Title: SKIN FINDINGS IN CHILD ABUSE
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Summary

The skin is the most accessible organ of the human being. It is also the most frequently injured organ in child abuse. Skin abnormalities are visible to everyone. The diagnosis of these abnormalities in suspected child abuse, however, is the work of specialists. Diagnostic errors can be prevented through close cooperation between forensic pediatrics and other pediatric disciplines, like pediatric dermatology.

Introduction

Victoria Adjo Climbié was born on November 2, 1991, in the area near Abidjan, Ivory Coast. She died in a hospital on February 25, 2000 of complications from child abuse. A post-mortem examination established that her body had no less than 128 visible injuries: 'There really is not anywhere that is spared - there is scarring all over the body.'

The skin is one of the largest organs of the human body and certainly the most frequently injured organ in children. Injuries will happen accidentally due to sports, play or traffic, but may also be inflicted in child abuse. The skin even is the primary target organ in physical violence against children. The skin can be observed by physicians as well as by bystanders. The correct interpretation of skin findings is not always simple. Since the publication of Kempe’s classical article ‘the battered child’ in 1962, many articles and chapters in textbooks have been published regarding e.g. normal variants or pediatric dermatological disorders that were unjustly regarded as physical signs of child abuse.

When a suspicion of child abuse arises, it is important to avoid jumping to conclusions. No physical sign or symptom is an absolute proof of child abuse. It is the combination of physical findings, a thorough medical history and the determination of the child’s developmental level that allows a physician to conclude whether a story told by the parents is consistent with the findings in the child.

In this lecture only physical findings in physical abuse and pediatric condition falsification and their differential diagnosis are dealt with.

Physical abuse

Physical abuse of a child is defined as the deliberate physically violent behavior towards a child, committed by parents, care providers and other known (such as brothers, sisters, acquaintances, and teachers) and (rarely) unknown individuals. This behavior leads to actual or potential physical harm that is the result of the interaction, or lack of an interaction, which should reasonably be within the control of a parent or person in a position of responsibility, power or trust.

The severity of the behavior may range from frequent physically aggressive behavior, such as beating, punching, kicking, biting and burning with or without visible injuries and/or scars, that is not life-threatening to a single incident with severe life-threatening and even lethal behavior.

Physically aggressive behavior can result in skin injuries, but does not necessarily cause (skin) injuries. Maguire did a comprehensive review of the medical literature on bruising in childhood related to suspicions of child abuse and found prevalence figures for child abuse related bruising in 28% of abused school age children up to 98% in infants with suspected abuse. Maguire concluded that ‘bruising is common in children who are abused’. The severity of injuries may range from bruises and superficial abrasions to injuries that are incompatible with the preservation of life.
**Pediatric condition falsification**

Pediatric condition falsification is defined as a form of physical and psychological child abuse, in which an illness is feigned or induced in a child by a parent (mostly the mother) or someone ‘in loco parentis’. The behaviour of the perpetrator leads to recurrent presentation of the child within the healthcare system, resulting in repeated medical examinations and possible interventions. Pediatric condition falsification should be differentiated from the findings in factitious disorders in children and adolescents. Factitious disorders are characterized by the intentional feigning or induction of signs and/or symptoms in order to assume the sick role. Factitious disorders in children and adolescents (also referred to as child and adolescent illness falsification) may go undetected for a long time.

Factitious disorders of the skin can present themselves in very different ways, ranging from a suggestive medical history for a skin condition (passive induction = fictitious) to clearly visible and fairly persistent skin abnormalities (active induction = factitious). The skin findings may range from easily identifiable artificial abnormalities to very complicated infectious diseases of the skin. Examples of skin abnormalities in factitious disorders are erythema, ‘easy bruising’, cutaneous abscesses (sterile or infected), dermatitis artefacta/(skin) rash of unknown origin and abrasions. Pediatric condition falsification, but also other inflicted injuries, should also be differentiated from the findings in self-mutilation in children and adolescents. Self-mutilation is defined as the deliberate alteration or destruction of one’s own body tissue without any conscious suicidal intent. The injury is self-inflicted, without the assistance of another person, and the injury is severe enough to result in tissue damage. Self-mutilation can be observed in children as young as 3 years of age.

**Inflicted skin injuries in physical abuse and pediatric condition falsification**

Skin injuries do result from either mechanical or non-mechanical trauma to the skin. Mechanical trauma can lead to injuries caused by either static (compressing, pulling or twisting of the skin) or dynamic (collision) loading. Skin injuries occur when the loading during the contact exceeds the capacity of the skin (and/or the underlying tissues) to absorb the transferred energy. This may happen in blunt and sharp force trauma. The difference between static and dynamic loading can be exemplified by the following: ‘Consider the effect of a stationary bullet resting on your chest, compared to the effect of a moving bullet striking your chest. The stationary bullet exerts a static load on your chest. A moving bullet exerts a dynamic load’. An overview of injuries resulting from mechanical trauma is given in table 1.

<table>
<thead>
<tr>
<th>Blunt-force trauma</th>
<th>Erythema</th>
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<tbody>
<tr>
<td></td>
<td>Bruising</td>
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<tr>
<td></td>
<td>Abrasion</td>
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<tr>
<td></td>
<td>Laceration</td>
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<td></td>
<td>Avulsion</td>
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<tr>
<td>Sharp-force trauma</td>
<td>Blunt penetrating trauma</td>
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<tr>
<td></td>
<td>Incision / incised wound</td>
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<tr>
<td></td>
<td>Puncture wound / stab wound / penetrating injury</td>
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<tr>
<td></td>
<td>Gunshot wound / missile wound / velocity wound</td>
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</tbody>
</table>

Non-mechanical trauma results from the transfer of energy during a direct contact or near contact of the skin with a physical agent (thermal, chemical, electrical, electromagnetical and ionizing trauma).
The most prevalent injuries caused by a non-mechanical trauma are burns (see also table 2). Burns are not only caused by exposure of skin to heat but also by the effect of chemical or physical agents (acidic and alkaline chemicals, electricity, microwaves and radiation), which may have a similar effect on the skin and the subcutaneous tissues as heat, or may create heat at the moment of contact with the skin.\textsuperscript{16,17,18}

Table 2 Injuries caused by non-mechanical trauma

<table>
<thead>
<tr>
<th>Classification</th>
<th>Example</th>
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</table>
| Thermal injuries     | Heat: burns and scalds  
Cold: pernio and congelatio (section 6.5) |
| Chemical injuries    | Burns  
Allergic reactions (topical and generalized)  
Generalized poisoning manifestations |
| Electrical injuries  | Burns  
High and low voltage injuries |
| Radiation injuries   | Burns |

Evaluating suspicious skin findings: ‘the Kipling principle’

"I keep six honest serving-men  
(They taught me all I knew);  
Their names are What and Why and When  
And How and Where and Who (Kipling, 1902)."

In table 3 an overview is given of the many ways in which a skin finding can be evaluated and interpreted.

Table 3 Classifications of injuries\textsuperscript{19}

<table>
<thead>
<tr>
<th>Classification based on</th>
<th>Example</th>
</tr>
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</table>
| What                    | Probability  
• No injury – inconclusive – possible – probable – reasonable medical certainty – injury proven |
|                         | Severity  
• Mild – moderate – severe – fatal |
|                         | Type  
• Closed and open  
• Blunt and sharp force trauma  
• Mechanical and non-mechanical |
| How                    | Cause/mechanism (biomechanics)  
• Mechanical (static and dynamic loading) and non-mechanical (physical agents) |
| Why                    | Manner/mode (circumstances)  
• Accidental versus non-accidental  
• Non-inflicted versus inflicted  
• Non-intentional/unintentional versus intentional/deliberate  
• Non-abusive versus abusive/negligent |
| Where                  | Anatomical location  
• Head/neck – trunk – extremities  
• External (skin, mucosa) – internal (muscles, brain, abdomen) |
| Tissue                 | Soft tissues (skin, mucosa, muscles, joints) – hard tissues (skeleton) – special tissues (brain, thoracic and abdominal organs, eyes) |
When Dating
- Old – recent
Who
- Person – object
- Self harm – harm by others

Differential diagnosis

Whenever child abuse is suspected as a result of physical findings, it mainly concerns bruises or burns. A short and incomplete overview of skin findings mistaken for injuries due to child abuse is given in table 4.

Table 4 Overview of physical findings mistaken for injuries due to child abuse

<table>
<thead>
<tr>
<th>Examples</th>
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<tbody>
<tr>
<td>Accidental injuries</td>
</tr>
<tr>
<td>Sports, play, traffic, chilblains, frostbite</td>
</tr>
<tr>
<td>Dermatological disorders</td>
</tr>
<tr>
<td>Mongolian spots, hemangiomas, erythema nodosum, Ehlers Danlos syndrome, phytophotodermatitis, epidermolysis bullosa and impetigo</td>
</tr>
<tr>
<td>Systemic disorders</td>
</tr>
<tr>
<td>Coagulopathies, osteogenesis imperfecta</td>
</tr>
<tr>
<td>Artefacts</td>
</tr>
<tr>
<td>Factitious disorders, self-mutilation, traditional medicine</td>
</tr>
<tr>
<td>Postmortem findings</td>
</tr>
<tr>
<td>Lividity, vibices, Tardieu spots</td>
</tr>
</tbody>
</table>

Conclusion

Skin findings may play a critical role in the recognition of child abuse. Physicians who are working in forensic pediatrics need to have an extensive knowledge of normal skin variants and of pediatric dermatology to prevent painful mistakes, either by wrongly diagnosing child abuse in normal variants or pediatric dermatological disorders or wrongly assuming a normal variant or a pediatric dermatological disorder in case of child abuse. It is therefore not surprising that forensic pediatrics and pediatric dermatology do regularly intersect in order to establish an adequate differential diagnosis in suspected cases of child abuse.

To prevent errors in cases of physical findings in child abuse a multidisciplinary approach is needed and children and their families will benefit from the cooperation of forensic pediatrics with other medical disciplines, like pediatric dermatology.

In other words: a suspicion of child abuse because of physical findings must be approached just like any other medical problem in a child, namely based on expertise and multi-disciplinary cooperation.
References

8. WHO (World Health Organisation) – Regional Office for Europe. Unintentional child injuries in the WHO European Region, 2006