DEGA PELVIC OSTEOTOMY IN TREATMENT OF DDH 50TH ANNIVERSARY

Jacek Karski, Marek Okoński,
Jerzy Ostrowski, Łukasz Matuszewski,
Grzegorz Kandzierski, Tomasz Karski*

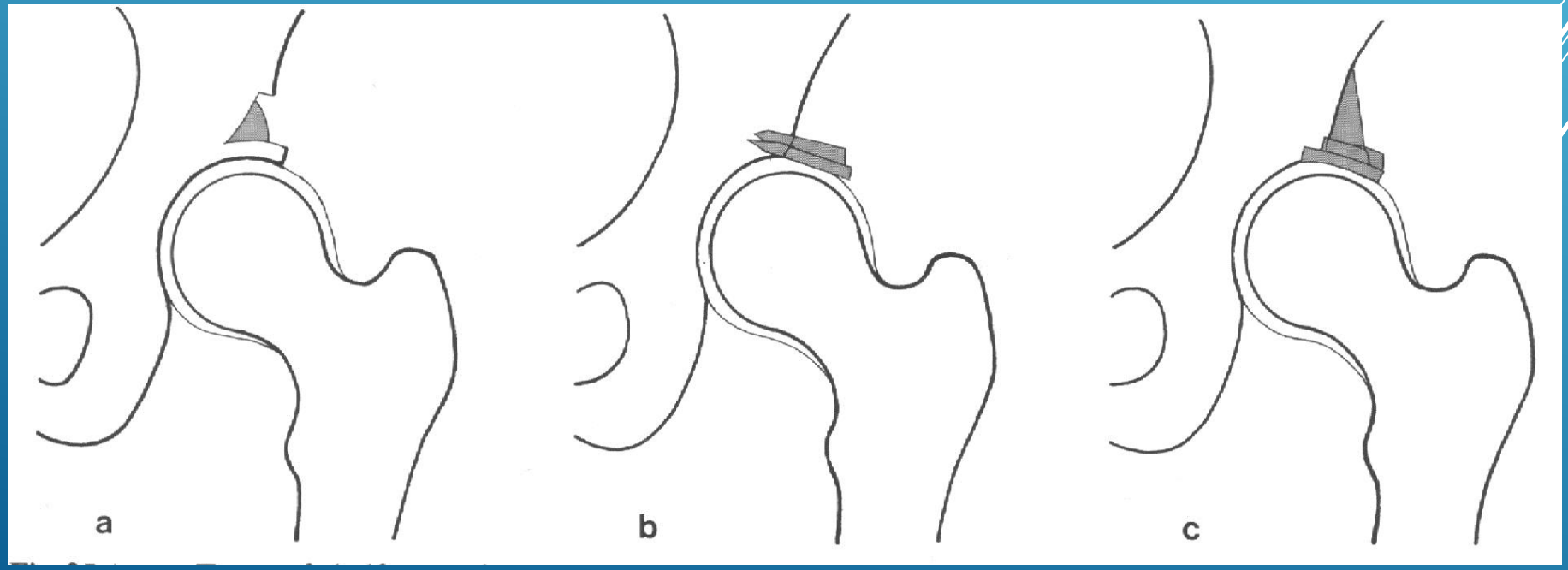
Paediatric Orthopaedic and Rehabilitation Department of Medical University in Lublin, Poland
Head: Professor Grzegorz Kandzierski MD PhD

*Vincent Pol University, Lublin, Poland

Introduction

Over the years, dysplasia and dislocation of the hip were diagnosed late. It resulted in severe disability.

The surgical methods used were imperfect and did not improve hip function permanently.



Introduction - History

Only the transiliac osteotomy method significantly improved the treatment results

In the 1950s-60s, Dega, Pemberton and Salter described their osteotomy methods

Introduction - History

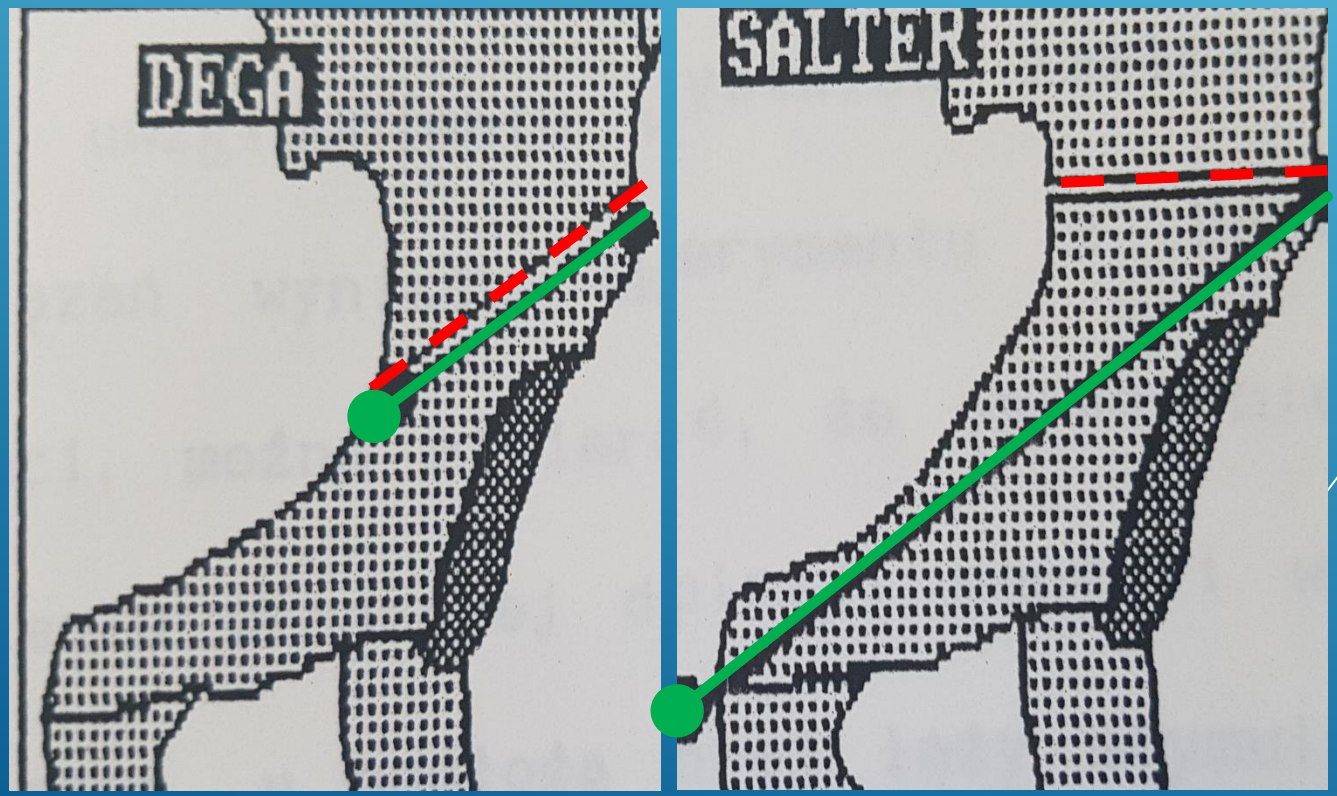
Dega in 1964 described briefly the first transiliac osteotomy which was performed in 1958 in Poznan Hospital in Poland

Pemberton's procedure performed in 1958 and described in 1969 the cut starts between the anterosuperior iliac spine and the anteroinferior iliac spine and progresses around the hip joint, back to the triradiate cartilage, but it does not got through the pelvis as in Dega's method.

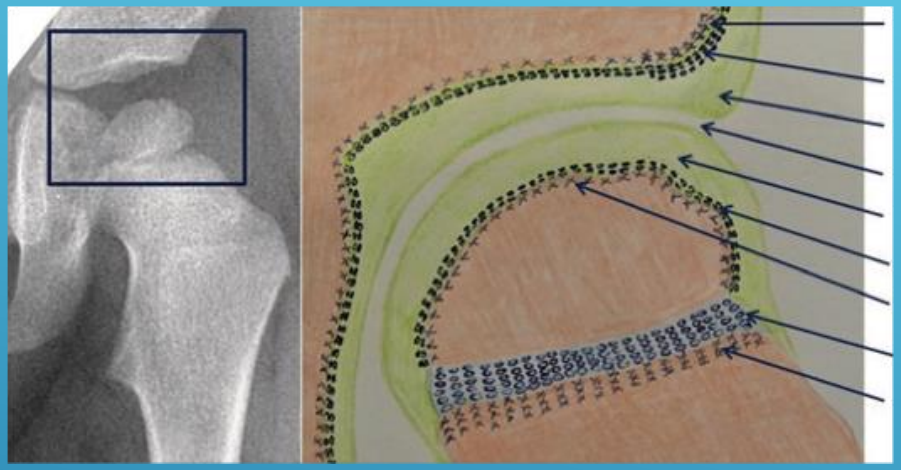
In 1957 **Salter** performed a complete pelvic osteotomy that hinges on the symphysis pubis and results in anterolateral displacement of the acetabulum. He presented it in 1961.

BACKGROUND INFORMATION

In Dega's osteotomy the point of rotation is located in the region of the cortical layer of the sciatic notch in contrast to Salter's osteotomy, where the point of rotation is pubic symphysis



Within the hip joint there are two growth plates which determine its development and growth.



immature bone of the acetabular roof
growth cartilage of the acetabular roof articular cartilage of the acetabular roof
articular cartilage of the femoral head
fissure of the hip joint
growth cartilage of the femoral head immature bone of the femoral head
epiphyseal (subcapital) cartilage
immature bone of the femoral neck

The first of these is the growth plate sandwiched between the epiphysis and the metaphysis which connects the neck of a femur to the head.

The roof's growth plate is located in the area of the acetabulum adhering directly to the bone roof

Materials and methods

Department of Pediatric Orthopedics in Lublin in the years 1970-2000,

959 repositioning - reconstruction surgeries of the hip joint were performed due to DDH.

- **593 open hip reductions where Dega's osteotomy with derotation osteotomy of proximal femur were used.**
- **291** other hips we performed **isolated Dega's osteotomy**with derotation osteotomy of proximal femur.
- In **75** patients only **isolated pelvic osteotomy** according to Dega's method was carried out

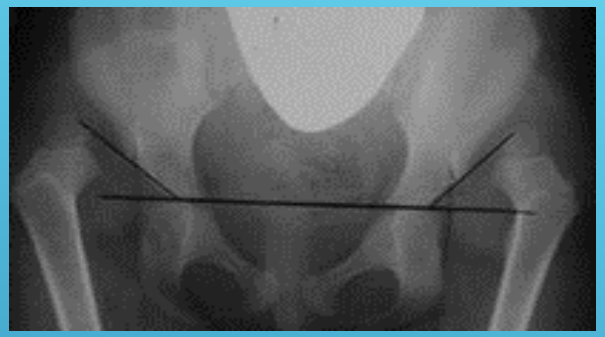
Materials and methods

In our analysis we took into account:

- **120 children operated between 2 - 6 years of age**
- **Follow - up longer than 4 years**
- **No surgical technique errors**
- **Full series of HQ x-rays (6, 12, 18, 24, 36, 48 and more months after surgery)**
- **It gave us three groups with 40 patients each operated according to Dega, Pemberton or Salter.**

We had three main indications for surgery:

1. Primary indications - children above 2 years old with late diagnosed of the hip's dislocation



2. Secondary indications - Children with failure of closed reduction preceded with traction's treatment (which stays no more than 3 weeks)

3. Failure of closed reduction, early reluxation

Surgical technique (Dega):

THE HIP IS APPROACHED LATERALLY (WATSON-JONES APPROACH)

Surgical technique (Dega):

1. Osteotomy initiation - The incision is extended with a osteotomie applied 1.5-2 cm below anterosuperior iliac spine

2. Obliquely and curvilinear oriented osteotomy is performed towards the sciatic notch, securing with retractor. Medial iliac cortex is intact for preservation of "the hinge”

3. Such osteotomy spares the acetabular roof’s growth plates

4. Dissection of the transverse acetabular ligament, removal of the pulvinar (fibrofatty tissue), or ejection of the overgrown ligament of head of femur (risk of interposition)

Surgical technique (Dega):

5. In older children femoral osteotomy with reduction of the femoral antetorsion angle to about 20 degrees, without changing the neck shaft angle

6. Spica cast for 6 weeks, than 2-3 months of abduction splin. Supported or active weight-bearing after 4-5 months

Surgical technique (Dega):

The inclination of the acetabular fragment - the cortico-spongy lobe causes its bending and slight collapse at the end of the osteotomy.

Through this act, the shape of the acetabulum changes, provides enough coverage of the femoral head. Therfore the entire pelvis deforms slightly.

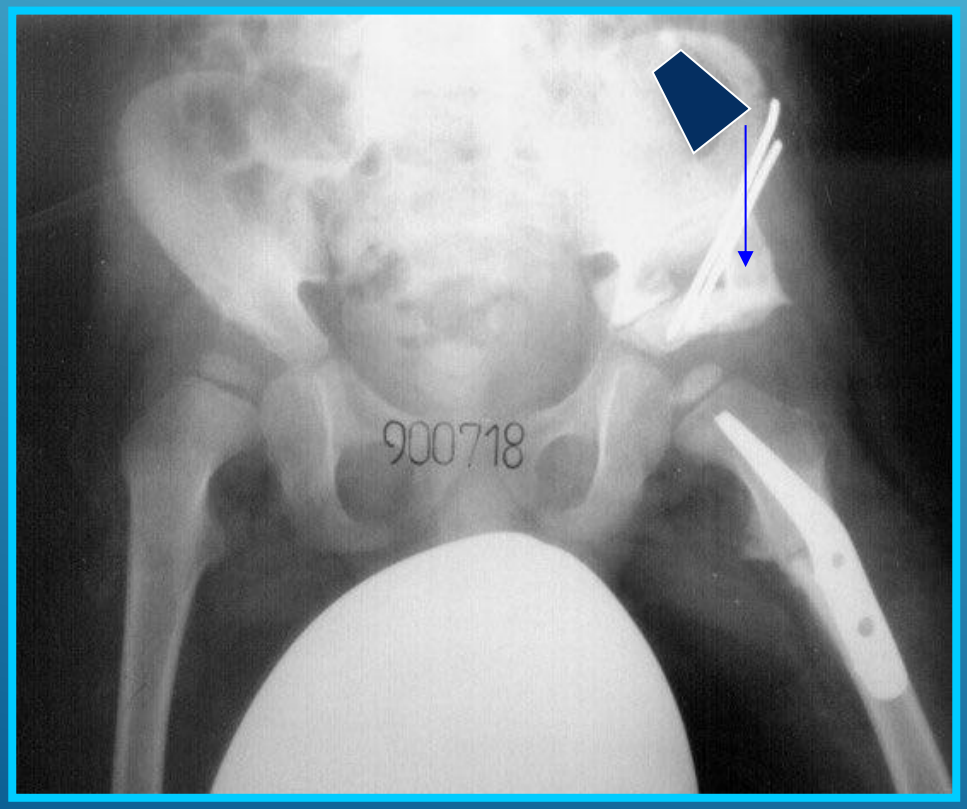
Surgical technique (Dega):

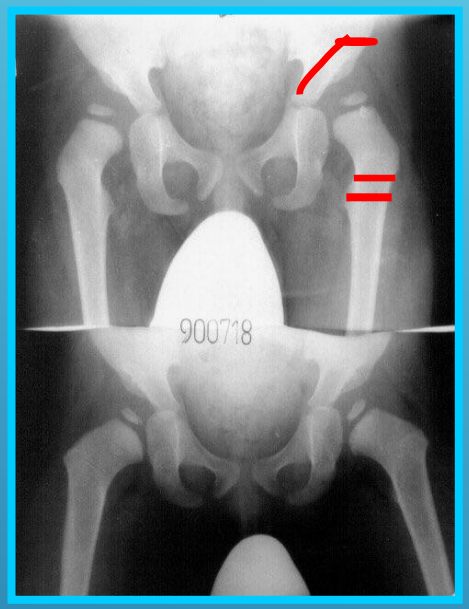
Graft harvested for the roof inclination:

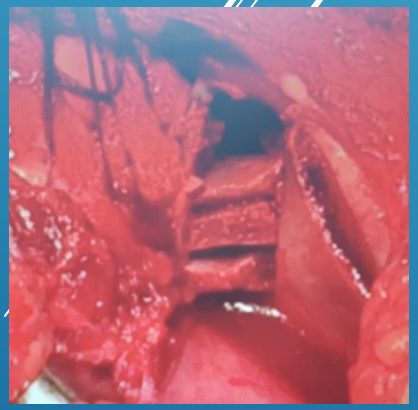
1. From the hip bone plate

2. or/and from the femur when the reduction was necessary. The size of the displacement was determined within the Shenton arc displacement

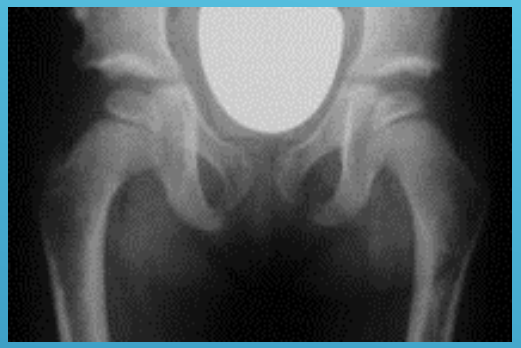
We take the graft from the hip bone plate from a place different than described in the original method. Not from the edge of the plate, but from the inside, which does not deform the pelvis. It is caused because of cosmetic reasons. Girls prevail in the clinical material.







RESULTS



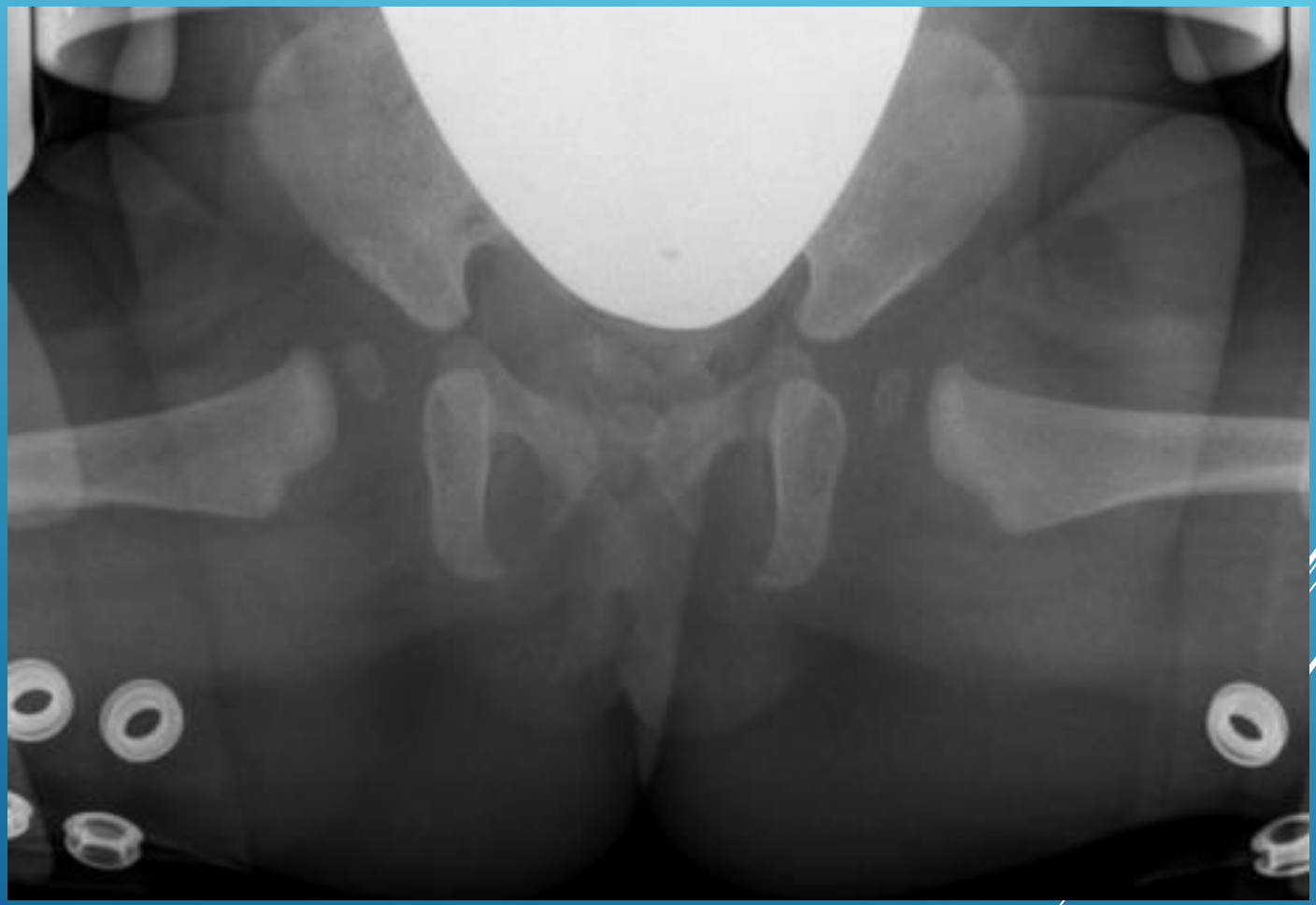
EXAMPLES OF ROOF'S DEVELOPMENT AFTER OSTEOTOMY ACCORDING TO DEGA

BILATERAL HIP LUXATION - DDH

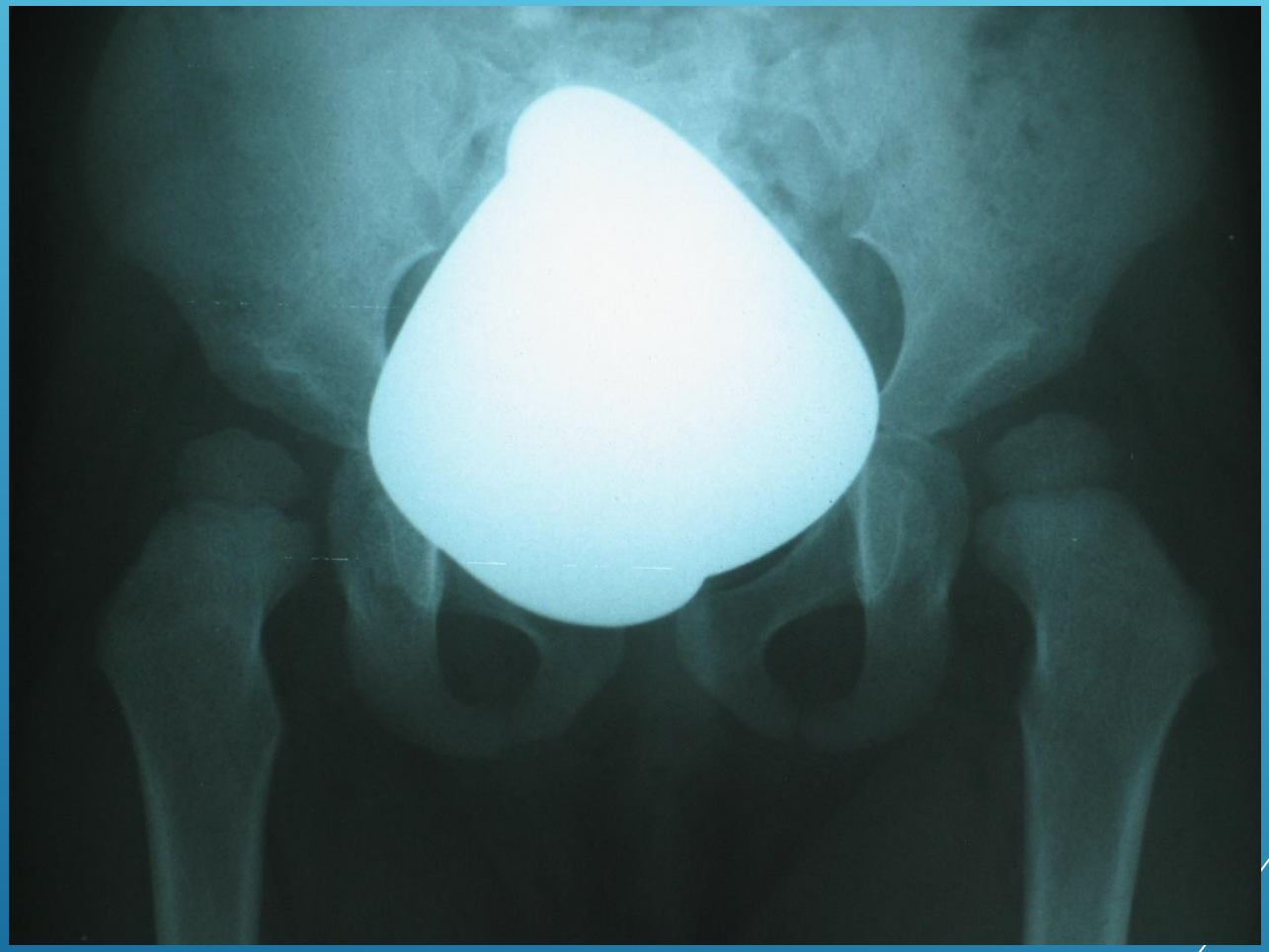
Natalia Dz.
born 15th of March 2006

OVERHEAD EXTENSION 6 WEEKS – REPOSITION DURING TRACTION – THEN HOHMANN DEVICE

HOHMANN – JORDAN DEVICE WAS APPLIED

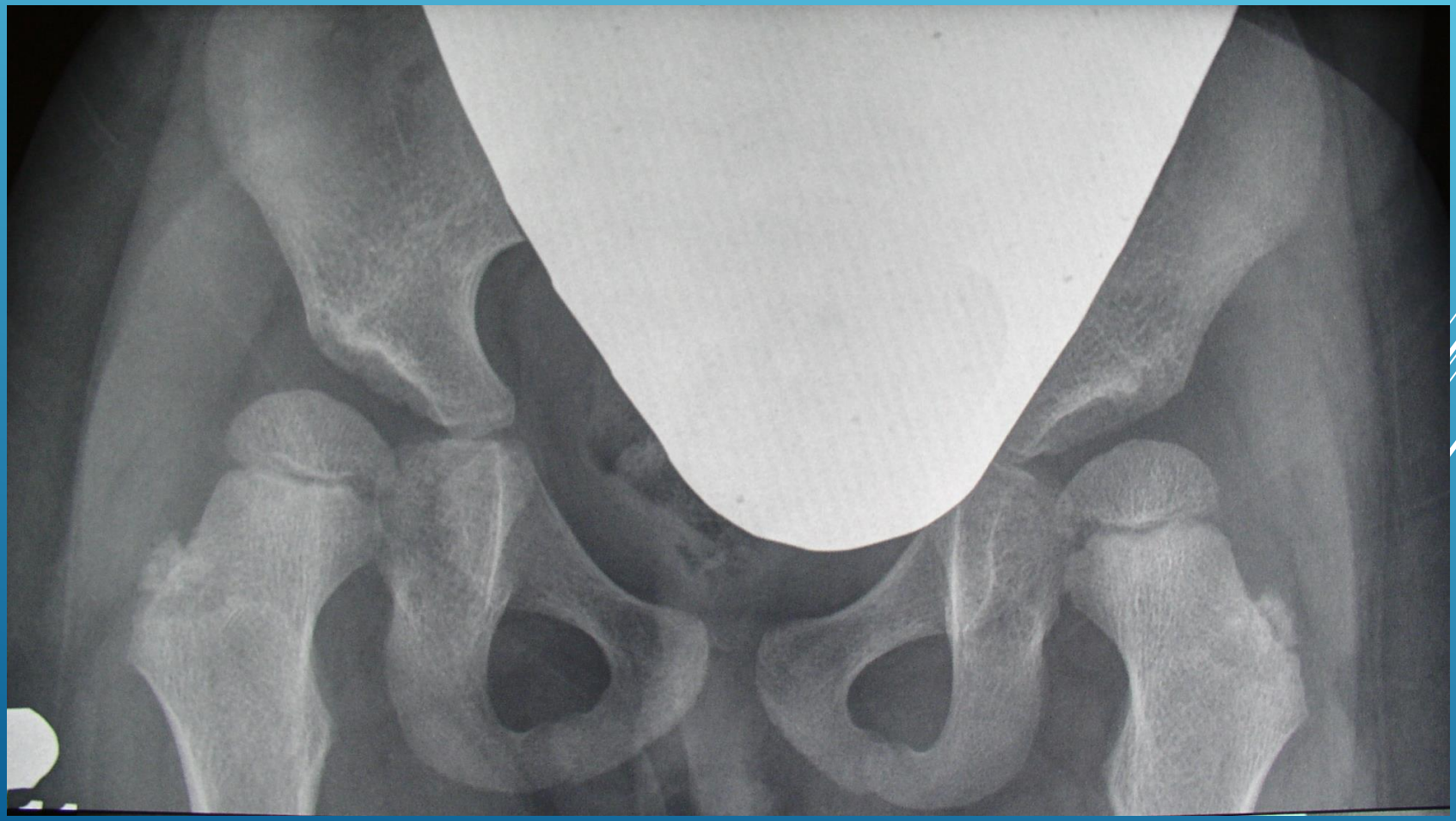


THE TREATMENT EFFECT INSUFFICIENT - RESULT - 1 YEAR OLD

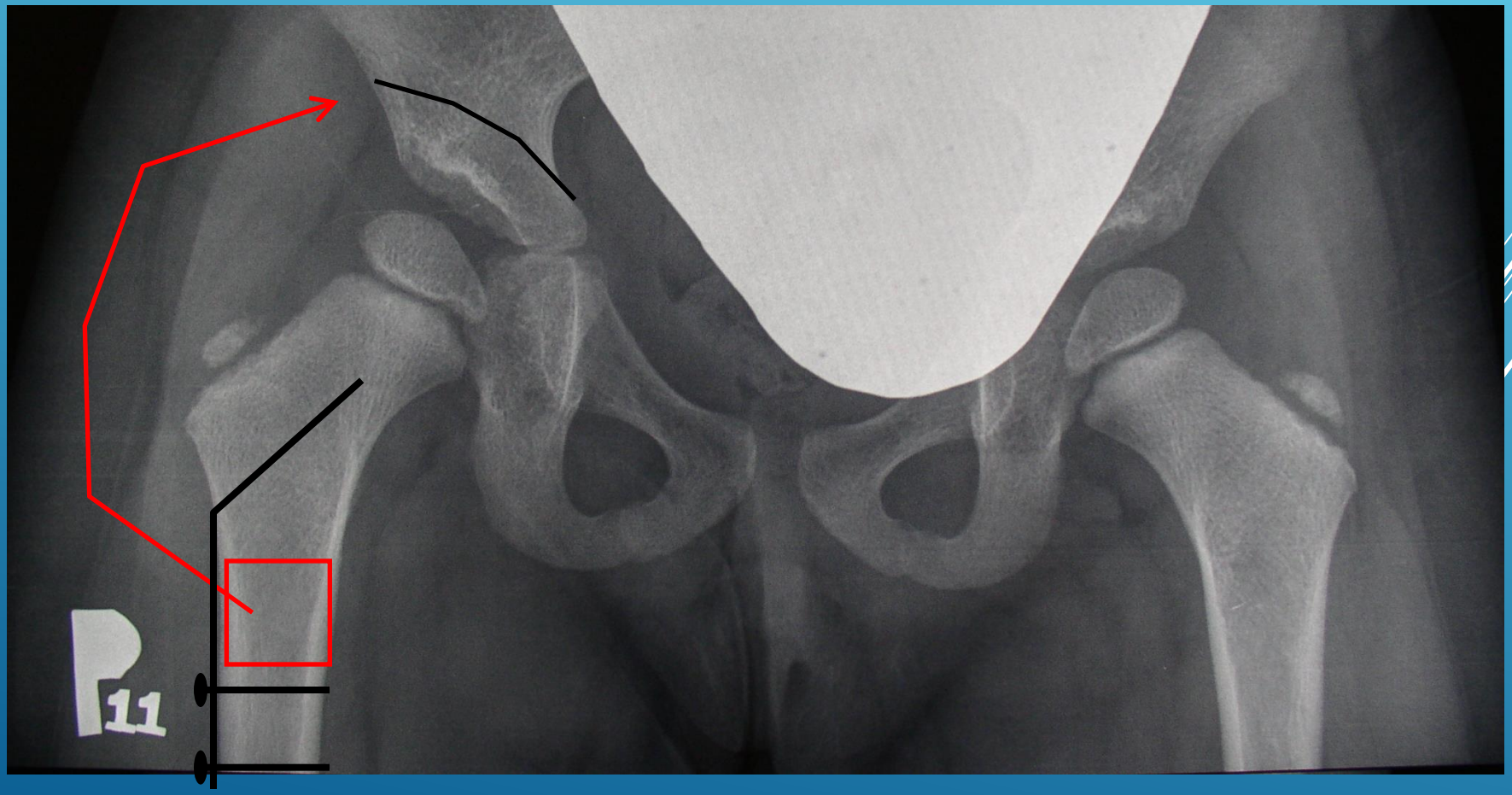


THE TREATMENT STILL IN PROGRESS – THE EFFECTS UNSATISFACTORY

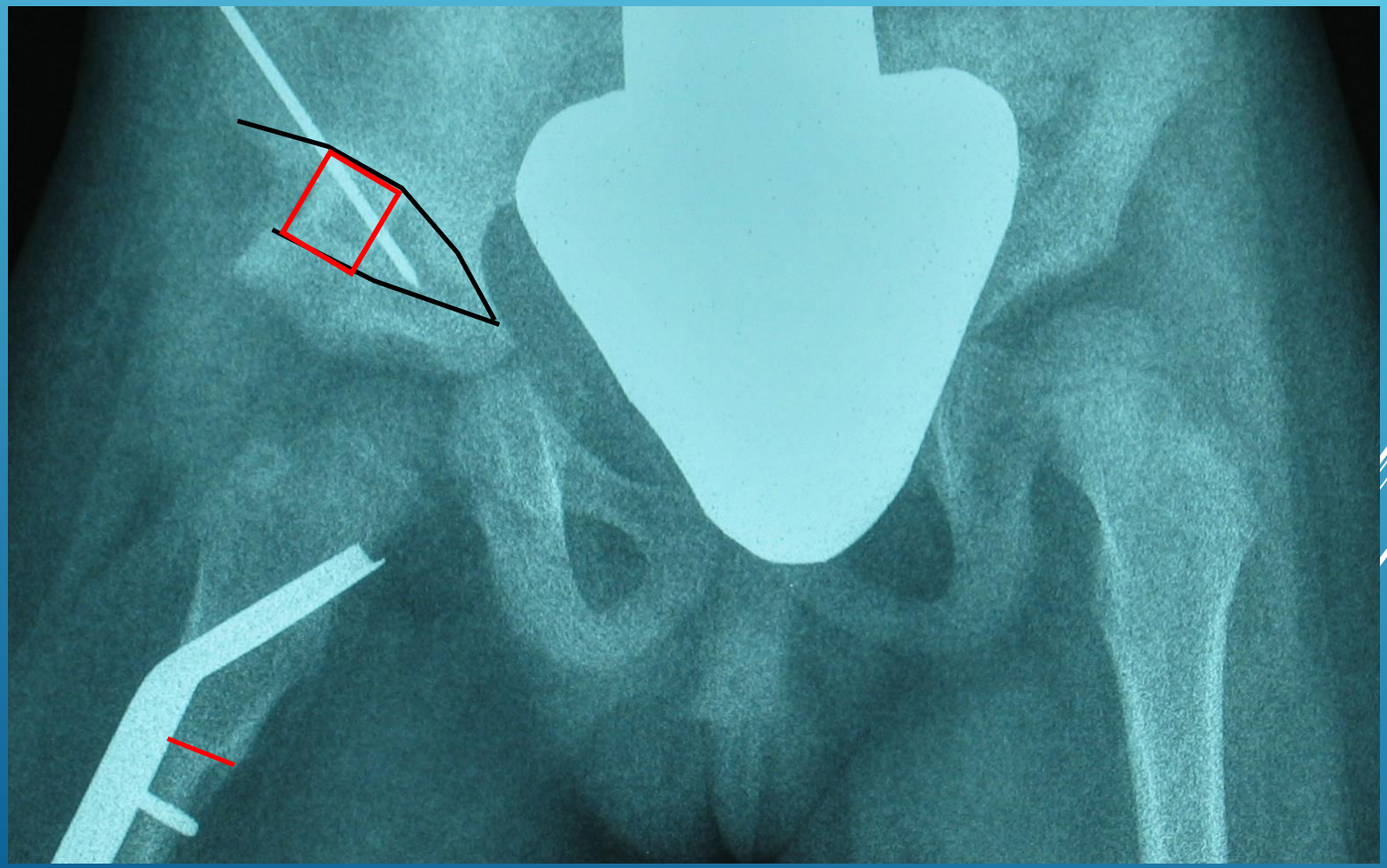
PATIENT 3.8 YEARS OLD – AP VIEW
AN OPERATIONAL DECISION WAS MADE



OPERATIVE TREATMENT - PLANING

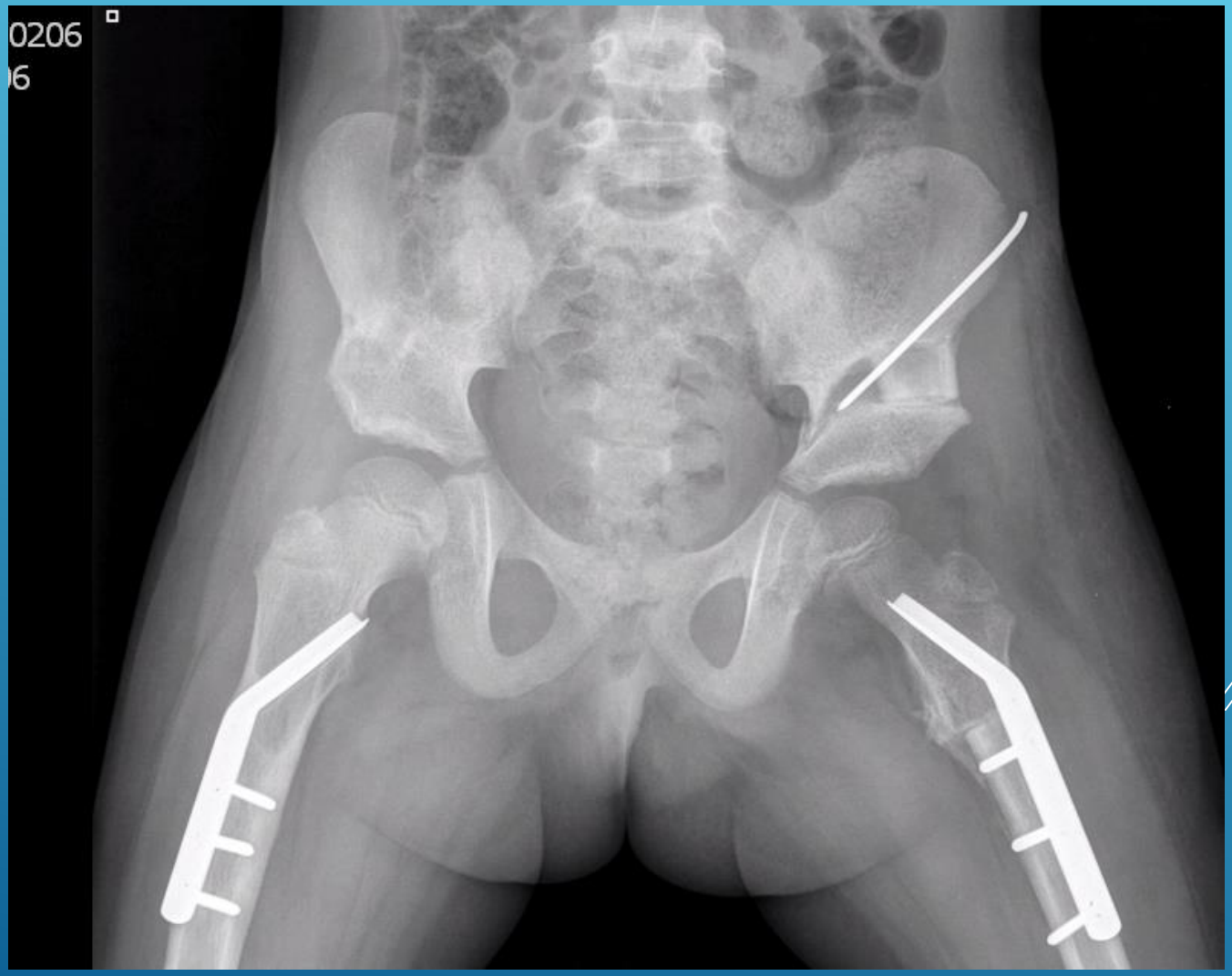


OPERATIVE TREATMENT

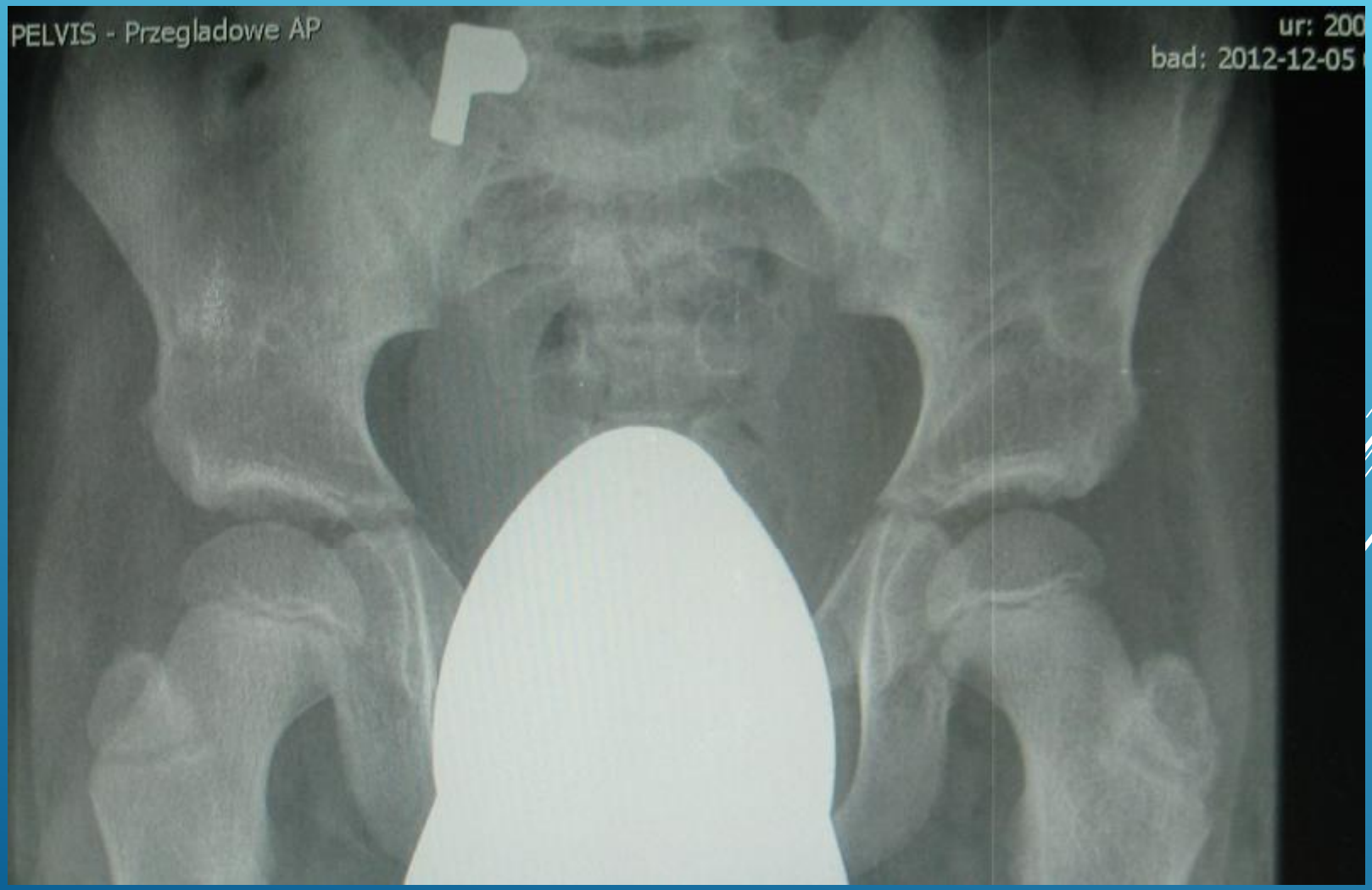


RIGHT HIP AFTER SURGERY – EXCELLENT RESULT, LEFT HIP NEED CORRECTION

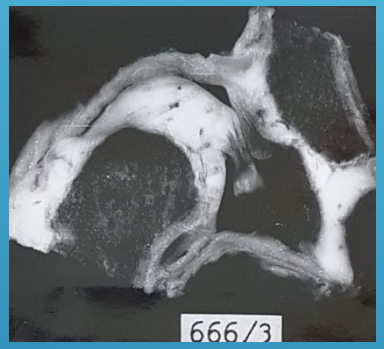
OPERATIVE TREATMENT - RESULT

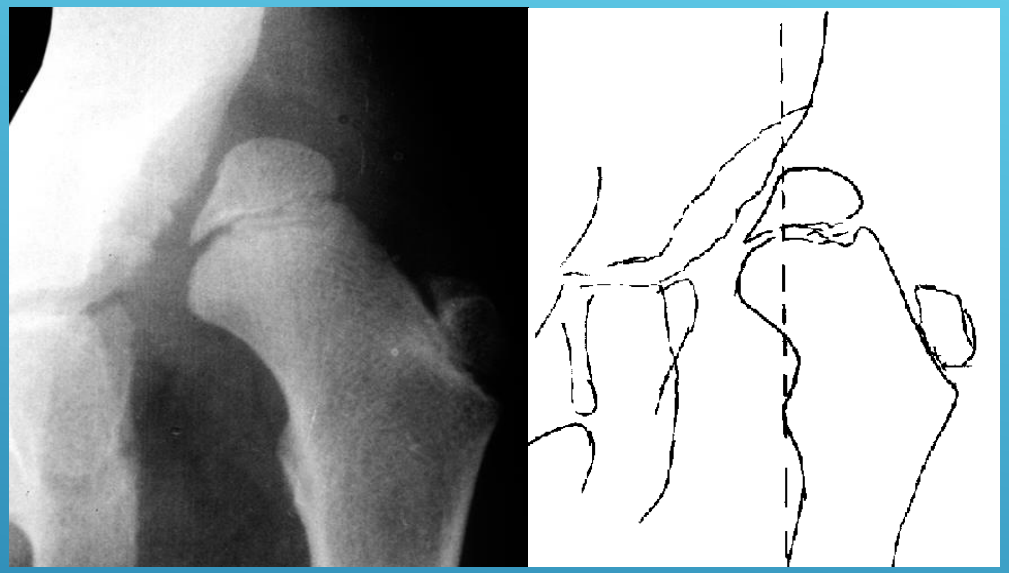


FINAL RESULT – TWO YEARS ATFER SURGARY CHILD IS 6 YEARS OLD



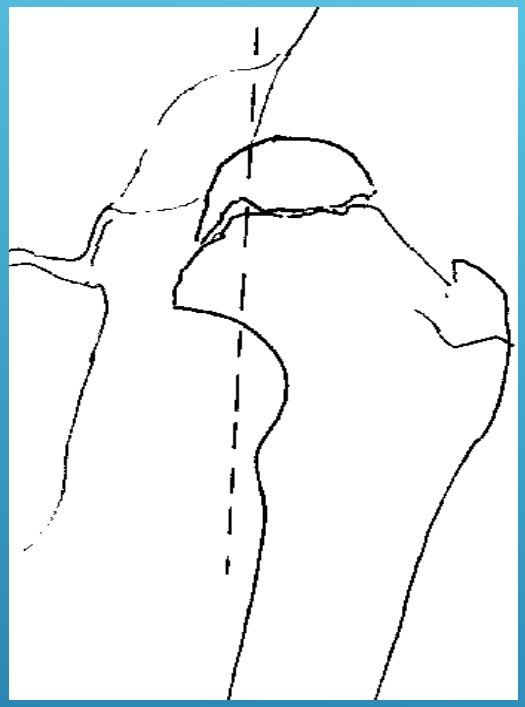
EXAMPLES





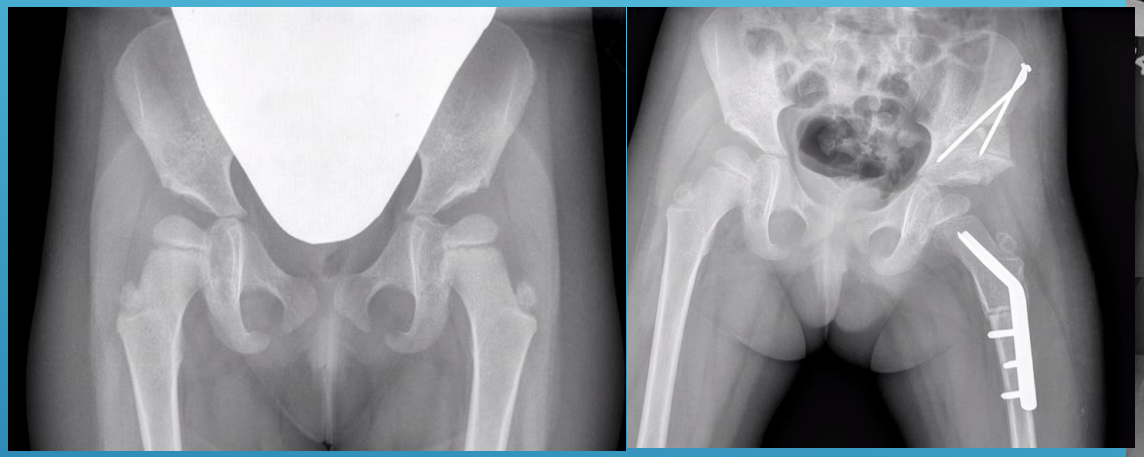
FEMALE PATIENT WITH LOW DEVELOPMENTAL DISLOCATION OF THE JOINT,
FEMORAL HEAD PRESSES ON THE EDGE OF THE ACETABULAR ROOF. THE ACETABULAR ROOF IS SHORT AND STEEP AND THERE IS A PSEUDOACETABULUM ABOVE THE ROOF. THE HEAD ON THE MEDIAL SIDE IS FLATTENED.

EXAMPLES

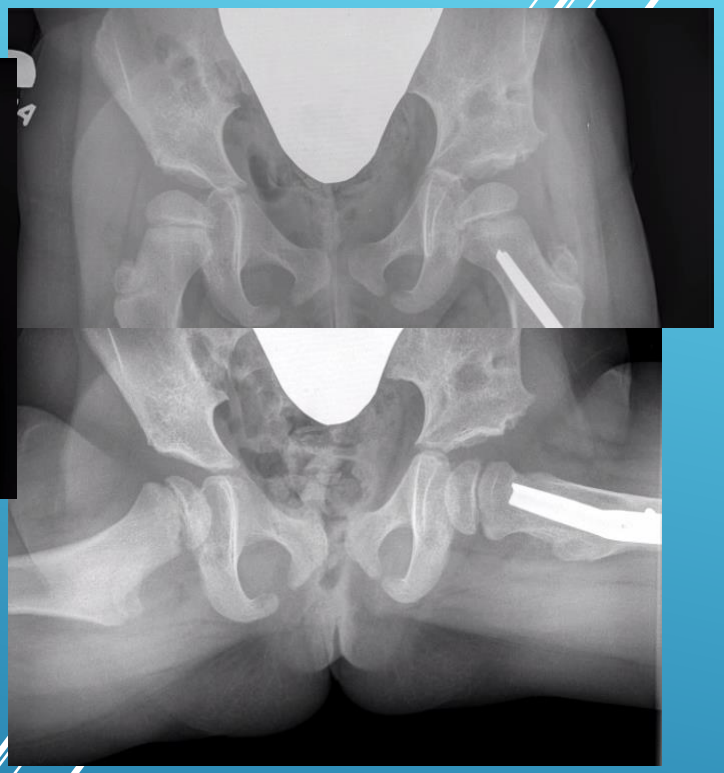


FEMALE PATIENT WITH DEVELOPMENTAL SUBLUXATION OF THE HIP, ACETABULAR ROOF IS SHORT AND STEEP, HEAD FLATTENED AND EPIPHYSEAL CARTILAGE IS BENT IN THE MEDIAL PART.

EXAMPLES



4y



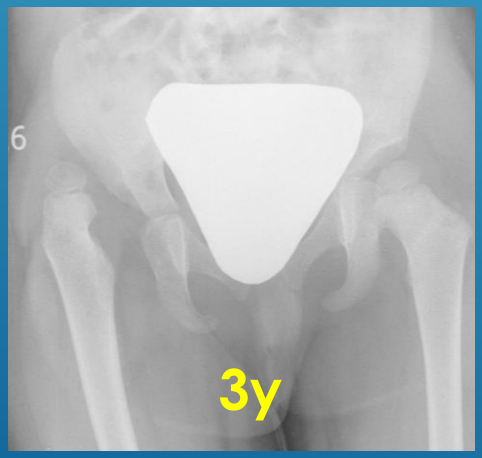
6y

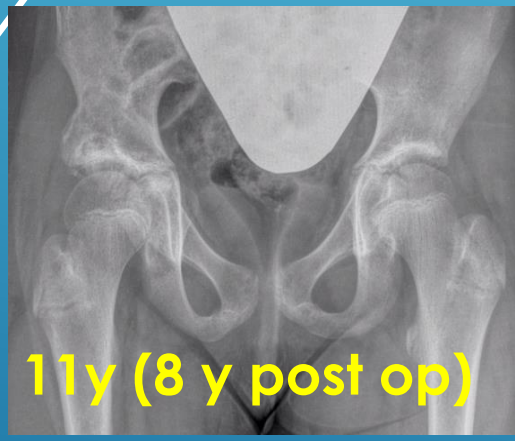
4 YEARS OF AGE

DDH - REMODELING OF THE ACETABULUM ROOF AND THE FEMORAL HEAD

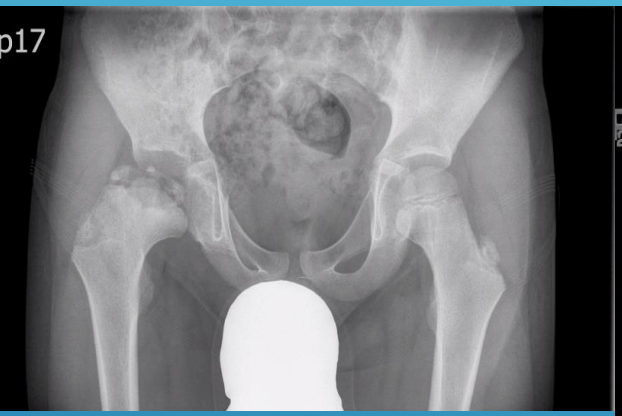
EXAMPLES

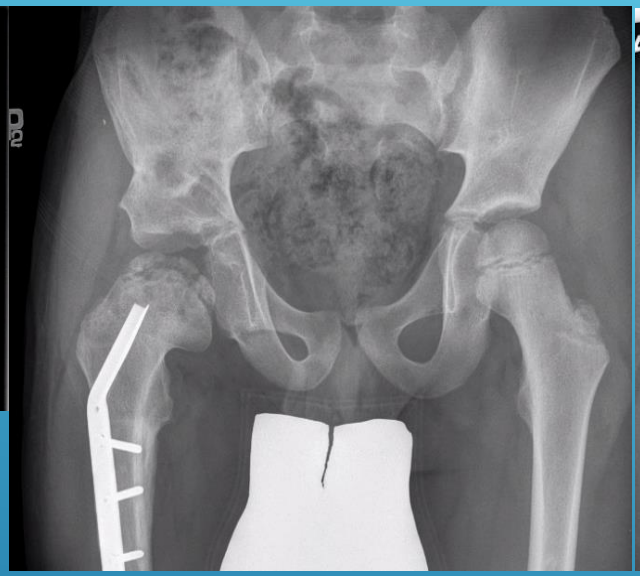
DEGA OSTEOTOMY
AG 3Y. DDH
STIMULATION OF ROOF GROWTH CARTILAGE REMODELING AVAILABLE EVEN AFTER SEVERAL YEARS





EXAMPLES





7 YEARS OF AGE
DEGA'S OSTEOTOMY

3 YEARS AFTER

PERTHE'S DISEASE

DISCUSSION

Aelopment of the acetabulum after various types of osteotomies (Dega, Salter, and Pemberton) did not proceed evenly over time.

After Dega's osteotomy (similarly to Pemberton), the acceleration of acetabulum edge growth was greatest in the first year after the surgery.

In Salter's osteotomy, an intense increase in acetabulum roof edge was observed in the second and third year after surgery.

The rhythm of the acetabulum roof growth after different types of pelvic osteotomy was statistically significantly differentiated.

It depended on the child's age and the length of the acetabular roof.

In older children (4-6 years), the acceleration of the acetabulum edge growth in the first year after Degia's osteotomy is definitely more explicit in comparison with Salter's osteotomy.

Gregosiewicz prooved that lateral margin of the acetabulum (roof length) rather than the acetabular index should be a criterion differentiating the choice of the osteotomy.

With a short roof, the Dega's osteotomy is more effective than Salter's osteotomy.

The Pemberton osteotomy involves cutting directly into the iliopubic and ilioischial limbs of the triradiate cartilage of the acetabulum.

Complete closure of the triradiate cartilage after this osteotomy has been described in case reports.

AI Leet et al: Injury to the growth plate after Pemberton osteotomy:

The Journal of Bone and Joint Surgery 81(2):169-76 · March 1999

Up to now we have not experienced nor observed cases of triradiate cartilage injury described in the literature with the Dega osteotomy.
This has not been the case with other types of osteotomies such as the Pemberton and Pembersal where there are such reports.

Shier-Chieg Huang, et al: Pemberton osteotomy for acetabular dysplasia.

J Bone Joint Surg Am. 2010;92:2083-94.

The results of this study demonstrate that Dega osteotomy produces near-normal lateral coverage parameters in children with DDH.

It is similar to other reports:

Czubak et al: Dega pelvic osteotomy: indications, results and complications Journal of Children s Orthopaedics 12(4):342-348 · August 2018.

Ahmed Alghamd et al: Dega Osteotomy for the Correction of Acetabular Dysplasia of the Hip: A Radiographic Review of 21 Cases Journal of pediatric orthopedics 32(2):113-20 · March 2012.

Virginie Rampal et al: **Outcomes of modified Dega acetabuloplasty in acetabular dysplasia related to developmental dislocation of the hip. Orthopaedics & Traumatology Surgery & Research 100(2) · April 2014**

CONCLUSIONS

1. In Dega's method, the place of osteotomy is located away from the growth cartilage, therefore saves the roof's growth plates.

2. After reduction the weightlessness acetabulum’s roof still growths to the lateral side. Simultaneously the acetabulum is modeling the femoral head. The shape of it normalizes with time.

Symposium

Prague-Lublin-Sydney-St. Petersburg 2020

Thank You for Your Attention