

Pediatric Lumps and Bumps

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No disclosures.

OBJECTIVES

- ✓ Why are children different?
- ✓ What to order for palpable lumps in children?
- ✓ Unusual lesions: foreign bodies, head shape, sacral dimple, vascular anomalies, chest wall...
- ✓ Rules to practice by



Perspective

General Perspective

Pediatric soft tissues masses

✓ COMMON

BENIGN >> MALIGNANT

1% of all pediatric soft tissue tumours are **malignant**

Up to **25%** of all pediatric soft tissue tumours are **malignant** if small superficial lesions are excluded.

Most can be managed conservatively!

- ✓ Clinical follow-up to resolution
- ✓ Or, ensured stability

All conservative management includes:

- Continued **clinical** follow-up to resolution.
- OR
- Ensured **clinical** stability of lesion.

***** Regardless of US findings, the overall assessment is always a clinical one.***



Ultimately
management should
be decided based on
the **entire clinical
picture.**

Never 100%
specific

Never 100%
sensitive

Imaging may be
wrong!

Pediatric Radiologist Perspective

FAVOURABLE STATISTICS

1 in 100 MALIGNANT



Don't miss that 1%!

EXPERIENCE

Incorrect Imaging

Poorly reported

Inadequate follow-up (imaging;
clinical)

Delayed
diagnosis!

... prognosis...

Pediatric Radiologist Perspective

Any concerning or indeterminate lump in a child comes to our **Stollery pediatric radiology team**. ★



RAD-PATH CORRELATION!

perspective



TUMOUR BOARD

Pediatric Radiologist
Oncologist
Pathologist
Rad Oncologist
Surgeon

SURVEILLANCE

Pediatric Radiologist

LIFELONG FOLLOW-UP IMAGING

Remission

Recurrence

Re-biopsy

Pediatric Surgeon

Pediatric Radiologist

Review
community
ultrasound

Pediatric Radiologist

MRI
CT
(NUC MED)

REFINED DIFFERENTIAL DIAGNOSIS

MALIGNANT

INDETERMINATE

BENIGN

BIOPSY

FOLLOW/
BIOPSY

FINAL PATHOLOGY

TREATMENT PLAN

Radiation

Chemotherapy

Surgery

FOLLOW-UP IMAGING

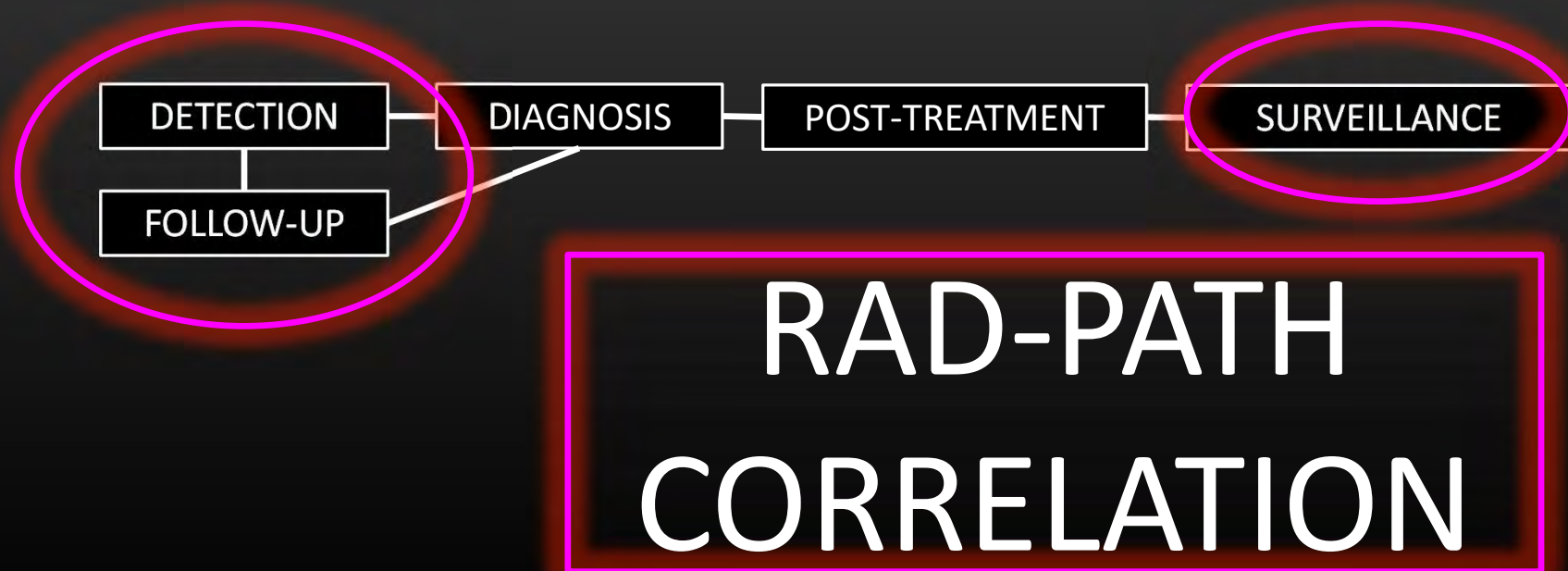
"What do you
think this is?"

"What imaging should
we do?"

"Should we follow it or
biopsy it?"

"Rad will biopsy..."
"How best to follow the
lesion?"

Pediatric Radiologist Perspective



**Lumps and bumps in children
are best assessed by a pediatric
radiologist.**

Stollery Peds Radiology team = MIC Peds Radiology team



STOLLERY
CHILDREN'S
HOSPITAL

=



Pediatric patient population

**CHILDREN ARE NOT LITTLE
ADULTS!**

UNRELIABLE
PHYSICAL EXAM

POOR
HISTORIANS

High level of uncertainty!

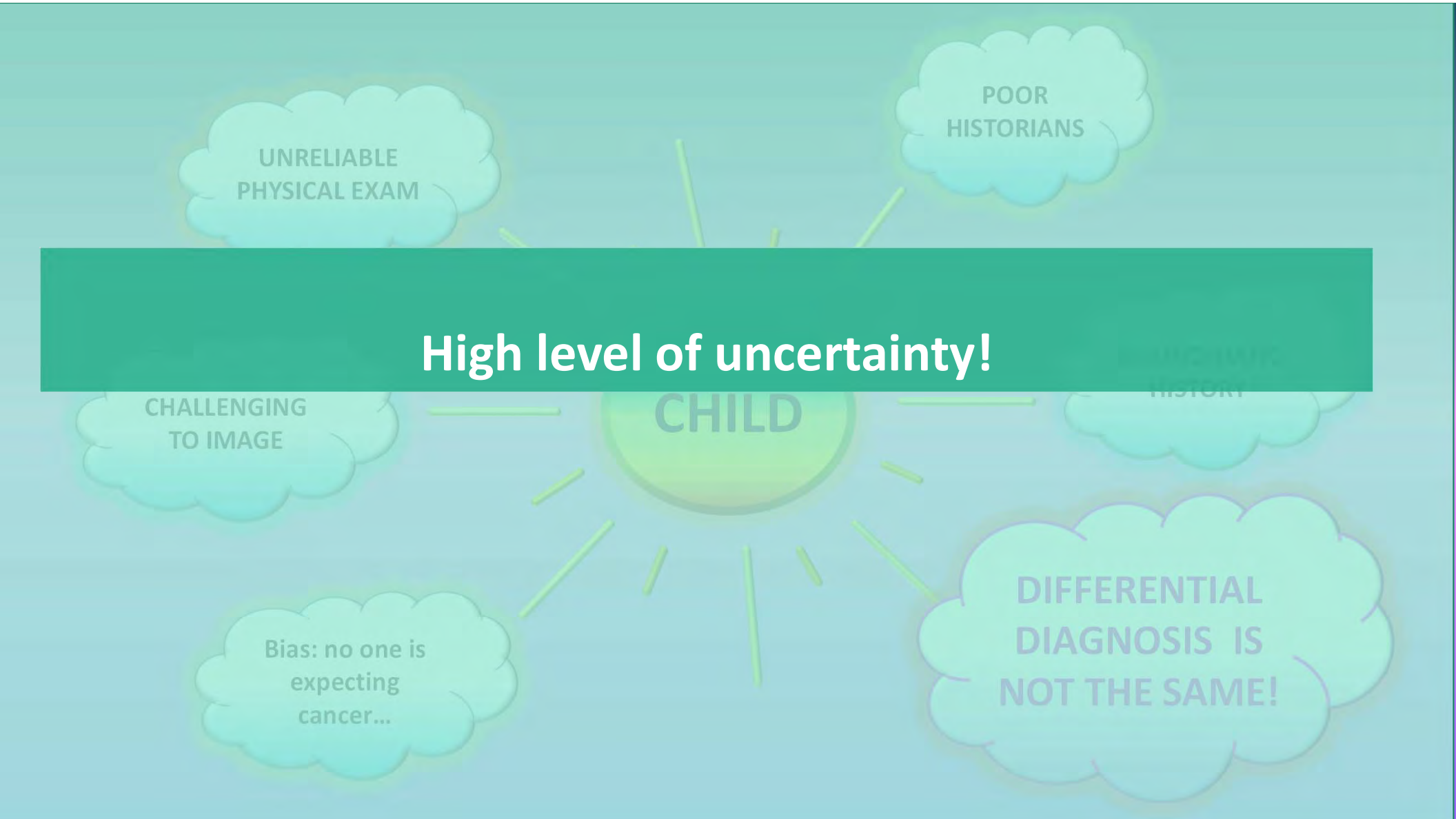
CHALLENGING
TO IMAGE

CHILD

PSYCHIATRIC
HISTORY

Bias: no one is
expecting
cancer...

DIFFERENTIAL
DIAGNOSIS IS
NOT THE SAME!



Differential Diagnosis

TRAUMA

- Hematoma, soft tissue contusion, fat necrosis, retained foreign body

INFECTION

- Abscess, phlegmon, retained foreign body

Cyst

- **Complex** (sebaceous cyst, **dermoid/epidermoid cyst**, **vascular anomalies**)
- **Simple** (dermoid/epidermoid cyst, ganglion cyst, **branchial cleft cyst**, **thyroglossal duct cyst**)

Mesenchymal Neoplasm

- **Malignant** (rhabdomyosarcoma, neuroblastoma, lymphoma, fibrous tumour)
- **Benign** *diagnosis of exclusion (**pilomatricoma**, **hemangioma**, lipoma, **lipoblastoma**)

Modalities Available



(+) Ionizing Radiation

X-rays

POOR for soft tissues

CT

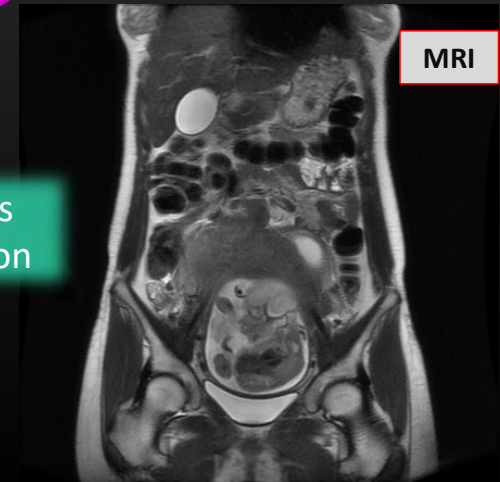
Fluoroscopy

(-) Ionizing Radiation

Ultrasound

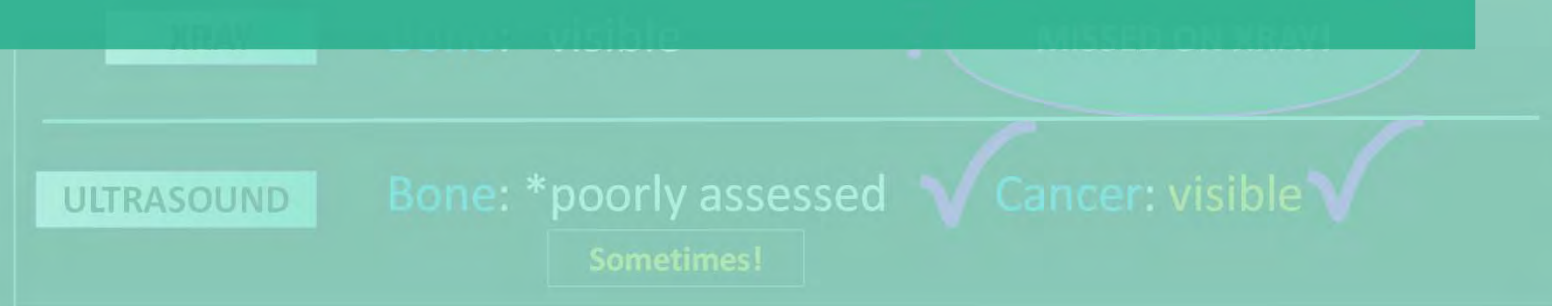
MRI

Needs sedation



Why not assess lumps with xrays only?

- Xrays do not assess soft tissues
- Xrays assess bone
- Start with ultrasound.
- If US indicates it's bone, then get an xray.



Ultrasound

- ✓ No Radiation
- ✓ No Sedation
- ✓ Any age
- ✓ Excellent characterization

Ultrasound is the first line imaging for **ALL** lumps and bumps.

CYSTIC OR SOLID?

Far more likely to be malignant.

More vigilant follow-up.

Frequently ultrasound cannot determine the exact nature of a soft tissue lesion...

- ✓ Clinical follow-up to resolution
- ✓ Or, ensured stability



What do you order for a palpable lump?

Order **Ultrasound LUMP** for any palpable mass.

Do not order an MSK ultrasound.

***Do not order MSK ultrasounds for lumps and bumps of the extremities

(LONG WAIT!)

Radiologist perspective

If you are concerned, in children we **REFER FIRST.**

- Obtain US immediately for any growing or non-resolving mass
- Follow-up in 4 weeks if lesion is:
 - Indeterminate
 - Unresolving
 - Growing

- *Growth*
- *Large*
- *Painless*
- *Hard/fixed*
- *Lymphadenopathy*

Management of lumps



STOLLERY
CHILDREN'S
HOSPITAL



Advanced imaging (CT, MRI) is not needed for referral to the Stollery.

**UNNECESSARY
RADIATION**

**UNNECESSARY
SEDATION**

**UNNECESSARY
DELAY**

- Imaging ordered is often **INCORRECT**

SURGEON WILL ORGANIZE IMAGING URGENTLY IF NEEDED

- Delays care
- Unnecessary radiation and/or sedation

PET/CT

Bone scan
MRI

**Order a US Lump for all palpable lumps,
head to toe.**

It's that simple!

Unusual lesions

Unusual Head Shape

Clinical Concern:

CRANIOSYNOSTOSIS

(premature sutural closure)

Clinical Findings:

- ABNORMAL HEAD SHAPE
- SUTURAL RIDGE
- Diagnosed in <1 yo

IMAGING?

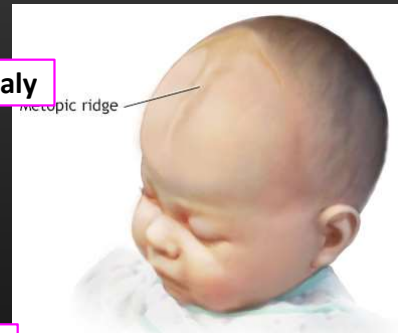
None!



Scaphocephaly

Brachycephaly

Trigonocephaly



MANAGEMENT:

- Craniosynostosis is considered a clinical diagnosis.
- If concerned, refer to the [Stollery Head Shape Clinic](#) (Pediatric Neurosurgery)
- **Skull XRAYs and Head CT are not indicated.**

Cervical Lymph Nodes

Clinical Concern:

Malignancy
Abscess

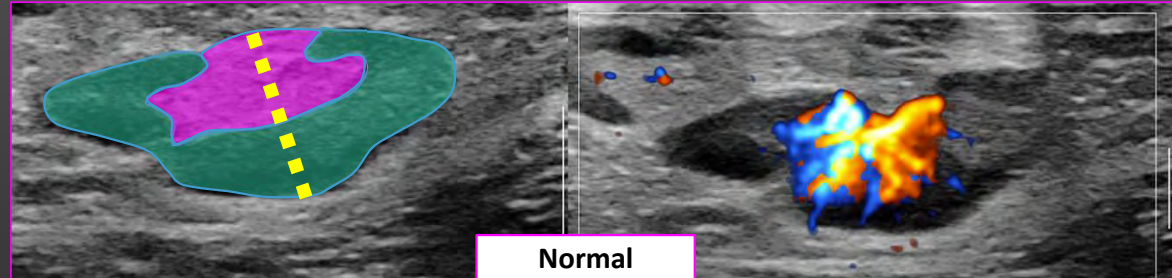
Clinical Findings:

- Enlarged
- Pain?
- Inflammation
- Mobile or fixed?

Kids have lots
of lymph
nodes!

IMAGING?

Ultrasound Lump/Neck



Normal

NORMAL SIZE < 1 cm short axis

NORMAL MORPHOLOGY RENIFORM & FATTY HILUM

Management:

- If patient has active infection, image only for abscess.
- If patient has enlarged LN > 4 weeks after illness or with no infection, order Ultrasound to assess size/morphology.
- If abnormal size/morphology on us without explanation for > 4-6 wk, refer to pediatric surgery.

Consider
obtaining a US
at Stollery.

Waxing and Waning Lesions Lymphatic Malformations

Clinical Concern:

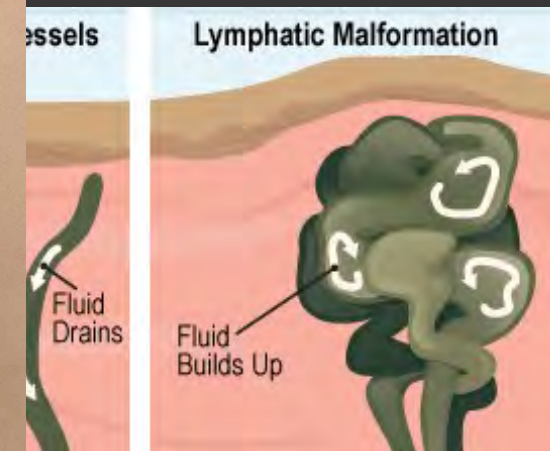
Trauma?
Infection?
Tumour?

Clinical Findings:

- Ballotable lump
- Present since birth/ Grows with patient
- **Acutely bleeds internally:**
 - Sudden pain & lump
 - +/- bruising
- No/? trauma
- Improves with no intervention
- **Recurrent**

IMAGING?

Ultrasound Lump



Relief/ elective tx

Surgery: refer to Pediatric

right abd



- 50% by 5yo
- 70% by 7 yo

IMAGING?

Ultrasound Lump/N

SURGERY

regularly until resolution.

6yo, refer to PEDS SURGERY

[https:// www.aao.org/eye-health/diseases/hemangioma](https://www.aao.org/eye-health/diseases/hemangioma)

Chest wall

Impaired sternocostal cartilage arrangement

PECTUS EXCAVATUM (90% chest deformities)

- Isolated; Marfan & Noonan Syndrome
- Cardiac associations: (mitral valve prolapse 17%, arrhythmias 15%, congenital heart disease 2%)
- Compression: cardiopulmonary impairment, pain, dyspnea

PECTUS CARINATUM (2nd most common chest deformity)

- 30% familial; most isolated; Marfan & Noonan syndromes
- Cardiac associations
- Respiratory symptoms

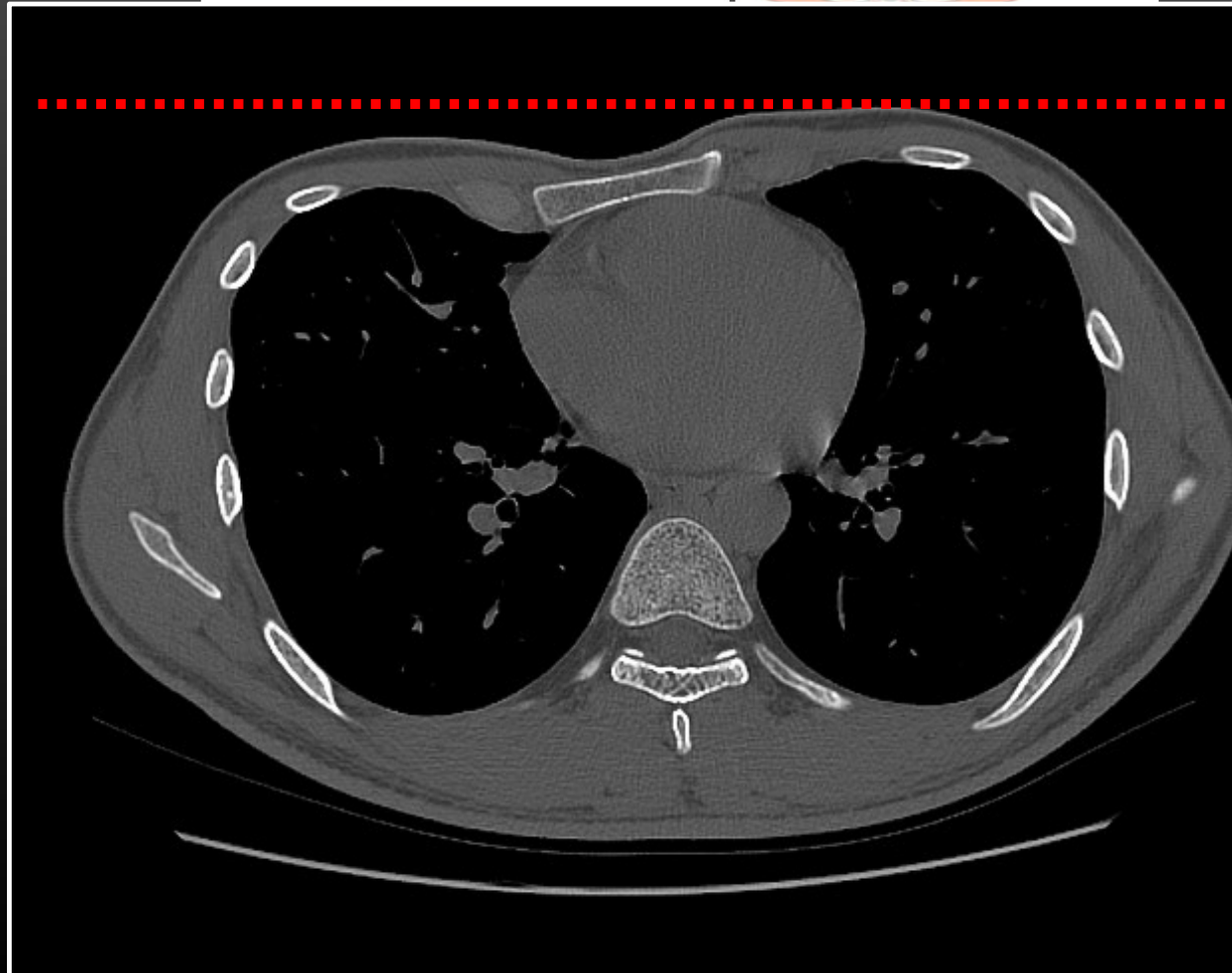
STERNAL TILT

- Lesser deformity; mild asymmetry
- Cosmetic and “palpable mass”

IMAGING?

None...

Ultrasound Lump if uncertain



and photos, Maricchi & Pado, Maricchi & Pado, Viviani & Pado, and Pado. (2011). Spectrum of anatomical variants, normal findings, and pathology in and around the paediatric sternum. Pediatric Radiology. 52. 10.1007/s00247-021-05268-5.

Sacral Dimple

Pediatric Neurosurgery

Five Things Physicians and Patients Should Question

by

Canadian Pediatric Neurosurgery Study Group

Last updated: June 2018



2

Don't image a midline dimple related to the coccyx in an asymptomatic infant or child.

Sacroccocygeal dimples (also called simple sacral dimples or sacroccocygeal pits) are common findings in newborns, with a prevalence of approximately 2 to 5%. They are not associated with any increased risk of occult spinal dysraphism (e.g., low lying conus, fatty filum, lipomyelomeningocele, split cord malformation, dermal sinus tract, etc.) compared with the general population of infants without sacroccocygeal dimples. There is therefore no need to investigate infants with this finding, with either ultrasound or MRI. Red flags for which investigating would be indicated include the presence of midline tuft of hair, sacral dimple or sinus tract above the gluteal cleft, hemangioma, dermal appendage, and/or a subcutaneous lump. The ideal choice for initial investigation (ultrasound or MRI) would depend on the specific cutaneous findings and clinical symptoms present.



NORMAL

- ✓ Midline
- ✓ < 5mm
- ✓ < 2.5 cm above anus
- ✓ No associated skin abnl

Zywickie, Holly A. and Curtis J. Rozzelle. "Sacral dimples." *Pediatrics in review* 32.3 (2011): 109-113; quiz 114, 151.

Skin tag

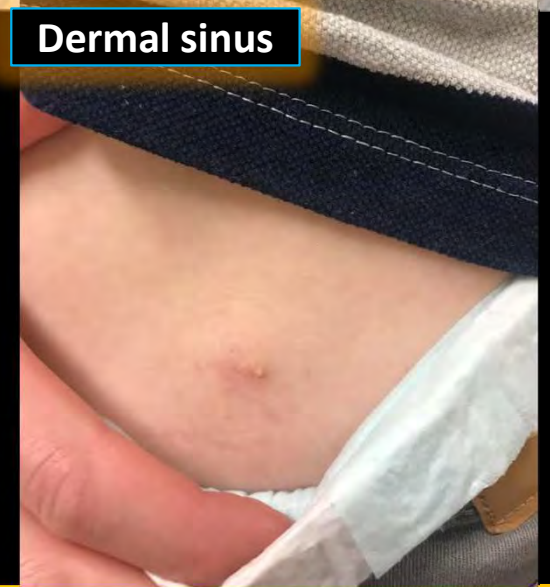


ABNORMAL

Hemangioma

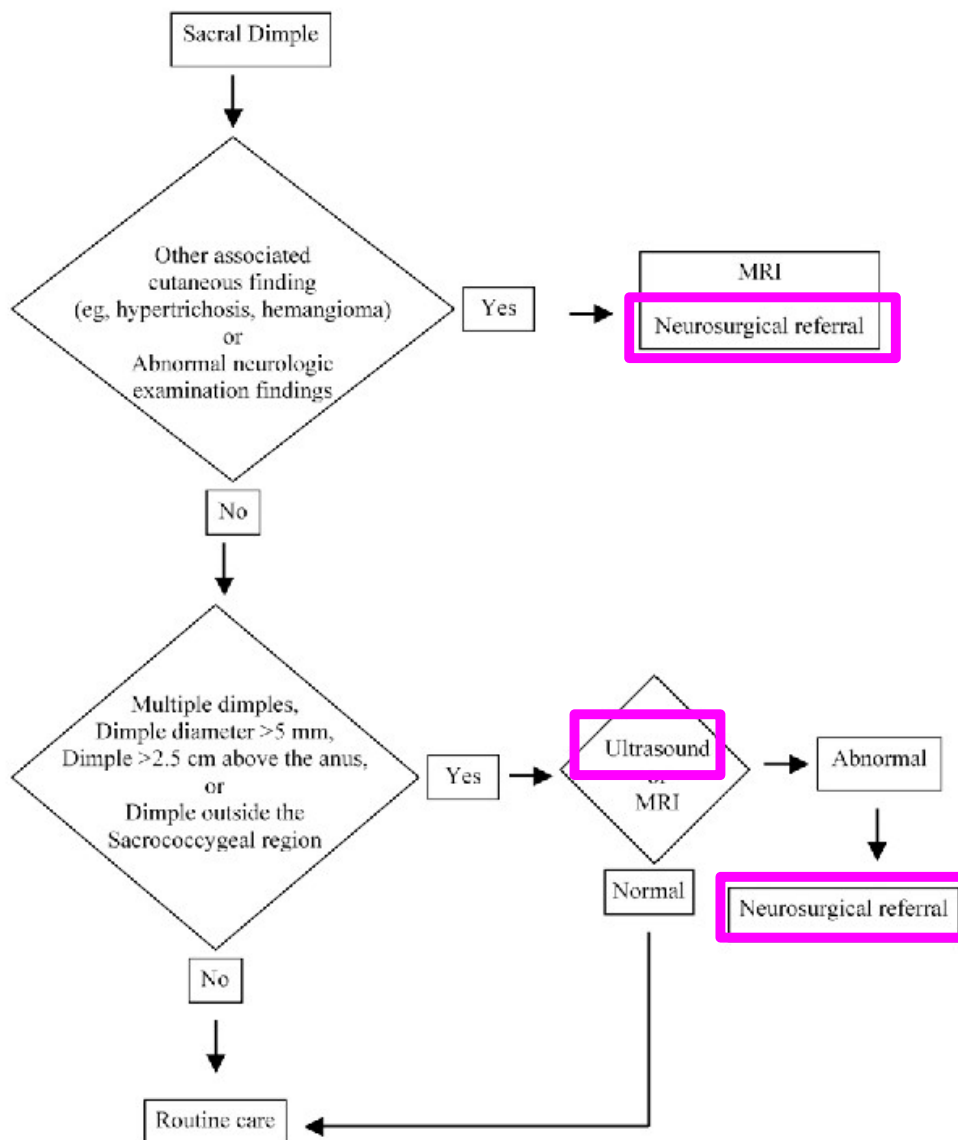


Dermal sinus



Hairy tuft





RED FLAG SIGNS

- ✓ Dimple/pimple
- ✓ Mass
- ✓ Hemangioma
- ✓ Hairy tuft
- ✓ May be off midline
- ✓ Skin tag

... located HIGH:

- above gluteal cleft
- > 2.5 cm above anus

Cutaneous Markers

Lipoma



Hairy Patch (1)



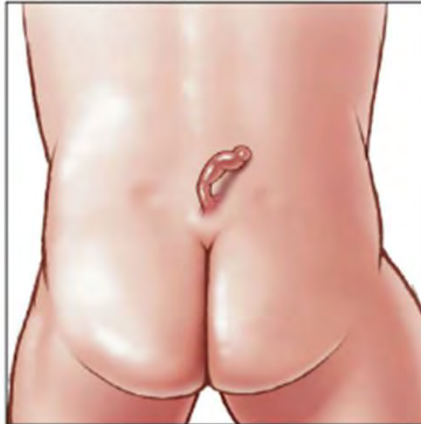
Hairy Patch (2)



Deviated gluteal cleft crease



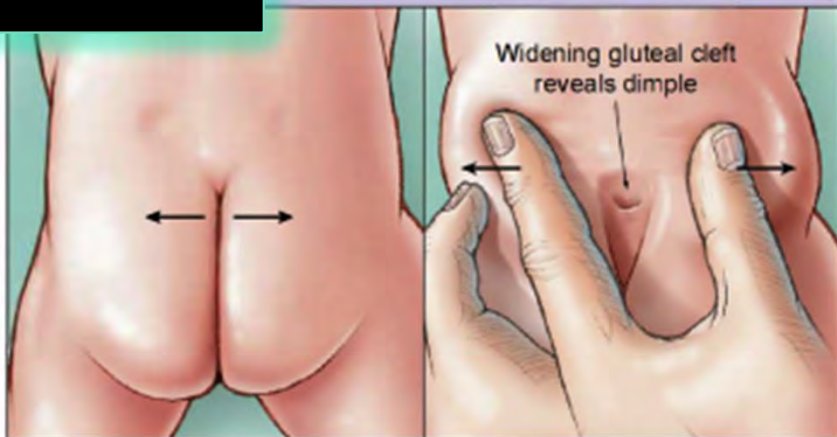
Caudal Appendage



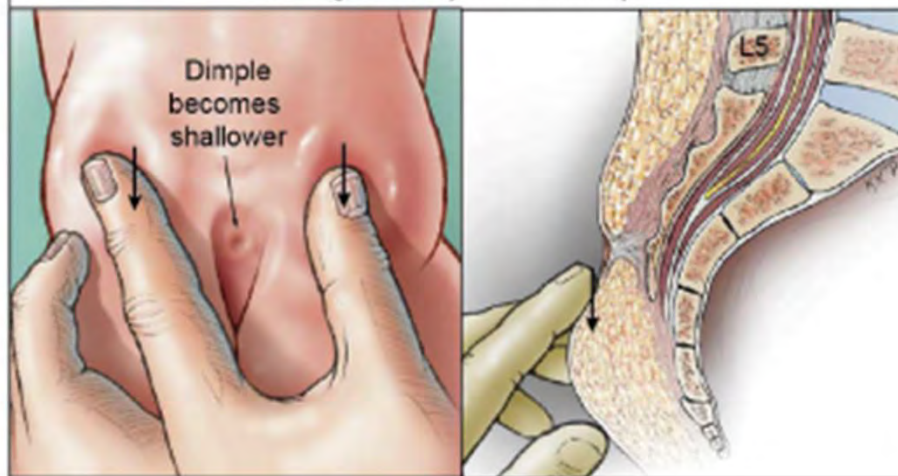
Bifid (Y) gluteal cleft crease



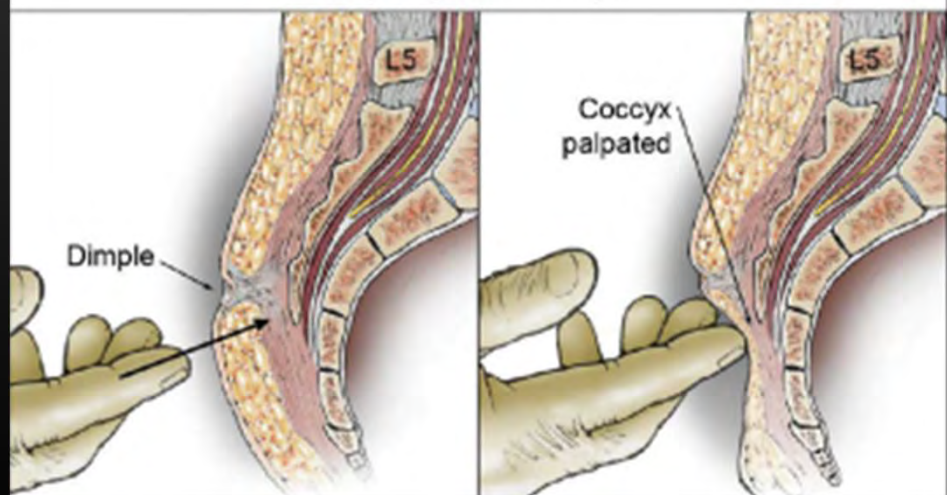
NORMAL



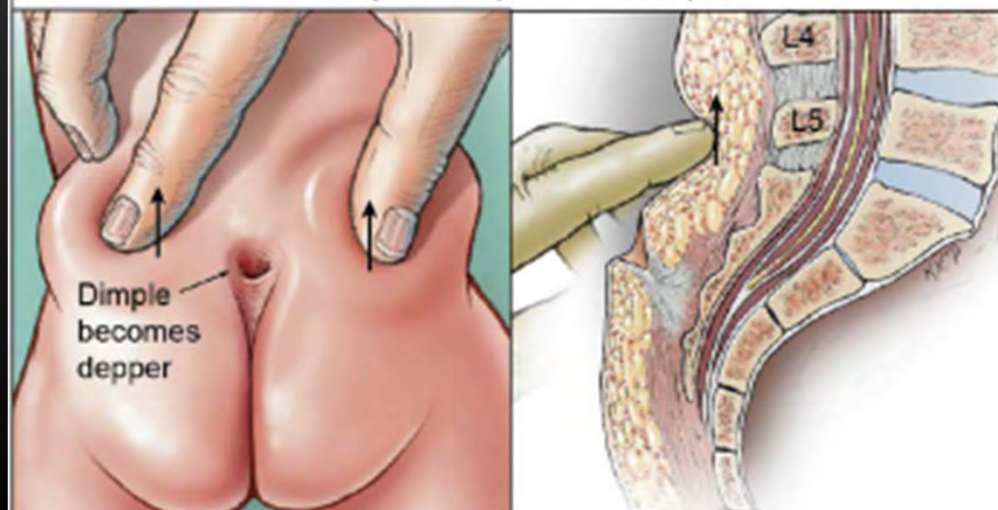
Pulling Caudally - Sacral Dimple



Palpating Sacral Dimple

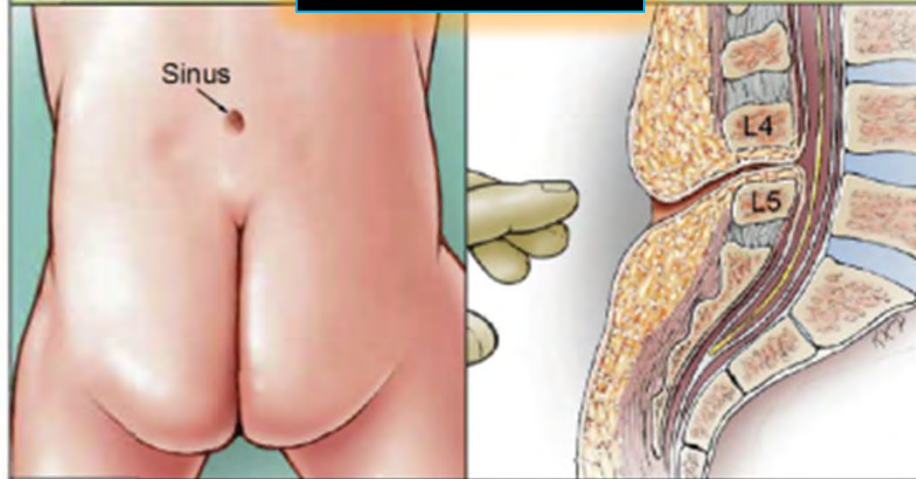


Pulling Cranially - Sacral Dimple

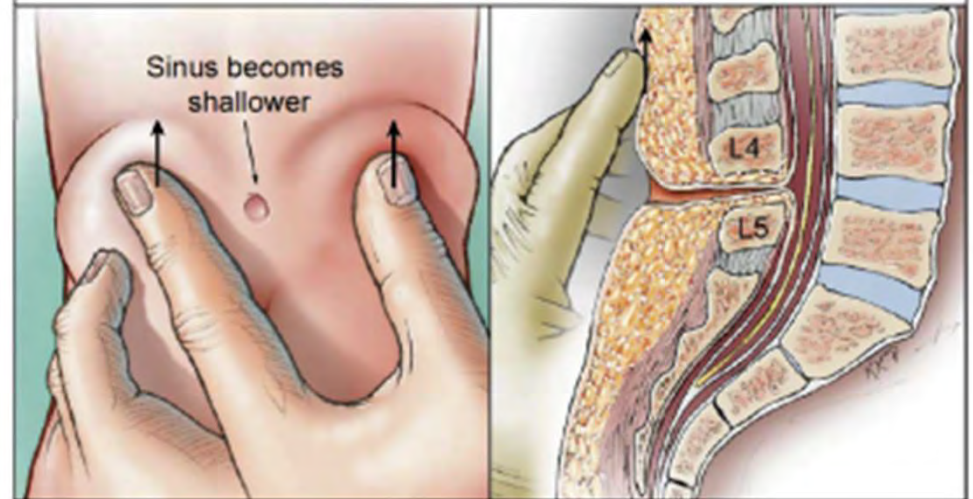


Dermal Sinus

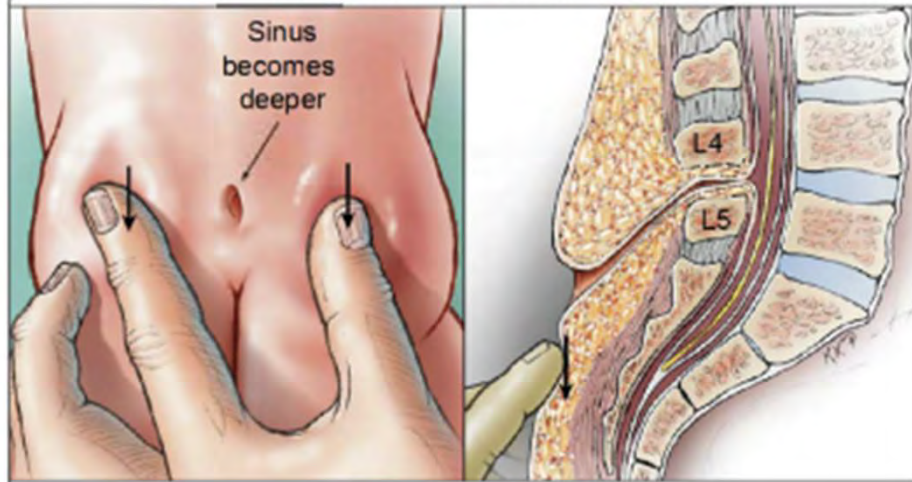
ABNORMAL



Pulling Cranially - Dermal Sinus



Pulling Caudally - Dermal Sinus



Foreign Body

Clinical Concern:

Retained foreign body

Clinical Findings:

- Penetrating injury
- Acute: Infection
- Chronic: granuloma/lump

IMAGING?

Consider Ultrasound



MANAGEMENT:

Send to pediatric surgery

US tech can also MARK the skin

Non-palpable Testicles in pediatrics

Clinical Concern:
Undescended testicles
vs Retractable testicles

Clinical Findings:
• Empty scrotum

IMAGING?
None

Paediatric Surgery



Six Tests and Treatments to Question

by
Canadian Association of Paediatric Surgeons
Last updated: September 2021

4 Don't order a routine ultrasound for children with undescended testes.

Undescended testes is the most common congenital genitourinary anomaly in boys. Diagnosis is made on physical examination and if necessary, imaging. The evidence shows that it is not necessary to order a routine ultrasound in children with suspected undescended testes before referring to a pediatric surgeon.

5 Don't delay referral for undescended testes beyond 6 months of age.

The ideal timing for surgical correction of undescended testes is 6 months – 1 year of age. Orchiopexy should not be performed before 6 months of age, as testes may descend spontaneously during the first few months of life. The highest quality evidence recommends orchiopexy between 6 and 12 months of age. Surgery during this time frame may optimize spermatogenic functions.

MANAGEMENT:

Send to pediatric surgery

Umbilical and Inguinal Hernias in pediatrics

Clinical Concern:
Hernia

Clinical Findings:

- Palpable lump at umbilicus or in inguinal region

IMAGING?

None



Paediatric Surgery

Six Tests and Treatments to Question

by
Canadian Association of Paediatric Surgeons
Last updated: September 2021

1 Don't order a routine ultrasound for umbilical and/or inguinal hernia.

Umbilical and inguinal hernias are one of the most common reasons a primary care patient may need referral for surgical intervention. The history and physical examination are usually sufficient to make the diagnosis. The routine use of ultrasound for these two conditions is not necessary and will not help the pediatric surgeon to reach a diagnosis.

MANAGEMENT:

Send to pediatric surgery

Take-home Points

- ✓ All lumps and bumps in children require:
 - ✓ Comprehensive history and physical
 - ✓ Continued follow-up to resolution or to ensure stability
- ✓ Imaging any palpable lump should always start with ultrasound
 - ✓ Xray ordered second only if the ultrasound finds a bone abnormality
- ✓ If a lump is concerning, refer the patient to pediatric surgery FIRST
- ✓ Advanced imaging (CT, MRI) is not needed for pediatric referral
 - ✓ Unnecessary delay, radiation, sedation

Take-home Points

- ✓ Hemangiomas are a clinical diagnosis and should resolve by school age
- ✓ US cannot differentiate between retractile and undescended testicles in a child and so should not be ordered. (Refer to peds surgery)
- ✓ US not needed for umbilical or inguinal hernia. (Refer to peds surgery)
- ✓ High sacral dimples (> 2.5 cm above anus) need US spine. Red flag spine lesions need referral to pediatric neurosurgery.

THANK YOU!

Resources

- Banerji A, Panzov V, Young M, et al. (2016). Hospital admissions for lower respiratory tract infections among infants in the Canadian Arctic: a cohort study. CMAJ Open. 4. E615-E622. 10.9778/cmajo.20150051.
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- <https://choosingwiselycanada.org/wp-content/uploads/2017/05/Pediatric-neurosurgery.pdf>
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- Zywicke, Holly A. and Curtis J. Rozzelle. "Sacral dimples." Pediatrics in review 32 3 (2011): 109-13; quiz 114, 151 .