

## Fractures - possible inflicted injury?

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### BACKGROUND

This document aims to describe pathways for these children and when to worry. Assessment of fractures in suspected physical abuse should involve Paediatrics, Paediatric Radiology and Paediatric Orthopaedics wherever possible (RCPCH, 2013).

**Aim for Consultant level input - this will help strategy Meetings.**

### When should you consider inflicted injury ?

- fractures in immobile children (*i.e. in order to have a toddler's fractures, the child should be able to toddle.*)
- Rib fractures in the absence of major trauma, birth injury or underlying bone disease have a high predictive value for abuse.
- Multiple fractures (*NB - Stair falls rarely cause multiple injuries.*)
- Transphyseal fractures of distal humerus / transphyseal proximal femoral separation.
- Fractures with different stages of healing.
- “corner” fractures or bucket handle fractures (also called Classic Metaphyseal Lesions CMLs.)
- Femoral and humeral fractures in those <18 months are statistically more likely to have occurred from abuse than in older children (under a year and the association is even higher).
- Mid-shaft femoral fracture is the most common type of femoral fractures in abuse and non-abuse.
- Linear fractures are the commonest abusive and non-abusive skull fractures
- history/mechanism incompatible with injury seen
- **clavicular fractures <1 year** need cautious assessment

**Remember:** even “normal” fractures can be sustained via NAI, so the bottom line is that all fractures require appropriate explanation and this must be consistent with the child's developmental age.

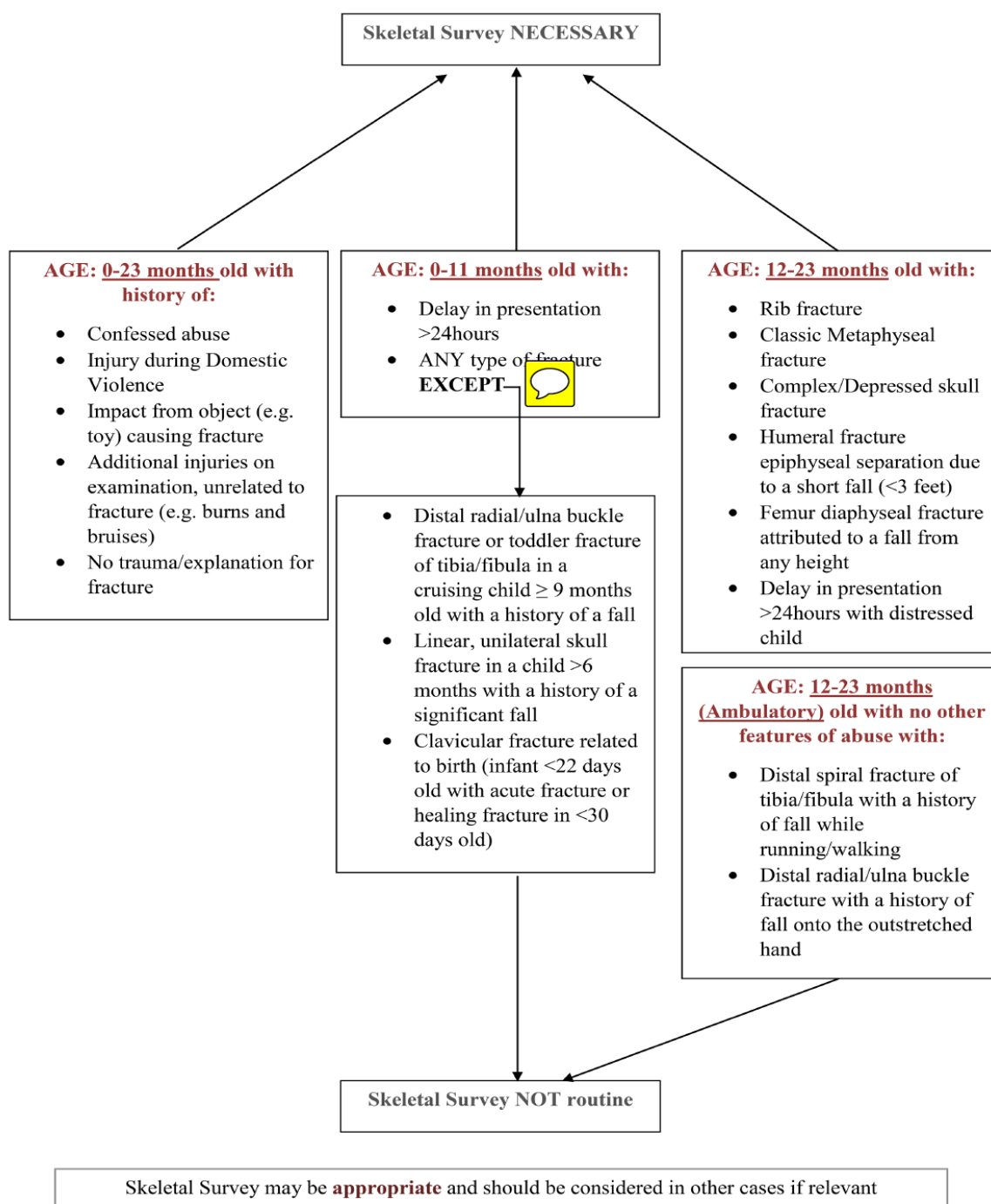
### Initial Management:

#### 1. **ASK** (and document can use CP proforma as prompt)

- |   |              |                     |
|---|--------------|---------------------|
| <input type="checkbox"/> gestation  | BW           | Development         |
| <input type="checkbox"/> diuretics/steroids   | TPN duration | Vitamin supplements |
| <input type="checkbox"/> child / family history of recurrent fractures / early onset deafness / late walking / unusual teeth/ eye disease |              |                     |

**Examination:** head shape, wrists, bossing, fontanelle, rosary, sclerae, skin translucence, hernia, ligamentous laxity, teeth, stature, bruising, injuries

2. Discuss case with paediatric registrar / consultant. [If you suspect possible NAI, follow Pan-Sussex guidance and refer: see link](#)
3. **Take blood:** LFTs, bone profile, PTH, Vit D, and copper
4. Which team to see / admit? (see p3) - print this guideline!
5. If admitting, complete checklist for CP admissions
6. Which fractures need a skeletal survey? RCR/RCPCH guidance says "**Children under 2yrs where NAI is "suspected"** – see flow chart
7. Consent form available on intranet.
8. Senior discussion with family around skeletal survey (children <1yr need CT head & eye examination)



## DIFFERENTIAL DIAGNOSIS

- Accidental (the presence/absence of bruise around fracture site, does not help distinguish)
- Abusive
- Normal physiological variant (i.e. not actually a fracture)
- Malignancy or Osteomyelitis
- OI (type I is mild, type II is lethal, type III is severe with progressive bone deformities and type IV is intermediate between I and III. Types I and IV should be considered in the differential diagnosis as they may be difficult to differentiate from normal children. OI usually presents when mobile with mid-shaft fractures, thin looking bones.)
- Metabolic bone disease of prematurity - gestational age <30 weeks, birth weight <1.25kg, with additional risk factors, e.g. prolonged TPN, delayed introduction of enteral feeds (>30 days), conjugated hyperbilirubinaemia, necrotising enterocolitis or gut resection, prolonged diuretics (e.g. furosemide) or rickets
- Birth injury (usually heal within a few weeks and should see callous) – review birth notes
- Vitamin C deficiency and copper deficiency (RARE)
- AEDs increase fracture risk (seizures + non-WB child- ? osteoporotic on xray)- these children are also at increased risk of abuse and often non-verbal. Liaise with their community paediatrician and disability social worker.

British Paediatric Bone Medicine Group advise that in the context of unexplained fractures in infancy the level of 25 hydroxyvitamin D is not relevant to the causation of the fractures unless there is radiological evidence of rickets using conventional X-ray and biochemical evidence of rickets, i.e. abnormal blood levels of calcium, phosphate, alkaline phosphatase or parathyroid hormone.

**If a child has low Vitamin D levels and a bone fracture suspicious of physical abuse,** the case should be reviewed carefully and discussed with endocrine consultant and Named doctor; assessment with reference to the full history, biochemical picture, radiology opinion and a discussion of Vitamin D supplementation.

## Which team manages the child?

### **Children who need in-patient Orthopaedic treatment:**

Some children will be admitted for Orthopaedic treatment. Safeguarding concerns (e.g. inadequate explanation or lack of supervision) may arise at any time during the admission period. **These patients will be managed jointly under Orthopaedic and Paediatric care. ENSURE CHILD IS ON THE PAEDS HANDOVER LIST.**

- The Paediatric team must be alerted when concerns first raised as there may be implications for other family members in the same home.
- These patients will require a comprehensive examination and assessment. This will be performed by a senior Paediatrician, usually the COW (Bleep 8636), who will decide whether further investigations +/- strategy meeting is required.
- Discussion between Orthopaedics and Paediatrics +/- Radiologist is strongly encouraged at consultant level.

- Until double reported the skeletal survey report remains PROVISIONAL and may change ensure this is clear at strategy meeting.
- Orthopaedic presence at the strategy meeting will vary case by case, however the strategy meeting may remain unaware of subtleties and uncertainties around the case, unless these are communicated clearly by Orthopaedics (in person or in writing).
- These children will be followed up in fracture clinic for their Orthopaedic injuries.
- Repeat skeletal surveys will be followed up by the requesting Paediatrician in accordance with agreed RACH radiology guidance.
- If, following their assessment, the COW feels that the safeguarding concerns are unfounded, their reasoning should be communicated verbally and in writing to the Orthopaedic team, and a decision made whether the child can remain under Orthopaedic management.

## Children who would usually be managed as an outpatient:

- Some children may be admitted via CED with injuries which would usually be managed as an out-patient (or no) follow-up- were it not for child protection concerns.
- These patients should be admitted under the care of the COW for further investigations +/- strategy meeting as required.
- **Orthopaedic opinion should be sought at consultant level** as a valuable contribution may be made with regards to mechanisms of injury e.g. twisting force, expected presentation / behaviour of the child. A joint approach is recommended to help piece together whether the fracture fits with the history.

## Child protection concerns arising in fracture clinic

The Orthopaedic surgeon raising concerns in fracture clinic has a duty to the family to explain the need for a child protection review.

Although this conversation may trigger parental distress this must not be allowed to detract from the main priority which is to keep the child safe until the safeguarding concerns have been investigated and resolved.

- The COW (Bleep 8636) should be contacted in this situation- they may need to liaise with other colleagues to ascertain who can best assess the child, given availability/time constraints.
- Due to their commitments elsewhere, there may be an unavoidable delay prior to review by Paediatrics. During this time the family should be kept informed and must not be allowed to leave the outpatients department.
- The Paediatric team will arrange further investigations as required. Occasionally this may require admission.

## REFERENCES

RCPCH Fractures systematic review September 2020

[https://www.rcpch.ac.uk/sites/default/files/2020-10/Chapter%20Fractures\\_Update\\_280920.pdf](https://www.rcpch.ac.uk/sites/default/files/2020-10/Chapter%20Fractures_Update_280920.pdf)

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