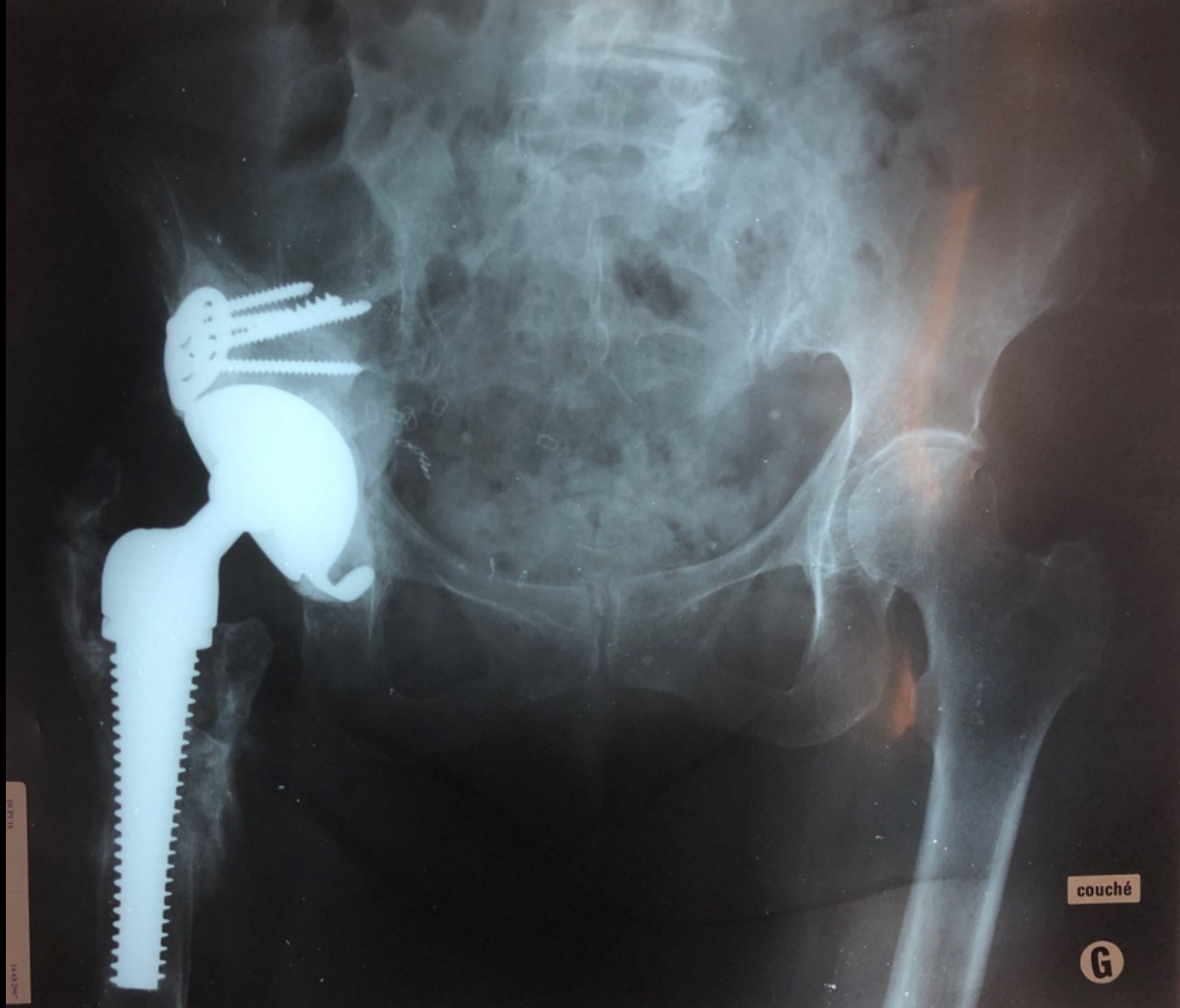
D

019008 F. 4m 76

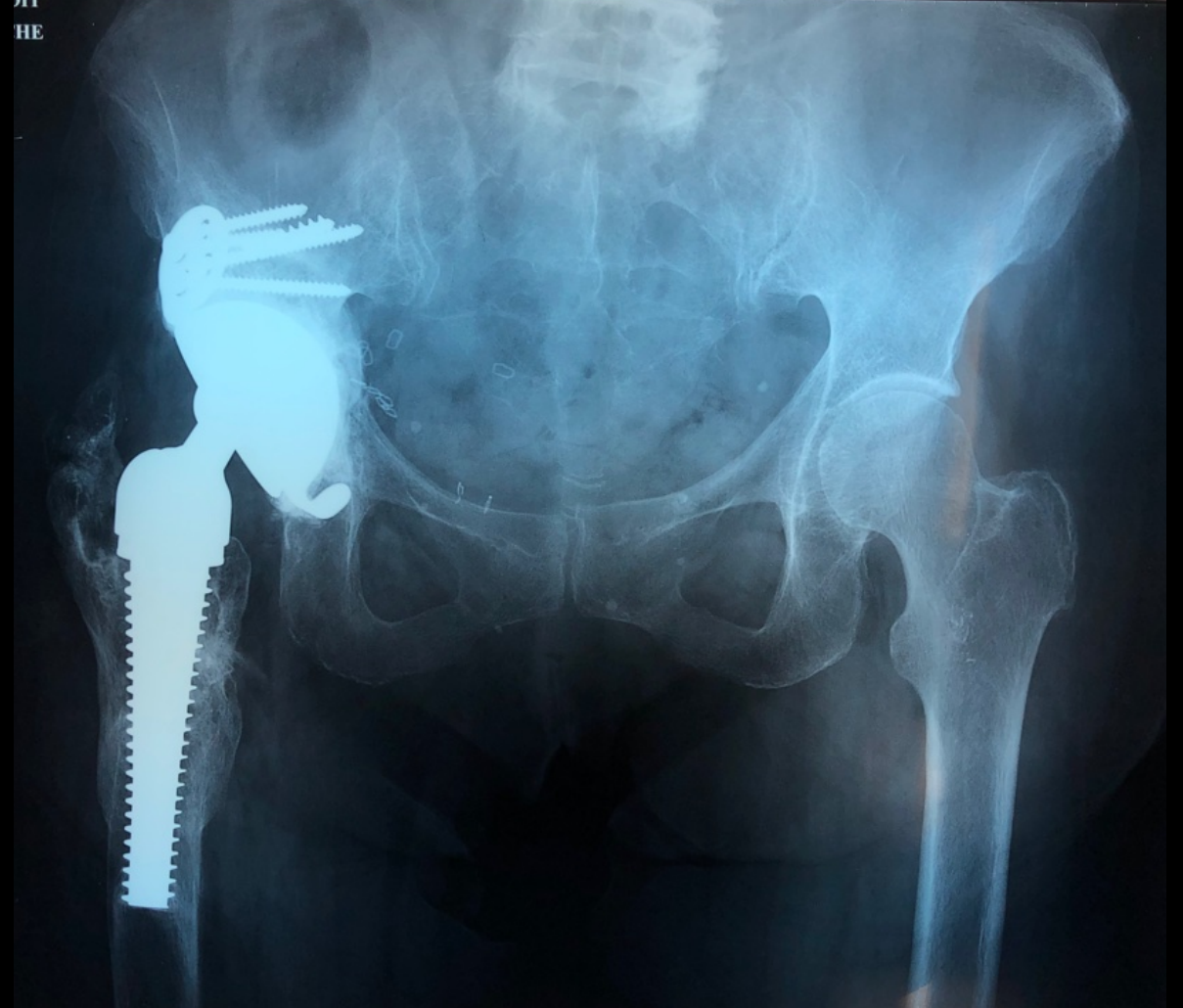


019008

G



DT
HE

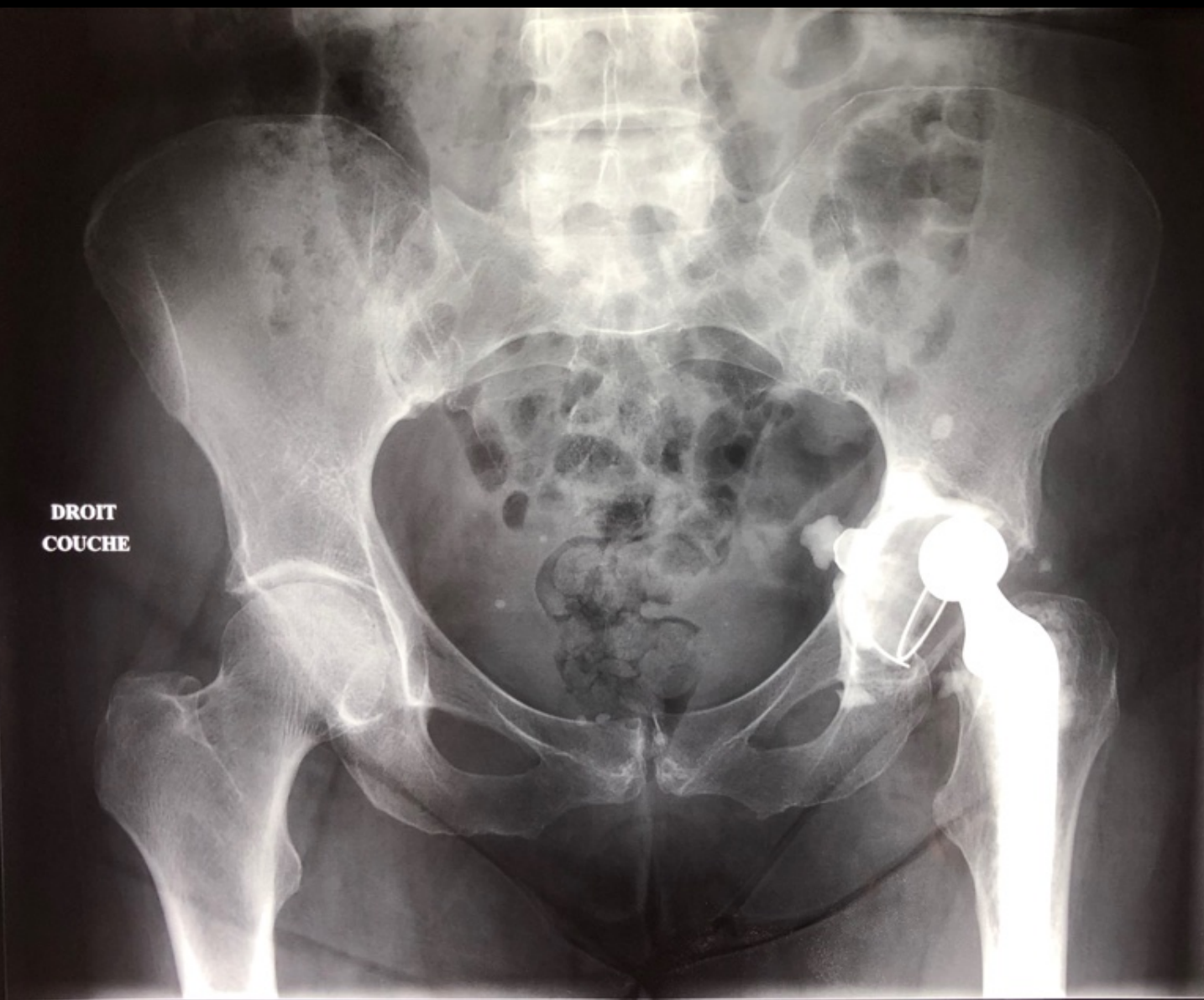


Case N°9

06500 023

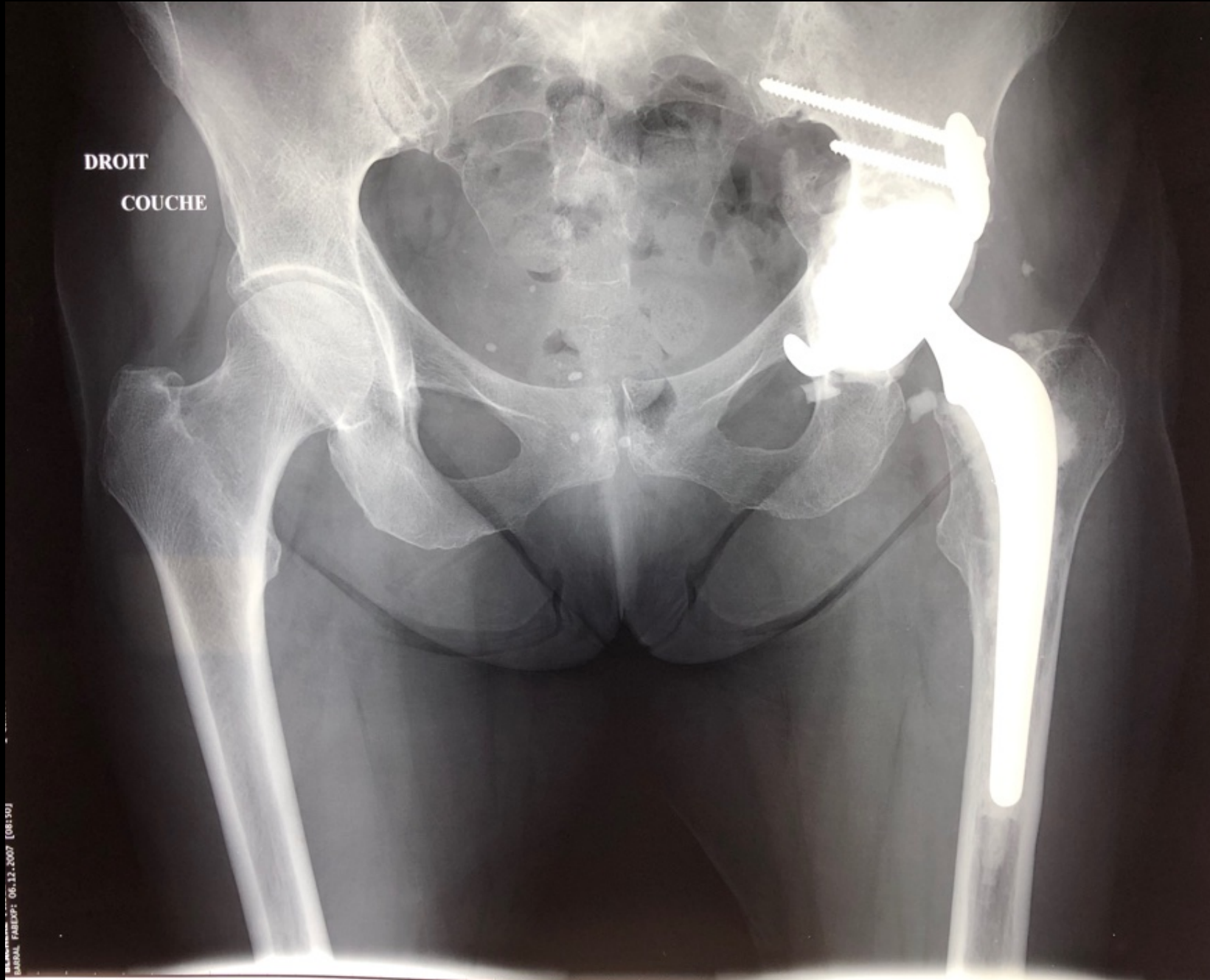
DROIT
COUCHE

CHU BELLEVUE - PU - 42000 ST ETIENNE





DROIT
COUCHE



Case N°10



GAUCHE
COUCHE

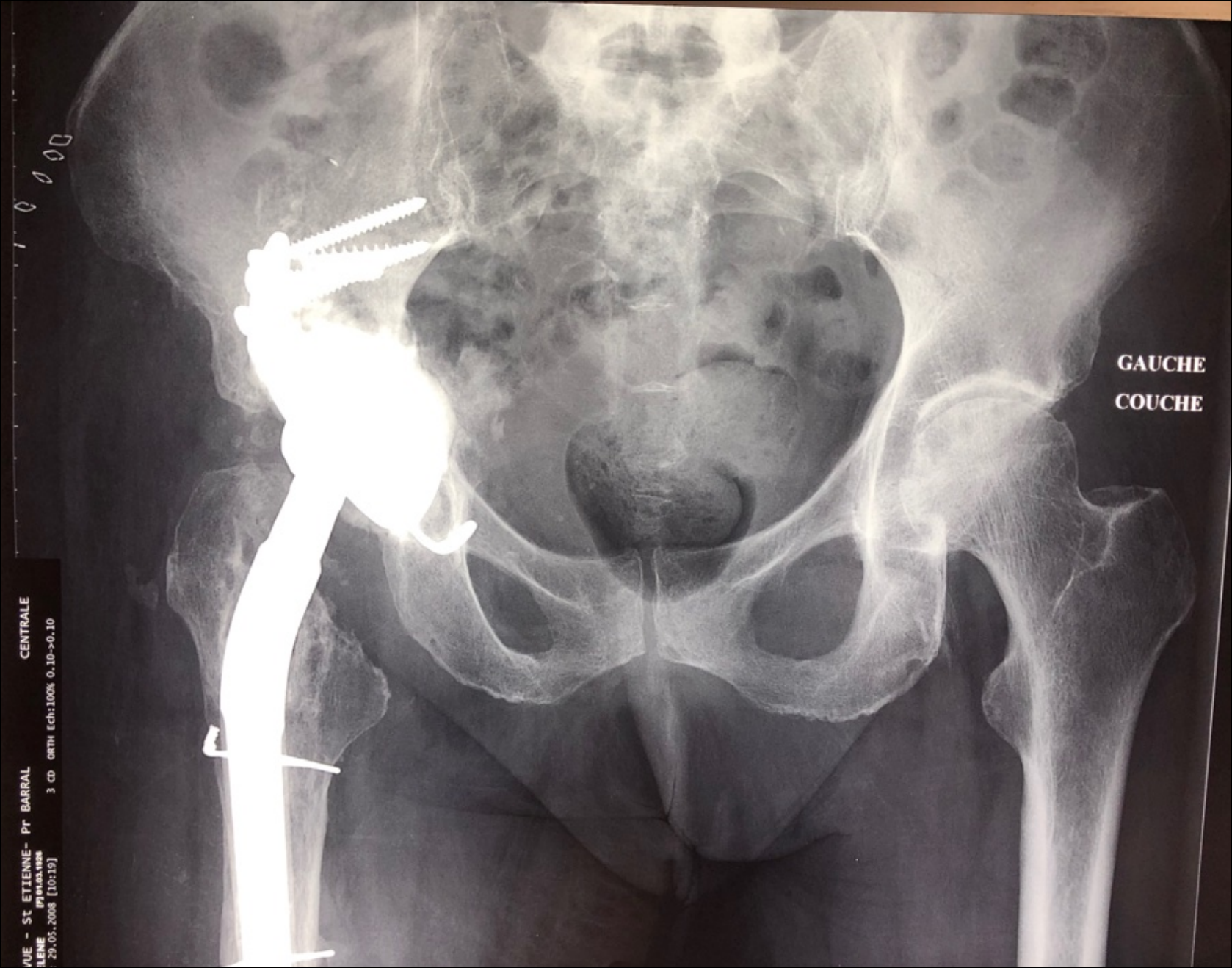
VUE - ST. ETIENNE - PT BARRAL
ILENE IP10431108
20.05.2008 [10:19]

CENTRALE

3 CD ORTH Ech:100% 0.10->0.10

1 0 0 0 0

GAUCHE
COUCHE

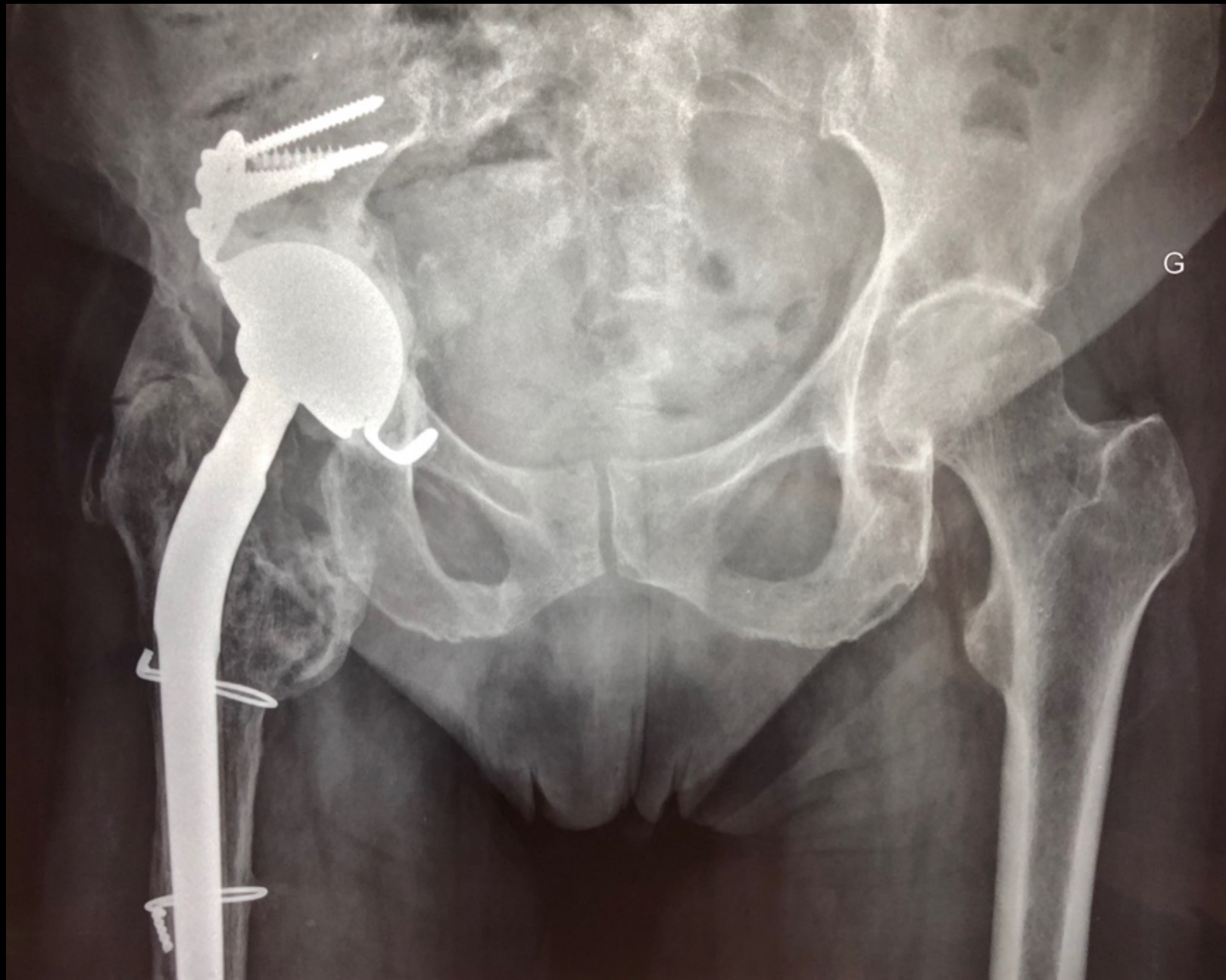


DROIT
COUCHE

1 CONSULT. Ech:100% 0.10-0.10

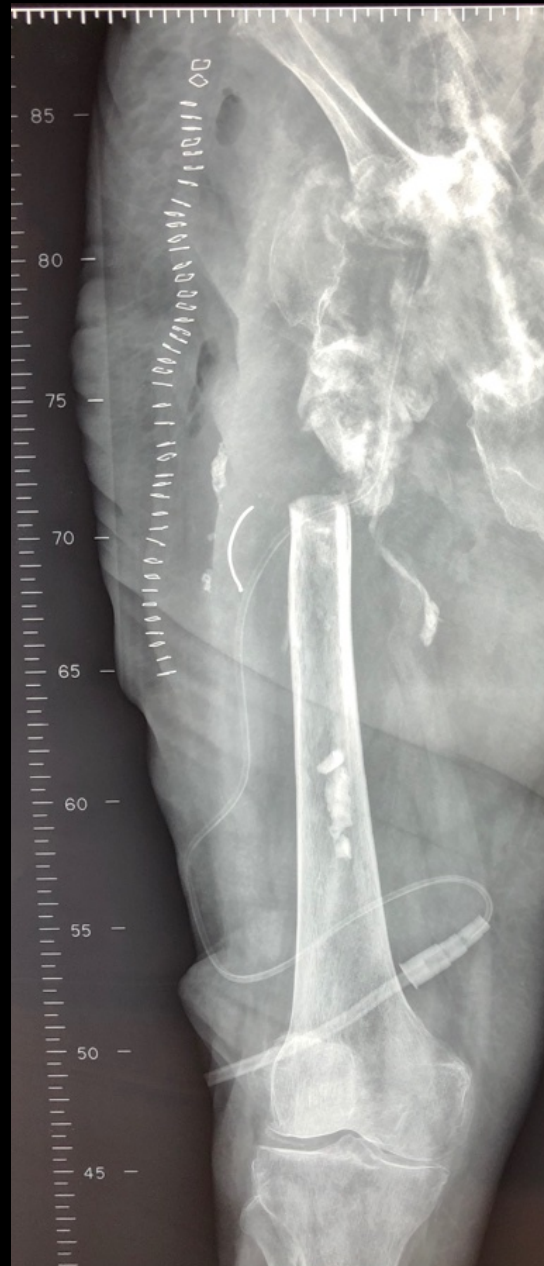
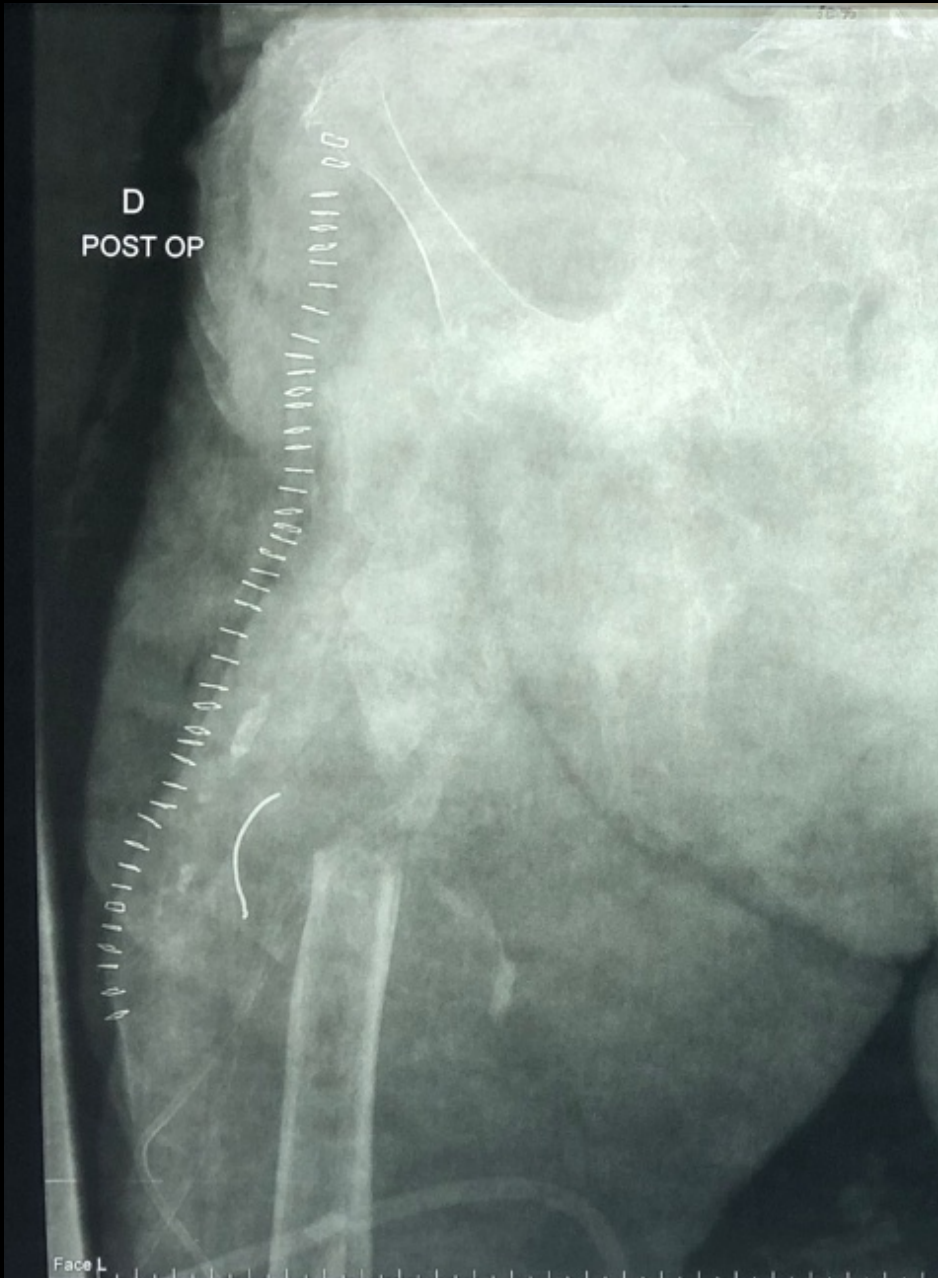
LENE pyrocarbone
02.07.2008 [12:05]

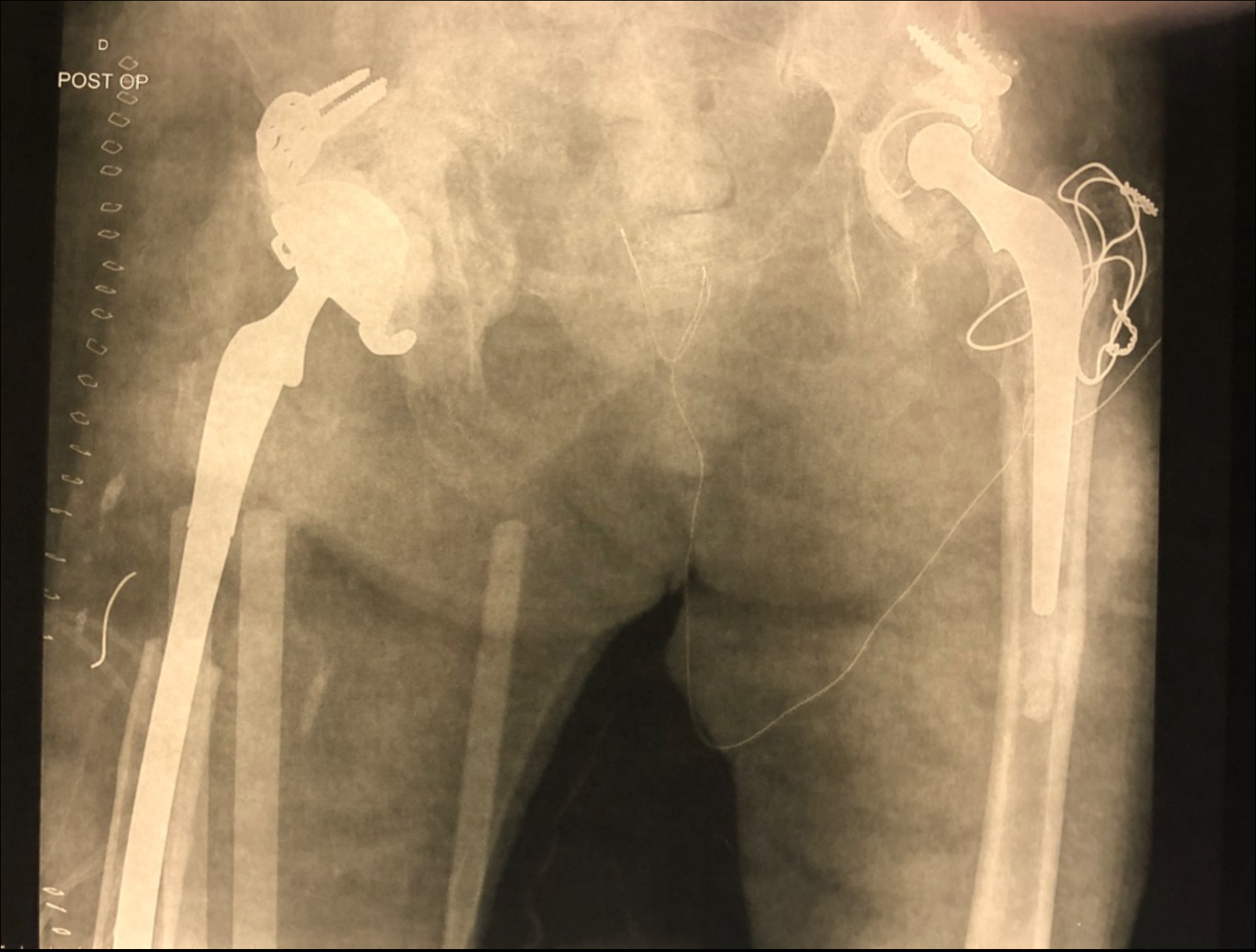


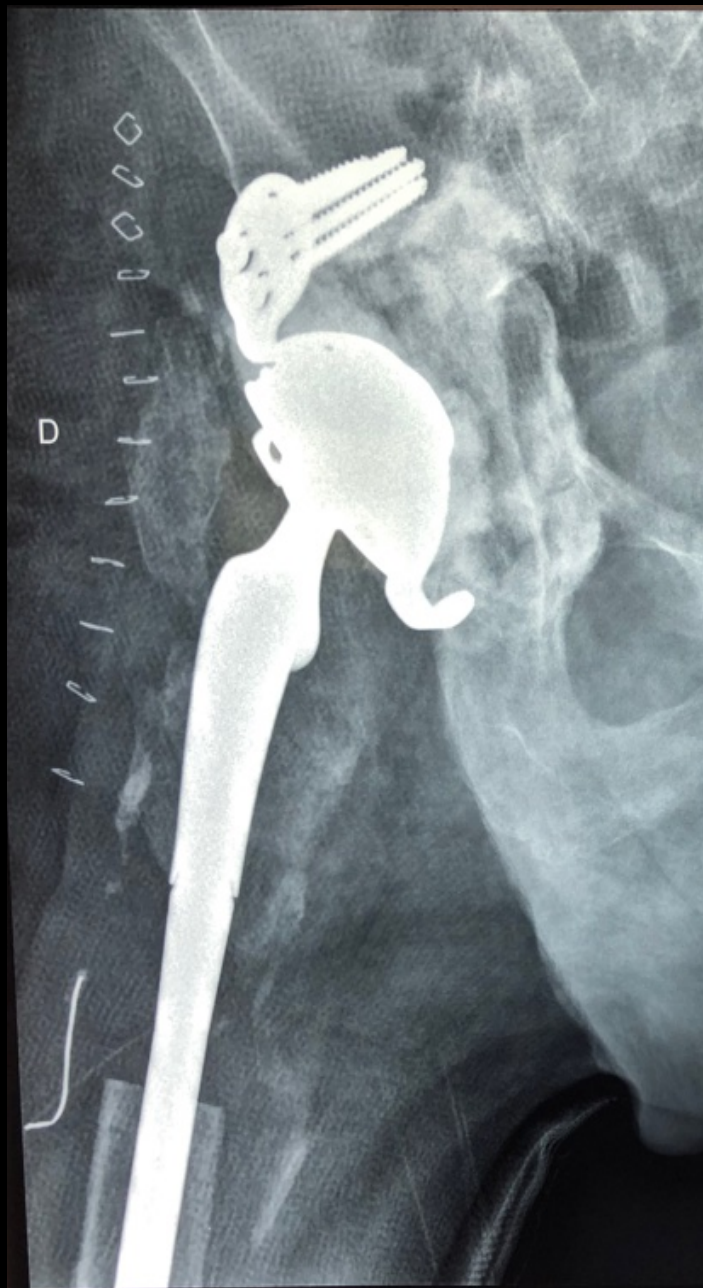


Case N°11



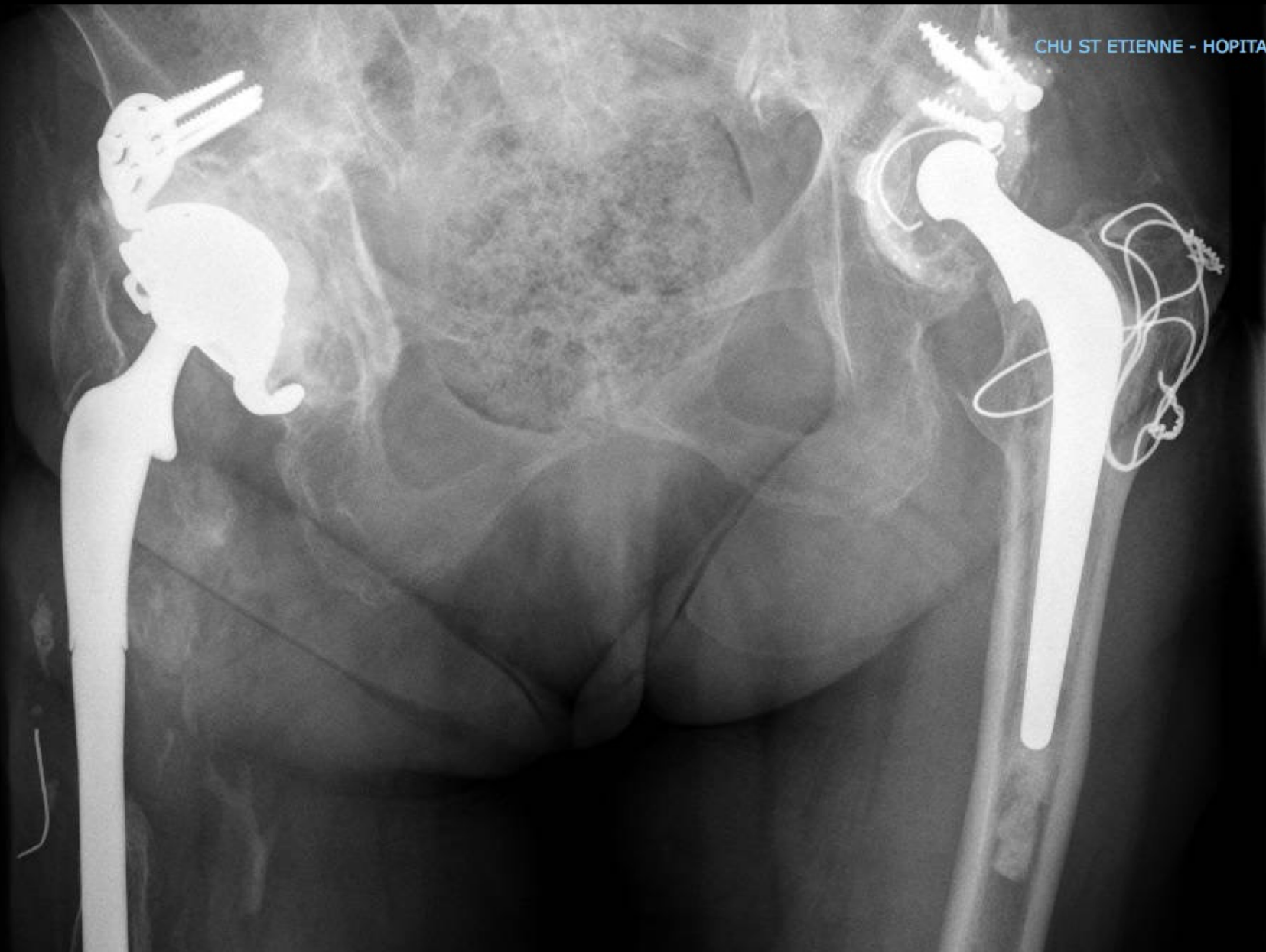






Early Dislocation
Open reduction, and
brace for 6 weeks
No dislocation with 10
years followup





24/10/2018 1
CHU ST ETIENNE - HOPITAL NORD - Pr Barral - Pr
C :2047 1
Zoor

Case N°12



D COUCHE



CHU ST ETIENNE - H

Case N°13





couché

G

/se,000362387
563
HANCHE RX
e AP (L)

CHU ST ETI



Message

DUAL MOBILITY is a **reliable solution** for **acetabular revision**,
with **low** or **high** acetabular bone loss (PAPROSKY IIIA B).



Cemented DM in acetabular metal ring is a solution for **complex** acetabular revision, with bone loss
(Paprosky III)

Low rate of acetabular loosening (3,89% at 10 years)

Low rate of chronic instability (1,29% at 10 Years)

No cases of IPD with new generation of PE Liner (UHMWPE)



Thank you for attention

