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### Point-of-Care Ultrasound for the Pediatric Limp

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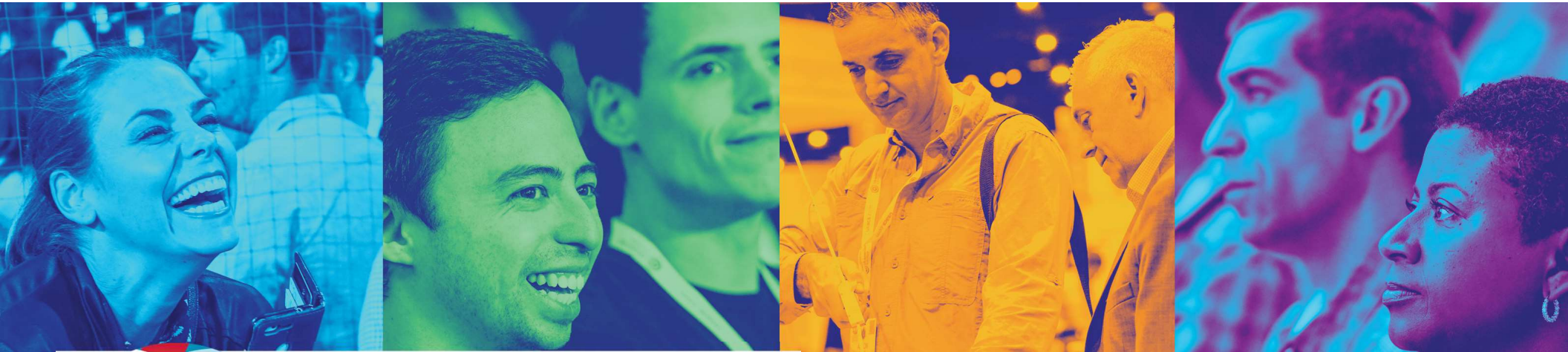
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Scientific Assembly  
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Point-of-Care Ultrasound  
for the Pediatric Limp



# Point-of-Care Ultrasound for the Pediatric Limp

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October 27, 2019



## Disclosures

- Disclaimer: "This research was supported (in whole or in part) by HCA and/or an HCA affiliated entity. The views expressed in this publication represent those of the author(s) and do not necessarily represent the official views of HCA or any of its affiliated entities."



## Parenting Advice



[weespring.com](http://weespring.com)



## Objectives

- Describe the technique and use of POCUS in the Limping Child
- Describe the use of POCUS in the diagnosis and treatment of Septic arthritis



# Laboratory Testing

## Kocher Criteria

History of fever  $> 38.5^{\circ}\text{C}$  ( $101.3^{\circ}\text{F}$ )

Non-weight-bearing

ESR  $\geq 40$

WBC  $>12$

CRP  $\geq 20$

## Probability of SA

- 1 criterion – 3%
- 2 criteria – 40%
- 3 criteria – 93%
- 4 criteria:

99.6%  
59.9%

- 5 criteria – 98%



Kocher, et al.



Luhmann, et al.



Caird, et al.



# Septic Arthritis – Diagnosis

## Clinical, Laboratory & Plain Radiographs

- Sensitivity = 74%
- Specificity = 74%
- Positive predictive value = 76%

## Plus Ultrasound

- Sensitivity = 86.4%
- Specificity = 89.7%
- Positive Predictive Value = 87.9%
- Negative Predictive Value = 76.8%



Zamzam , et al.





## Hip Effusion – Diagnosis

- 28 symptomatic hips
- Standard:
  - ▶ Radiology Department's Ultrasonography
- Ultrasonographers:
  - ▶ 2 PEM attending
  - ▶ 1 PEM fellow
  - ▶ 30-minute didactic
  - ▶ Supervised practice

**Sensitivity 85%**

(95% CI 54% - 97%)

**Specificity 93%**

(95% CI 66% - 99%)

**PPV 92%**

(95% CI 60% - 99%)

**NPV 88%**

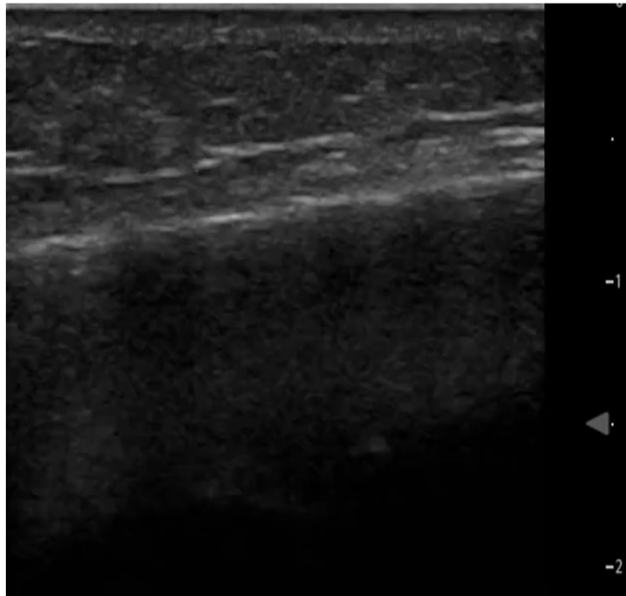
(95% CI 60% - 98%)



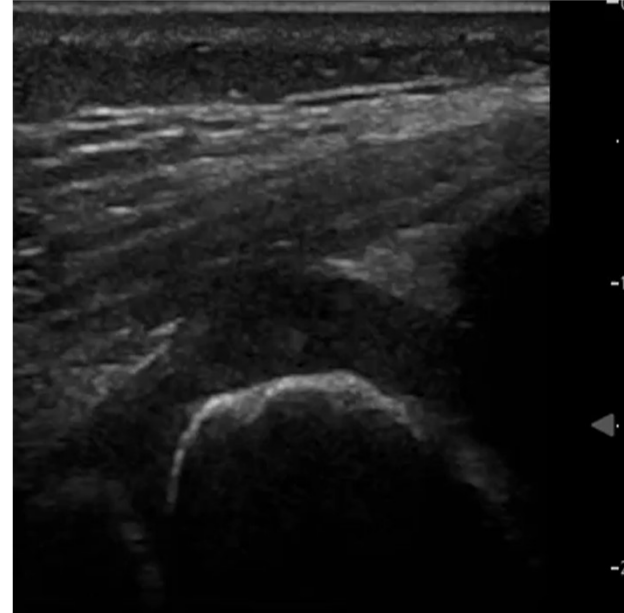
Vieira, et al.



**Tibia (Toddler's Fracture)?**

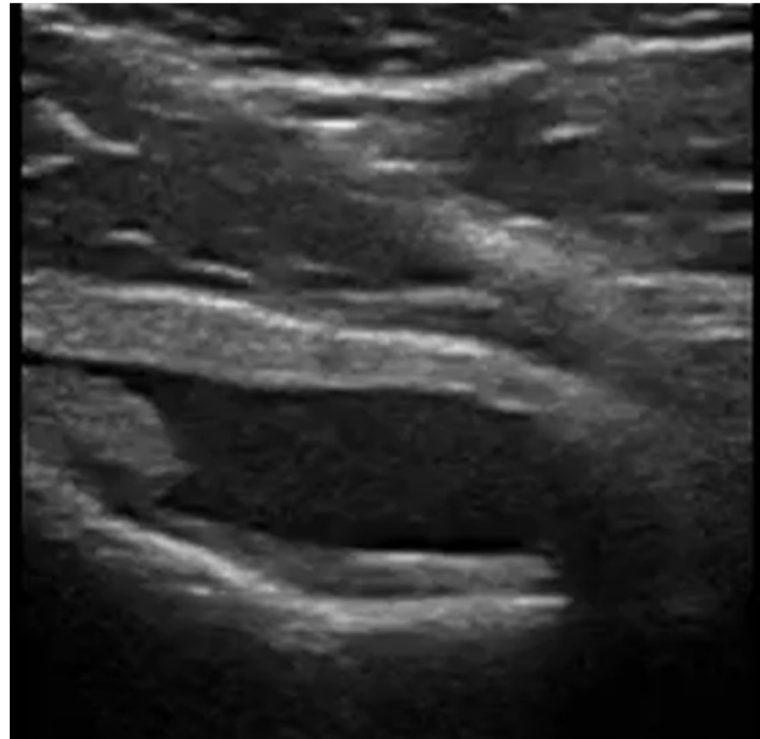


**Knee (Septic Arthritis)?**





## Hip Effusion?

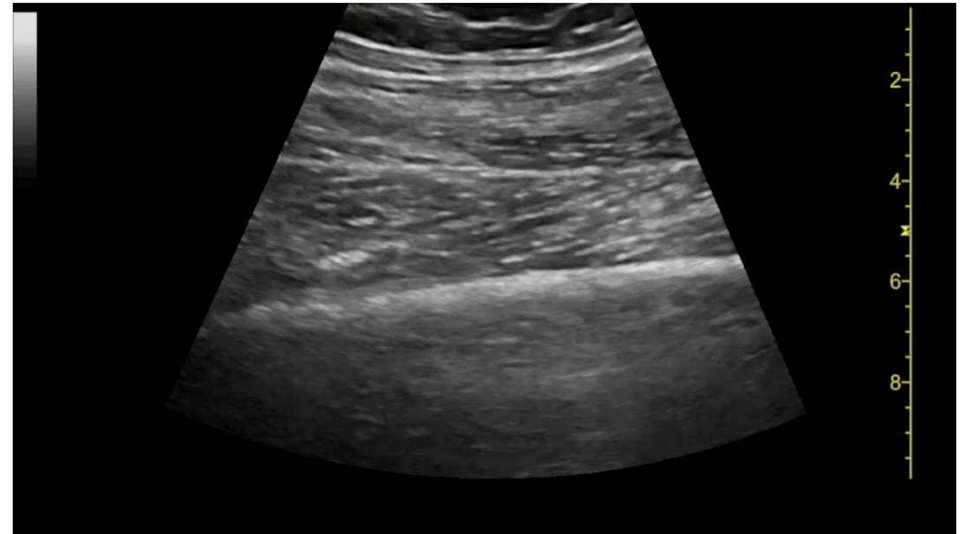




## Technique



Linear (High frequency) probe  
Anteriorly in a sagittal plane



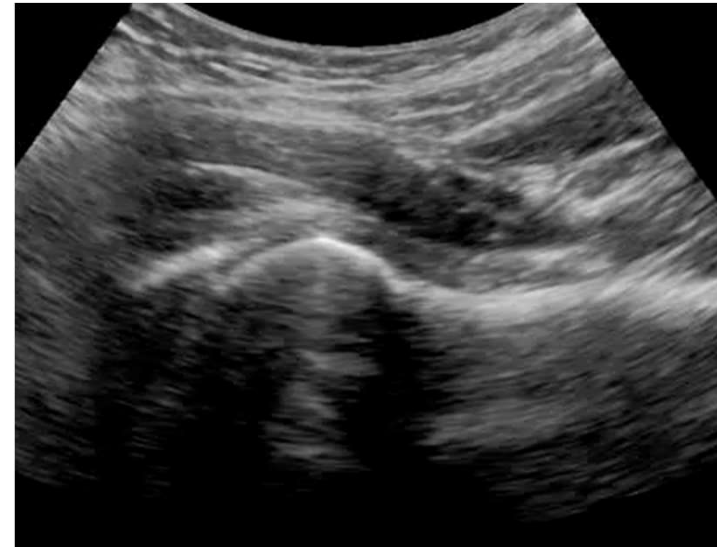
Scan cranially along femur  
Rotate obliquely along femoral neck



# Hip Effusion – Adult

Effusion

Normal

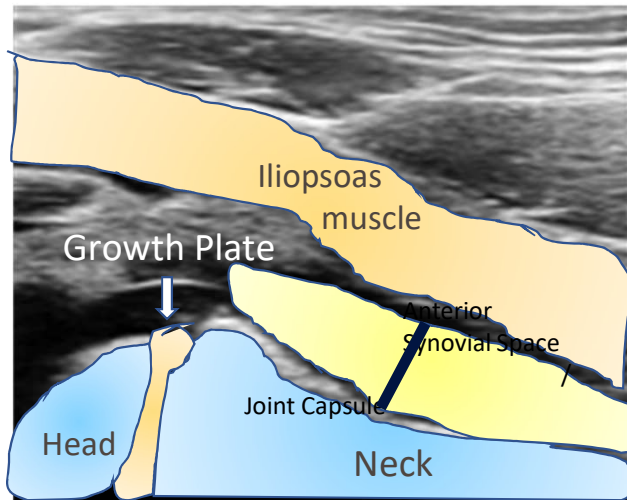


7 mm

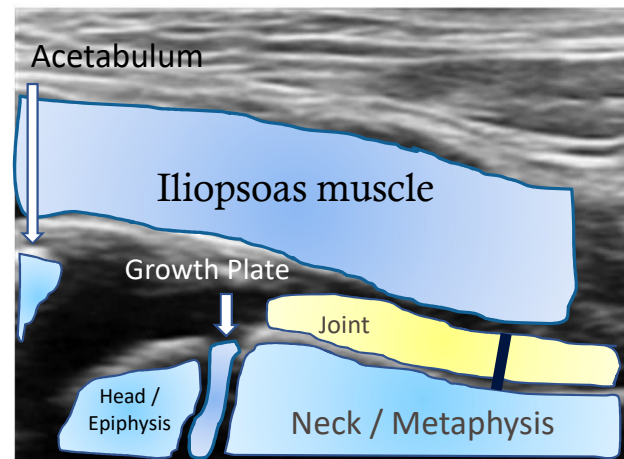


# Hip Anatomy

**Effusion**



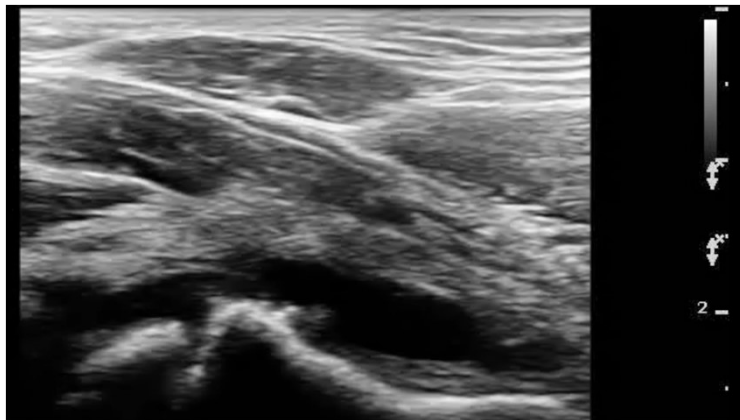
**Normal**





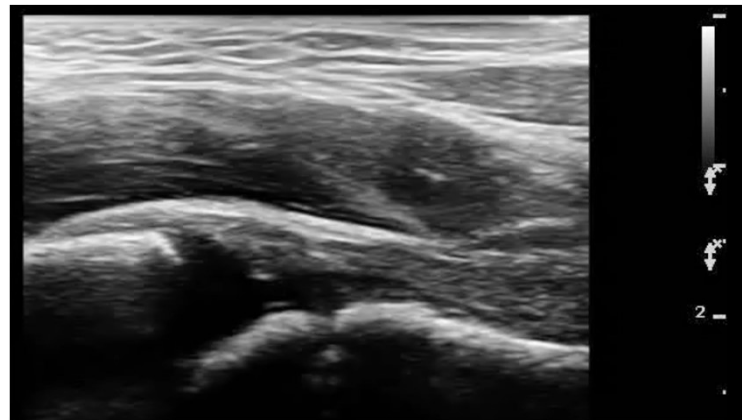
# Hip Effusion – Pediatric

**Effusion**



5 mm  
> 2 mm compared to contralateral

**Normal**





# Arthrocentesis

## Anatomic Landmark Technique

- Anterior approach:
  - ▶ 60% of injection successful
  - ▶ 27% pierced/contacted the femoral nerve
- Lateral approach:
  - ▶ 80% of injections successful



Leopold, et al.

## Ultrasound Guided

- 97% accuracy
  - ▶ Confirmed by contrast-enhanced fluoroscopic examination

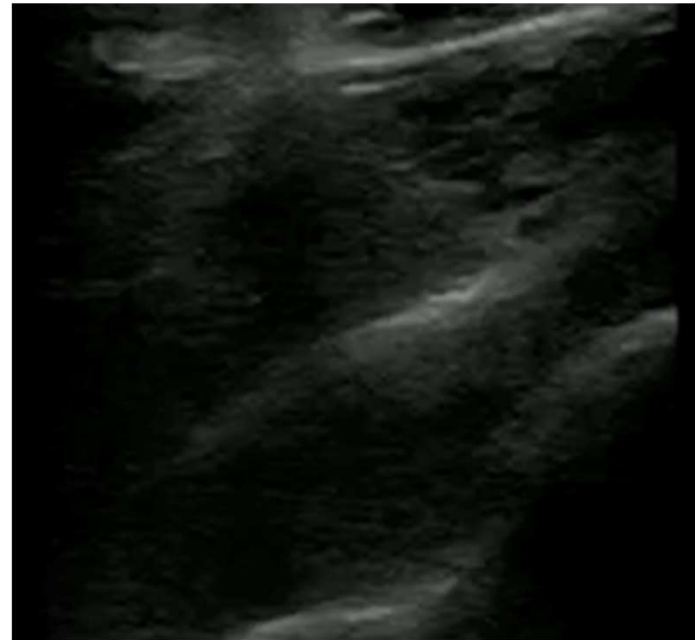
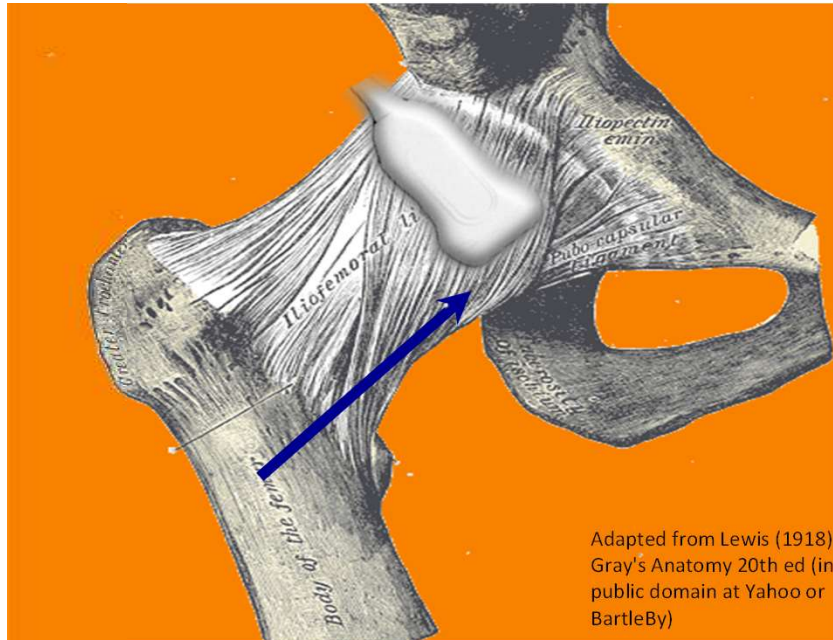


Smith, et al.



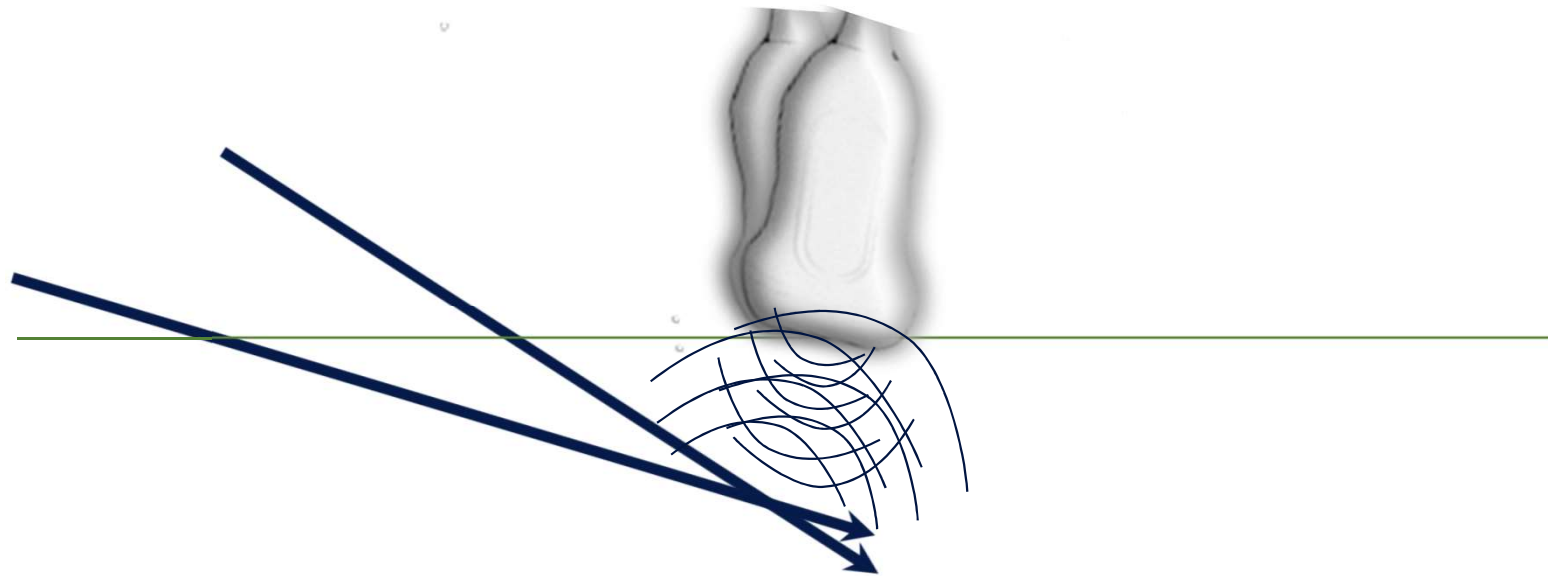


# Arthrocentesis





## Needle Guidance – Anisotropy





# Hip Transient Synovitis – Treatment

## Bed Rest + NSAIDS

- Refusal to bear weight: 14%
- Hip joint pain: 81%
- Limping @ 24 hours: 92%
- Duration of illness: 5.9

## Aspiration + NSAIDS

- Refusal to bear weight: 1%
- Hip joint pain: 6%
- Limping @ 24 hours: 10%
- Duration of illness: 3.77





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