



Case Report

The importance of laboratory re-evaluation in cases of suspected child abuse – A case report



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ABSTRACT

In order to accurately diagnose child abuse or neglect, a physician needs to be familiar with diseases and medical conditions that can simulate maltreatment. Unrecognized cases of abuse may lead to insufficient child protection, whereas, on the other hand, over-diagnosis could be the cause of various problems for the family and their potentially accused members.

Regarding child abuse, numerous cases of false diagnoses with undetected causes of bleeding are described in the scientific literature, but, specifically concerning leukemia in childhood, only very few case reports exist.

Here, for the first time, we report a case of a 2-year-old boy who got hospitalized twice because of suspicious injuries and psychosocial conspicuities, in a family situation known for repeated endangerment of the child's well-being. After his first hospitalization with injuries typical for child abuse, but without paraclinical abnormalities, medical inspections were arranged periodically. The child was hospitalized with signs of repeated child abuse again five months later. During second admission, an acute lymphoblastic leukemia was revealed by intermittent laboratory examination, ordered due to new bruises with changes in morphology, identifiable as petechial hemorrhages.

This case elucidates the discussion of known cases of leukemia in childhood associated with suspected child abuse in order to provide an overview of possible diseases mimicking maltreatment. To arrange necessary supportive examinations, a skillful interaction between pediatrician and forensic pathologist is crucial in the differentiation between accidental and non-accidental injury.

1. Introduction

Bruising is the most frequent sign of child abuse [1,2] during childhood, but bruises are also a symptom of a wide variety of diseases such as leukemia [3,4]. With an annual incidence of 45 in 1,000,000 children less than 16 years of age, leukemias are a rather rare disease, but nevertheless the most frequent type of malignoma in childhood [5]. In 2015, 452 cases of acute lymphoblastic leukemia (ALL) were diagnosed in children below the age of 15 in Germany [6]. However, the record 'child abuse' had been registered seven times more frequently than ALL for the same year [7], and assumingly a considerably high estimated number of unreported or misinterpreted cases. The peak incidence of ALL in children occurs between the ages of three and five [8]. Children who are most vulnerable to child abuse are younger than six years, with the highest incidence among children under the age of one [9], affecting nearly the same age group as ALL.

Bruises are considered normal for children, though there are some characteristics which help to discriminate between accidental and non-

accidental injuries, especially bleedings in multiple areas and in unusual regions, bruising in various stages depending on age, and patterned injuries [3,4]. Apart from this, other lesions such as fractures, scars, or burns can support the suspicion of child abuse, as well as a history that doesn't fully explain the nature of those findings [10]. Therefore, the plausibility of circumstances leading to the injury, often described and presented by the parents, should always be reassessed.

ALL in childhood can show varying symptoms that complicate the diagnostic workup. Intensive bruising as well as severe hematological disorders [10,11], and even patients without any cutaneous signs are known [12], yet without medical treatment ALL leads to death.

Here we report the case of a 2-year-old boy who was brought to hospital twice at an interval of five months due to bruises of unknown origin. During the second admission an ALL was diagnosed.

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Fig. 1. Frontal photograph of the face with several notable bruises varying in intensity (taken during first admission to hospital).

2. Case report

2.1. First hospitalization

A boy of 2 years and 4 months of age was admitted to hospital by child protective services due to multiple bruises of unknown origin. He had already been known previously for having a Kartagener syndrome presenting with an inverse situs and several airway infections, but nothing about a suspected child abuse was found in the medical documentation. During admission a solid general state and eutrophic nutritional condition were assessed, with a height of 85.5 cm (Percentile 12), a weight of 11.3 kg (Percentile 16) and a BMI of 15.5 kg/m² (Percentile 33). A balanitis was reported in the anamnesis, which according to the mother's statement had been the consequence of a forced retraction of the prepuce. The boy's skin showed several brownish-yellow bruises. Internal injuries were excluded by ultrasound examination. A forensic consultative examination was required to rule out the suspicion of child abuse.

During this examination, three bruises in slightly different intensity was found on the boy's forehead, as well as two bruises on the middle and upper left cheek, partly not on top of bony structures (see Fig. 1). Furthermore, there were scabbed excoriations on his lower abdomen (see Fig. 2) and healing rhagades on the root of his penis. From a forensic point of view, the excoriations on the abdomen had been the result of a forced tangential violence, perhaps following a manipulation on the boy's trousers. The rhagades could best be explained by a forceful traction of the penis. However, a retraction of the prepuce tends to cause dermal abrasions, even a disrapture of the frenulum, but not injuries at the root of the penis. Therefore, the findings on the left cheek, lower abdomen and penis were classified as non-accidental injuries.

After the mother had been informed about the examination results, she stated that her son was very 'clumsy' and had bounced against a doorframe – an explanation which could not have plausibly led to those two-sided injuries on his head; according to her, the injury of the lower abdomen appeared to have been the consequence of an exertion of pressure in order to stimulate his urination.

To rule out hematological and coagulation disorders as internal reasons for bruising, an extensive blood investigation was performed. The laboratory results showed no pathological findings (see Table 1). Due to the suspected injury patterns and their multiplicity, a child



Fig. 2. Picture of the lower abdomen with extensive excoriations and a surrounding bruising as well as healing rhagades around the root of the penis (taken during first admission).

Table 1
Laboratory findings during admission.

	First admission	Second admission
Hemoglobin (normal: 6.7–7.9 mmol/l)	7.6 mmol/l	4.8 mmol/l -
Hematocrit (normal: 0.34–0.4 l/l)	0.38 l/l	0.23 l/l -
Leucocytes (normal: 5–12 Gpt/l)	6.4 Gpt/l	22.2 Gpt/l +
Thrombocytes (normal: 140–360 Gpt/l)	264 Gpt/l	28 Gpt/l -
Retikulocytes (normal: 4.8–16.4/1000)		6.0/1000
Lymphocytes (normal: 13–55%)	52.3 %	76.0% +
Blasts (normal: negative)		75.5% +
Atypical lymphocytes reactive (normal: negative)		6% +
Granulocytes unsegmented (normal: 3–5%)		1.1% -
Granulocytes segmented (normal: 30–75%)		2.7% -
Anisocytosis		++

During the first investigation the following laboratory values were collected: Quick (98%), aPTT (32.5 s), vWF antigen (77%), Ristocetin cofactor activity (74%), factor-VIII activity (91.4%), factor-XIII activity (135%), PFA collagen/ADP (105 s) and PFA collagen/epinephrine (138 s) to exclude a clotting disorder. All investigations resulted in normal ranges.

The lymphomonocytic hemogram revealed an absolute neutropenia (0.56) during second admission.

Pathological laboratory values are presented in bold print.

endangerment had been affirmed after the forensic investigation. The partially ambivalent behaviour of the mother supported her hazard potential for the boy.

He was discharged from hospital with child protective services ensuring that the child would undergo periodic medical inspections for follow-up.

2.2. Second hospitalization

Five months later the boy was sent to the hospital by his resident pediatrician, because of a progressive swelling of the soft tissues over the left eye with a surrounding bruise found during follow-up examination.

During this admission to hospital, a steady general and nutritive condition could be assessed again. The boy and his clothes were soiled and a general paleness was noticed. Another forensic examination was performed because of the soft tissue lesions around his left eye.

There, slightly streaky bruising with small petechial hemorrhages at the skin of the eye lid as well as the surrounding skin, yet without any bulbar or conjunctival involvement, attracted attention (see Fig. 3). Additionally, two older bruises were found at the temples. On the back, a bruise presenting with numerous single punctate bleedings was visible

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