



# Imagerie de la hanche douloureuse chez l'enfant



**Hôpital Universitaire  
des Enfants** Reine Fabiola

Universitair **Kinderziekenhuis**  
Koningin Fabiola

**Paolo Simoni, MD, PhD, MBA**

**Pediatric Imaging department**

**“Reine Fabiola “ Children’s University Hospital**

*Université Libre de Bruxelles*

*Brussels, Belgium*



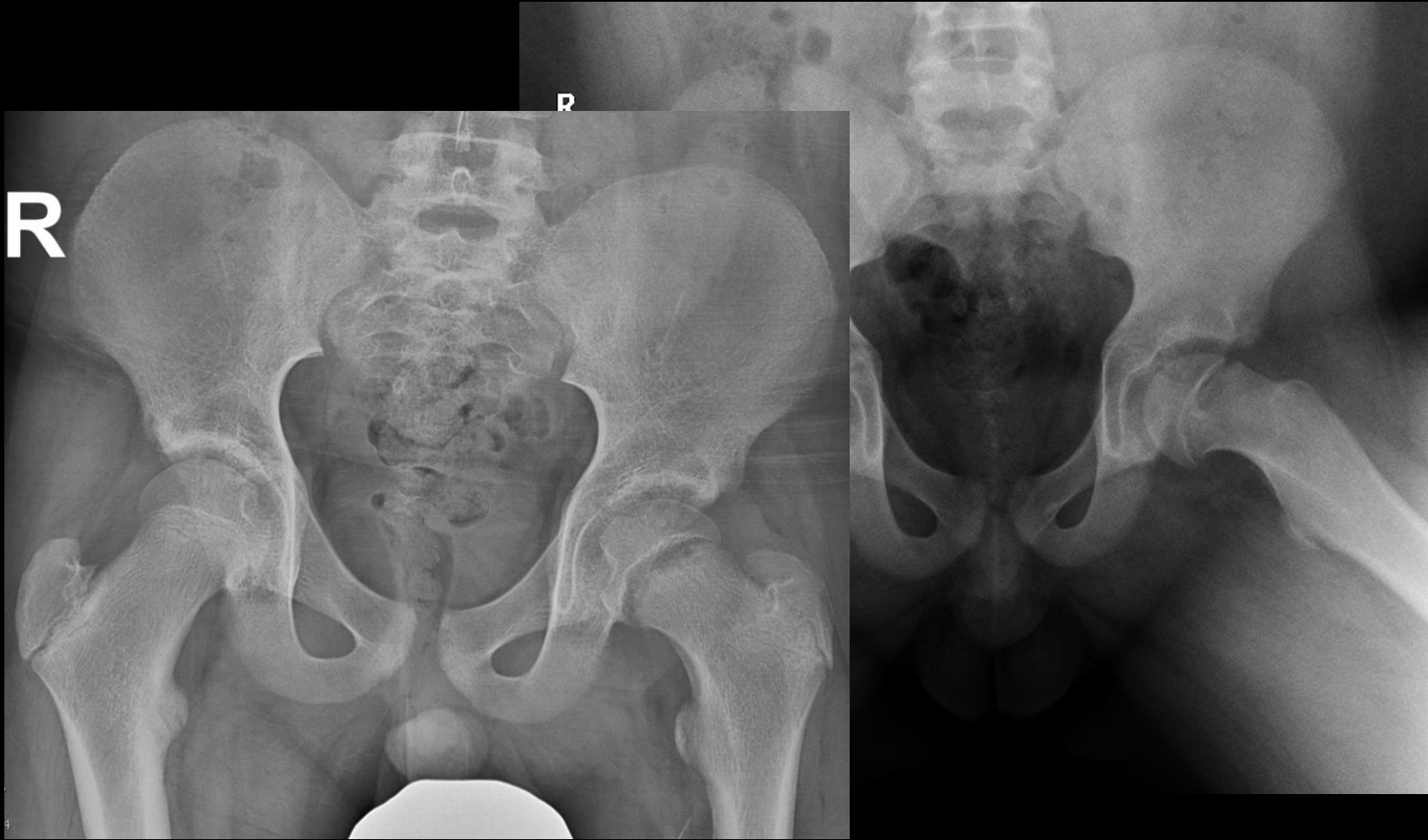
# Radiographie standard- jeune enfant



# Radiographs in children –



# Radiographie standard



# Radiographie standard - adolescent complément



## Gonad shielding in paediatric pelvic radiography: disadvantages prevail over benefit

Marij J. Frantzen · Simon Robben · Alida A. Postma · Johannes Zoetelief · Joachim E. Wildberger · Gerrit J. Kemerink

**Table 5** Gonad shield positioning in pelvic radiography according to various studies

Ref.	Number of radiographs with shielding			Percentage with incorrectly placed shields		
	Boys	Girls	Total	Boys (%)	Girls (%)	Average <sup>a</sup> (%)
Kenny and Hill [14]	102	107	209	44	60	52
Wainwright [15]	76	40	116	38	59	45
McCarty et al. [16]	82	57	139	63	72	67
Sikand et al. [17]			110			26
Gul et al. [18]			678			31
Masud et al. [19]			100			78
Fawcett and Barter[20]	611	550	1161	26	48	36
McManus and Davis [21]	618	741	1359	59	71	66
This study	193	307	500	66	91	81

<sup>a</sup> Taking the number of each sex into account

### Abstract

**Objective** To re-evaluate gonad shielding in paediatric pelvic radiography in terms of attainable radiation risk reduction and associated loss of diagnostic information.

**Methods** A study on patient dose and the quality of gonad shielding was performed retrospectively using 500 pelvic radiographs of children from 0 to 15 years old. In a subsequent study, 195 radiographs without gonad shielding were included. Patient doses and detriment adjusted risks for heritable disease and cancer were calculated with and without gonad shielding.

**Results** For girls, gonad shields were placed incorrectly in 91% of the radiographs; for boys, in 66%. Without gonad shielding, the hereditary detriment adjusted risk for girls ranged between  $0.1 \times 10^{-6}$  and  $1.3 \times 10^{-6}$  and for boys between  $0.3 \times 10^{-6}$  and  $3.9 \times 10^{-6}$ , dependent on age. With shielding, the reduction in hereditary risk for girls was on average  $6 \pm 3\%$  of the total risk of the radiograph, for boys  $24 \pm 6\%$ . Without gonad shielding, the effective dose ranged from 0.008 to 0.098 mSv.

**Conclusions** With modern optimised X-ray systems, the reduction of the detriment adjusted risk by gonad shielding is negligibly small. Given the potential consequences of loss of diagnostic information, of retakes, and of shielding

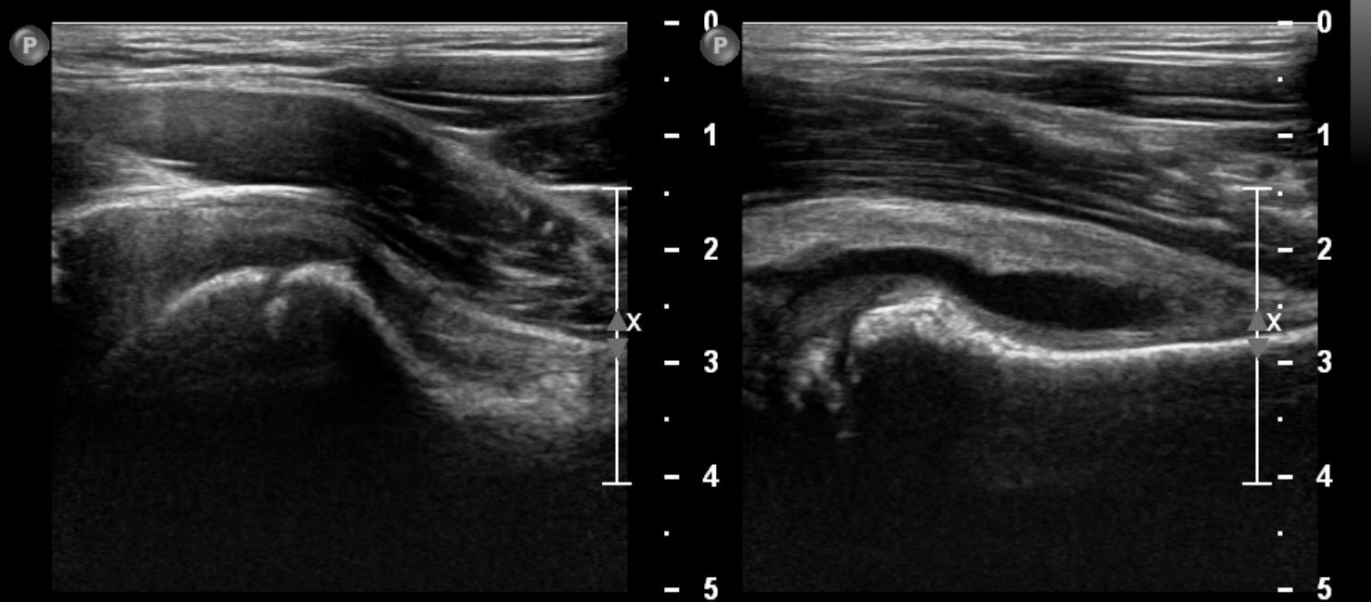
Table 2. Mean equivalent doses ( $\mu\text{Sv}$ ) to ICRP organs for skull, sinus, abdominal, and chest examinations

Examination	Skull						Sinus				Abdomen						Chest												
	0		5		15		0		5		15		0		5		15		0		5		15		0		5		15
Age group, years	AP	AP	AP	LAT	LAT	LAT	PA	PA	PA	PA	AP	AP	AP	LAT	LAT	LAT	PA	PA	AP	AP	AP	LAT	LAT	LAT	PA	PA	PA		
Projection	AP	AP	AP	LAT	LAT	LAT	PA	PA	PA	PA	AP	AP	AP	LAT	LAT	LAT	PA	PA	AP	AP	AP	LAT	LAT	LAT	PA	PA	PA		
Organ dose, $\mu\text{Sv}$																													
Ovaries	–	–	–	–	–	–	–	–	–	–	42	97	241	100	134	934	61	126	1	–	–	2	–	–	2	–	1		
Testes	–	–	–	–	–	–	–	–	–	–	9	36	73	21	24	127	8	18	–	–	–	–	–	–	–	–	–		
Active bone marrow	45	36	10	37	25	11	23	26	12	19	7	18	53	15	39	376	27	85	4	5	10	9	11	36	4	7	31		
Skeleton	136	204	55	115	141	68	131	151	63	95	30	54	128	63	70	414	58	133	21	13	21	40	31	72	19	20	63		
Lungs	2	1	–	2	1	–	1	–	2	2	8	15	38	15	20	128	8	17	32	33	58	52	69	166	19	37	105		
Lower large intestine	–	–	–	–	–	–	–	–	–	–	37	103	246	53	50	302	52	108	1	–	–	1	1	–	–	–	–		
Stomach	–	–	–	–	–	–	–	–	–	–	53	174	390	52	52	242	35	79	22	19	22	16	11	13	8	8	18		
Liver	–	–	–	–	–	–	–	–	–	–	47	133	296	137	280	2010	50	118	23	20	28	46	38	85	9	13	38		
Thyroid	23	15	8	16	8	7	10	9	16	30	1	–	1	1	–	1	–	1	45	38	33	41	46	31	6	9	18		
Esophagus	7	4	1	5	3	1	4	3	9	19	5	7	13	10	12	66	5	8	19	19	27	46	52	94	12	24	66		
Breasts	–	–	–	–	–	–	–	–	–	–	1	3	9	2	5	26	2	4	48	47	87	46	53	169	6	15	25		
Urinary bladder	–	–	–	–	–	–	–	–	–	–	55	174	424	88	132	736	35	72	–	–	–	1	–	–	–	–	–		
Skin	51	53	17	37	33	20	39	59	9	27	14	45	96	34	64	437	25	65	9	7	13	16	16	42	4	7	19		
Adrenals	1	–	–	–	–	–	–	–	–	–	15	34	71	64	85	634	86	225	13	11	17	32	33	49	19	37	107		
Brain	146	173	84	84	137	149	124	169	77	174	–	–	–	–	–	–	–	–	–	–	1	1	1	2	–	–	1		
Kidneys	–	–	–	–	–	–	–	–	–	–	17	34	83	90	146	933	138	347	6	5	4	22	8	11	14	5	12		
Pancreas	–	–	–	–	–	–	–	–	–	–	34	86	201	63	73	405	53	114	24	20	21	28	20	25	11	17	37		
Small intestine	–	–	–	–	–	–	–	–	–	–	44	119	290	95	147	921	55	124	2	1	1	4	2	2	1	1	2		
Upper large intestine	–	–	–	–	–	–	–	–	–	–	48	142	340	121	224	1466	47	104	2	2	1	5	2	3	1	1	2		
Spleen	–	–	–	–	–	–	–	–	–	–	25	56	133	37	30	137	97	230	16	13	14	14	9	12	18	20	50		
Thymus	6	2	–	4	1	–	2	–	2	2	1	2	5	2	5	30	1	2	48	53	105	39	49	105	5	11	23		
Uterus	–	–	–	–	–	–	–	–	–	–	41	115	286	91	135	685	52	113	1	–	–	2	–	–	1	–	1		
Remainder (muscle)	25	14	3	23	13	5	19	15	21	19	18	50	119	38	63	424	31	74	10	8	14	15	15	34	6	8	23		
Gall bladder	–	–	–	–	–	–	–	–	–	–	46	142	366	89	149	1433	37	96	13	8	7	25	9	16	5	4	7		
Heart	2	–	–	1	–	–	–	–	1	–	8	19	48	16	19	121	7	15	39	39	71	40	48	90	10	18	42		

For X-ray radiation, the equivalent dose in Sv equals the absorbed dose in Gy. A complete summary of the doses (with age groups of 1 and 10 years) is presented in the online version of the paper. AP: anteroposterior; LAT: lateral; PA: posteroanterior.

# Echographie

CI 23Hz  
RV  
Z 1.0  
2D  
78%  
C 56  
P Moy  
Rés



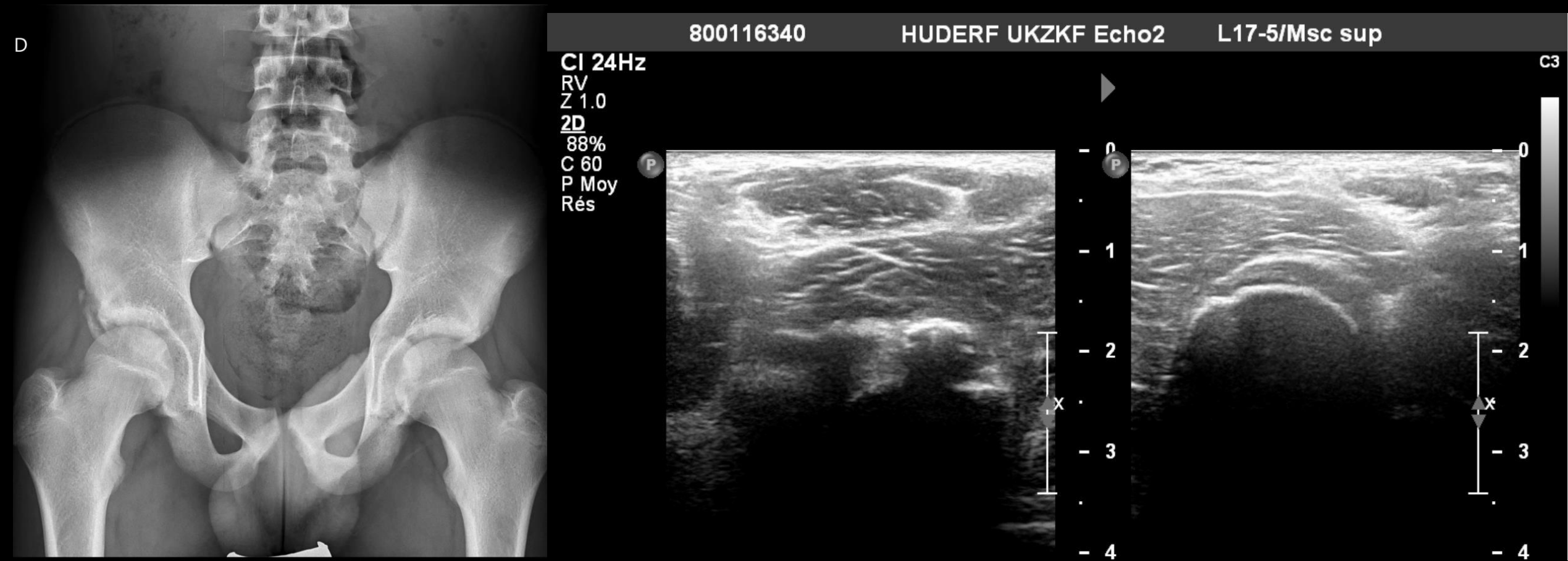
Droite



# Echographie



# Echographie



# Echographie



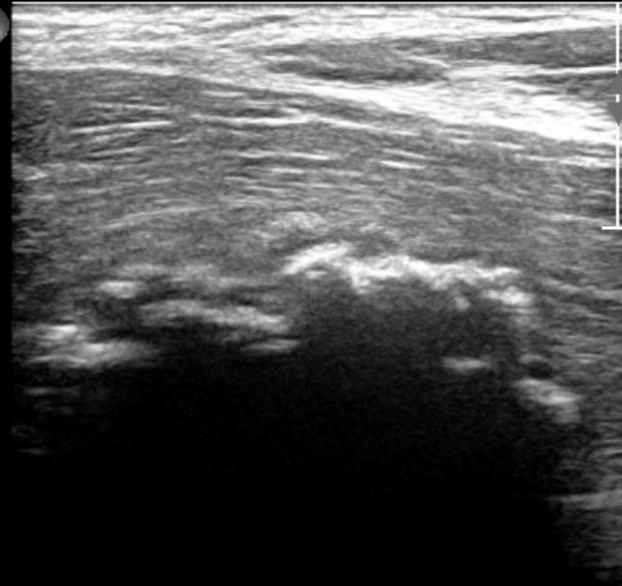
800116340

HUDERF UKZKF Echo2

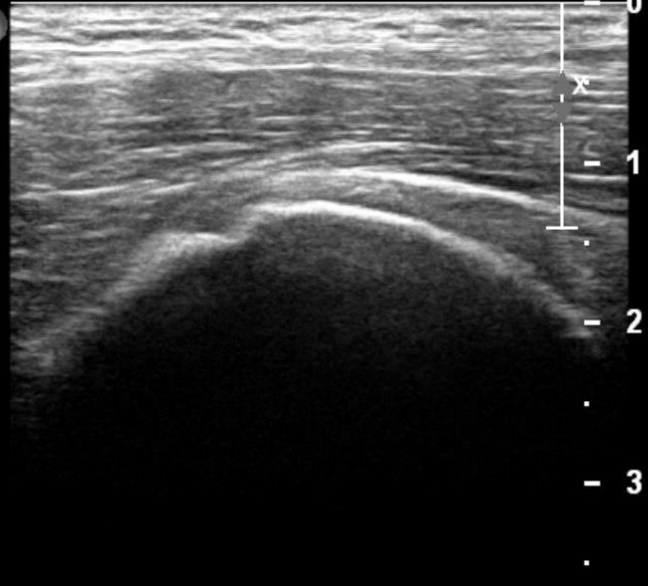
L17-5/Msc sup

CI 29Hz  
RV  
Z 1.0  
2D  
87%  
C 60  
P Moy  
Rés

P



P



C3

# Radiographie

ACCES#@2484770

01/10/2009



D

4.111  
kV:80.9  
19msec  
mas12

# Scanner et radiographie



# Scanner vs échographie



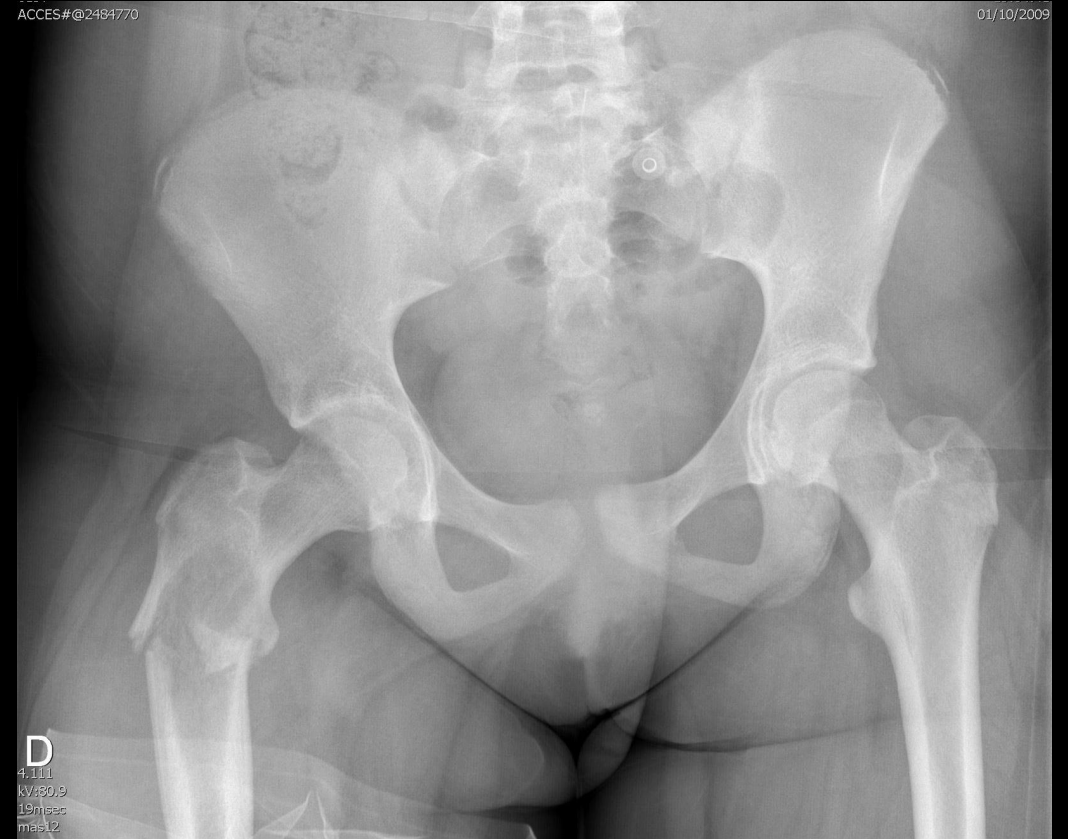
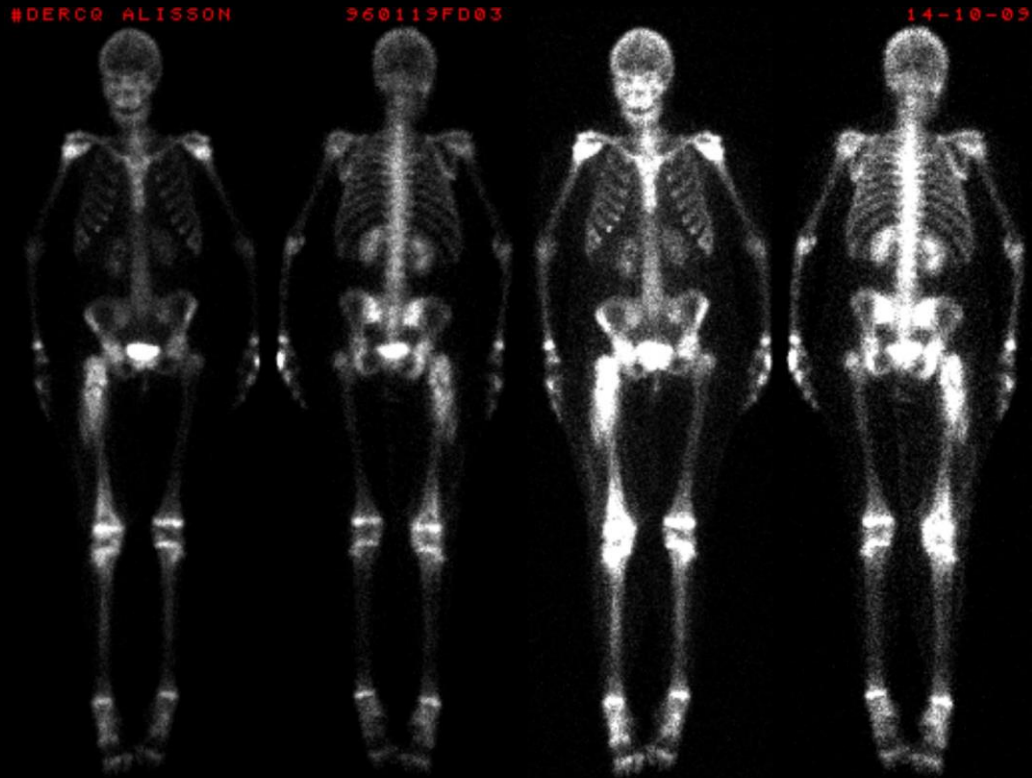
298

HUDERF UKZKF RAD

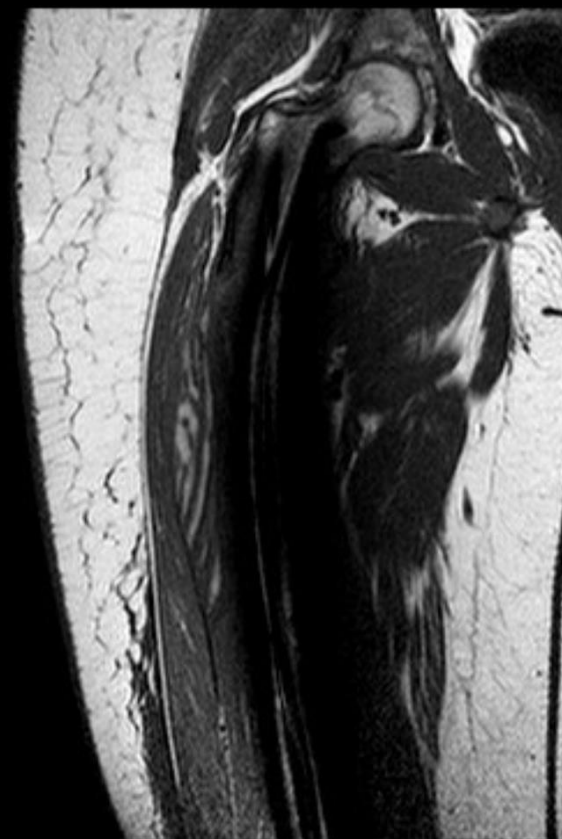
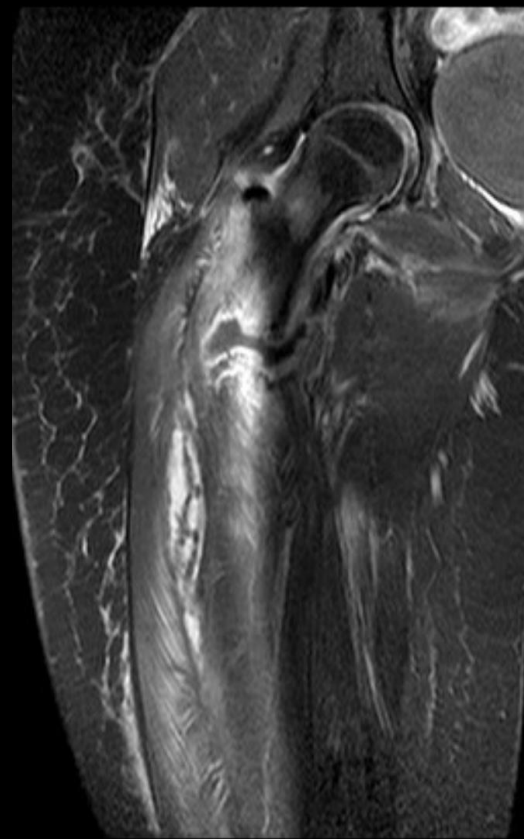
L12-5/Péd hch



# Scintigraphie alias «bone scan»

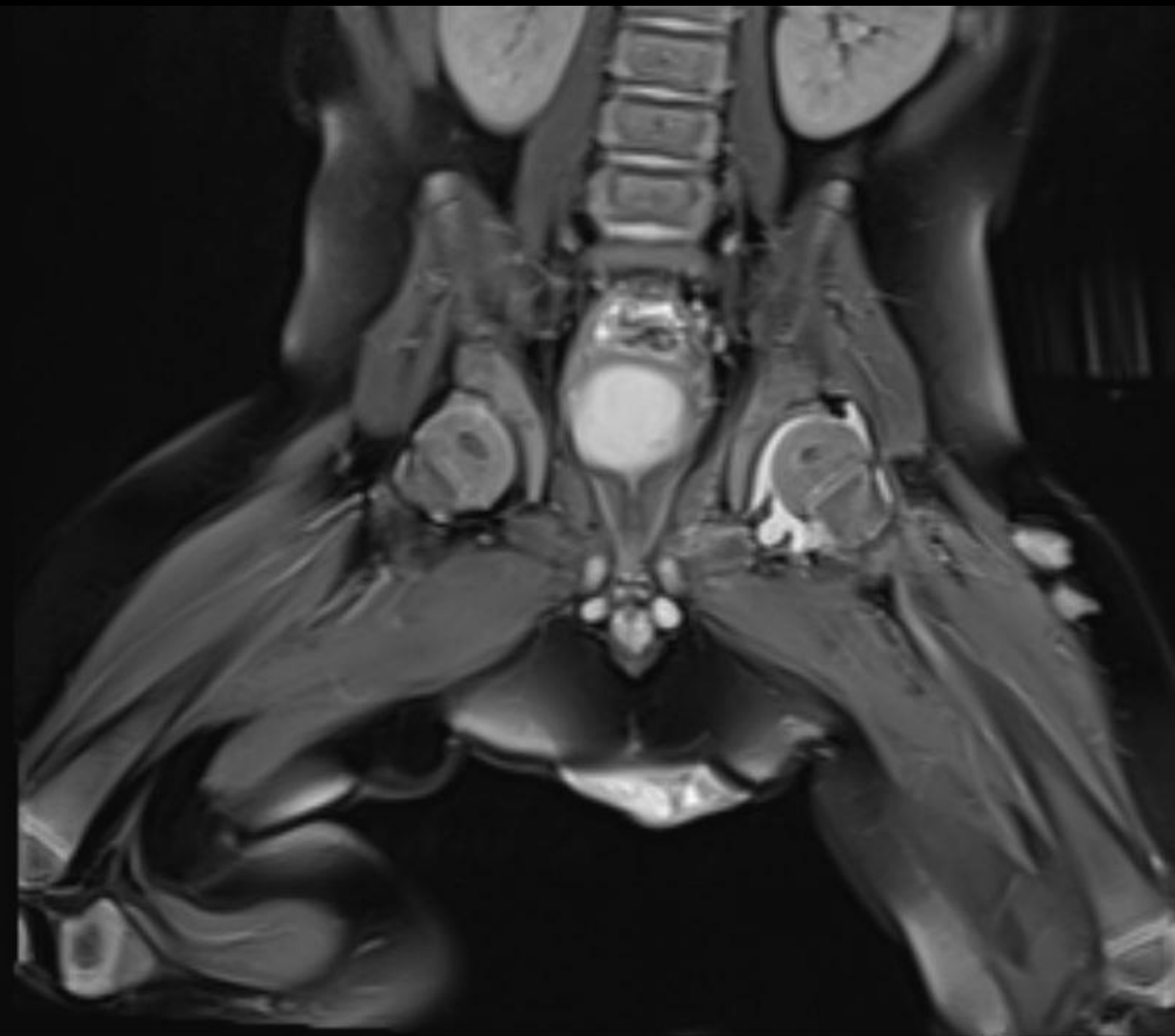
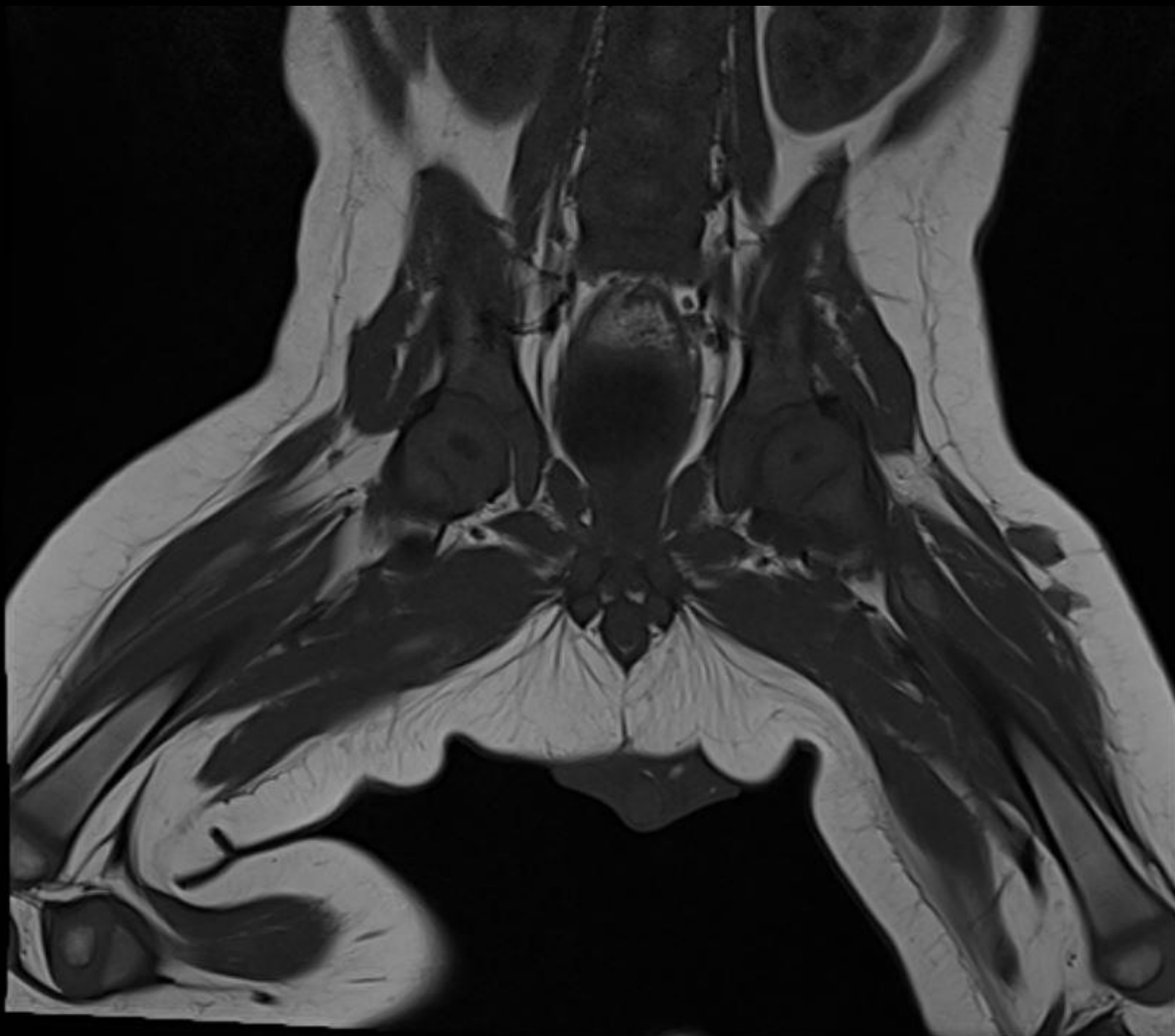


# Scanner versus IRM





# IRM chez le nourrisson



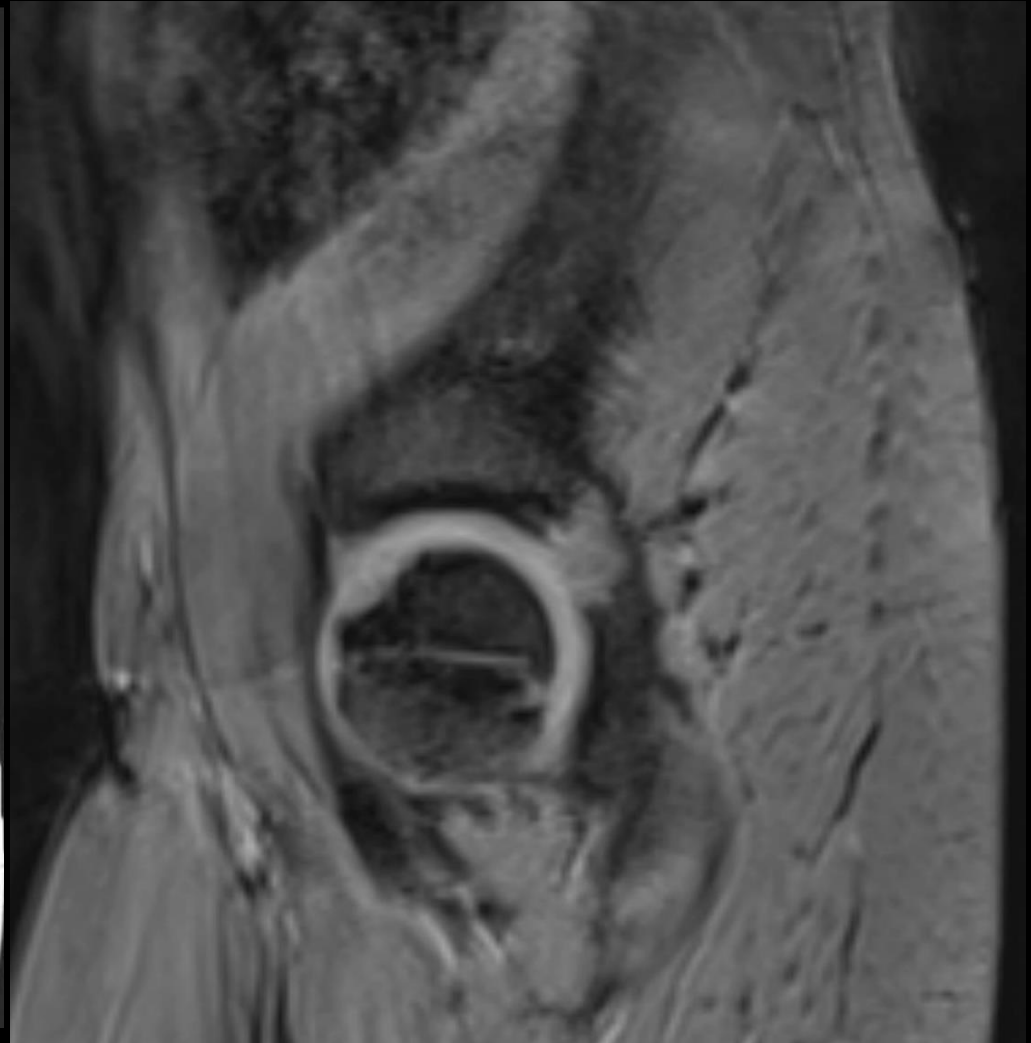
# Cas n° 1

D

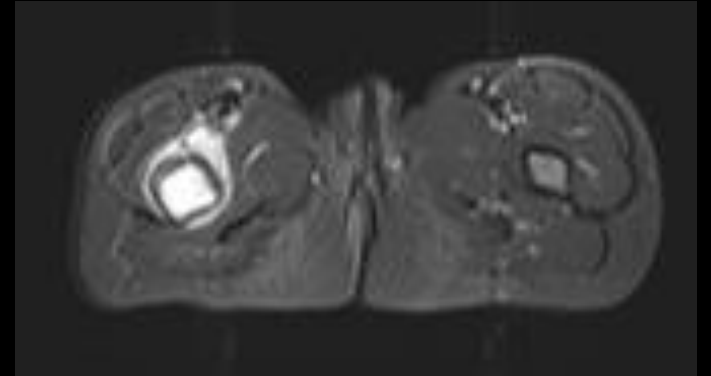
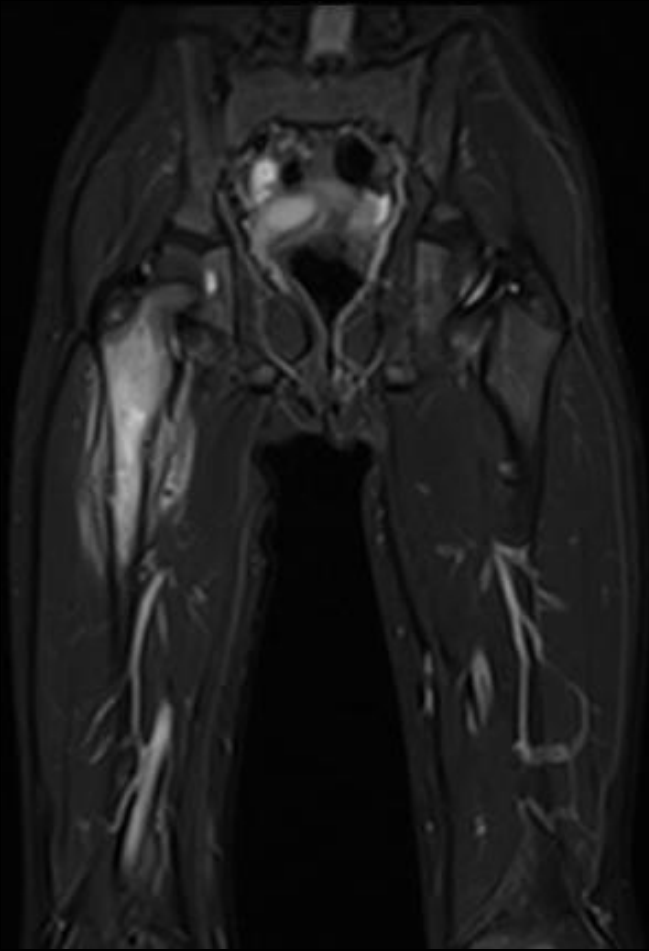
007Y  
M



# Cas n°1





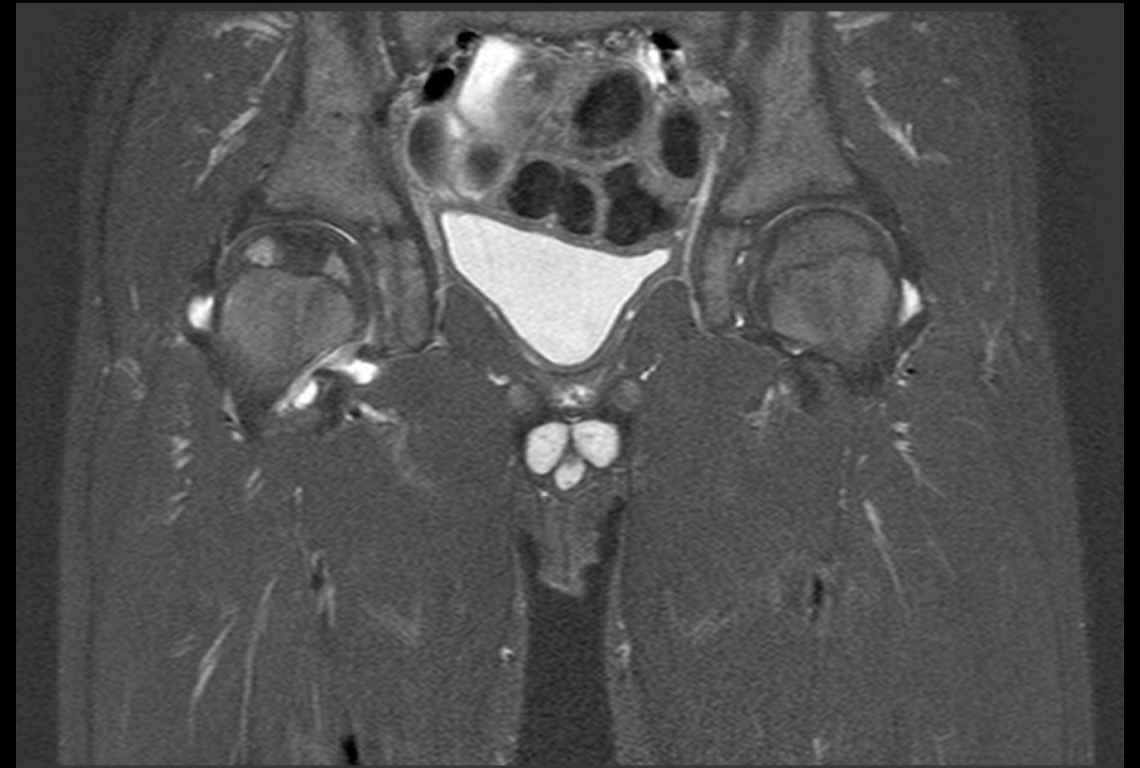
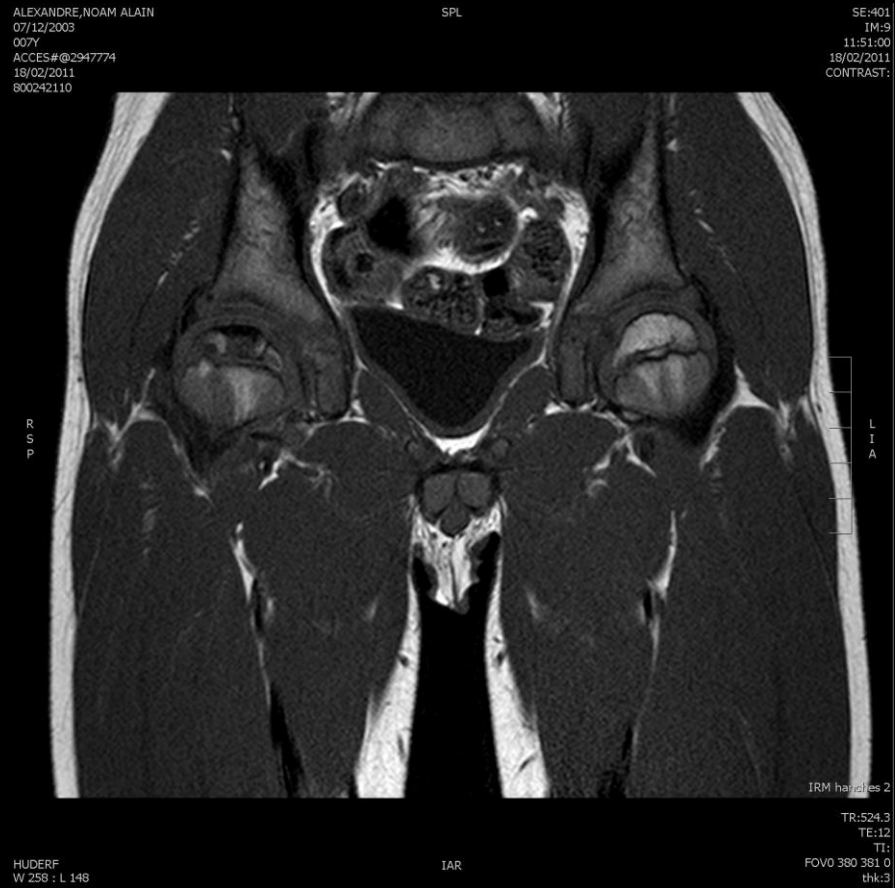




Cas 2



# Cas n° 2





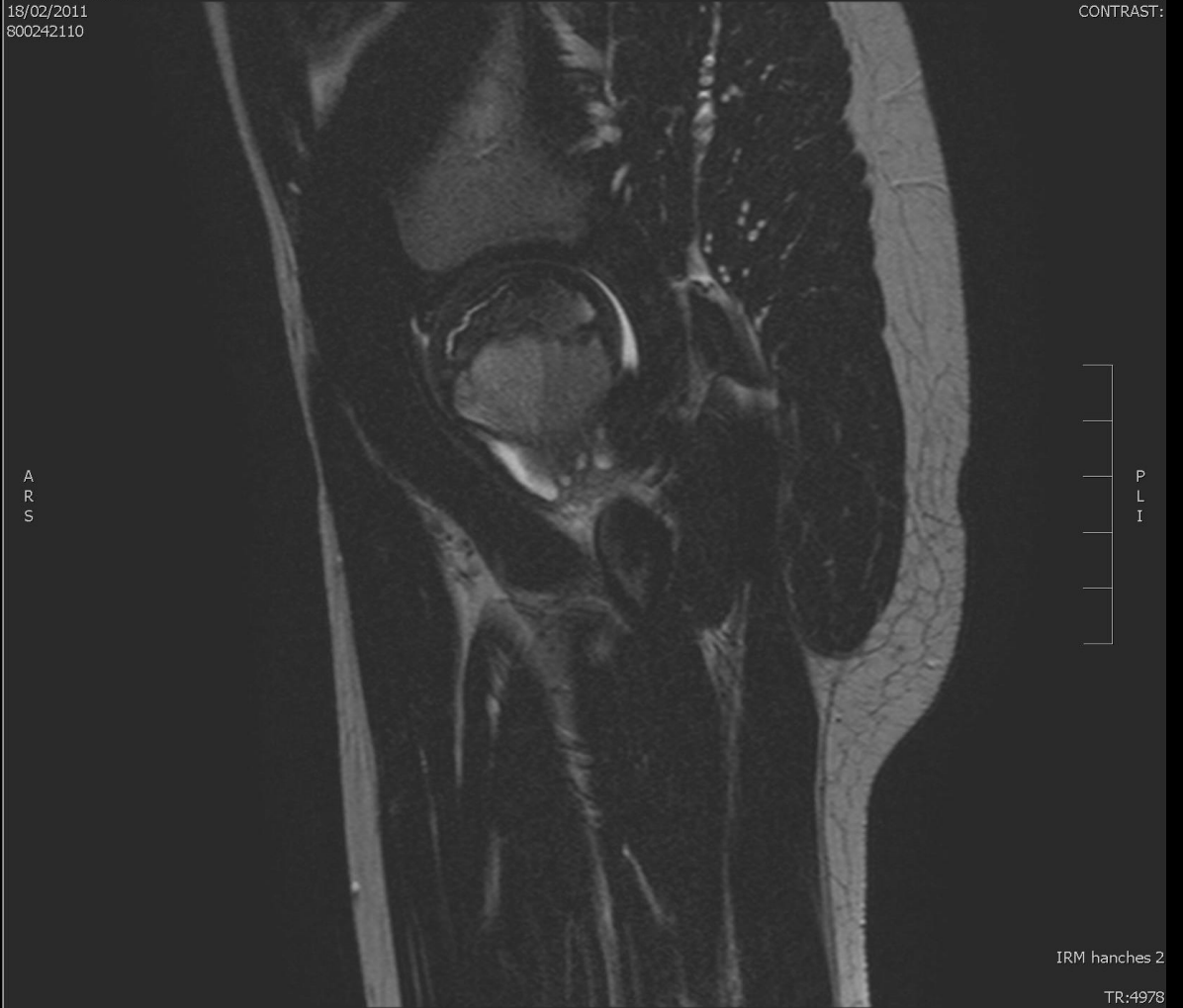
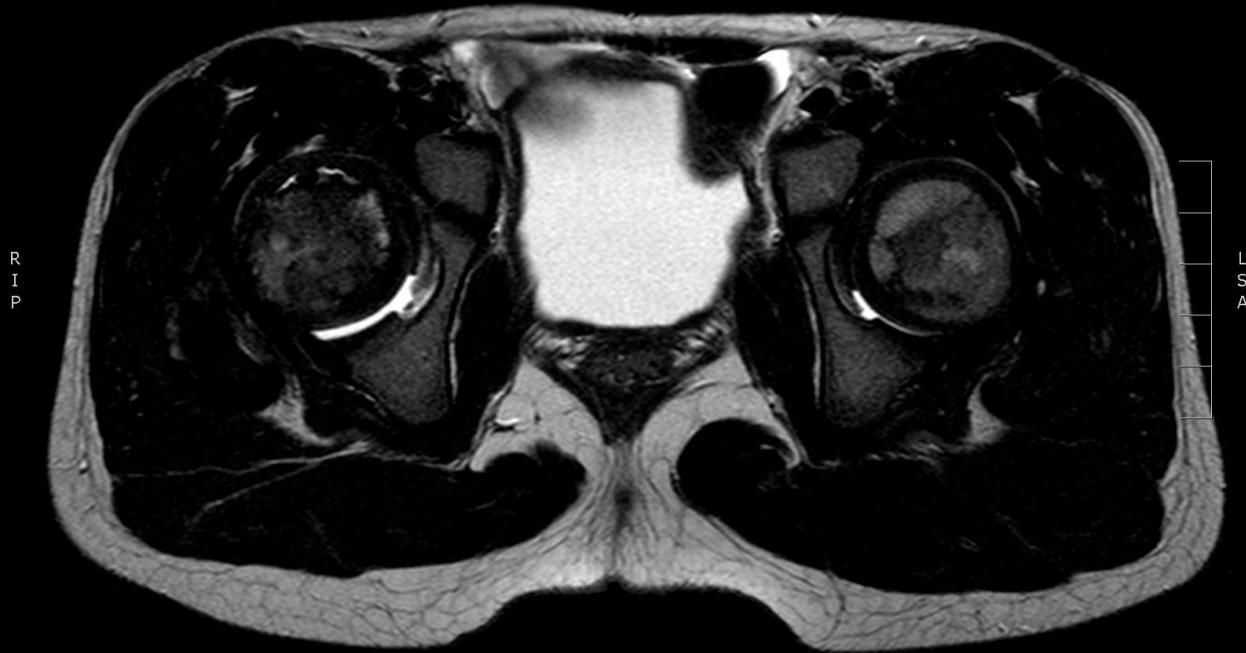
# Cas 2

07/12/2003  
007Y  
ACCES#@2947774  
18/02/2011  
800242110

IM:14  
11:58:49  
18/02/2011  
CONTRAST:

07/12/2003  
007Y  
ACCES#@2947774  
18/02/2011  
800242110

IM:11  
12:07:50  
18/02/2011  
CONTRAST:



07/12/2003  
009Y  
ACCES#@3621012  
17/04/2013  
800242110

IM:11 07/12/2003  
12:07:05 009Y  
17/04/2013 ACCES#@3621012  
CONTRAST: 17/04/2013  
800242110

IM:11  
12:19:56  
17/04/2013  
CONTRAST:

Injection  
Gd



# Cas 2

07/12/2003  
009Y  
ACCES#@3621012  
17/04/2013  
800242110

IM:9  
12:01:50  
17/04/2013  
CONTRAST:

07/12/2003  
009Y  
ACCES#@3621012  
17/04/2013  
800242110

IM:14  
12:11:59  
17/04/2013  
CONTRAST:

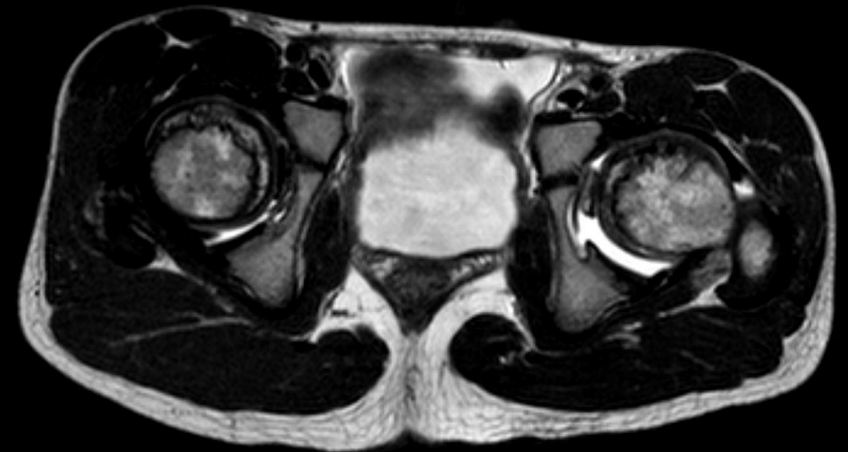


R  
A  
I



L  
P  
S

R  
I  
A



L  
S  
P

# Cas 2

07/12/2003  
009Y  
ACCES#@3621012  
17/04/2013  
800242110

IM:9  
12:01:50  
17/04/2013  
CONTRAST:

07/12/2003  
009Y  
ACCES#@3621012  
17/04/2013  
800242110

IM:14  
12:11:59  
17/04/2013  
CONTRAST:

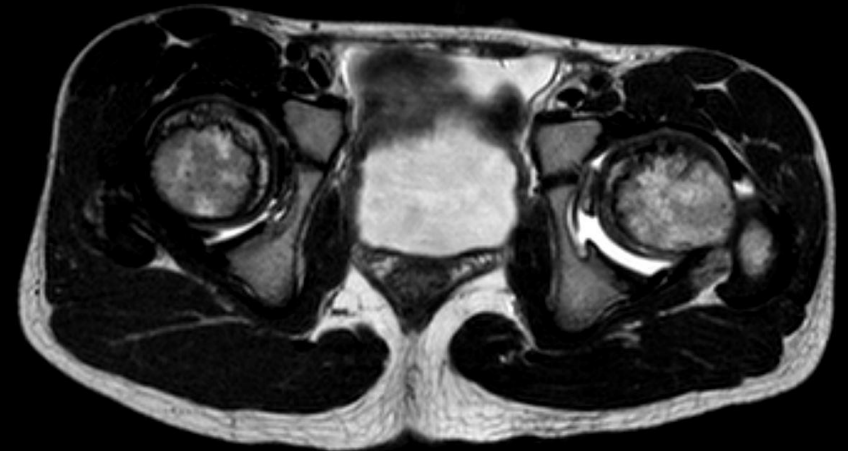


R  
A  
I



L  
P  
S

R  
I  
A



L  
S  
P

# Cas n°2

07/12/2003  
014Y  
ACCES#@5155019

03/10/201  
14:43:0  
03/10/201



Cas n °3





P R

L A



028872

AS

09/72  
COI

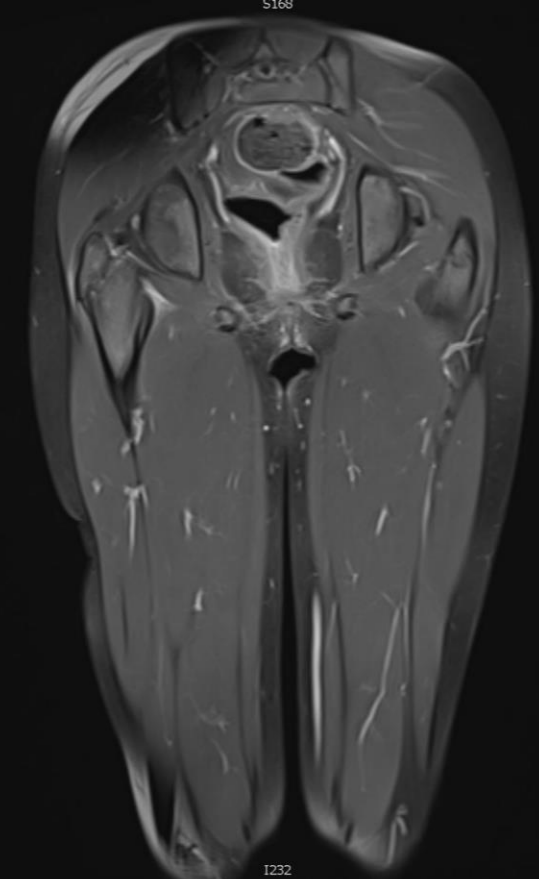
IRM  
\*t

PI

FOV256

IRM BASSIN  
\*tse2d1\_3  
TR:674  
TE:9.8  
TI:  
FOV0 448 349 0  
th:3

H.U.D.E.R.F.  
W.631 - L.275



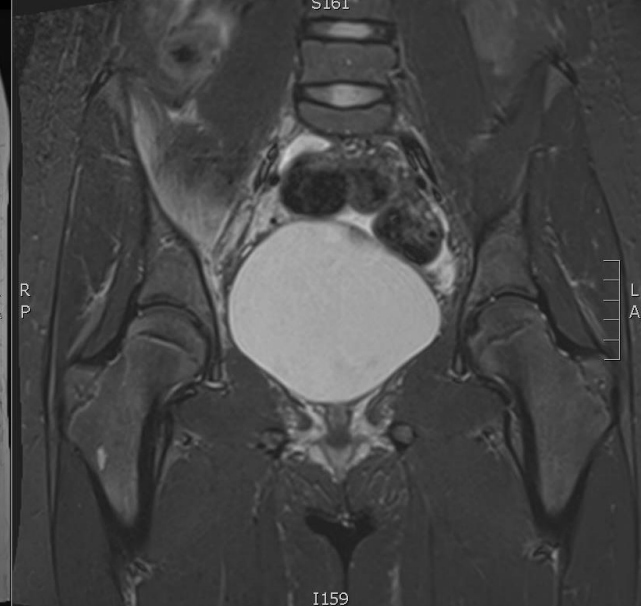
L A

IRM BAS  
\*tse2c  
TR:  
TE:  
FOV0 448 3  
th:

# Cas n°3 - Lésion apophyse



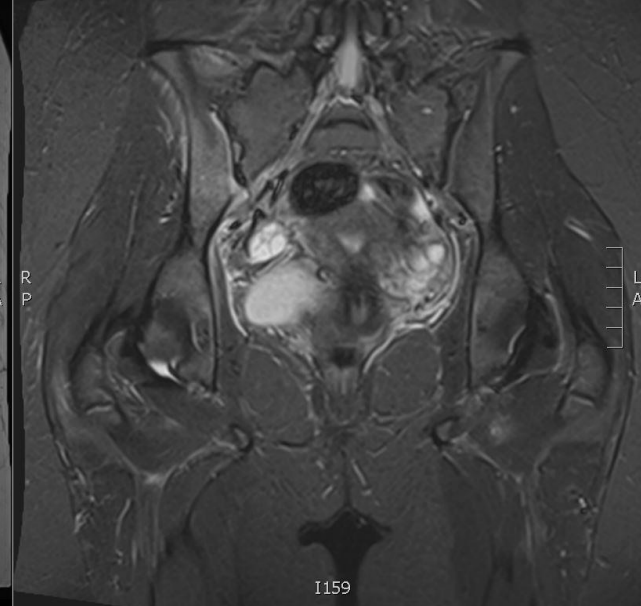
IRM HANCHES



IRM HANCHES



IRM HANCHES



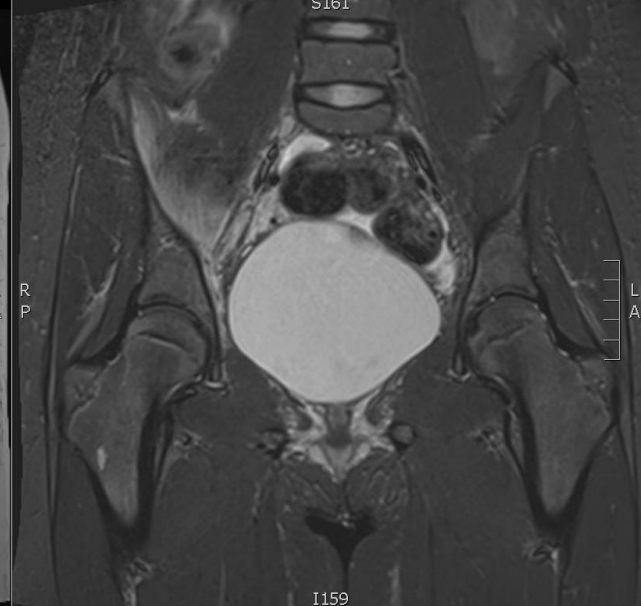
IRM HANCHES

# Cas n 4





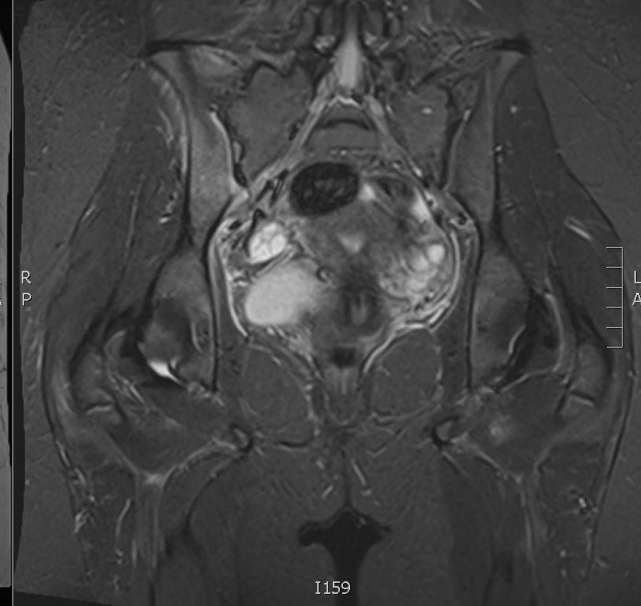
IRM HANCHES



IRM HANCHES



IRM HANCHES

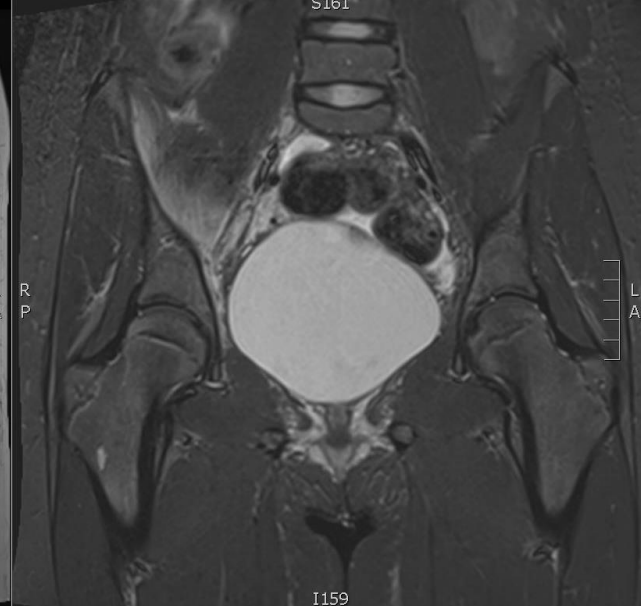


IRM HANCHES

# Cas n°4



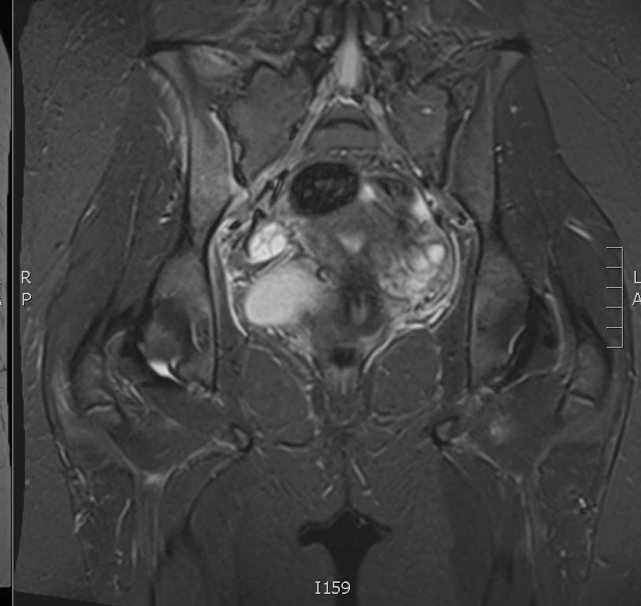
IRM HANCHES



IRM HANCHES



IRM HANCHES



IRM HANCHES

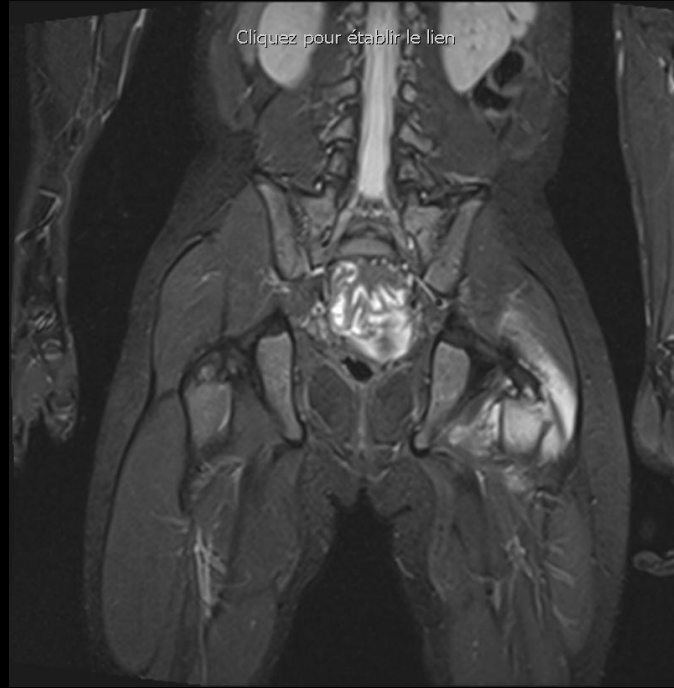
# Cas n°4 : arthrite septique



Cas n°5

# Cas n°5

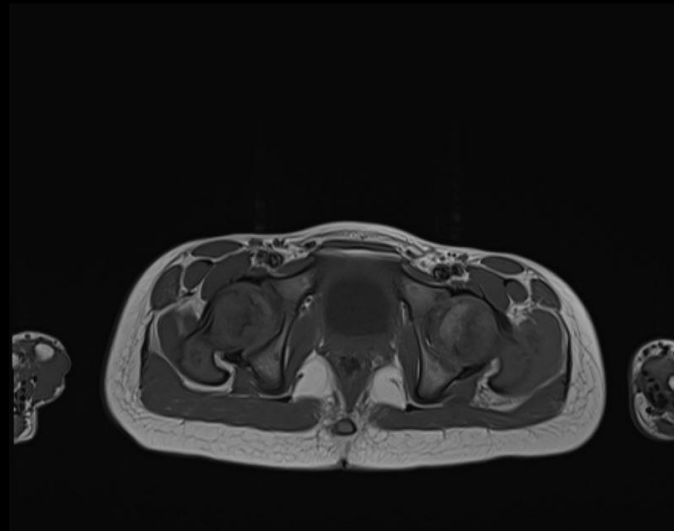
10



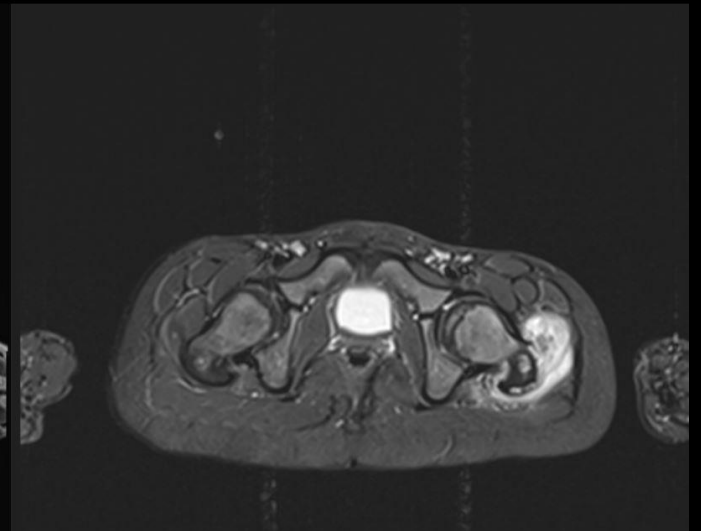
10



21



21



# Cas n°5: TBC

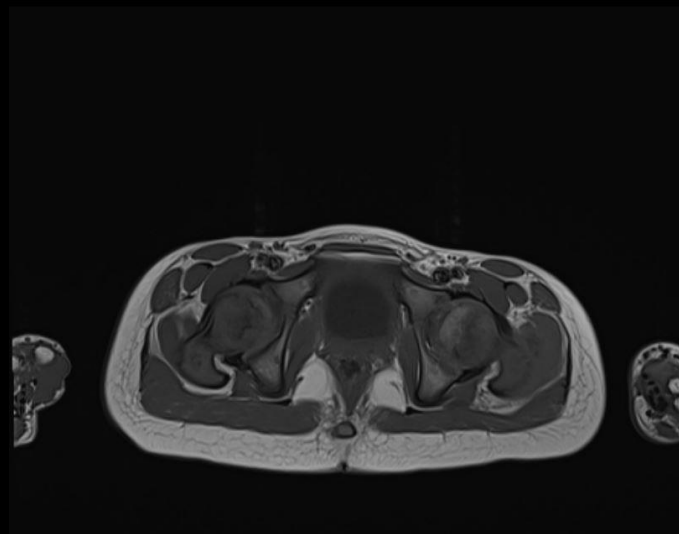
10



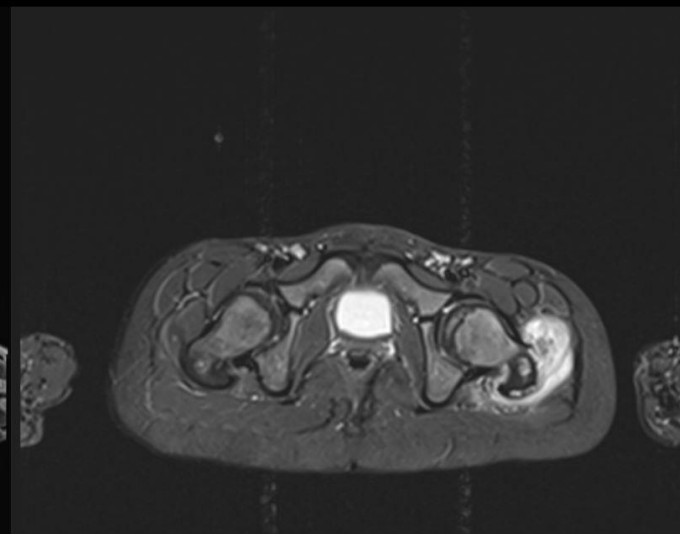
10



21



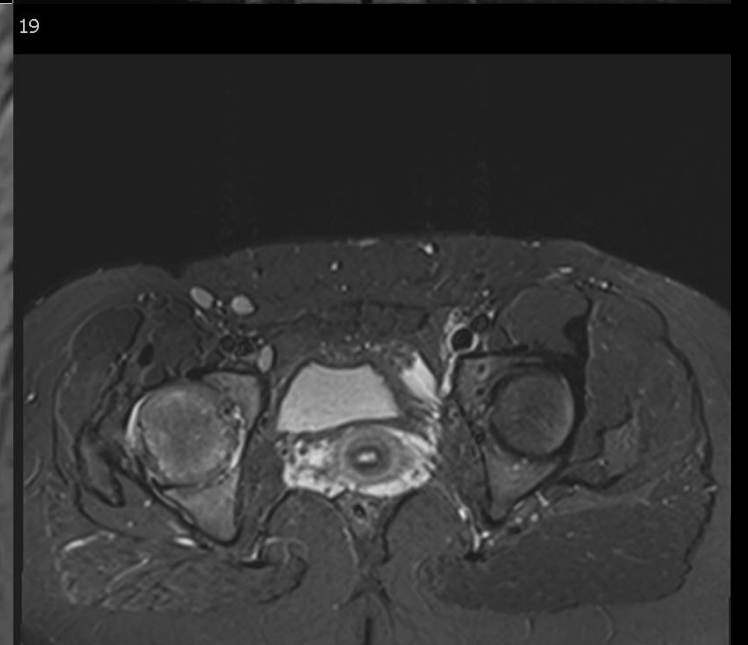
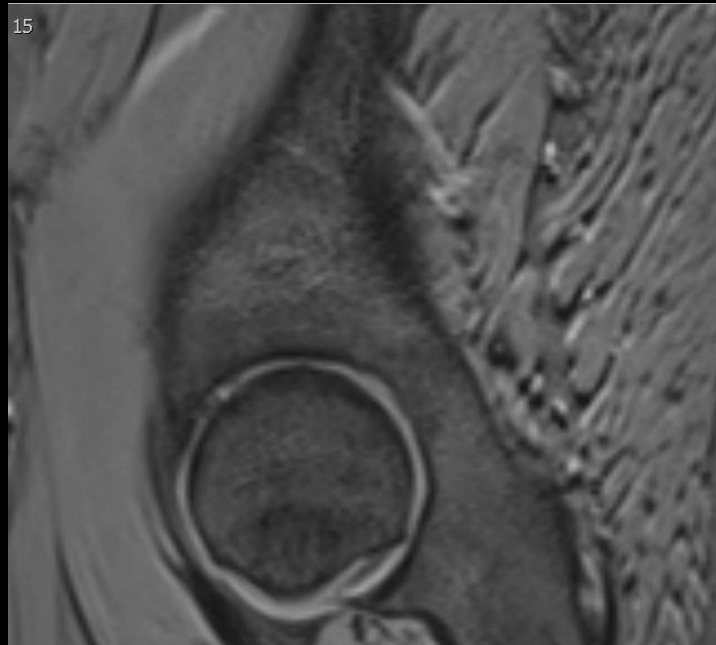
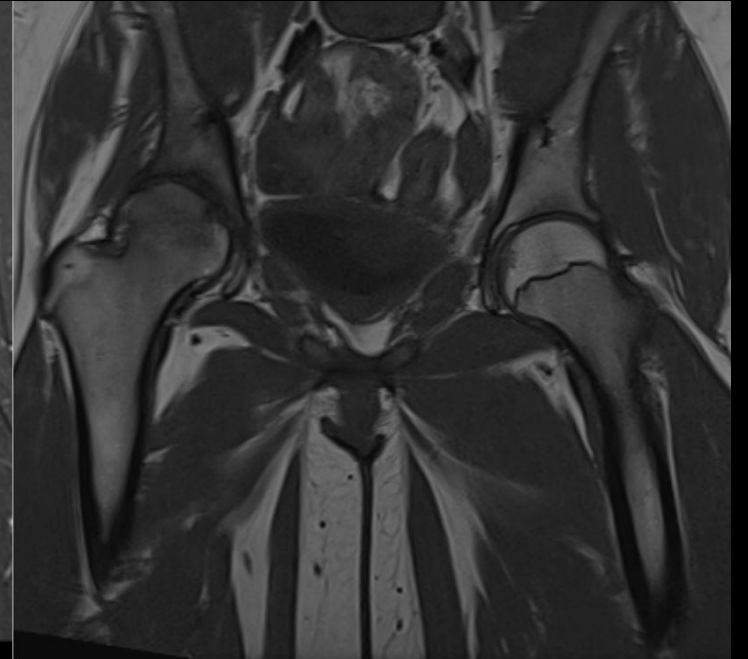
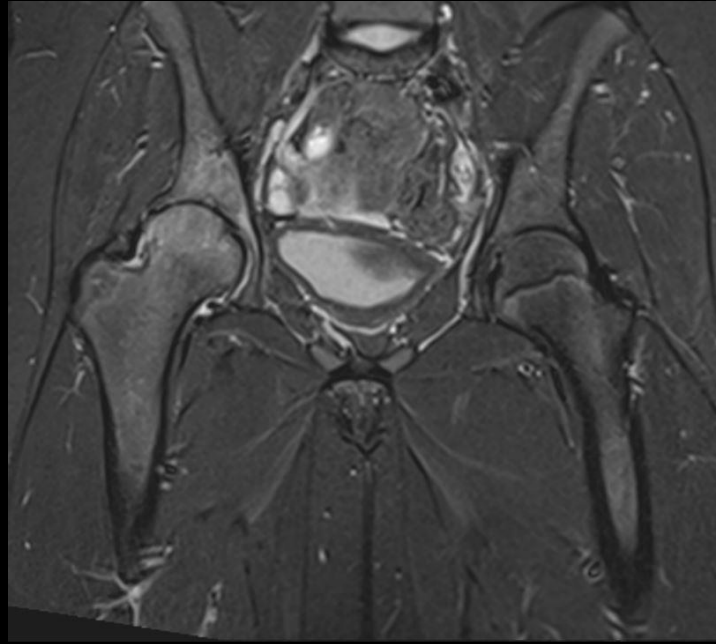
21



# Cas n° 6



Cas n°6:



# Quelques principes de base

Age, clinique (douleurs référées), laboratoire

Adapter technique à l'âge (complément d'examen)

ALARA mais avec les vrais notions de réduction de dose

CT osseuse lésions évolutives- metal

Echographie outil fondamental

Place de l'IRM (lésions moelle et pronostique)

En dehors de la MAP de la DDH échographie et IRM toujours avec une exploration radiographique