

CASE ONE

Parents of a 10 week old baby bring her in to the emergency department. They are concerned about her crying constantly, being unsettled, and having vomits after feeding.

1. *What important history should you ascertain?*

- Thorough antenatal/perinatal/postnatal history
 - Gestation, mode of delivery, NICU, any complications
- Nature of crying – duration, when, relationship, acuity of change
- Feeding history – bottle/breast, type formula, frequency and amounts
- Nature of vomiting – spills vs vomiting, frequency, colour, blood
 - Any diarrhoea, blood in stools
- Other systemic signs – fevers, rash, level of alertness
- Any trauma
- Fhx congenital
- Social concerns or history, signs of parental distress, maternal mental health
 - Sudden onset of irritability and crying should not be diagnosed as colic; a specific cause is usually present
 - The maternal and family psychosocial state must be taken into account. Maternal post-natal depression may be a factor in presentation. Note that excessive crying is the most proximal risk factor for Shaken Baby Syndrome.

2. *Discuss your approach to examination and addressing specific causes for this presentation?*

- Full set of observations and compare to normal range vitals
- Head to toe examination:
 - Alertness, eyes (red reflex), corneal abrasions
 - Colour and perfusion, CRT, rashes
 - Signs of any trauma, bruising
 - Fontanelles ? raised ICP, hydration
 - Reflexes : Moro reflex , palmar reflex, asymmetric tonic neck reflex, rooting reflex
 - Cardiac, limb pulses, respiratory
 - Abdomen – distension, masses, bowel sounds, herniae, genital (testicles), perineum/anus
 - Jaundice?
 - Digits - ? tourniquet

The history is of intermittent crying with associated pallor; with frequent episodes over the last 2 days. She is vomiting her breast feeds. On examination of the baby there is a mild tachycardia of 180 bpm, and there is an abdominal fullness.

3. *What differentials would you consider?*

- Broad differential diagnosis
 - Think about common and serious things – UTI, sepsis, cardiac, resp, CNS, NAI
 - Abdominal causes: intussusception, volvulus, hernia, appendicitis, pyloric stenosis, gastroenteritis

4. *What investigations would you carry out?*

- Signs of irritability, relatively sudden onset change in crying, mild tachycardia and abdominal fullness; all would warrant further investigation:
 - CSU
 - FBC/LFT/U+E/CRP
 - ECG- tachyarrhythmia
 - CXR/AXR - Consolidation, bowel obstruction/volvulus/intussusception
 - CT head – something to consider if no other cause found and clinical suspicion after discussion with paediatric team

5. *Below is the plain AXR for this baby please describes and discuss?*



- Lack of any bowel pattern in the RUQ with dilated prominent loops of bowel LUQ of the abdomen could be intussusception.
 - A normal AXR does not exclude intussusception
 - Signs of intussusception on a plain X-ray include:
 - Target sign - 2 concentric circular radiolucent lines usually in the right upper quadrant
 - Crescent sign - a crescent shaped lucency usually in the left upper quadrant with a soft tissue mass

6. *What are the clinical signs and symptoms of Intussusception?*

- Typically occurs between 2 months to 2 yrs peak 5-9 month old
 - Most commonly in children ileal invagination into ileocolic valve
- **History**
 - The child appears to have **intermittent pain** which is colicky, severe and may be associated with the child drawing up the legs.
 - Episodes typically occur 2-3 times/hour and may increase over the next 12-24 hours
 - During these episodes of crying the child may look pale.
(Note: many other causes of infant crying are associated with facial redness rather than pallor).
 - **Pallor and lethargy** may be the predominant presenting signs, may be persistent rather than episodic, and in some the crying episodes may not be very vigorous.
 - **Vomiting** is usually a prominent feature (but bile stained vomiting is a late sign)
 - **Bowel motions**
 - blood and/or mucus
 - classic red currant jelly stool is a late sign
 - **Diarrhoea** is quite common and can lead to a misdiagnosis of gastroenteritis
 - There may be a preceding respiratory or diarrhoeal illness

Examination

- **Pallor, lethargy** - may be intermittent, and may look well in between episodes
- **Abdominal mass** - sausage shaped mass RUQ or crossing midline in epigastrium or behind umbilicus, palpable in about two thirds of children.
- **Distended abdomen** later in the course
- **Stool**
 - Bloody stool/occult blood positive
- Signs of an **acute bowel obstruction**
- **Hypovolaemic shock** is a late sign

7. *How would you manage and investigate this child?*

- Secure **IV access** for all patients who are suspected to have intussusception
 - Most children will require fluid resuscitation with **IV boluses of 20mls/kg normal saline** before radiological investigations
 - Give adequate **analgesia** (usually morphine)
 - Keep **nil orally**
 - **Discuss with Paeds Surgical**
 - Pass **nasogastric tube** if bowel obstruction or perforation on AXR
 - Consider **IV antibiotics before air enema** (discuss with surgeons)
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- **Ultrasound scan**
 - Diagnostic investigation of choice (unnecessary if high level of suspicion)
 - Useful if there is a suggestive history but no mass palpable or signs on plain AXR and may identify other pathology
 - Better performed by radiographer with high level of experience (Starship)
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- Treatment is with air enema

CASE TWO

A 55 year old man is brought to ED via ambulance with history of abdominal pain and back pain with a few episodes of diarrhoea. Initially his BP was 80/50 with a HR of 50 in the ambulance but this self-corrected. He is triaged to an assessment room, his current observations are:

BP 110/80, HR 80, RR 20, Sats 99%, afebrile, GCS 15

He has on-going moderate abdominal and back pain. He has no past history.

1. *Discuss your differential diagnoses and initial investigations?*

- Broad differential
 - Renal colic, biliary, pancreatitis, gastroenteritis, bowel obstruction, perforated viscus, appendicitis, colitis
 - Aortic pathology – AAA, dissection
 - Cardiac atypical

- Bedside : ECG, POCUS
- Bloods
- Consider CXR erect/AXR

2. *He becomes suddenly pale/diaphoretic with escalating pain. His blood pressure is now 70/55 with a HR of 120bpm. How would you manage this?*

- Transfer to resuscitation room and establish surgical emergency call
- IV access large bore x 2 if able
 - Resuscitate carefully small bolus IVF consider blood early
- Establish cause of shock likely hypovolaemic/haemorrhagic
 - POCUS – RUSH or shock protocol free fluid, Aorta, subcostal view
- Analgesia as required – fentanyl

3. *This is a bedside ultrasound image please interpret and discuss management?*



4. *Despite 1L of N saline his BP is still 70/50, HR 120bpm. How would you manage this patient?*

- Resuscitate to end point aiming BP 90 systolic
 - RBC and activate MTP, keep warm
 - Consider ART access (do not delay definitive mx)
 - TXA
- Early consultant vascular input – discuss activation of RED BLANKET process
 - Not safe for CT scanner unless can stabilise BP/HR

CASE THREE

R40 32 year old man in RTC high speed who has significant facial injuries. His vitals are as follow:

GCS 12 (M5), BP 140/70. HR 120. 92% o/a, RR 25

1. *Discuss your concerns and how you would prepare for the arrival?*

- High risk mechanism with likely multisystem injuries
- Trauma call
- Potential airway risk and difficult airway
- Consider airway call out or prepare for this
- Prepare a team and have roles
- Discuss a plan of approach
- Prepare medications required : RSI drugs, analgesia

2. *On arrival you notice these obvious injuries, discuss your impression of potential injuries based on these images?*

GCS 12 (M5), RR 20, BP 120, HR 110, Sats 95% o/a



- Le fort facial fractures- airway/nasal haemorrhage, vascular injury
- Skull fractures and TBI
- Ocular injury
- Oro-pharyngeal injury or obstruction
- Laryngeal cartilage injury or airway disruption
- Blunt force chest and abdominal injuries

3. He is maintaining his own airway in an elevated position is confused but will sometimes obey command. You note large volume epistaxis from the right, with blood going posteriorly requiring suction to clear. How can you manage this?

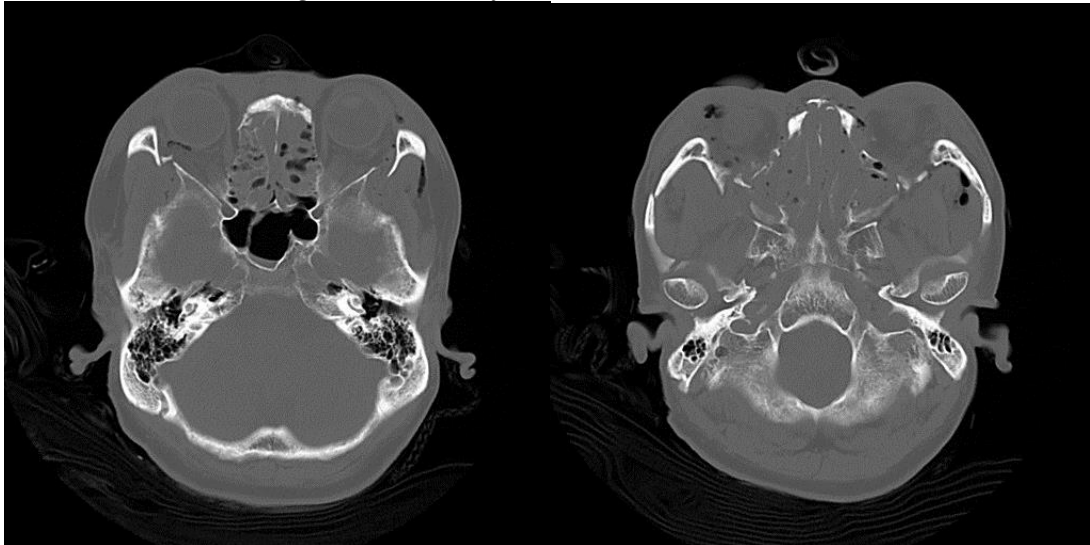
- Get help – ENT and Maxillofacial if available
- TXA as with all bleeding
- Visualise bleeding if able
- Avoid blind rapid rhino insertion risk traumatic disruption
- Anterior ribbon packing likely unsuccessful
- Insert foley under vision, inflate balloon slightly and pull back into posterior canal, pack anterior to this with adrenaline/TXA soaked ribbon

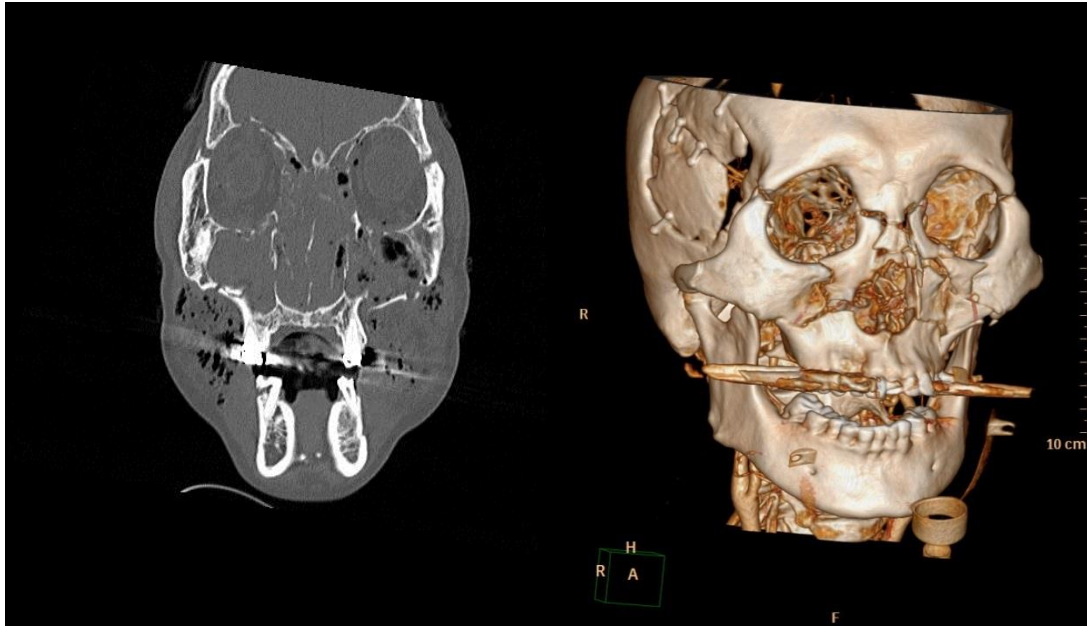
In massive bleeding midface/OP may need airway secured and packing +/- IR or operative control

4. What further investigations would you undertake?

- Bedside – eFAST, ECG
- Trauma bloods, VBG (pH, lactate, acute Hb)
- Trauma CT if stable and able tolerate lying flat

5. Below are his CT images, discuss Le fort Fractures?





MIDFACE

- the nasal cavity, paranasal sinuses and orbits act as a series of compartments that progressively collapse and absorb energy protecting the brain, spinal cord and other vital structures.

Le Fort I

- # involving the maxilla at the level of the nasal fossa
- horizontal plane at the level of the nose
- palate-facial separation

Le Fort II

- maxilla, nasal bones and medial aspect of the orbit involved -> freely mobile, pyramidal-shaped portion of the maxilla (pyramidal disjunction).
- fracture line extend from the lower nasal bridge through medial wall of the orbit, crosses the zygomaticomaxillary process.

Le Fort III

- craniofacial disjunction -> fracture line runs parallel to the base of the skull which separates the midfacial skeleton from the cranium (involves the ethmoid bone and cribriform plate at the BOS)
- fracture line extends through the upper nasal bridge and most of the orbit across the zygomatic arch.

SEEK ASSOCIATED INJURIES

- Base of skull fracture
- CSF rhinorrhoea (anterior or middle fossa BOS #)
- carotid-cavernous fistula (pulsatile exophthalmos, orbital bruit)
- TBI
- cervical spinal injury
- traumatic occlusion or dissection of internal carotid artery or vertebral artery
- thoracic trauma
- abdominal trauma

Those with facial injuries have a high chance of having other serious injuries:

6. After CT he becomes suddenly more agitated, with obstructive upper airway noises, he is hypoxic saturations 80% despite 15L O2 via mask, BP 150 systolic, HR 140bpm. What is your concern and how will you manage this?

- Airway compromise or obstruction, or thoracic pathology
 - Upper airway obstruction or disruption from any cause
 - Upper airway haemorrhage
 - Pneumothorax, tension, massive surgical emphysema
- High flow oxygen via mask
- Repeat bedside examination for root cause, USS for PTx
- De-escalate agitation verbally if able
- Consider agitation control? options
- Emergency call out airway team
- Prepare air formalize airway plan
 - Mark for surgical airway
- Awake Fibre-optic intubation with surgical back up

CASE FOUR

A 3 week old baby is brought to your emergency department with feeding concerns and vomiting.

Observations: 37.6 R, RR 40, HR 180, BP 65, CRT 2s, alert

1. Discuss your approach and differentials?

- Antenatal-postnatal history
- Weight birth and present (should be at least at birth weight and above)
- Feeding history – frequency, type, spills, vomiting (bilious-green)
- Bowel history- meconium passage, frequency, amount, blood
- Systemic features or concerns
- Fhx and social history- mental health, supports, concerns

Usually no medical issue look closely at feeding, coping, social concerns and supports. Always be wary of vomiting in small babies/neonates! Spilling is not uncommon but **vomiting is not normal**.

- Colitis/gastroenteritis
- Sepsis
- CNS pathology raised ICP
- Cows-milk protein allergy if formula feed
- Surgical: malrotation/volvulus, pyloric stenosis (@ 3 weeks present), Hirschsprung's (if severe present newborn-neonate- may fail pass meconium)

2. What investigations would you do?

- ECG
- CSU
- CXR/AXR – signs obstruction, cardiac abnormalities etc
- Bloods – FBC/LFTS/U+E/CRP
- CT head if concerns raised ICP, CNS cause
- LP consider if signs sepsis

3. *This is the plain film please interpret?*



Abnormal dilated loops bowel throughout abdominal field, nil obvious air fluid levels differentials:

- Obstruction or pseudo
- Malrotation, volvulus, atresia's
- Colitis
- Hirschsprung's

4. *The baby spikes a fever of 38.5, HR 180, CRT 4s. There is a further vomit while in ED. What are your concerns and how would you manage this baby?*

- Concern about sepsis? Enterocolitis, volvulus, or perforation
 - Check CSU for infection
 - Fluid resuscitate carefully as required - perfusion/HR, BP
 - Check glucose, VBG (lactate, pH)
- Discuss early with paediatrics and surgical teams
 - NG tube
 - Antibiotic cover after discussion with specialty service

5. Discuss malrotation and presentation in neonates?

Malrotation

- Consider Malrotation in patients with vomiting with or WITHOUT abdominal distension.
- Occurs in 1 in 500 births.
- “Malrotation” applies to a wide range of intestinal anomalies, in which the abnormal rotation and fixation of the midgut lead to narrow base of the small bowel mesentery and can allow volvulus to occur (often with disastrous results).
- Most frequently the cecum has failed to reach the right iliac fossa and lies, instead, in the subhepatic or central position.
- Often have dense fibrous bands that can further predispose to volvulus or occasionally cause obstruction themselves.
- The bowel’s abnormal position and connections lead to excessive mobility, which predisposes to bowel compression, kinking, or volvulus and also intussusception.

Presentation of Malrotation

- **The Neonate (<30 days of age)**
 - Most malrotation present in this population.
 - ~50% will present in first week of life and more than 60% before the end of the 1st month.
 - Bilious emesis is the most frequent symptom (**but not the sine qua non**).
 - Pain and irritability are not prominent clinical features in the neonate!
 - Abdomen is soft and not tender (until there is strangulation).
- **The older child**
 - 20% develop symptoms after 1 year of age (even into adulthood)!
 - Diagnosis is more difficult
 - Larger Differential Dx to consider
 - Pain and irritability are more prevalent in toddlers and older children.
 - Vomiting may be non-bilious in up to 50% initially.
 - Diarrhea may even be present (16% in one study, 23% in another).
 - Abdomen may still be soft and not tender (until there is strangulation).
 - Stuttering attacks or pain and vomiting can occur and may lead to alternative Dx:
 - “Cyclical vomiting”
 - “Abdominal migraines”

Imaging

- Abdominal Xray
 - May show dilated duodenum

- May show air-fluid levels
- Can be read as “normal” 20% of the time.
- Reliance on AXR can lead to delayed diagnosis