



75th ANNUAL MEETING



hipscreens.org

Mini-Symposium MS07
HipScreen Tutorial

Vedant A. Kulkarni, MD



Shriners Hospitals
for Children®—Northern California

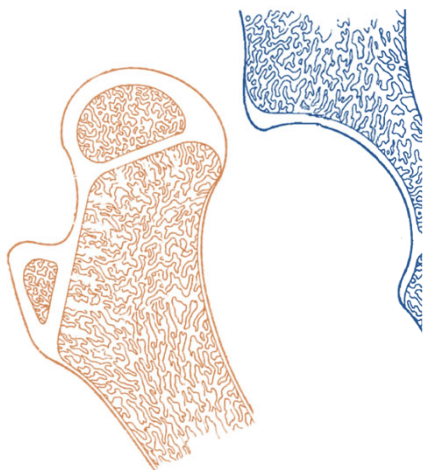
UC DAVIS
HEALTH

SCHOOL OF
MEDICINE



Part 1

Introduction of Hip Surveillance



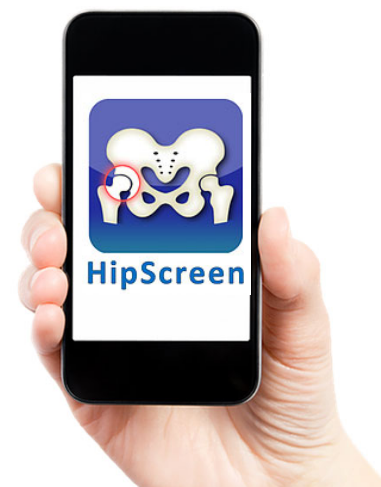
Part 2

Perspectives in Hip Surveillance Implementation



Part 3

HipScreen: Hip Surveillance at Your Fingertips!





75th ANNUAL MEETING

FINANCIAL DISCLOSURE
AACPDm 75th Annual Meeting
October 6-9, 2021

Speaker Name: Vedant Kulkarni, MD

1. Disclosure of Relevant Financial Relationships

I have no financial relationships to disclose.

2. Disclosure of Off-Label and/or investigative uses:

I will not discuss off label use and/or investigational use in my presentation.

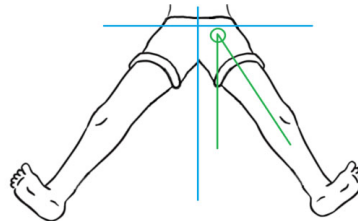


The Hip Surveillance Visit: *Assess Whole Child*

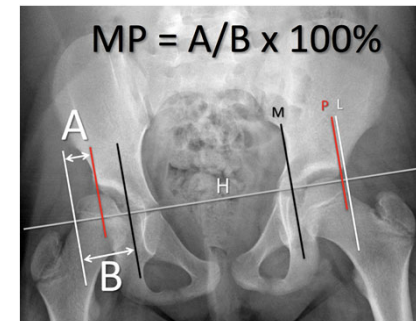
Function



Physical Exam



Radiographs





Barriers to Implementation

The Provider Perspective

“The guidelines
are too complex”

“Don’t know how
to read an x-ray”



“Measuring an X-ray
takes too much time”

“My radiologists don’t
measure the Migration
Percentage”

Use 21st Century Technology!





Home How HipScreen Works Why Hip Surveillance? Tutorials About HipScreen  


HipScreen Publication
Read the research study that establishes HipScreen as a reliable and valid tool.

Sage Award Winner
American Academy for Cerebral Palsy and Developmental Medicine

HIP SURVEILLANCE at your fingertips.


One in three children with cerebral palsy will develop hip problems. Early detection through a "Hip Surveillance Program" can preserve a child's function and prevent pain. Learn how to implement a Hip Surveillance Program for a child with cerebral palsy with **HipScreen**, a free app developed by physicians specializing in cerebral palsy.

Learn More
Get an overview of the HipScreen's features. 

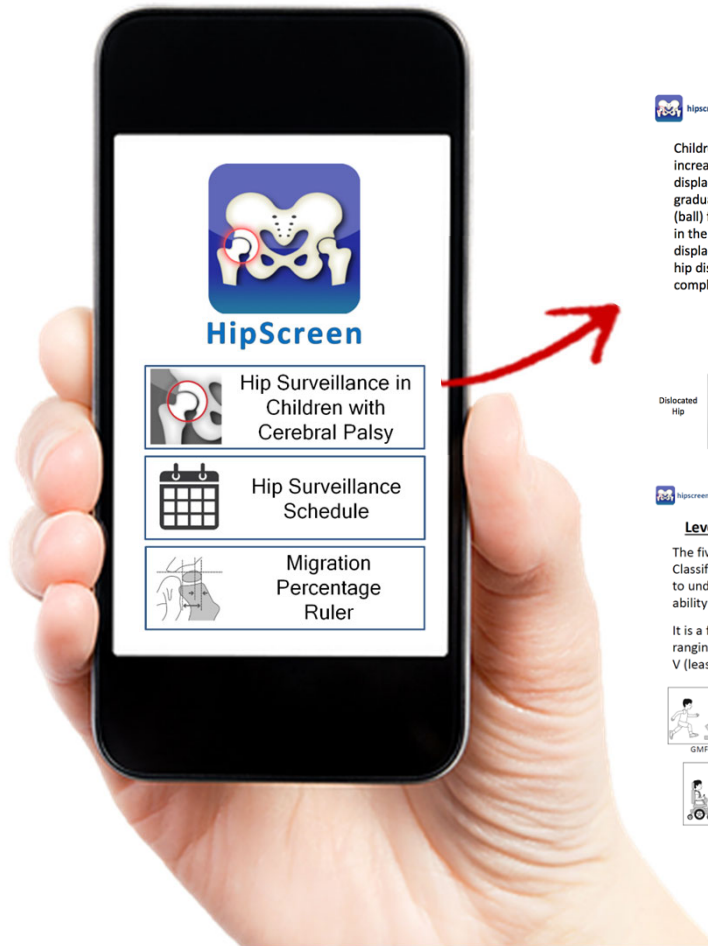
Tutorials
Get trained to use HipScreen! 

2016 CP Academy Fred P. Sage Award

created and designed at

 **Shriners Hospitals**
for Children™

Educational Material



WHY do Hip Surveillance?

Children with cerebral palsy (CP) are at increased risk for hip displacement. Hip displacement, or "subluxation," is the gradual movement of the femoral head (ball) from the acetabulum (socket). As in the child's x-rays below, progressive displacement may eventually lead to a hip dislocation where the ball is completely outside of the socket.



Level of Function Classification

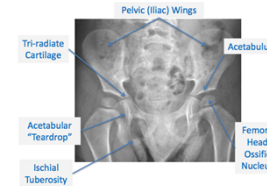
The five level Gross Motor Function Classification System (GMFCS) is an easy to understand classification of a child's ability to initiate movement.

It is a five-level classification system, ranging from levels I (most function) to V (least function).



Interpretation of an AP Pelvis X-Ray

An anterior-posterior (AP) Pelvis X-Ray gives valuable information about the presence of hip dysplasia in a child with cerebral palsy. An AP Pelvis X-Ray has the following important landmarks:



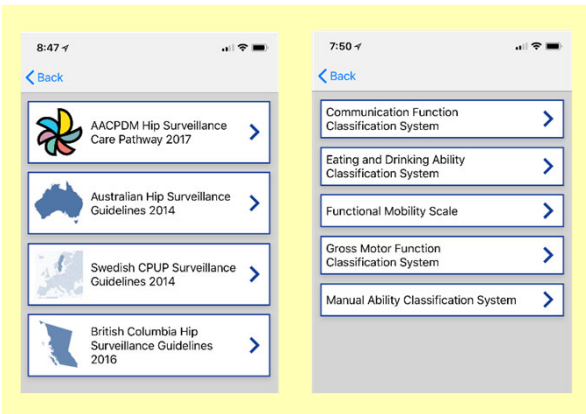
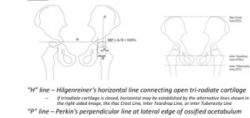
Radiology Protocol for Cerebral Palsy Hip Surveillance AP Pelvis X-Ray

Study Requested: Supine Anterior-Posterior Pelvis X-Ray

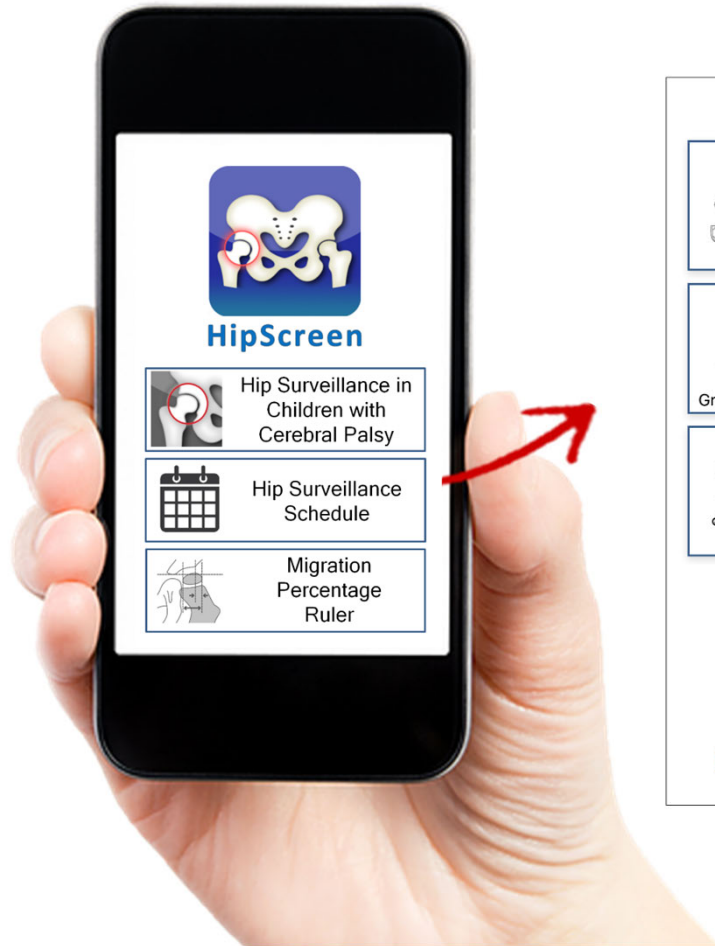
Positioning details:

- Children should be positioned as follows:
 - Pelvis horizontal
 - Feet and legs - neutral abduction/adduction
 - Feet pointing forward (feet may not necessarily point up)
 - If a hip brace/corset is present, position the lower leg as placed to prevent anterior pelvic tilt and lumbar lordosis.

Reason for Request: Please report the Migration Percentage (MP) for each hip, defined as the percent of ossified femoral head that is not covered by the ossified acetabulum roof, in the left-sided figure below. **Migration Percentage ≤ 0.8 $\pm 100\%$**



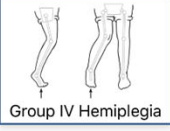





*Full Text Surveillance Guidelines
and CP Classification Systems*






Guidelines at Your Fingertips

Choose Child's Level of Function

 GMFCS I	 GMFCS II
 Group IV Hemiplegia	 GMFCS III
 GMFCS IV	 GMFCS V

[Hip Surveillance Information](#)

 **AACPDM Hip Surveillance
Care Pathway 2017**

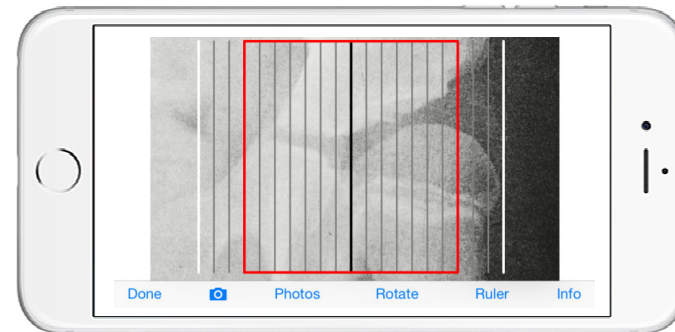
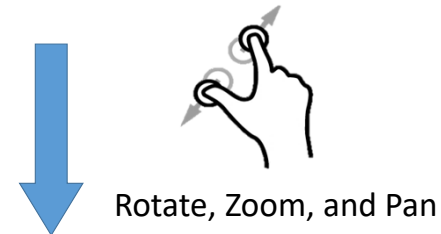
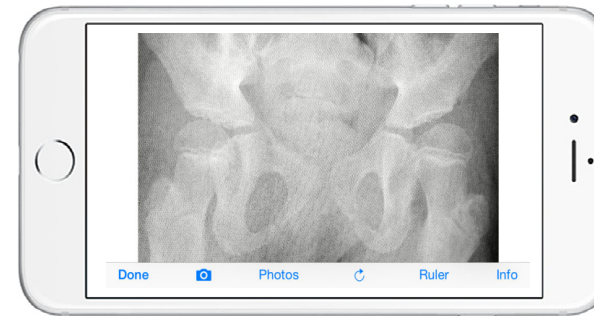
- Ages 2 – 8: Pelvis X-ray and Clinical Exam every year
- Ages 10 – 16 (or skeletal maturity): Pelvis X-ray and Clinical Exam every 2 years
- Discharge from surveillance if skeletally mature (tri-radiate cartilage closed) and MP \leq 30%. Continue surveillance beyond skeletal maturity if pelvic obliquity associated with increasing scoliosis is present.

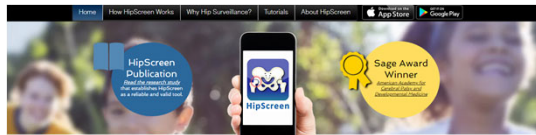
[When to Refer to Orthopaedic Surgery](#)

AACPDM Hip Surveillance Care Pathway Recommendations

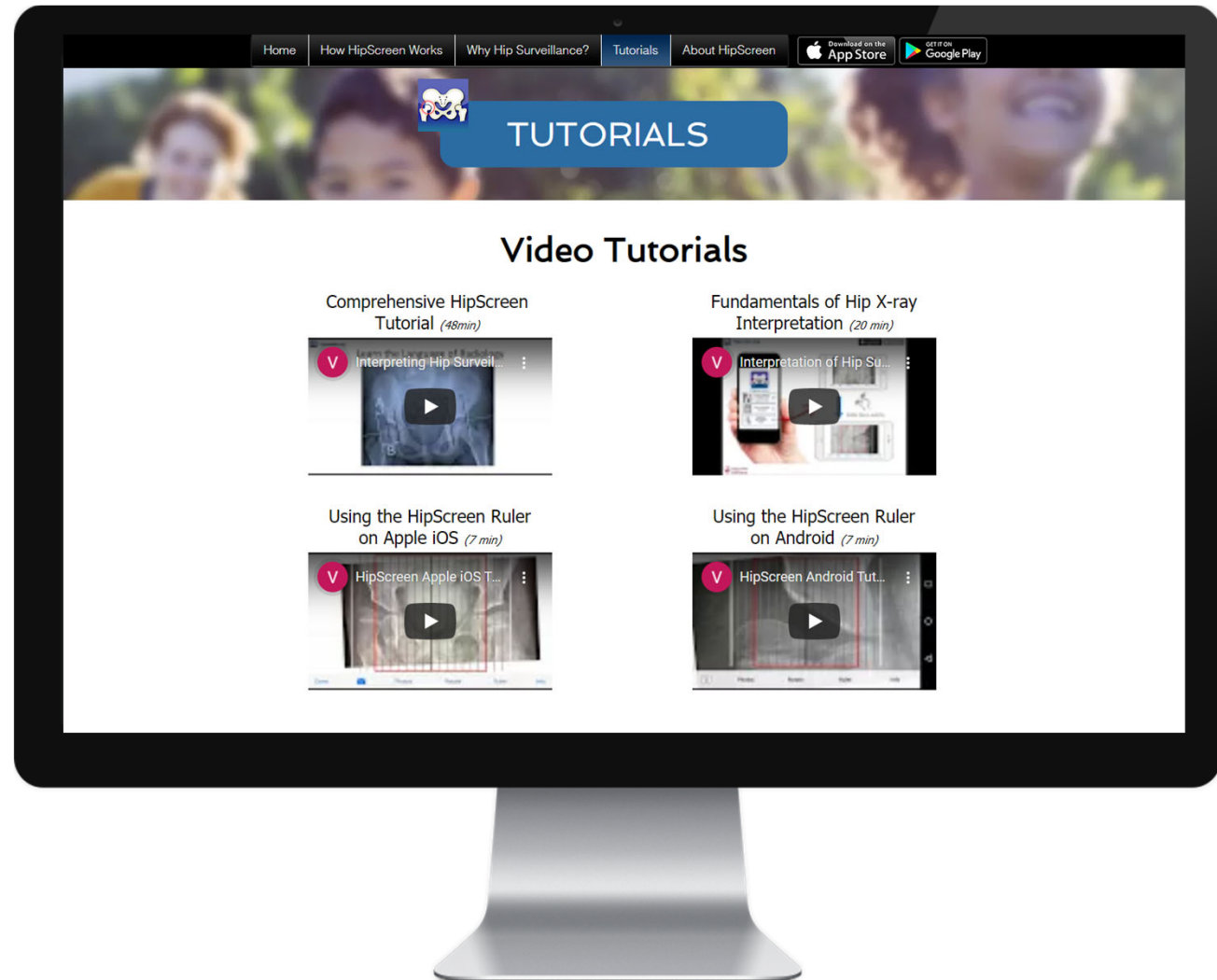


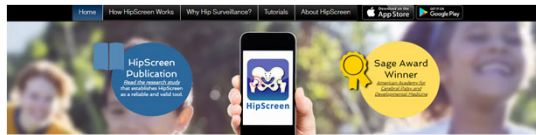
Easily Measure Hip X-Rays





Watch it
again!





HIP SURVEILLANCE at your fingertips.

One in three children with cerebral palsy develop hip problems. Early detection through a hip surveillance program can preserve a child's function and prevent pain. Learn how to implement a hip surveillance program for a child with cerebral palsy with HipScreen, a free app developed for physicians specializing in cerebral palsy.



Learn More
Get an overview
of the HipScreen's
features.

[GO](#)

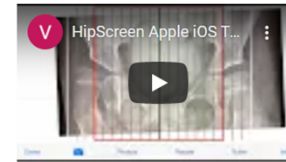


Tutorials
Get trained to
use HipScreen!

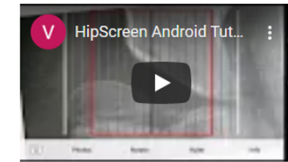
[GO](#)

More
Resources!

Using the HipScreen Ruler on Apple iOS (7 min)



Using the HipScreen Ruler on Android (7 min)



Additional Resources

Click the resources below to help you understand how to implement a hip surveillance program.

Improve your HipScreen Ruler accuracy

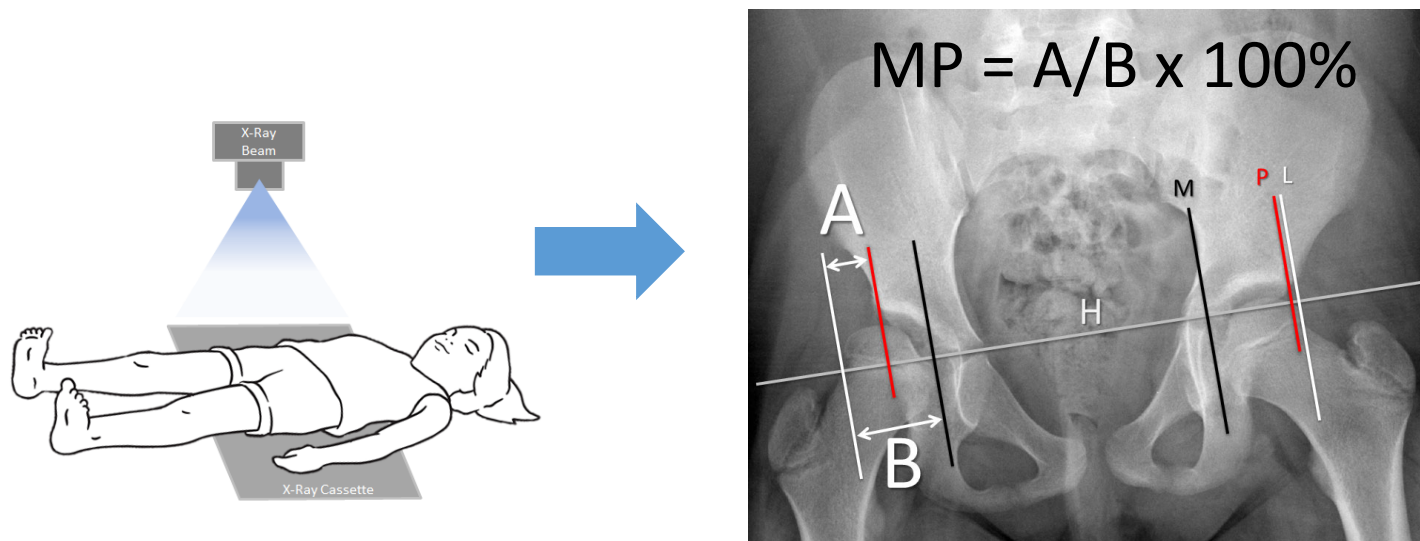
- [HipScreen Ruler User Quick Guide](#)
- [Using the HipScreen Ruler: Comprehensive Overview](#)
- [Practice X-rays from HipScreen Tutorial with Answers](#)
- [Fundamentals of X-Ray Interpretation](#)
- [Radiology Protocol for Hip Surveillance X-ray Positioning and Interpretation](#)
- [Validation Study: HipScreen Method for X-ray Measurement is Reliable and Accurate](#)

Understand the Guidelines

- [Frequently Asked Questions about Hip Surveillance](#)
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- International Hip Surveillance Guidelines
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 - [Austrian Hip Surveillance Guidelines 2014](#)
 - [British Columbia Consensus Statement on Hip Surveillance](#)
 - [Swedish CPUP Guidelines](#)
- [Understanding Level of Function in Children with Cerebral Palsy: Overview of the Gross Motor Function Classification System](#)

Migration Percentage (MP)

Cornerstone to Early Identification

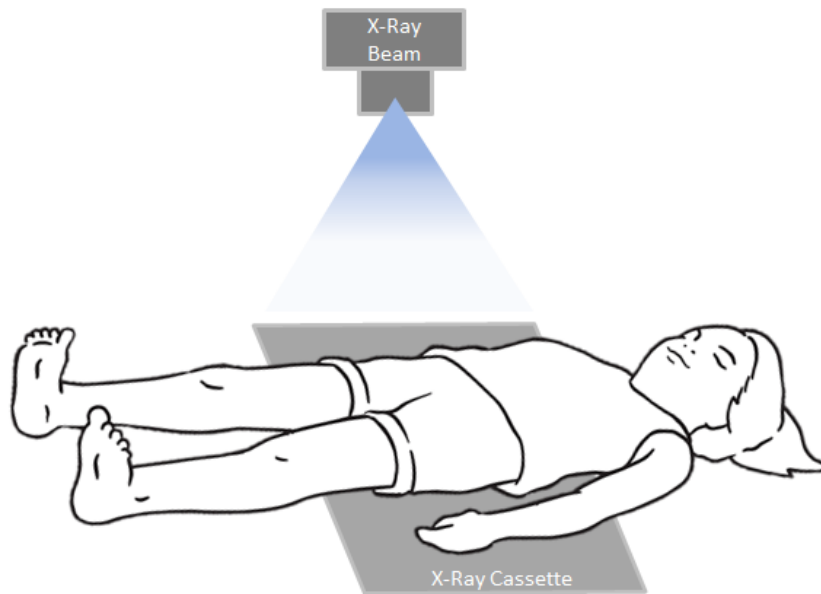


MP is the “Percentage of the Ball Outside of the Edge of Socket”
MP greater than **30%** = Increased Risk of Progressive Displacement



Supine AP Pelvis X-Ray

Establishes MP for Both Hips



Radiation Exposure = **60 mrem**

- Average annual radiation = 300 mrem
 - Higher if you live at above sea level
- Air travel = 0.5 mrem per hour

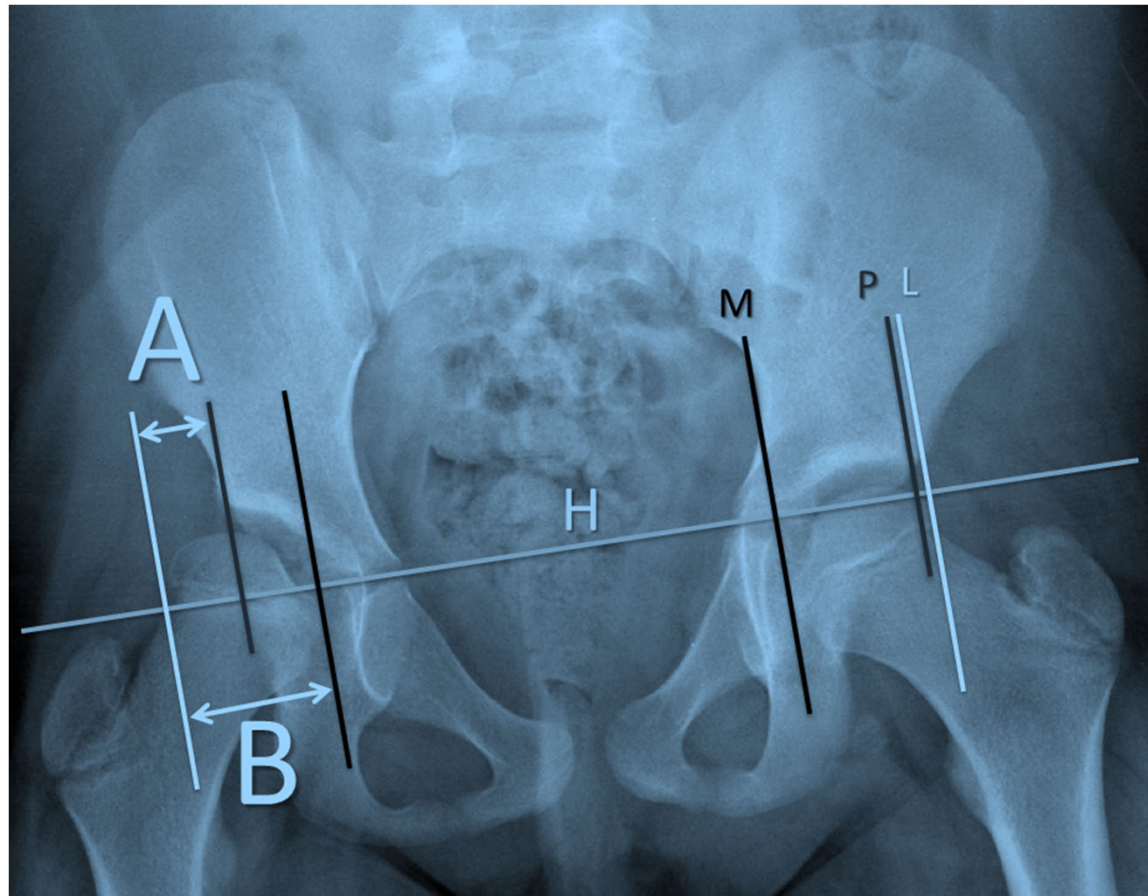
Critical Migration Percentage: *Refer to a Specialty Center for Treatment*

30%

Migration Percentage at
which risk of progressive hip
displacement increases
dramatically



Learn the Language of Radiology



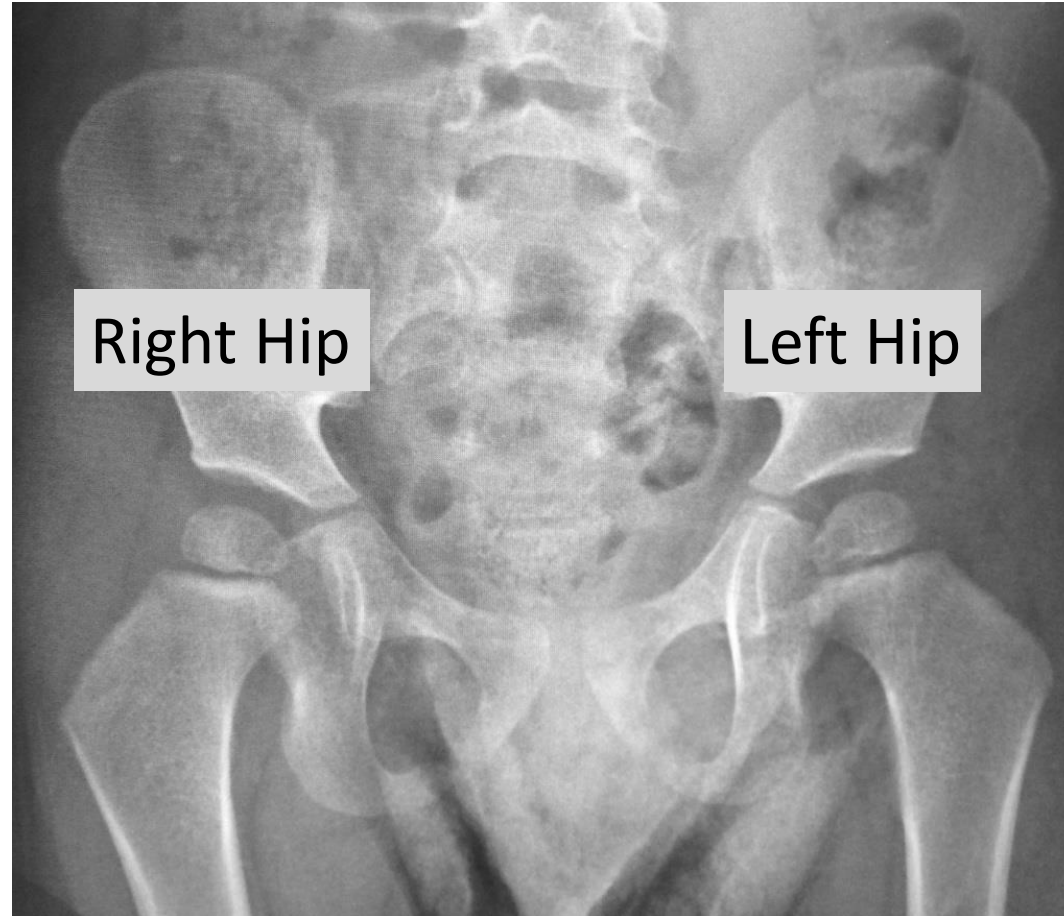


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hipscreens.org

The child is facing you!

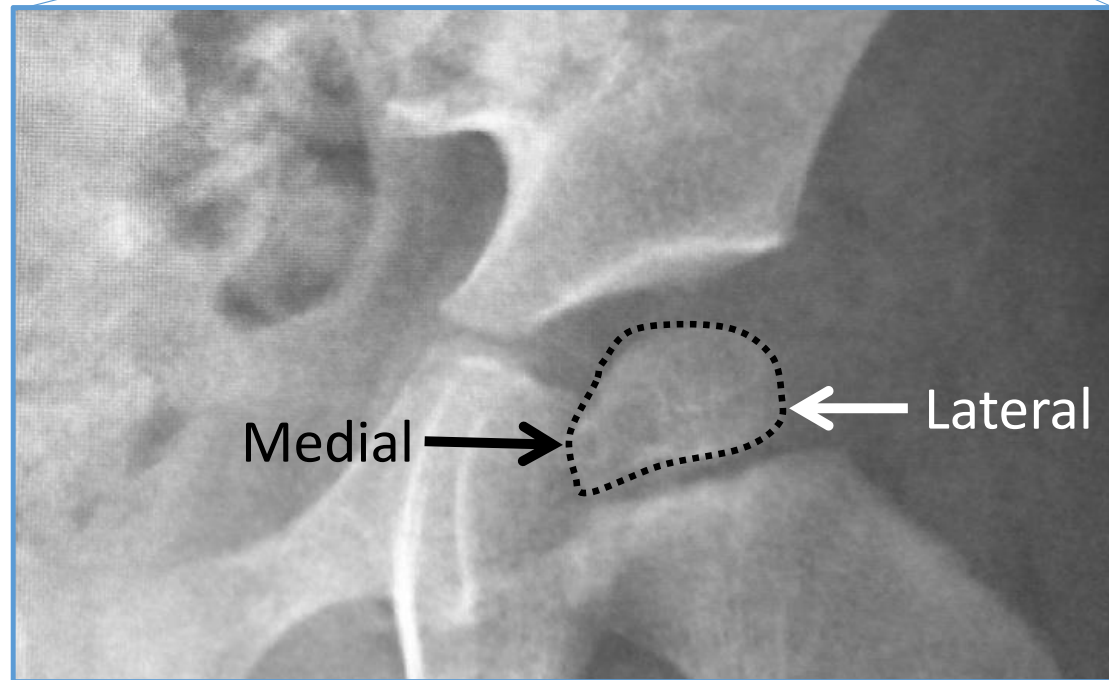
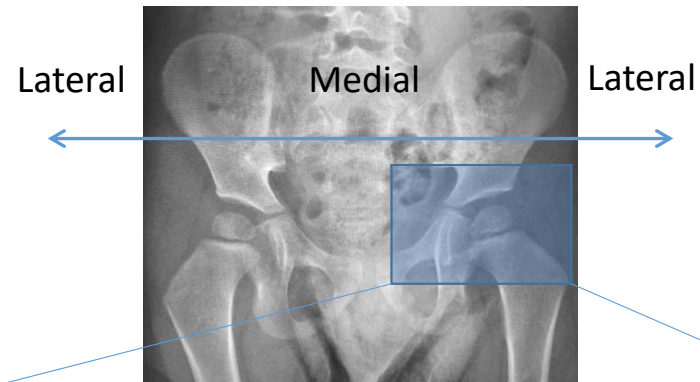




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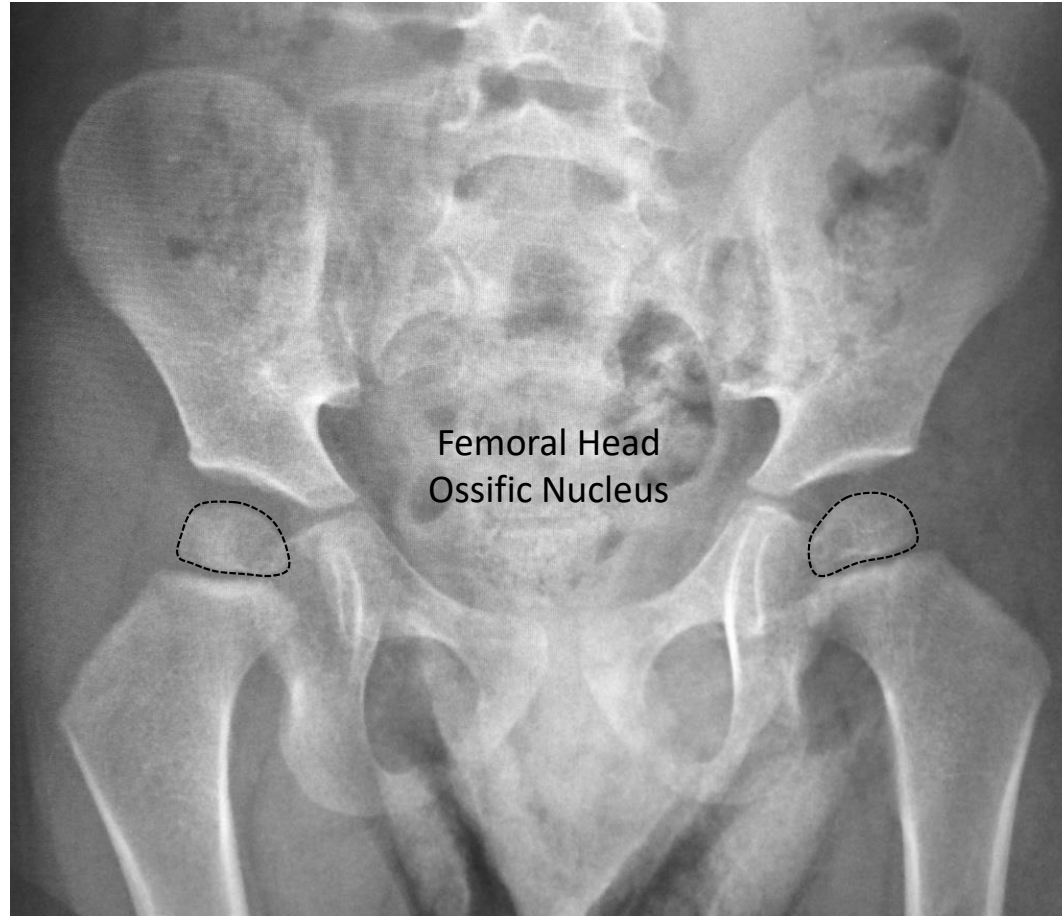


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hipscreen.org

The hip joint



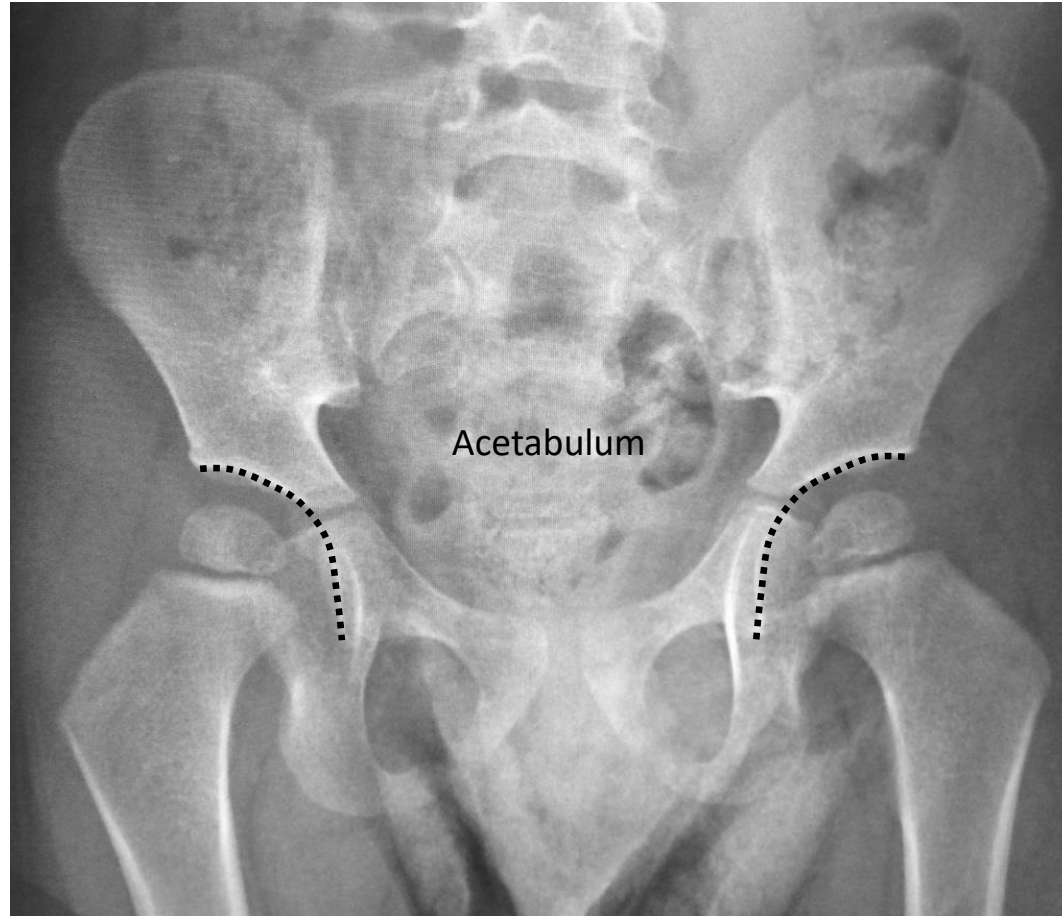


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The hip joint



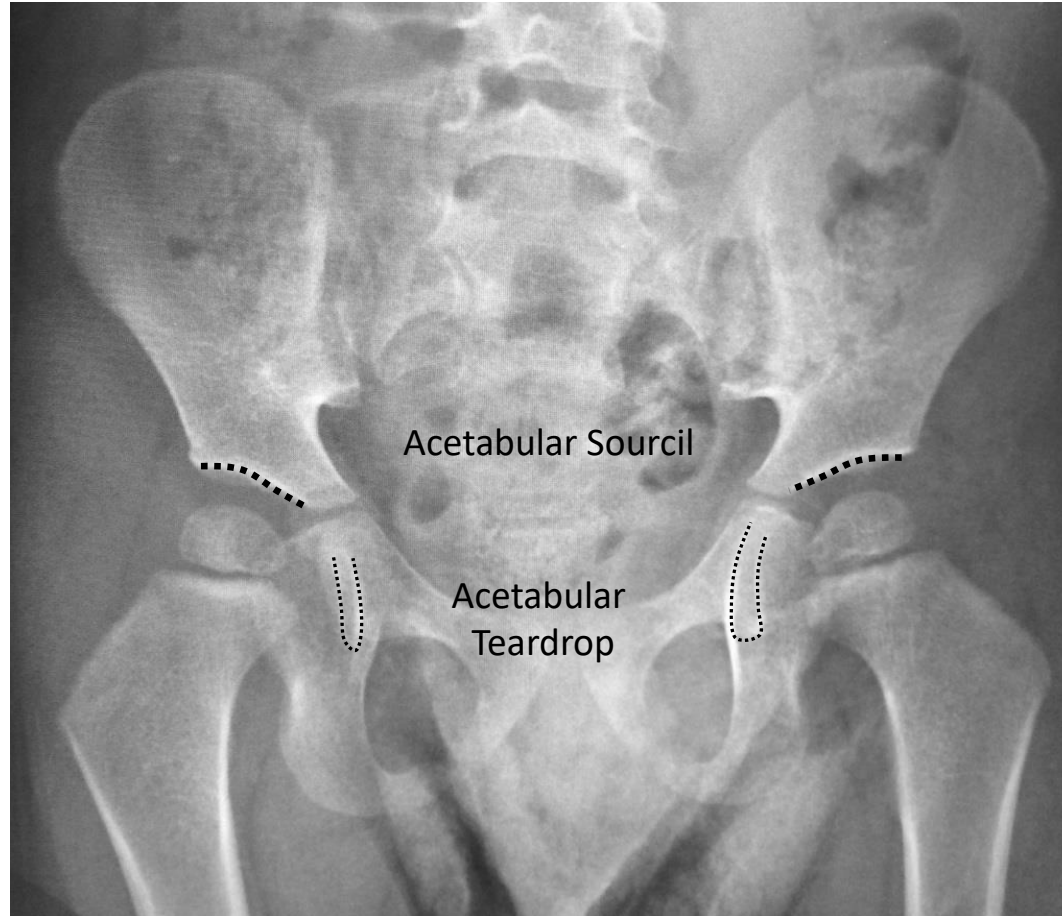


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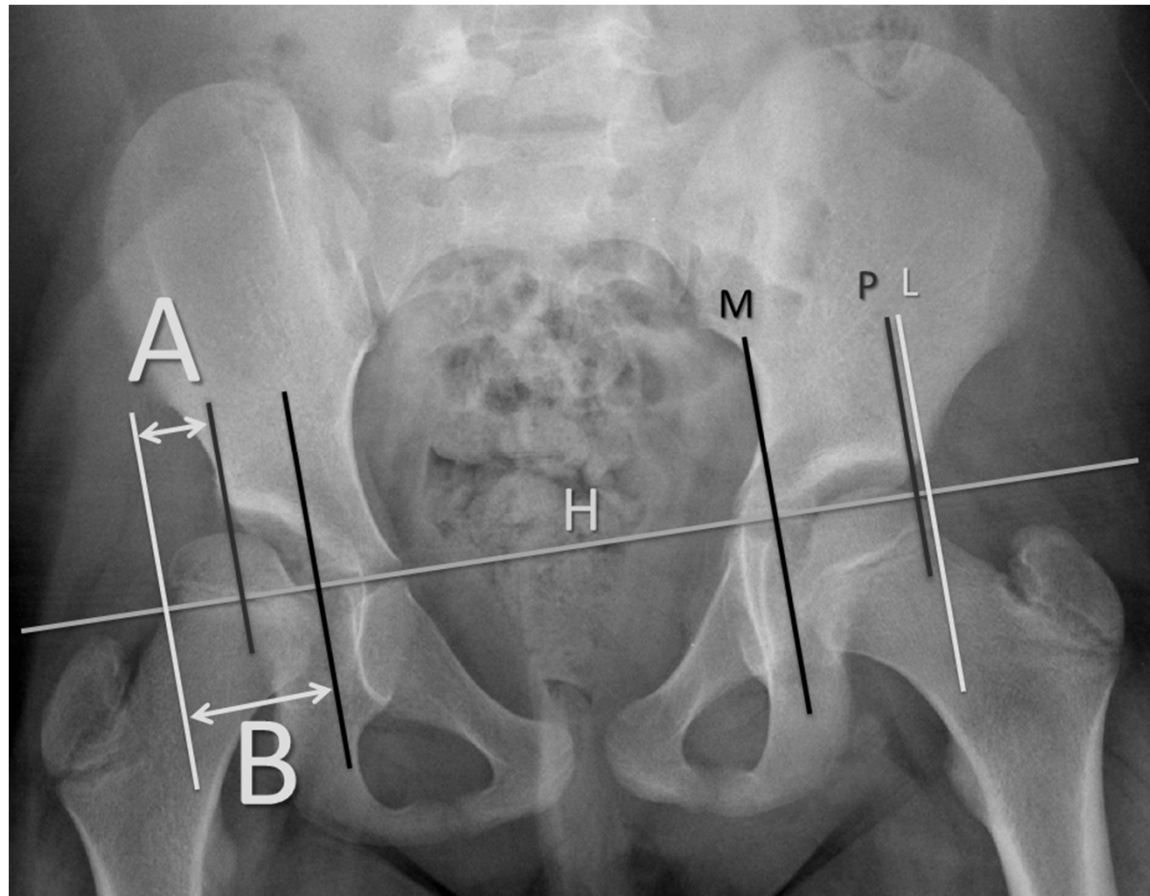


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The hip joint

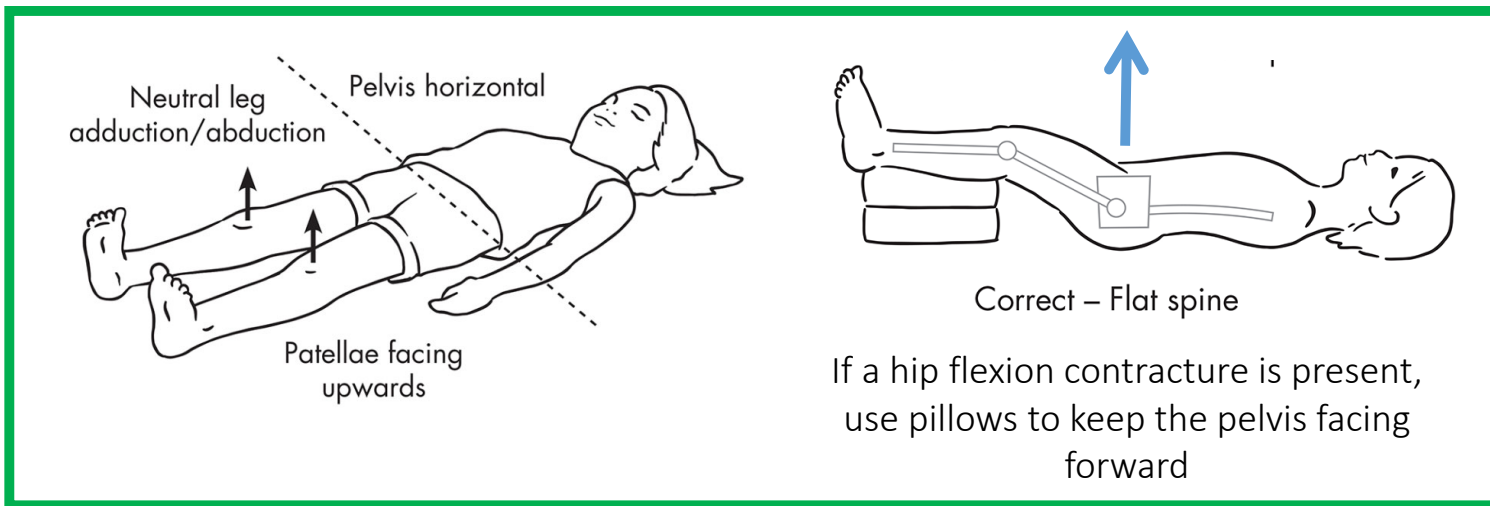


Calculating Migration Percentage (MP)

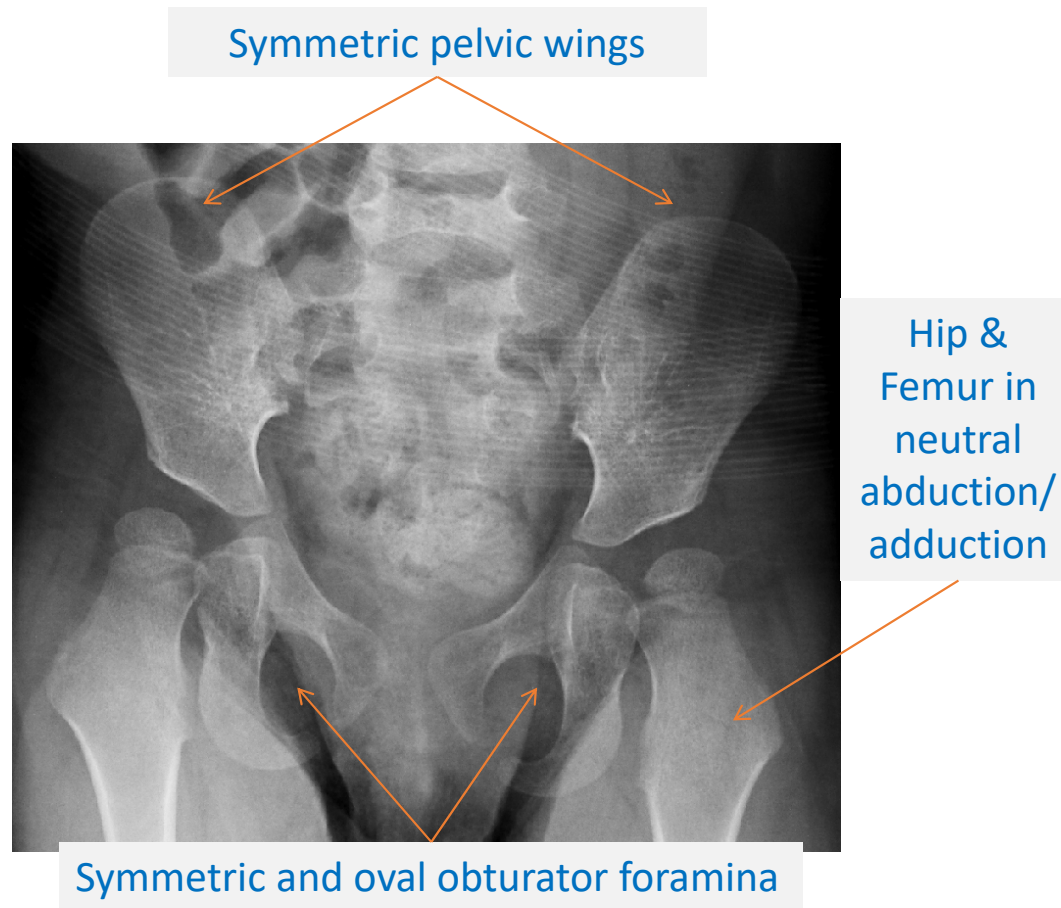


Four Steps to Calculate Migration Percentage

STEP 1: Confirm that you have a properly positioned AP Pelvis X-ray.



Features of Appropriately Positioned AP Pelvis





Features of Appropriately Positioned AP Pelvis



Symmetric Pelvic Wings

Symmetric and oval
obturator foramina

Femur in neutral
abduction/adduction



Asymmetric pelvic wings

Asymmetric obturator
foramina

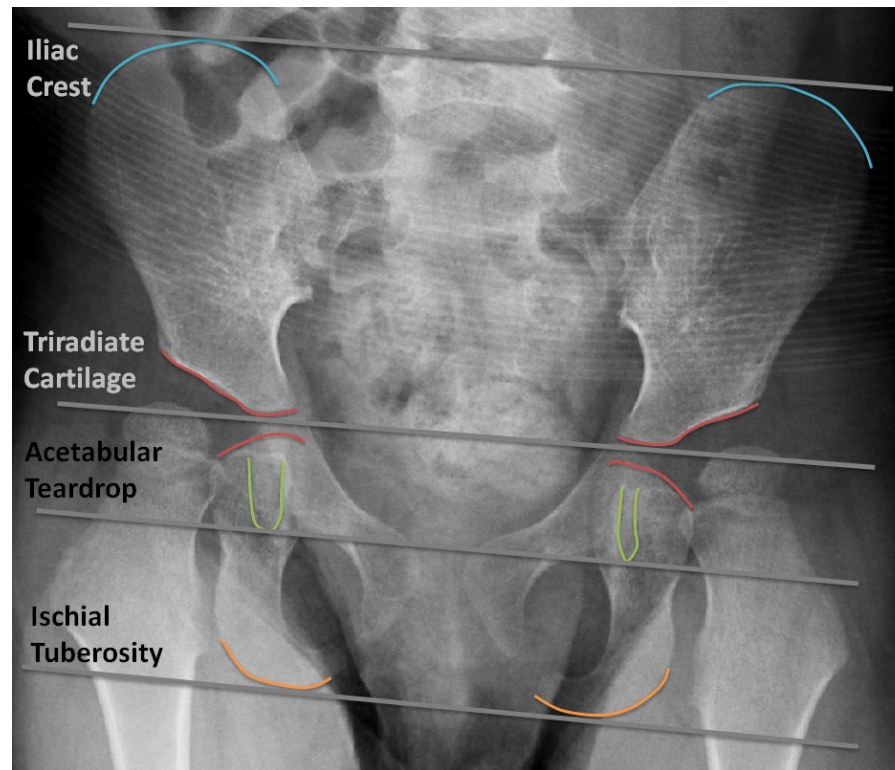
Femur abducted



Obturator foramina not oval
shaped and difficult to visualize

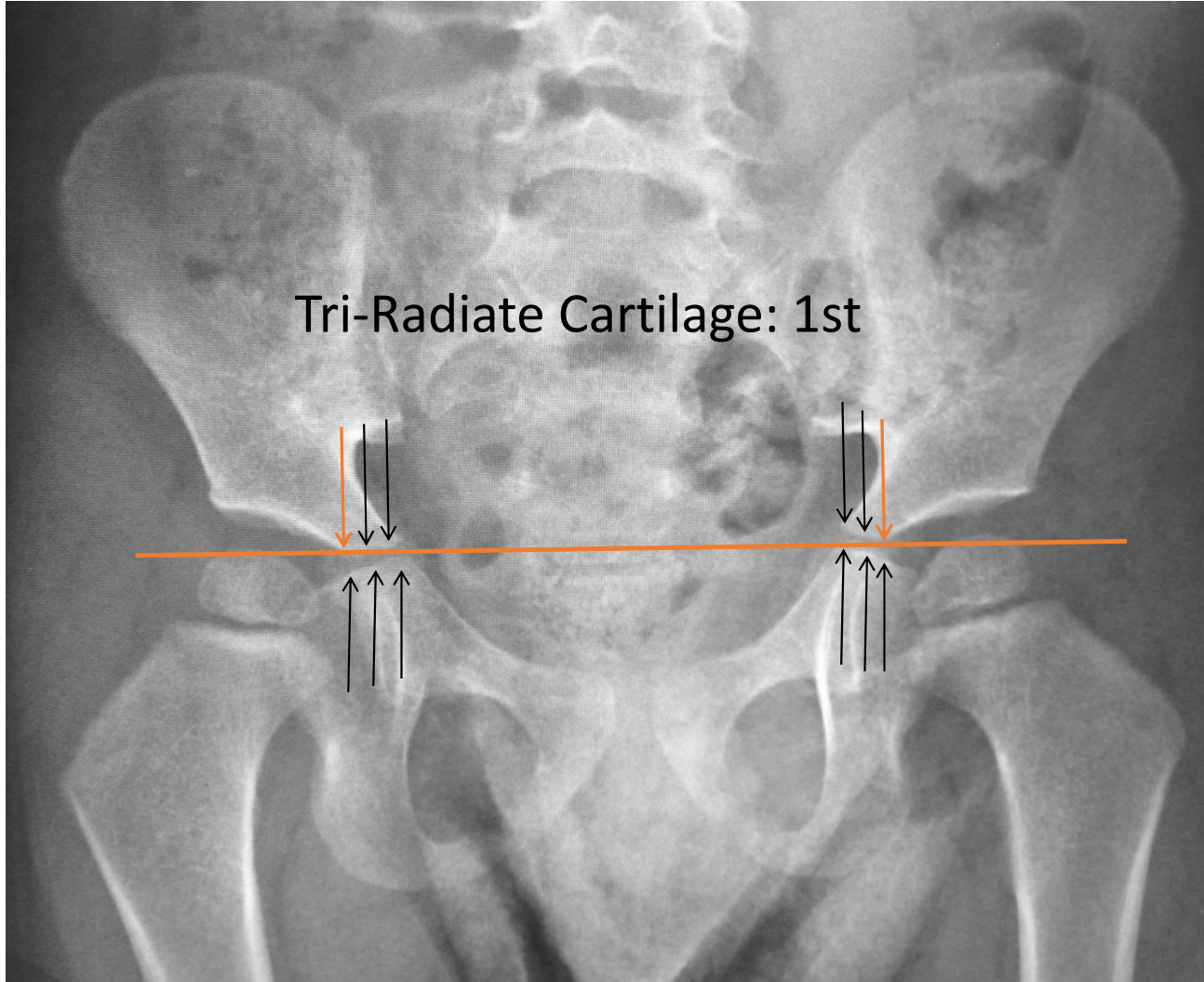
STEP 2:

- Establish the pelvis horizontal axis, or **H-line**, by connecting one of the pair of landmarks outlined below.
- The most common landmark to use is the Tri-Radiate Cartilage.



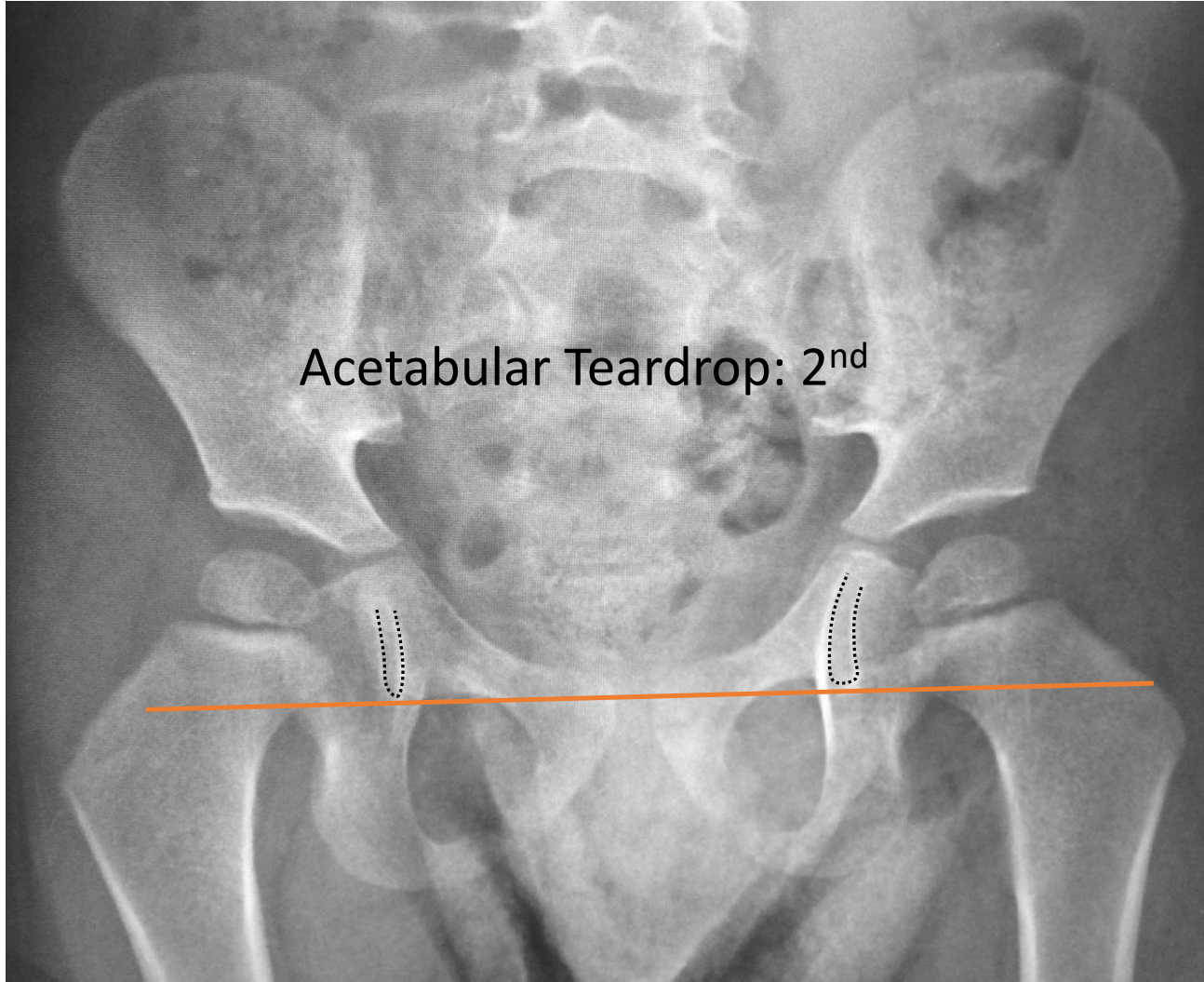


Tri-Radiate Cartilage: 1st





Acetabular Teardrop: 2nd





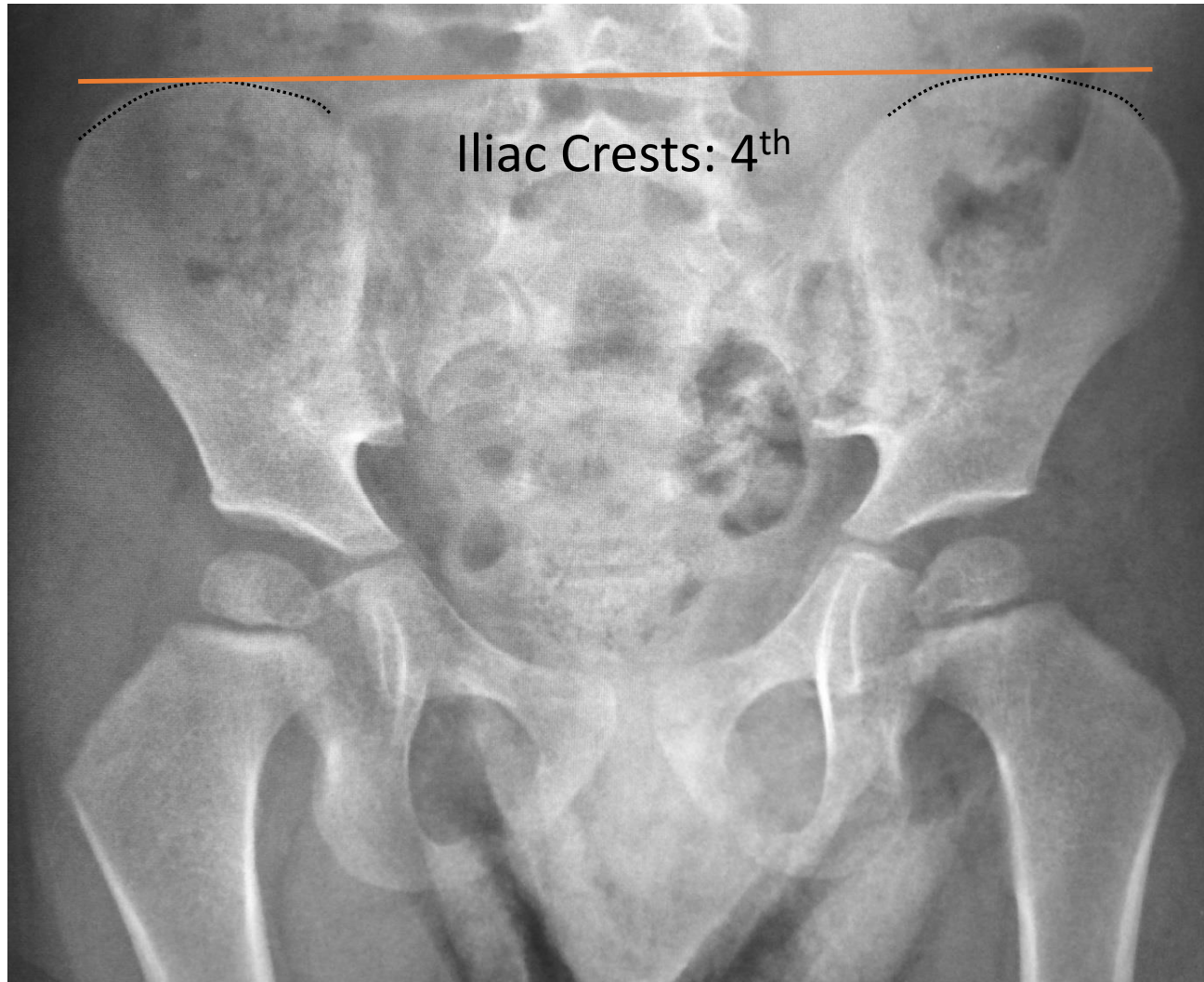
Ischial Tuberosity: 3rd



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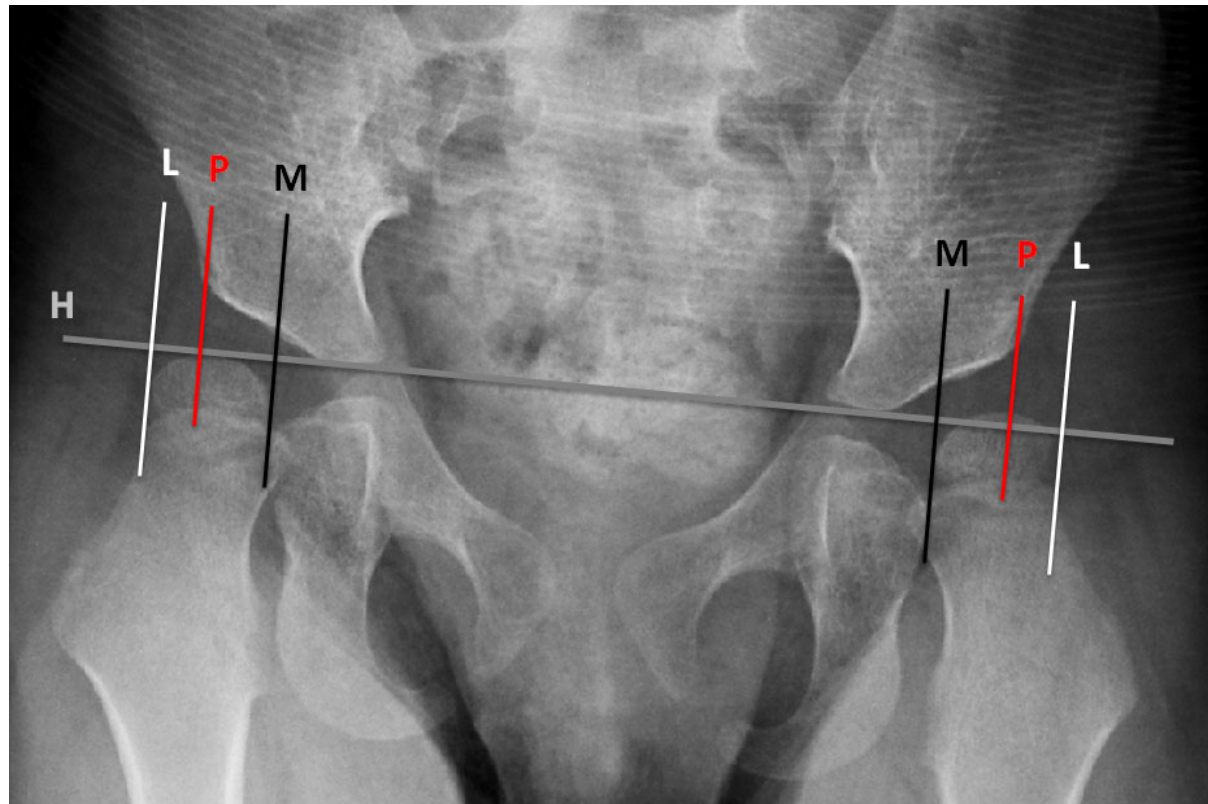


hipscreen.org



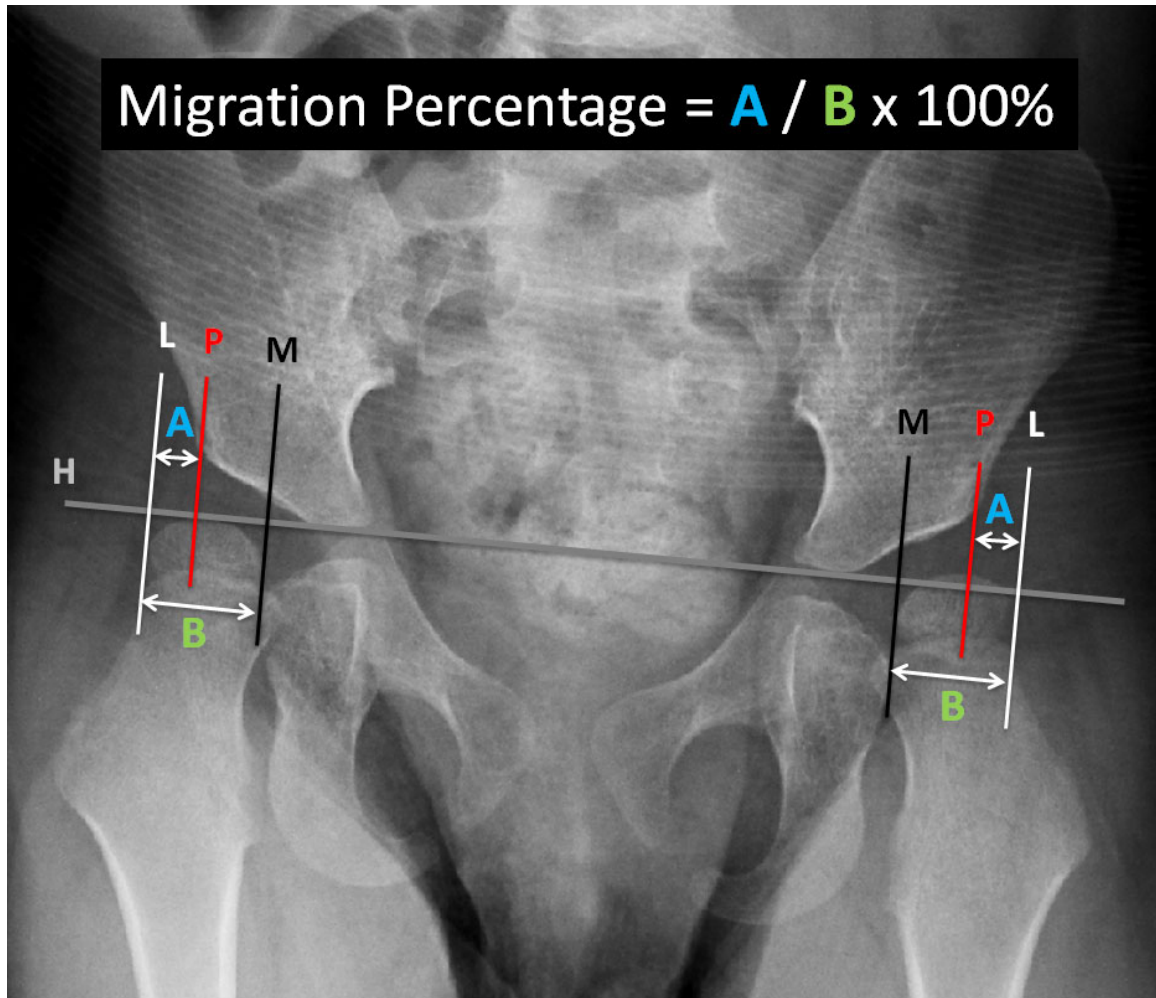
STEP 3: Draw three perpendicular lines to the H-Line:

- **M-line:** medial most edge of the femoral head
- **P-line:** lateral edge of the acetabulum
- **L-line:** lateral most edge of the femoral head



STEP 4: Calculate Migration Percentage

$$\text{Migration Percentage} = \frac{A}{B} \times 100\%$$



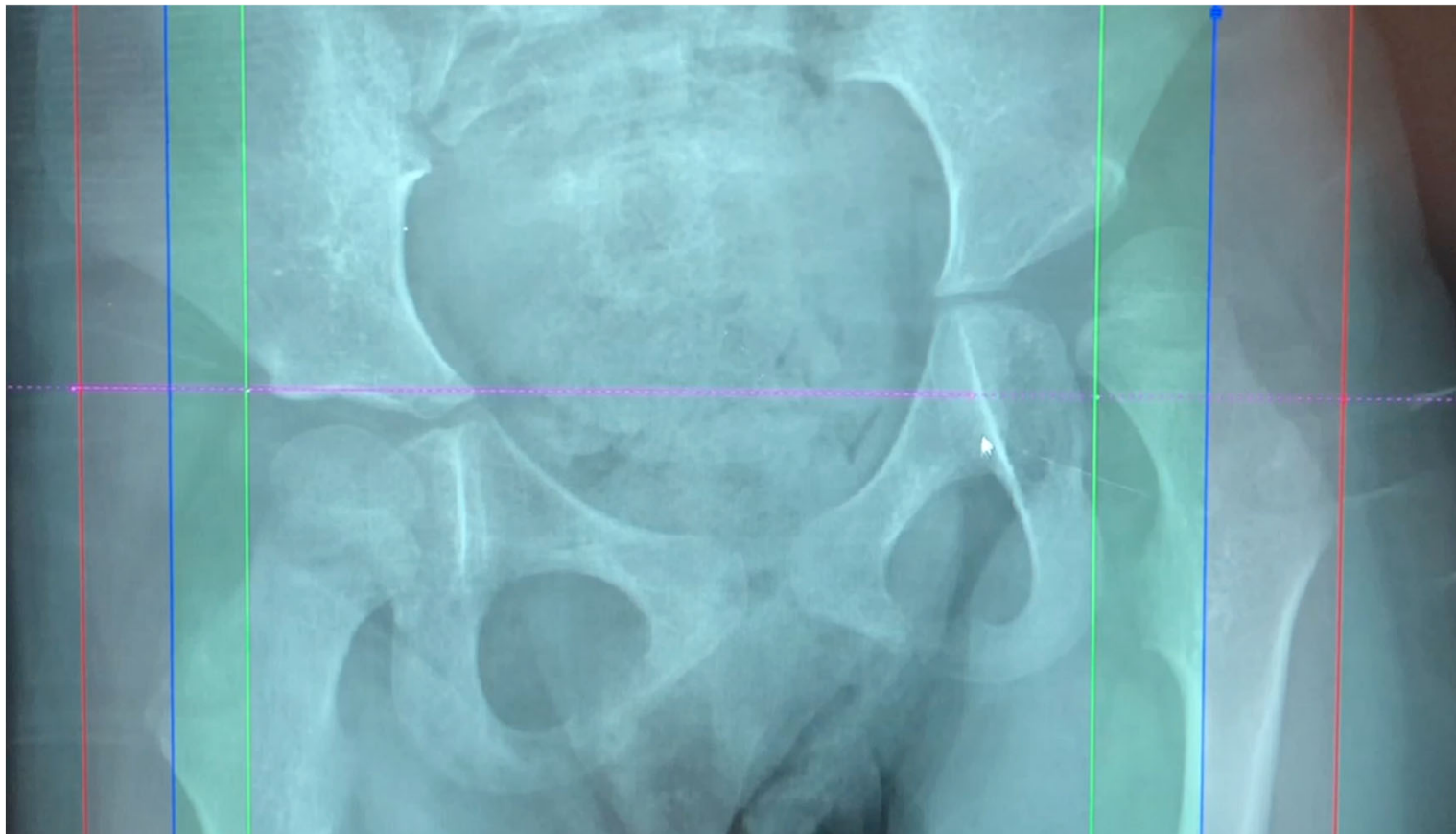
Methods of Measuring MP

Digital Measurement on PACS Workstation



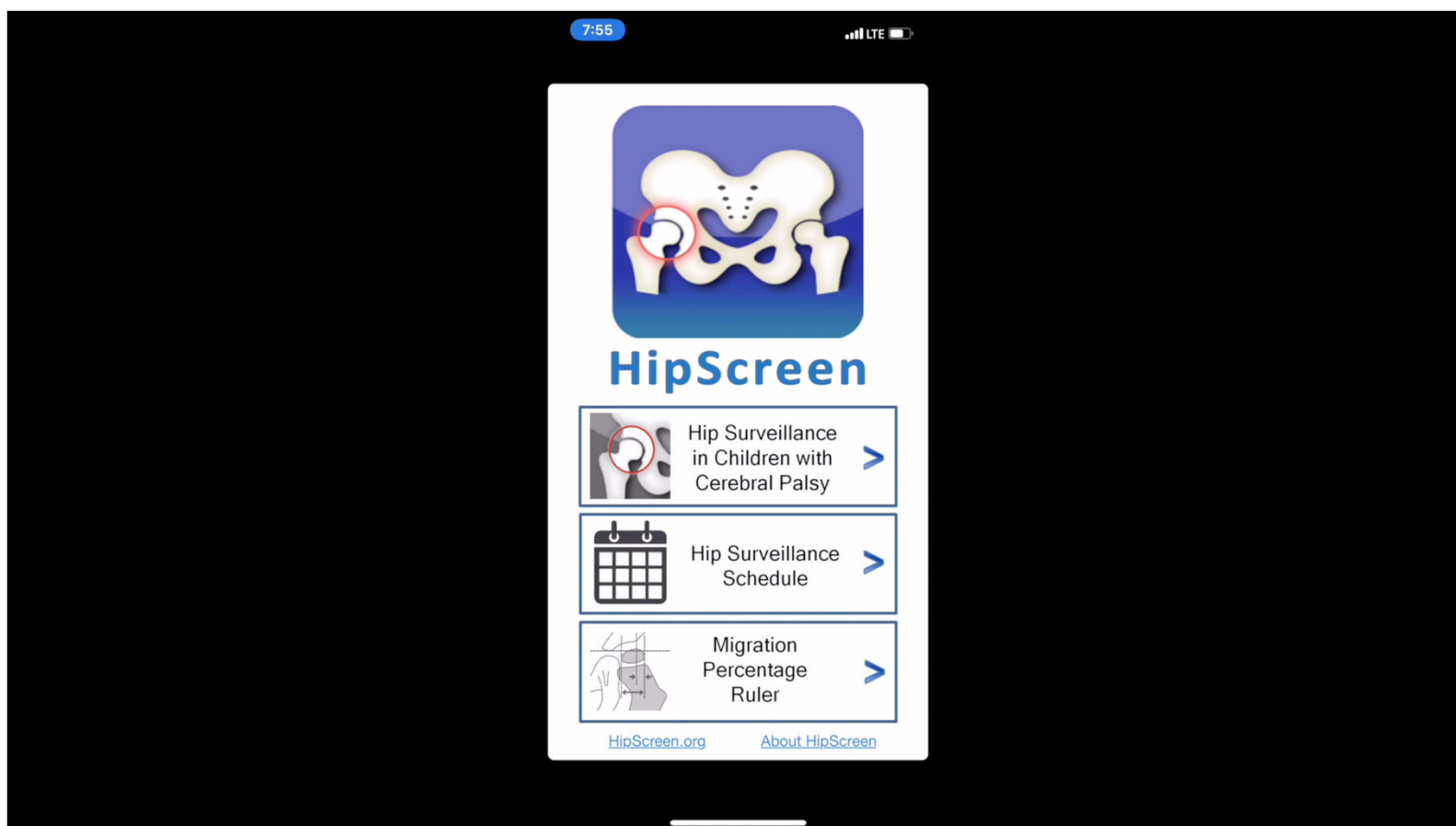
Methods of Measuring MP

Computer Aided Digital Templating

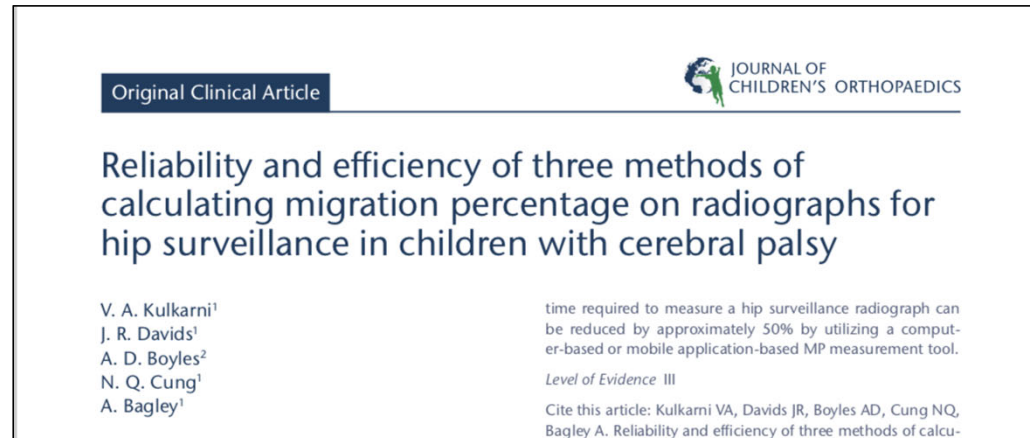
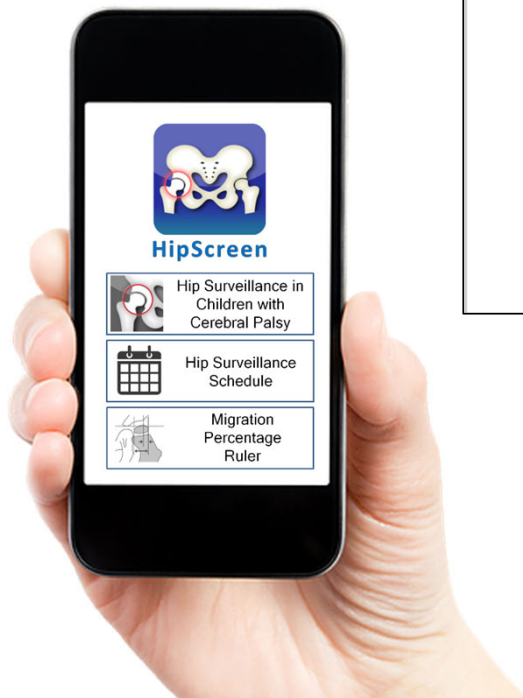


Methods of Measuring MP

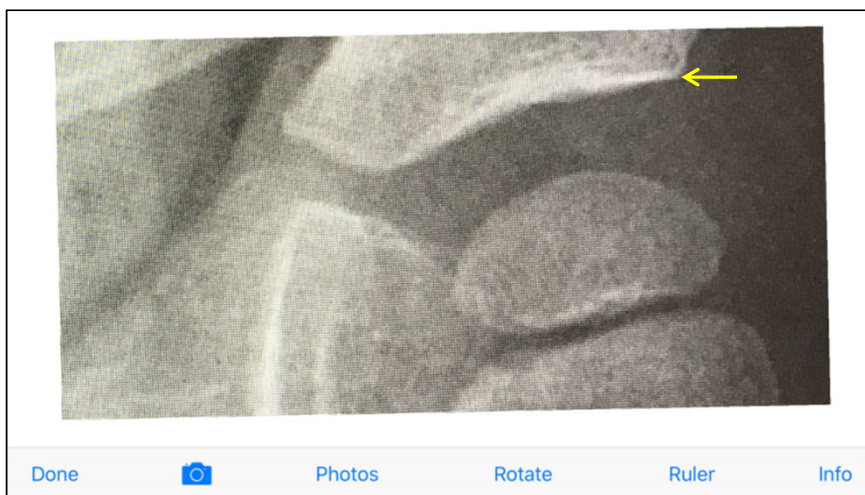
HipScreen App Measurement Technique



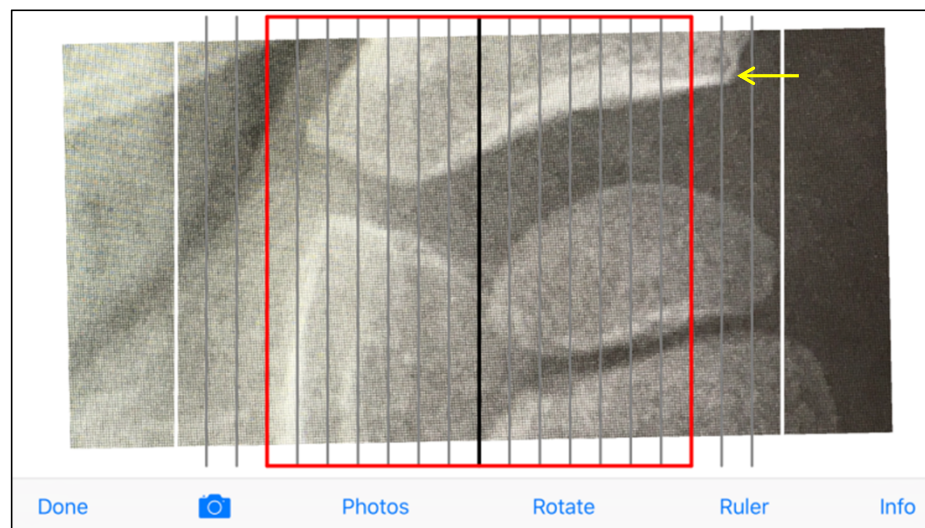
Journal of Children's Orthopaedics 2018; 12(2): 145-151.



- Migration Percentage measurement with HipScreen:
 - As **accurate** as Computer Aided or Manual Digital Measurement (error in MP 2.8 – 3.6%)
 - Has **excellent reliability** and is equivalent to other methods
 - **Significantly faster** than manual measurement (by 1 min) and **clinically equivalent** to commercially-available computer templating methods (7 sec slower)

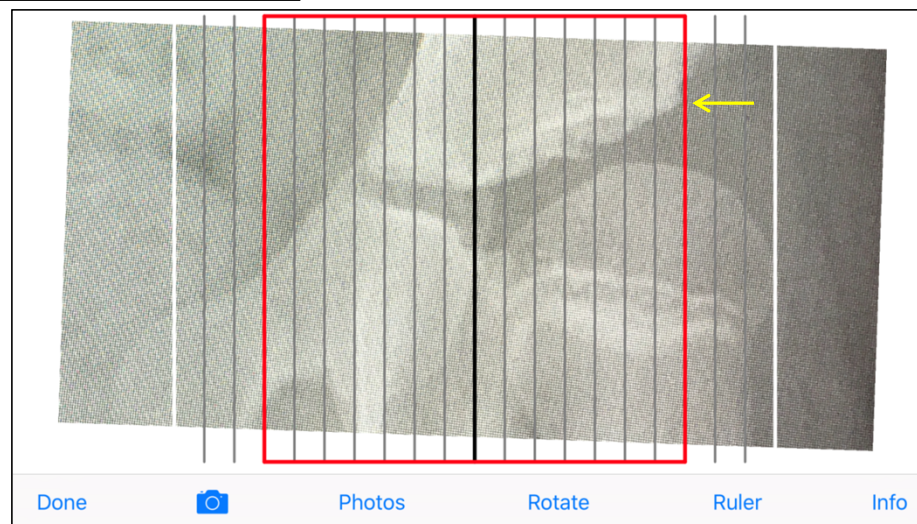


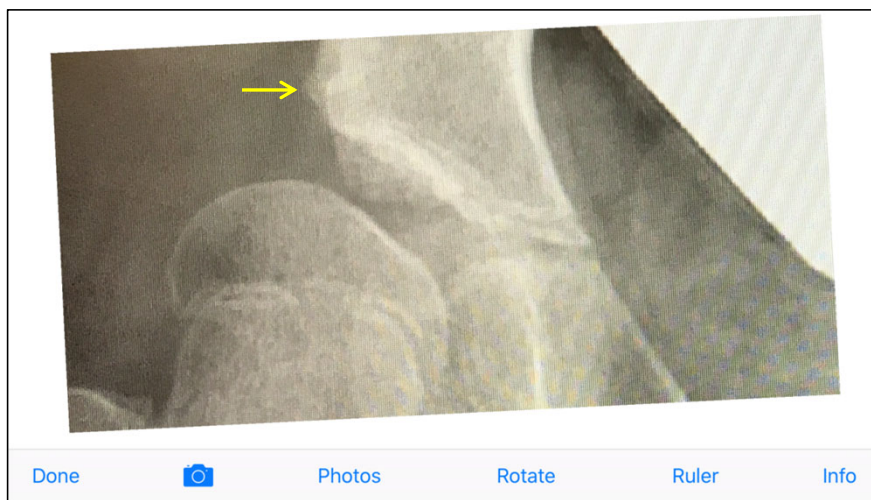
15% Example



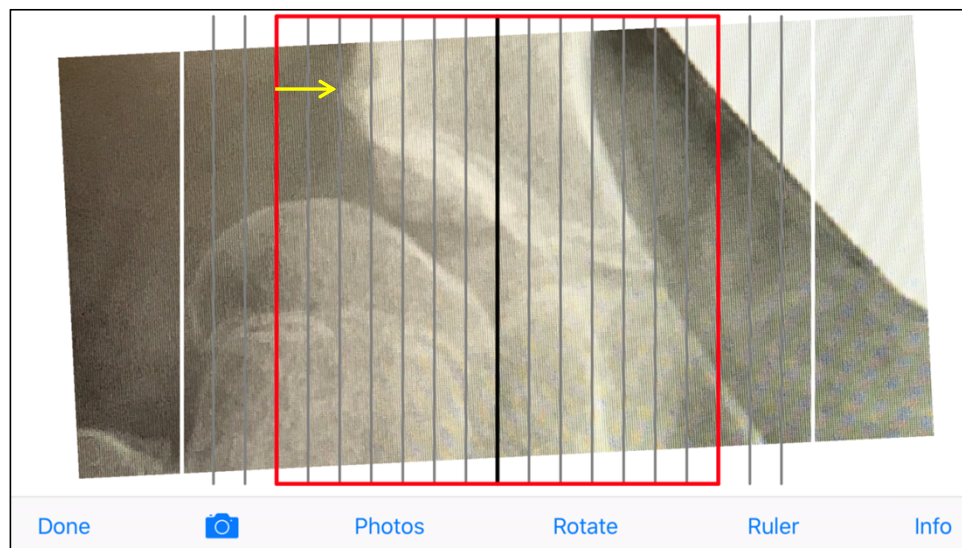


30% Example



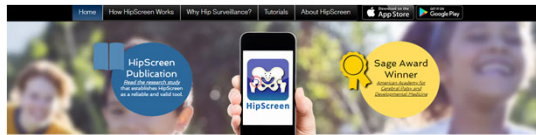


50% Example



Now it's your turn!





HIP SURVEILLANCE at your fingertips.

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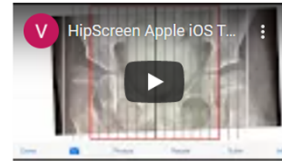
Learn More
Get an overview
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features.



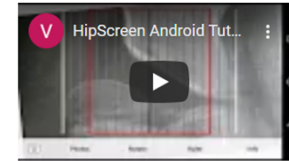
Tutorials
Get trained to
use HipScreen!

Answers!
(Don't cheat!)

Using the HipScreen Ruler on Apple iOS (7 min)



Using the HipScreen Ruler on Android (7 min)



Additional Resources

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Understand the Guidelines

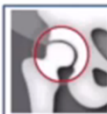
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 - [AACDPM Hip Surveillance Care Pathway](#)
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 - [Swedish CPUP Guidelines](#)
- [Understanding Level of Function in Children with Cerebral Palsy: Overview of the Gross Motor Function Classification System](#)



2:16



HipScreen



Hip Surveillance in
Children with
Cerebral Palsy

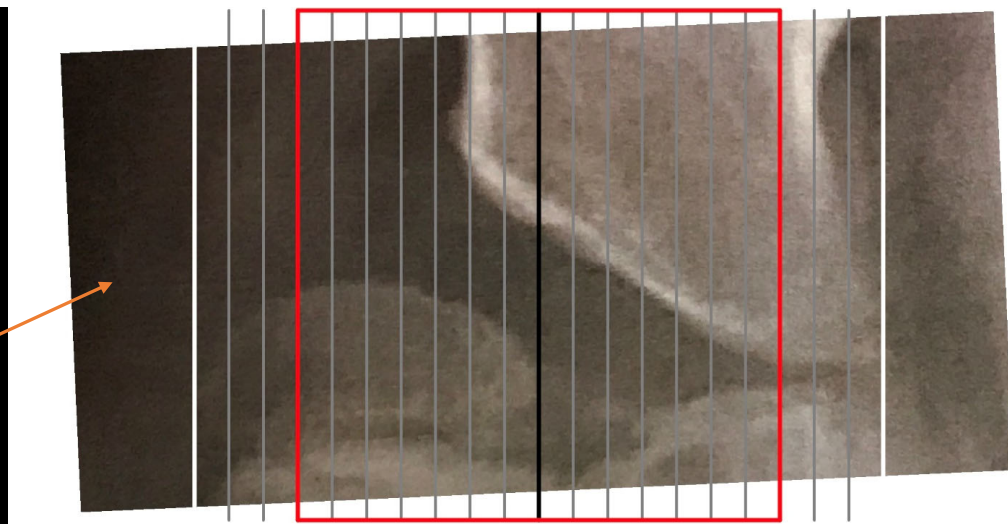
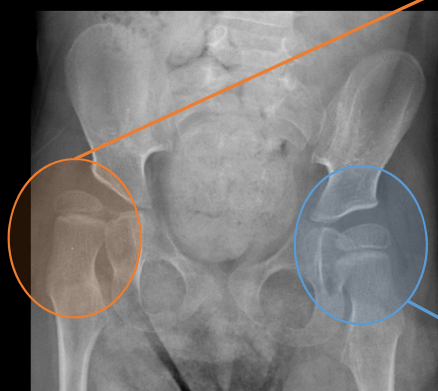


Hip Surveillance
Schedule

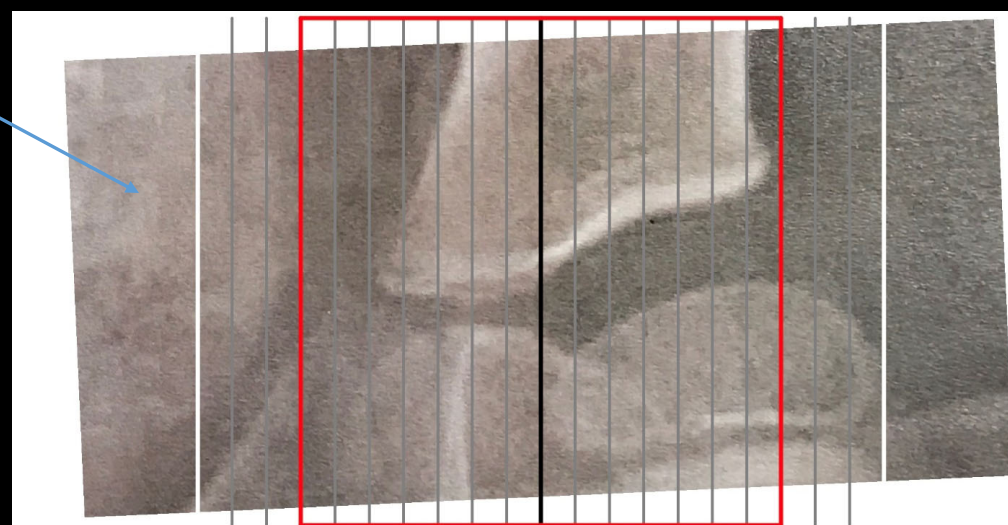


Migration
Percentage
Ruler

[About HipScreen](#)



R: 75%



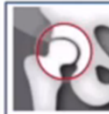
L: 33%



2:22



HipScreen



Hip Surveillance in
Children with
Cerebral Palsy

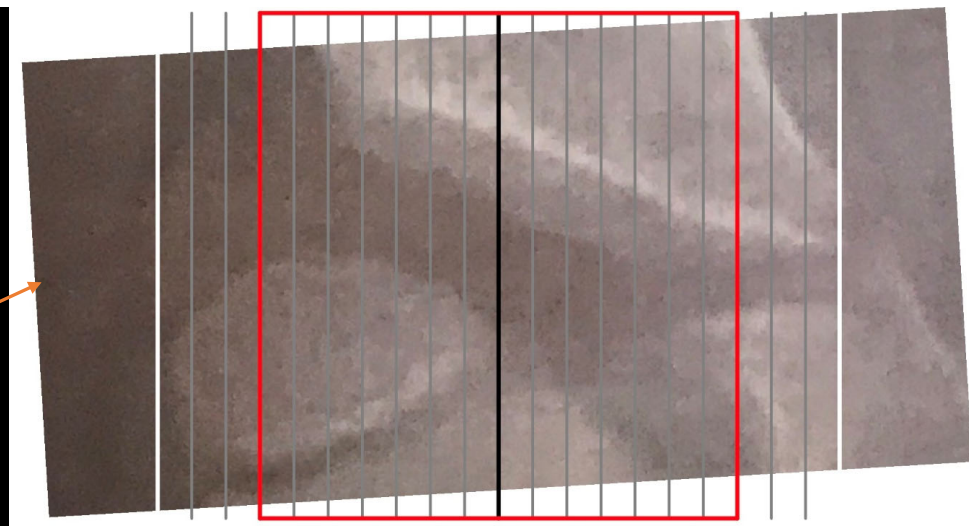
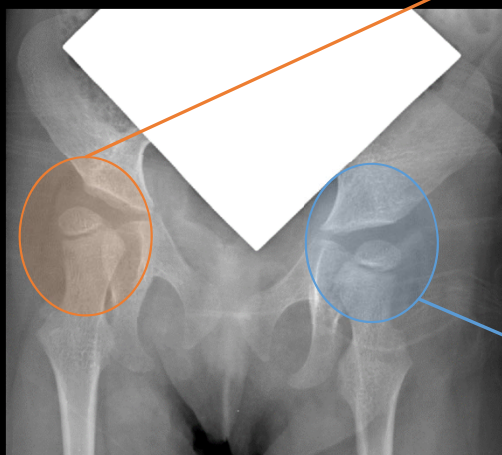


Hip Surveillance
Schedule

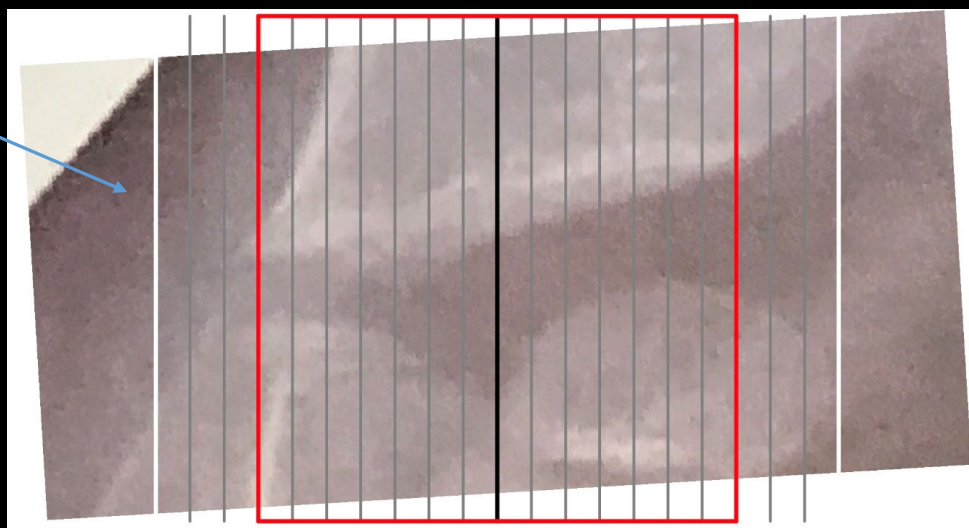


Migration
Percentage
Ruler

[About HipScreen](#)



R: 50%



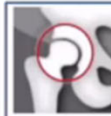
L: 30%



2:26



HipScreen



Hip Surveillance in
Children with
Cerebral Palsy

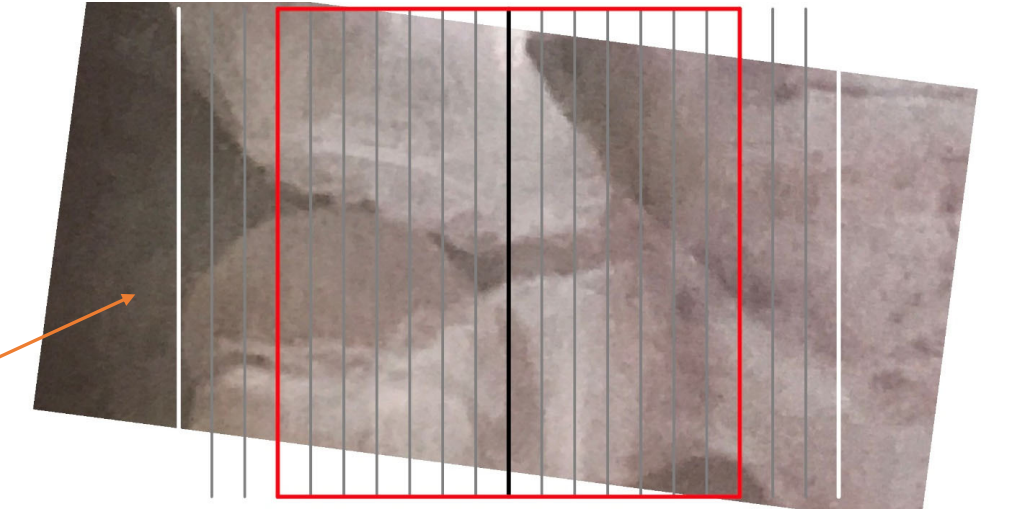
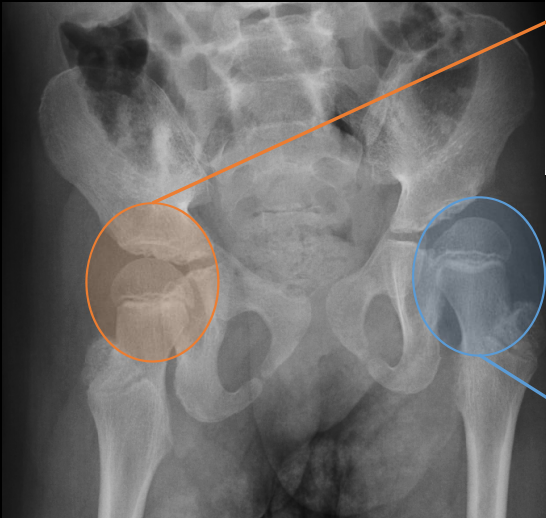


Hip Surveillance
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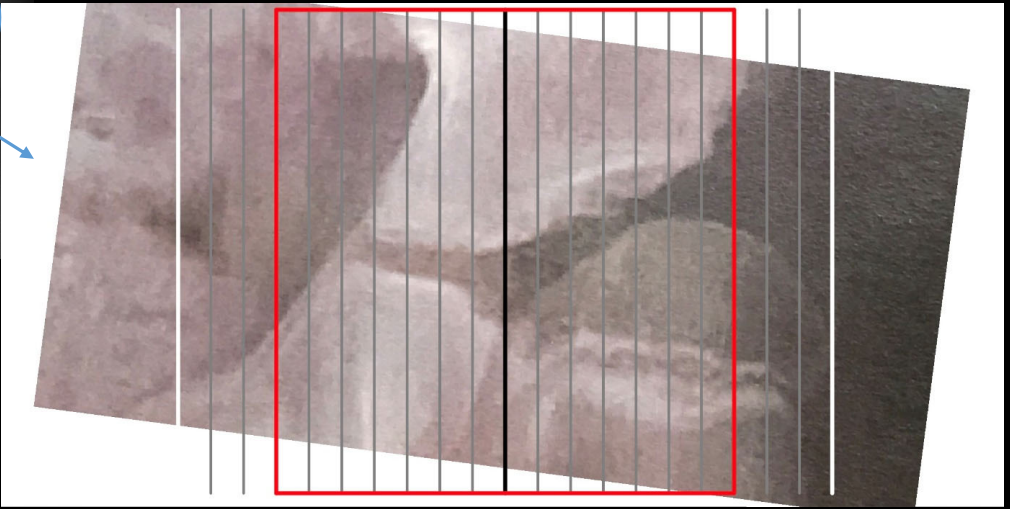


Migration
Percentage
Ruler

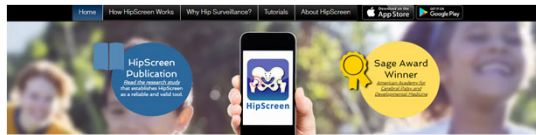
[About HipScreen](#)



R: 20%



L: 35%



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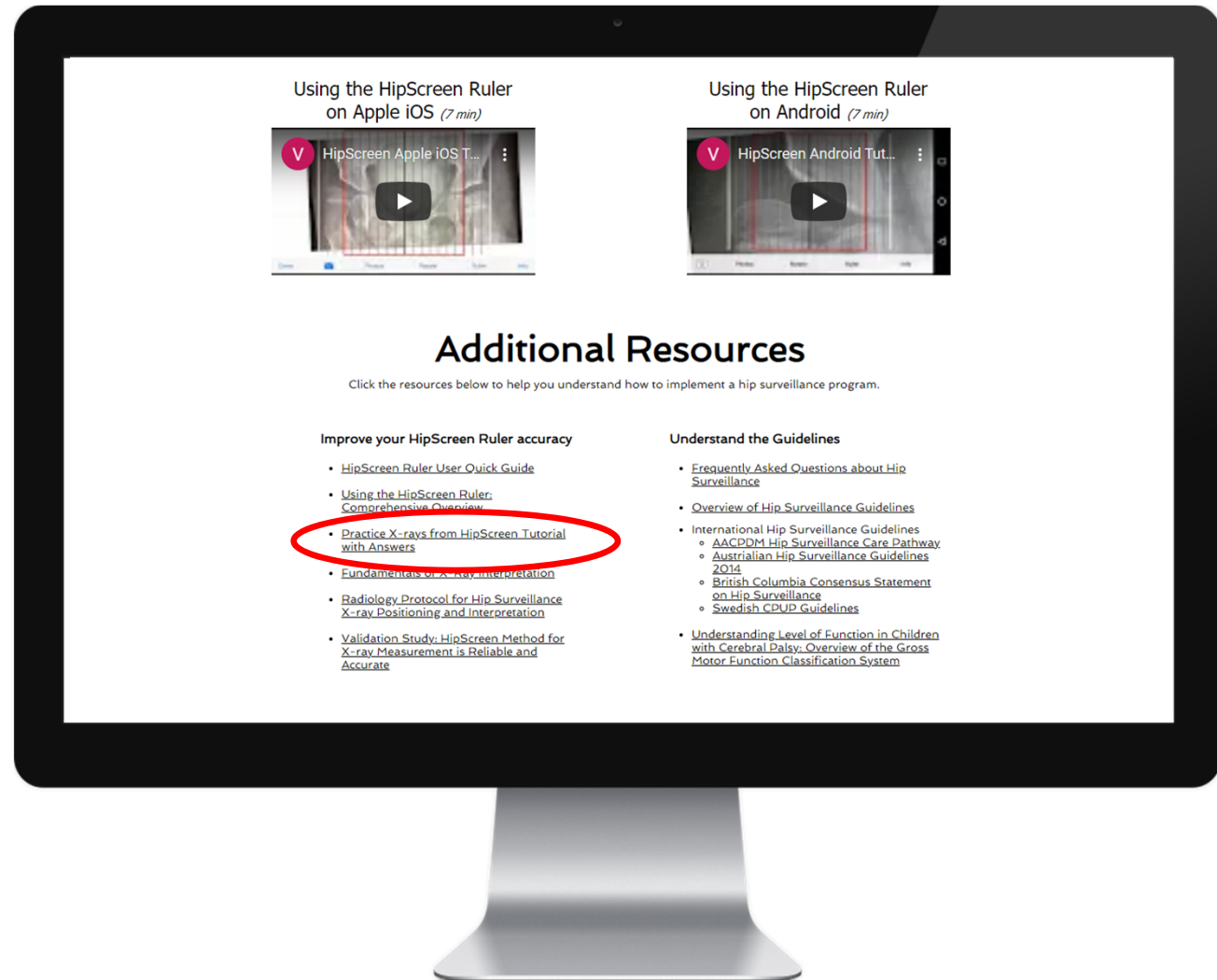


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features.



Tutorials
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Thank you to all!



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