Pediatric Emergencies – What Not to Miss in the FP Office

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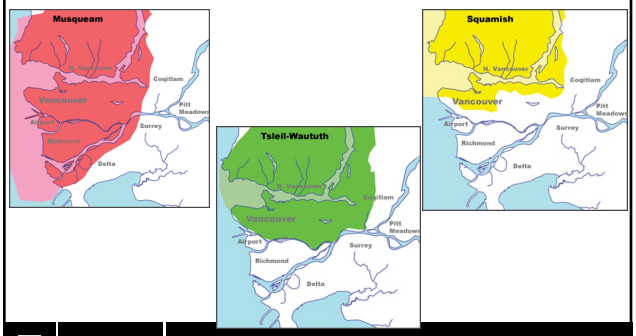
1

We would like to acknowledge that we are gathered today on the traditional territories of the Musqueam, Squamish and Tsleil-Waututh peoples.

Source: www.johomaps.net/na/canada/bc/vancouver/firstnations/firstnations.html



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Disclosures

No Conflict of Interests or Potential Conflicts of Interests to Declare

Speaker owns shares of Johnson & Johnson, Abbott Laboratories, Medtronic PLC, Merck

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Objectives

1) Identifying important "can't miss" diagnoses in pediatric emergency medicine
   1) Head Injuries
   2) Testicular Pain
   3) Bruising
   4) Fever in Infants
   5) Abdominal Emergencies

2) Become familiar with evidence based and validated clinical decision rules in pediatric emergency medicine

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CiTBI

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

Epidemiology

Head injuries account for > 500,000 ED visits/year in the US[1]

Those with minor blunt trauma rarely have ciTBI

- GCS 14 – 15: 1%[2]
- GCS < 14: 35%[3]

Rates of CT use in Canadian Pediatric EDs has increased

- 1995: 15%[4]
- 2005: 53%[5]
- Trends may be reversing…

32% rate in the USA[6]

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CiTBI

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

Detecting CiTBI

Rates of ciTBI are high in those with GCS < 14

- All should be assessed in the ED

Rates of ciTBI in those with GCS 14-15 are < 1%

- Not all patients require an ED assessment

Pediatric GCS exists to calculate score in younger children

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CiTBI

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

	Under Age 2	Age 2 and Older
History	LOC	LOC
	Vomiting	Vomiting
	Mechanism	Mechanism
	Parental report of behaviour	Severe/worsening headache
	Post-HI seizure	Post-HI seizure
	Suspicion of NAI	Amnesia
Physical Exam	GCS/AMS/irritability	GCS/signs of AMS
	Open/depressed/ palpable skull fracture	Open/depressed/ basilar skull fracture
	Non-frontal or large boggy hematoma	

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CiTBI

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

PECARN Head CT Rule[2,7]

- Most widely validated
- Highest sensitivity

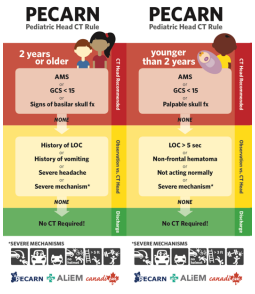

Image Source: ALiEM

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CiTBI

Head Injuries

Testicular Pain

Bruising

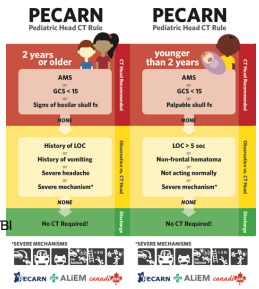
Fever

Abdominal Emergencies

Send to ED — 4.4% risk ciTBI

Send to ED — 0.9% risk ciTBI

ED assessment not required — <0.05% risk ciTBI



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CiTBI

Head Injuries

Testicular Pain

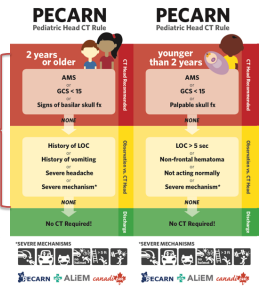
Bruising

Fever

Abdominal Emergencies

Send to ED — 45%

ED assessment not required — 55%



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CiTBI

Head Injuries

Testicular Pain

Bruising

Fever

Abdominal Emergencies

ED assessment not required — 55%

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CiTBI

Head Injuries

Testicular Pain

Bruising

Fever

Abdominal Emergencies

Summary

- All patients with GCS less than 14 require ED evaluation
- Use PECARN head injury rules to determine need for ED assessment in those with GCS 14-15

CDRs support but never replace clinical judgment

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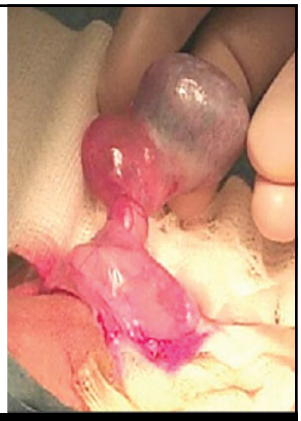
Testicular Torsion

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

Epidemiology[8]
- Affects 1:400 males younger than 25
- Often due to underlying anatomic predisposition
- Threatening to viability of testicle
- Area of active medicolegal litigation



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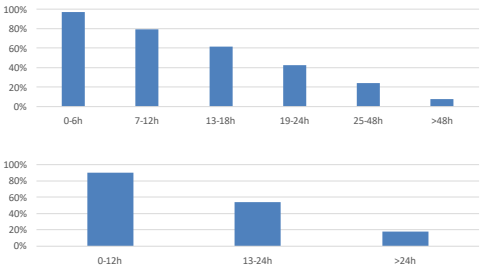
Testicular Torsion

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

Salvage by Duration of Symptoms[9]



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Testicular Torsion

Head Injuries
Testicular Pain
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Abdominal Emergencies

Reliability of Historical features[10]

	Testicular Torsion	Torsion of the Appendix Testis	Epididymitis Orchitis
Previous Trauma	Sens: 25% Spec: 93%	Sens: 10% Spec: 88%	Sens: 5% Spec: 84%
Previous Pain Attacks	Sens: 42% Spec: 89%	Sens: 16% Spec: 81%	Sens: 8% Spec: 73%
Nausea/Vomiting	Sens: 69% Spec: 93%	Sens: 12% Spec: 75%	Sens: 4% Spec: 64%
Dysuria/micturition disorder	Sens: 11% Spec: 61%	Sens: 14% Spec: 59%	Sens: 55% Spec: 87%

No single historical feature has sufficient sensitivity to rule out torsion!

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Testicular Torsion

Head Injuries
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Abdominal Emergencies

Reliability of Physical Examination[10]

	Testicular Torsion	Torsion of the Appendix Testis	Epididymitis Orchitis
Elevation of testis	Sens: 83% Spec: 90%	Sens: 20% Spec: 70%	Sens: 4% Spec: 54%
Transverse location of testis	Sens: 83% Spec: 94%	Sens: 8% Spec: 69%	Sens: 5% Spec: 61%
Anterior rotation of epididymis	Sens: 69% Spec: 98%	Sens: 2% Spec: 76%	Sens: 3% Spec: 70%
No cremasteric reflex	Sens: 92% Spec: 94%	Sens: 4% Spec: 66%	Sens: 7% Spec: 59%

No single physical examination feature has sufficient sensitivity to rule out torsion!

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Testicular Torsion

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

TWIST Score[11-13]

Low Risk*
0-2
Intermediate Risk
3-4
High Risk
5-7

*Different low risk cutoff from BCCH Pathway

	Points
Testicular Swelling	2
Hard Testes	2
Absent Cremasteric Reflex	1
Nausea or Vomiting	1
High Riding Testicle	1

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Testicular Torsion

Head Injuries
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Abdominal Emergencies

BCCH Pathway

BC CHILDREN'S HOSPITAL

Please affix Patient label

ED PATHWAY FOR EVALUATION/TREATMENT OF PATIENT WITH SUSPECTED TESTICULAR TORSION

Child with history/physical examination suspicious for testicular torsion

*Order urinalysis
*Other investigations may be ordered based on history and physical

Complete Twist Score

TWIST SCORE	Score
Symptoms	
Nausea/Vomiting	/1
Signs	
Testicular Swelling	/2
Hard Testicle	/2
Absent Cremasteric Reflex	/1
High-riding Testicle	/1
Total	/7

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Testicular Torsion

Head Injuries
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Abdominal Emergencies

BCCH Pathway

Complete Twist Score

<1 | 1 to 5 | >5

Low Risk for Testicular Torsion
Equivocal for Testicular Torsion
High Risk for Testicular Torsion

Reassess and PO Challenge Discharge home with follow-up with PCP

No sonographic evidence of torsion

NPO Analgesia **Ultrasonography AND Urology consultation**

Sonographic evidence of testicular torsion, or torsion cannot be ruled out

IV Fluids NPO Analgesia **Urology consultation No imaging by ED Team**

Other testicular pathology

Reassess and PO Challenge Discharge home with urology follow-up

Ultrasound Results
☐ No radiographic evidence of testicular torsion
☐ Testicular torsion cannot be ruled out
☐ Radiographic evidence of testicular torsion
☐ Other:

***If TWIST Score > 0, do NOT delay imaging or urology consult to obtain results of urinalysis or other investigations**

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Testicular Torsion

Head Injuries
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Abdominal Emergencies

TWIST Score and Disposition

Testicular pain

Calculate TWIST Score

TWIST = 0 → Home!

TWIST > 0 → Emergency Department!

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Testicular Torsion

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

Summary

- Testicular pain is a time sensitive presenting complaint
  - Goal is to rule in or rule out testicular torsion
- TWIST score can help stratify risk of testicular torsion

CDRs support but never replace clinical judgment

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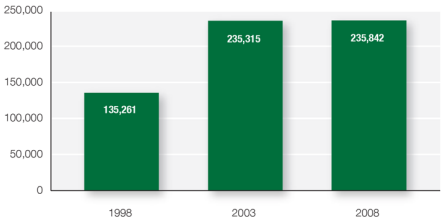
Child Maltreatment

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

Maltreatment investigations in Canada[14]



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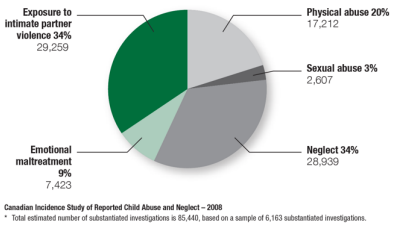
Child Maltreatment

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

Primary Category of Maltreatment[14]



Canadian Incidence Study of Reported Child Abuse and Neglect – 2008
* Total estimated number of substantiated investigations is 85,440, based on a sample of 6,163 substantiated investigations.

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Child Maltreatment

Head Injuries
Testicular Pain
Bruising
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Abdominal Emergencies

Bruising

- Very common when developmentally appropriate
  - < 1% of those under 9 months have bruising
  - 40—90% of children greater than 9 months have bruising[15,16]
- Bruises may be presentation for NAI
  - Most common finding in physical maltreatment cases[14]
  - Underlying medical causes should be considered[17]

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Child Maltreatment

- Head Injuries
- Testicular Pain
- Bruising
- Fever
- Abdominal Emergencies

Bruising

Red Flags[17]

- Babies not cruising
- Ears, neck, feet, buttocks, torso
- Not overlying front of body or overlying bone
- Unusually large or numerous
- Clustered or patterned
- Do not fit with mechanism

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Child Maltreatment

- Head Injuries
- Testicular Pain
- Bruising
- Fever
- Abdominal Emergencies

Bruising

Red Flags[18]

Original TEN-4

Bruising Rule

Image Source: faceitabuse.org

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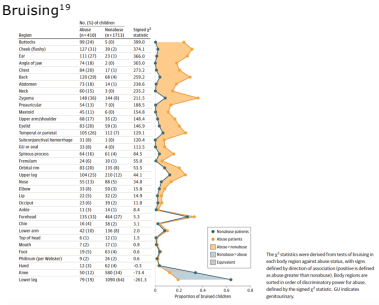
Child Maltreatment

- Head Injuries
- Testicular Pain
- Bruising
- Fever
- Abdominal Emergencies

Bruising[19]



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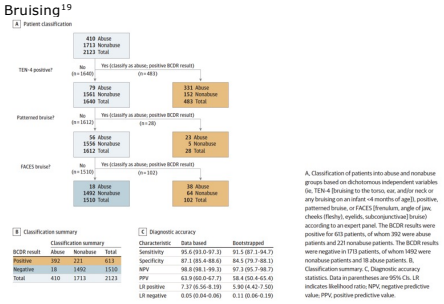
Child Maltreatment

- Head Injuries
- Testicular Pain
- Bruising
- Fever
- Abdominal Emergencies

Bruising[19]



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Child Maltreatment

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

Bruising[19]

Trunk
Ears
Neck

4 years or younger

Frenulum
Auricular area
Cheek
Eyes
Sclera
Patterned bruising

4 Any bruising on a child less than 4 months

"Kids that don't cruise rarely bruise."[1]

Yes? → Initiate NAI Work-up

No? → Unlikely to be result of NAI

Image Source: acepnow.com

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Child Maltreatment

Head Injuries
Testicular Pain
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Fever
Abdominal Emergencies

Maltreatment considered?

If suspected:

- Contact your local Suspected Child abuse or Neglect team for advice
  - 604-875-2345 (ask for Child Protection Service Unit)

Report suspected abuse to:

- Ministry of Children and Family Development
- Delegated Aboriginal Child and Family Services Agency Helpline for Children
  - 310-1234

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Child Maltreatment

Head Injuries
Testicular Pain
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Abdominal Emergencies

Summary

- Bruising is common
  - Some bruises are due to maltreatment
- TEN - 4 FACESp can help decide which patients require further investigation
- If maltreatment is considered, there is a duty to report to MCFD

CDRs support but never replace clinical judgment

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Febrile Infants

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

Infants < 60 days

- Higher risk of SBI
  - UTI
  - Bacteremia } IBI
  - Meningitis } IBI

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Febrile Infants

- Head Injuries
- Testicular Pain
- Bruising
- Fever
- Abdominal Emergencies

Infants < 60 days[20]

	UTI	Bacteremia	Meningitis
0-28 d	5-9%	2.9 %	1.2 %
29-60 d	3-6%	1.6%	0.4%

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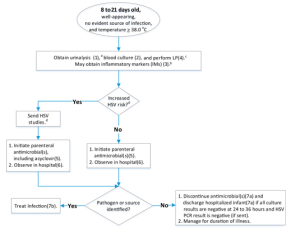
Febrile Infants

- Head Injuries
- Testicular Pain
- Bruising
- Fever
- Abdominal Emergencies

Infants < 60 days[21]



< 21 days: All need admission. Send to ED.

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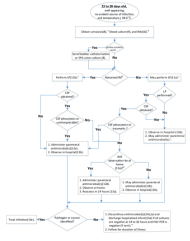
Febrile Infants

- Head Injuries
- Testicular Pain
- Bruising
- Fever
- Abdominal Emergencies

Infants < 60 days[21]



22 to 28 days: Will need admission or LP or both. Send to ED.

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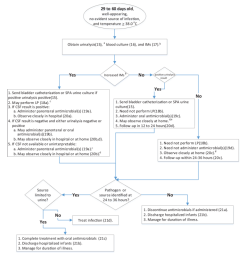
Febrile Infants

- Head Injuries
- Testicular Pain
- Bruising
- Fever
- Abdominal Emergencies

Infants < 60 days[21]



29-60 days. Need investigations. LP/admission may be required. Send to ED.

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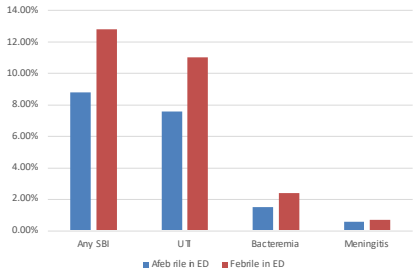
Febrile Infants

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

Fever at home vs in ED[22]



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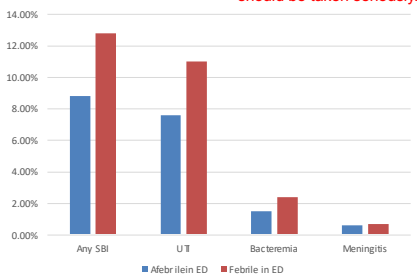
Febrile Infants

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

Fever at home vs in ED[22]

Fever measured at home should be taken seriously.



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Febrile Infants

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

Viral Source vs No Viral Source[23]

	UTI	Bacteremia	Meningitis
Viral Source	2.8%	0.8%	0.4%
No Viral Source	10.7%	2.9%	0.8%

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Febrile Infants

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

Viral Source vs No Viral Source[23]

	UTI	Bacteremia	Meningitis
Viral Source	2.8%	0.8%	0.4%
No Viral Source	10.7%	2.9%	0.8%

Lower risk of SBI in those with viruses. Will still need risk stratification in ED.

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Febrile Infants

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

Summary

- Infants less than 2 months of age are at high risk of SBI
- Those who have a fever at home but not in clinic remain at high risk of SBI
- Those who have a likely viral source still have risk of SBI
- Send all febrile infants under 2 months of age to ED regardless of measured temp in clinic or symptoms

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Abdominal Emergencies

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

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Abdominal Emergencies

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

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Abdominal Emergencies

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

Pyloric Stenosis

- Epidemiology
  - Age 3 to 6 weeks
  - Male > female, Preterm > term, First born
- History
  - Progressive, projectile, non-bilious
- Exam
  - Palpable "olive" RUQ
  - Peristaltic waves

} Rare

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Abdominal Emergencies

- Head Injuries
- Testicular Pain
- Bruising
- Fever
- Abdominal Emergencies

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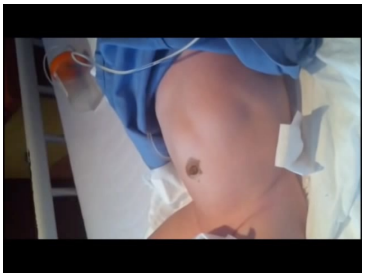
Abdominal Emergencies

- Head Injuries
- Testicular Pain
- Bruising
- Fever
- Abdominal Emergencies



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Abdominal Emergencies

- Head Injuries
- Testicular Pain
- Bruising
- Fever
- Abdominal Emergencies

Pyloric Stenosis

- Evaluation
  - Electrolytes (Low K+ and Cl- & High HCO3-)
  - Ultrasound
- Management
  - Correction of metabolic derangements
  - Surgery

Need ED assessment.

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Abdominal Emergencies

- Head Injuries
- Testicular Pain
- Bruising
- Fever
- Abdominal Emergencies

Malrotation/Volvulus

- Epidemiology
  - 80% in neonatal period
  - 90% < 12 years
- History
  - Neonates: bilious vomiting
  - +/- Fussiness or blood stools
- Exam
  - Late findings are distention, hematochezia, shock

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Abdominal Emergencies

- Head Injuries
- Testicular Pain
- Bruising
- Fever
- Abdominal Emergencies

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Abdominal Emergencies

- Head Injuries
- Testicular Pain
- Bruising
- Fever
- Abdominal Emergencies

Malrotation/Volvulus
- Evaluation
  - History and high index of suspicion
  - ?Plain films
  - UGI
- Management
  - NG tube
  - Fluid resuscitation
  - Emergent transfer

Immediate transfer to ED.

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Abdominal Emergencies

- Head Injuries
- Testicular Pain
- Bruising
- Fever
- Abdominal Emergencies

Incarcerated Hernia
- Epidemiology
  - Peak in neonates, usually < 12 months
  - Boys > girls, preterm > term, R > L
- History
  - Fussiness/Obstructive symptoms
- Exam
  - Inguinal/scrotal mass
    - In girls, 50% ae incarcerated ovary

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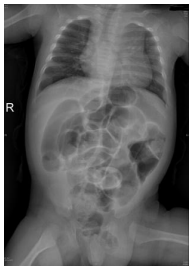
Abdominal Emergencies

- Head Injuries
- Testicular Pain
- Bruising
- Fever
- Abdominal Emergencies

Incarcerated Hernia
- Evaluation
  - Physical Exam (always check diaper area)
- Management
  - Manual Reduction

Immediate transfer to ED.



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Abdominal Emergencies

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

Intussusception
- Epidemiology
  - Peak age 4-7 months, rare < 4 months
  - Male > female, ?sesonal, ?rotavirus vaccine
- History/Exam
  - "Classic Triad" Intermittent abdominal pain, vomiting,
  - "current jelly" stool uncommon
  - Progressive lethargy
- Evaluation
  - US is gold standard
- Management
  - Air enema +/- admission

Immediate transfer to ED.

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Abdominal Emergencies

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

Summary
- Beware of surgical pathology in young children
- Projectile vomiting -> PS
- Beware of bilious vomiting
- Always check the diaper area
- Worry about severe colicky abdominal pain

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Take Home Pearls

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

In those with a head injury, always rule out CiTBI
- PECARN Head Injury Rule

In those with testicular pain, always rule out testicular torsion
- TWIST Score

In those with bruising, always consider non-accidental injury
- TEN - 4 FACESp

In those with fever < 2 months, high rates of SBI
- Always send to ED

Watch out for red flags with fussiness/vomiting
- Projectile or bilious vomiting, groin mass, colicky pain or lethargy

CDRs support but never replace clinical judgment

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References

Head Injuries
Testicular Pain
Bruising
Fever
Abdominal Emergencies

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Questions?

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Thank you for your attention!

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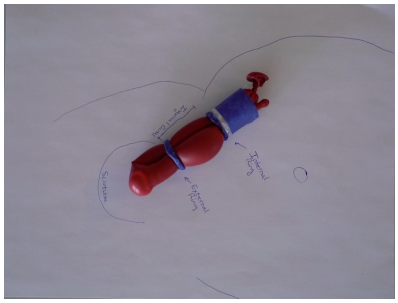

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