

COMMENTARY

## Multiple unexplained fractures in infants – the need for clear thinking

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Disclaimer: Professor Jenny has testified in legal cases concerning infants with multiple fractures.



The December Issue of *ACTA Paediatrica* contained three articles about multiple fractures in infants (1–3). One article (1) reported four infants and toddlers who were removed from their homes because of suspected abuse. In three of the cases the children had biochemical evidence of Vitamin D deficiency. In the fourth, the child had a possible ‘pseudofracture’ of the rib and ‘evidence of a “minor degree of rickets...”’ at the wrists and the knees, although radiographs were not provided. With the data provided, it is impossible to determine if the children had ‘clinical rickets’, vitamin D insufficiency/deficiency, or some other condition. In addition, it was impossible to discern why child protection professional removed the children from their homes. What was the totality of the information available to the decision makers? What family and social data, investigative findings, and other information led to the decisions to put the children in foster care? Most child protection agencies are strapped for resources and lack adequate numbers of foster homes, and in cases of suspected child abuse, they happily consider organic illnesses to be the cause of children’s physical findings if such evidence is available. While the author presents these cases as ‘misdiagnosis of rickets as non-accidental injury’, the data supporting or refuting the decisions by the courts and child protection agencies are not supplied, making it difficult to assess whether abuse occurred. In one case, the author notes that the child was removed from the home because

of ‘alleged concerns about parent skills’, without presenting more detailed information.

Vitamin D insufficiency/deficiency is a part of the differential diagnosis of multiple fractures, but low vitamin D levels do not necessarily make the diagnosis of rickets or rule out the diagnosis of abuse (4).

The other article by Dr Paterson is more concerning (2). This article revisits the theoretical phenomenon of ‘temporary brittle bone disease’ (TBBB) in infants. Five cases are presented to support the validity of this diagnosis. The first was an obvious case of metabolic bone disease of prematurity, a well defined entity described in seriously ill premature infants (5). The second was a full term infant delivered by vacuum extraction, indicating a complicated delivery. This infant’s rib fractures were discovered on the second day of life and were attributed to the delivery. While not common, traumatic deliveries are a known cause of rib fractures (6). Neither of these cases could be considered caused by a ‘new’ diagnosis, TBBB.

The third was a 6-week-old infant who was imaged because his twin had been found to have rib fractures. He was noted to have healing rib fractures, and other rib fractures appeared on subsequent X-rays during his hospitalization. Case 4 (the twin of Case 3) was imaged because of bruising to the ears and petechial haemorrhages on the face. X-rays taken on the first day of hospitalization were negative, while those taken at another hospital the next day showed multiple rib fractures, and further rib fractures were noted during her hospitalization. Both of these cases can be explained by the fact that acute rib fractures in infants are difficult to diagnose on X-ray, and become obvious over

*Invited Commentary for Paterson. Vitamin D deficiency rickets and allegations of non-accidental injury; Paterson. Temporary brittle bone disease: fractures in medical care; Miller. The death of temporary brittle bone disease is premature.*

time as healing progresses. In fact, in a study of follow-up skeletal surveys performed by Kleinman et al. (5), new rib fractures were frequently seen on repeat skeletal survey after initial images had not shown fractures. As a result of this, the Section on Radiology of the American Academy of Paediatrics recommends that repeat skeletal surveys be performed in all cases of suspected child abuse in children under 2 years of age (7). To call any of these three cases TBBD is unwarranted.

In the final case, the infant was hospitalized during the time of the discovery of the fractures, but the mother had access to the child and the '... nurses reported seeing the mother holding the child tightly on visits.' No films were provided in this case, but according to the author, only some of the fractures '...could have occurred at times when the mother was present'. There is no further documentation of the mother's access to the child or of the degree of fracture healing seen in the infant, but the mother and child were in hospital together. Of note, while dating fractures by degree of healing can be helpful in determining a range of possible times of injury, it is hardly an exact science. Criteria for dating fractures in children are neither standardized nor reproducible (8). Interestingly, this case was called TBBD, even though there was no follow-up to determine if the child had an underlying genetic or metabolic disorder or if further fracturing occurred after discharge from the hospital.

The third article (3) was an opinion piece touting the existence of the disease, TBBD, based on Dr Paterson's article. Dr Miller states several reasons why TBBD is different than child abuse. His reasons (in italics), and my responses as to why I disagree with him on each point, follow.

- *The children in Paterson's cases did not have bruises present over the fractures.* Peters et al. (9) found associated bruises in only 3.8–16.7% of inflicted fractures (other than skull fractures) in children.
- *Children had multiple rib fractures without severe internal thoracic injury.* The author quotes a study of children with blunt and penetrating trauma to the thorax where rib fractures predicted a poor outcome, rather than squeezing of the chest, which is the presumed mechanism of injury in abused infants (10). In addition, all of the subjects in the study had been admitted to a paediatric trauma intensive care unit, and children who were not seriously injured were not included in the study. The results of the study are not relevant when discussing children who are not seriously injured.
- *Transient environmental factors affect bone strength.* No evidence is given in Dr Miller's article to support this hypothesis.
- *Plain X-rays are inadequate to judge infant bone strength.* While this can be true, the relationship of the limits of imaging to TBBD is not explained by the author.

In addition to arguing for the TBBD hypotheses, the author discusses the 'child advocacy establishment' (the

CAE) and their role in discrediting Dr Paterson, who was 'struck off the register' by Great Britain's General Medical Council (GME) for providing false testimony in courts of law. It remains unclear who the nefarious CAE includes. Family court judges? Child protection social workers? Board certified subspecialists in Child Abuse Paediatrics? It would be helpful to know how members of the cabal are identified and how they acted in concert to discredit Dr Paterson. In fact, the case against Dr Paterson was initiated by a senior Family Court Judge in England (11). The GMC's professional conduct committee stated that Dr Paterson '... ignored the significant clinical evidence which was at variance with (*his*) published view,' 'You risked misleading the court and undermining the confidence which the judiciary is entitled to place in expert medical witnesses'. Dr Paterson had shown '... a reckless disregard of the magnitude and seriousness of the problem (11)'. Of note, if the GMC was controlled by the 'CAE', it is unlikely that two noted child abuse experts in Britain would have been struck off the registry (12,13).

When child abuse is considered in cases of multiple unexplained fractures, the medical workup should include a thorough history and physical, careful imaging studies, and appropriate biochemical and genetic testing (14). Medical professionals should confirm their findings with child protection agencies only after carefully considering a complete differential diagnosis.

Temporary brittle bone disease has been discredited by The Society for Paediatric Radiology and the European Society of Paediatric Radiology. In their joint statement, they concluded:

A diagnosis of "TBBD" cannot meet... basic legal evidentiary standard because it lacks appropriate grounding in scientific methods and procedures... a "TBBD" diagnosis is not generally accepted within the field of radiology, but is instead based on unsupported speculation and subjective beliefs of a very small number of medical professionals (15).

It is unlikely that these three recent articles in *ACTA Paediatrica* will change their opinion.

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