# Bruising – can we really tell which bruises are caused by abuse?

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# Synopsis

- Definitions
- Myths  - so can we age a bruise?
- How do we approach the child with suspected inflicted bruising
- How do we form an opinion about causation – which bruises might be inflicted?

# Definitions

- A **bruise** represents bleeding beneath intact skin due to trauma (blunt-force)
- Commonest manifestation of both accidental and non-accidental trauma so can we tell the difference?

# Definitions –other types of bruises

- **Contusion;** Bruise in deeper tissues. Not visible on skin. Bruise preferred when giving evidence to a court and for consistency.
- **Haematoma;** Extravasated blood *filling a cavity* (or potential space). Usually associated with swelling eg. “Egg” on the forehead
- **Petechiae;** Pinpoint sized (0.1-2mm) hemorrhages into the skin due to acute rise in venous pressure

# Petechiae – mechanical causes

## Direct forces

- Impact pressure
- Suction bruises "love bites/hicky's"


## Indirect forces

- Coughing, vomiting, convulsions, asthma, sneezing
- Electrocution, strangulation, tourniquets, inversion

# Petechiae – medical causes

- Coagulopathies
- Infections
  - Strep, meningococcal, viral (CMV, parvo), DIC
- Non-infectious medical causes
  - ITP, HUS, malignancy, Vit C and K deficiencies, CT disorders
- Vasculitis
  - HSP, Haemorrhagic oedema of infancy
- Medications
  - Aspirin, carbamazepine, cimetidine, indomethacin, nitrofurantoin, penicillin

# Factors affecting development and appearance of a bruise

- Properties of object or surface impacted
- Force of impact
- Duration of impact
- Properties of body region impacted (blood supply, underlying bone, tissue planes)
- Quantity of blood extravasated
- Depth of bleeding
- Age and health of individual (medications, coagulation status)
- Skin colour

# Myths about bruising!

- AGE!  - can we accurately age a bruise?
- The site of the bruise is the site of the trauma?
- Does the shape of the bruise reflect the shape of the implement?
- The bigger the bruise, the greater the force?

# Timing – what do we know?

- Superficial bruises appear almost at once
- Deep bruises may not appear for hours/days
- Red may actually appear at any time
- Bruises of same age on same person may be different colours and may change at different rates
- Yellow >18 hours but perception is individual
- No yellow does not mean bruise is <18 hours

# So…. multiple bruises sustained at the same time can all appear different

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# So what can we say….?

- Location (anatomical position, landmarks), orientation, contouring
- Underlying structures
- Dimensions, colour and pattern
- Tenderness
- Swelling
- Limitation of function or movement

# The child with bruising - history

- Vitamin K IM? Cephalohaematoma
- Prolonged bleeding with surgery, immunization, loss of teeth
- Muscle or joint swelling
- Recurrent epistaxis/gum bleeding
- Recurrent bloody diarrhoea/haematemesis
- Menorrhagia resulting in anaemia
- Ethnic origin (Fx 11 Ashkenazy Jews), consanguinity, FHx (dominant/X-linked conditions, new mutations common)

# Mimickers….

- Mongolian blue spots, haemangiomas, cultural practices,  accidental bruising, texta!
- Coagulation disorders, ITP
- Sepsis, DIC
- Malignancy
- Drug ingestion
- Vitamin K and C deficiencies
- HSP, other vasculitis, CT disorders, striae
- Erythema nodosum, erythema multiforme
- Haemorrhagic oedema of infancy

# Do we always investigate? Which bloods when?

**In all bruised children where NAI is suspected?**

- Older children, clear Hx, no red flags, patterned bruises – probably not indicated
- Younger children, widespread distribution, Hx unclear or suspicious for coag disorder
- Commonest acquired is ITP, commonest inherited is VW disease
- Remember children with a clotting disorder can also be abused

# A practical approach to Ix

- FBE and film
- PT, APTT, INR and Fibrinogen
- Von Willebrand Factor antigen/activity and blood group
- LFT/renal function/evidence malabsorption

- If abnormalities or personal/family history - factors 8, 9 and 13 in neonates …or should these be in all children?

- ?PFA100/platelet function
- Remember normal screens –

VW, HSP, HOI, platelet function….

# So which bruises are inflicted?

- Sometimes its bleeding obvious……
- And sometimes it's not…..

# Important factors – what we need to consider

- Age - babies
- Developmental stage – can they do what carers are saying they can do?
- Location of bruises – Shins? Knees? Ears? Genitals? Hands?
- Number of bruises
- Pattern/shape of bruises
- Previous DHHS CP involvement – social situation

# 1. Age of child

- Children sustain more bruises as they get older
- Uncommon in non-mobile infants (<1%)
- 17% of infants who cruise will bruise
- 52% of children who are walking have bruises
- Non-ambulatory children – RED FLAG

# 2. Location of bruises

## Inflicted

- Away from bony prominences
- Face, back, abdomen, arms, buttocks, ears, genitalia, hands and feet
- TEN concept – children under 4, Torso, Ears, Neck

## Accidental

- Anterior aspect of body
- Bony prominences eg forehead, knees, shins

# 3. Shape or pattern

- Fingertip bruising
- Tramline/tram-track bruising
- Pinch marks
- Slap marks
- Implement bruising

# Patterned bruising - fingertip

- Often face, limbs, trunk (shaking/squeezing) injury
- Oval or round
- One surface up to 4 bruises, other surface thumb imprint
- Reasonable to assume significant force
- Can be accidental – “saving” child from running across road

# Patterned bruising – pinch, grip marks

- 2 small areas (1-2cms), relatively round
- Initially separated by normal skin, later may coalesce

# Patterned bruising – tramline/tram-track

- Linear objects- rigid or flexible
- Often ascribed to discipline methods
- “Negative imprinting” – object sinks into the skin, edges drag skin down and tear marginal blood vessels, centre compresses the skin but with no bone underlying little or no damage to vessels caused – spared area of non-bruised skin

# Patterned bruising - implements

- Outline of object on the skin
- Ligatures – bruises reflecting texture and size, circumferential or partly circumferential, limbs or neck
- Rope – areas of bruising interspersed with areas of abrasion
- Belt/cord – loop marks, parallel lines of petechiae with central sparing

# Patterned bruising - slap

- Parallel linear bruises
- Might be petechial
- Separated by areas of central sparing
- Often on the cheek

# NAI or not? Opinion formulation

- Bruising in non-ambulatory children and babies
- Bruising away from bony prominences
- Bruises to face (lateral aspect esp left), back, abdo, arms, buttocks, ears, genitalia/perineum and hands and feet (accidental more likely front of body, bony prominences) – TEN concept in under 4's
- Multiple bruises in clusters
- Multiple bruises of uniform shape
- Patterned bruises (often incomplete skin sparing)

# Archives Disease Childhood
## Welsh Child Protection Group

### 2014 study – patterns of bruising in abused children

Prevalence, number & characteristics vary between abused and non-abused

PA children have more bruises, more sites affected

- Buttocks, genitals, cheeks, neck, trunk, head, thighs, upper arms
- Petechial bruising OR 9.3
- Linear, patterned OR 5.9
- Clustered OR 4
- Greater number of left-sided ear/cheek

# Archives Disease Childhood Welsh Child Protection Group

**2015 study patterns of bruising in non-abused children – is there an effect of gender, season, family order, development on number and distribution of bruises?**

- Can affect pre-mobile children but rare
- Ears, neck ,genitals, hands in all ages - rare
- Buttocks and front trunk in early/pre-mobile children - rare
- Below knee, facial T and head

- common

# Sometimes we need to remember that accidents happen

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# Opinion

- Most bruises non-specific
- Evidence of blunt-force trauma
- Patterned bruising more likely to be able to state diagnostic certainty eg hand-print patterned bruising to the buttocks, linear imprinting/tram tracking/implement shape
- Concept of probability “almost certainly is to almost certainly isn’t…”

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