

Not All That Blisters Is a Burn!

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Objectives

- To review the epidemiology of burns in children including burns caused by abuse
- To review the steps in evaluating burn injury including assessment of pattern and the pattern types that suggest abuse
- To review other skin findings traumatic and atraumatic that can mimic burn injury

Burn Injury

- Represent 5% – 22% of child abuse
- More common in children <3 years
- Inflicted burns are about 10% – 25% of pediatric burns
- Scald burns are most frequent type of burn abuse
- 30%-45% of tap water scalds are abusive
- 85% of intentional scalds are by tap water

Kos & Shwayder. Cutaneous Manifestations of Child Abuse. *Pediatric Dermatology*: 2006.

Quick Burn Bullets

Epidemiology of abusive vs. accidental burns

- Younger children, higher abuse
- Single-parent families, higher abuse
- Abuse burns more serious (grafting, full-thickness)
- Lower SES, unemployed
- FTT higher risk

**All these clearly in Reece/Christian book

Four factors that determine severity of a burn

- Time
- Temperature
- Thickness
- Type

Differentiate Between Superficial, Partial, Deep Partial, and Full-Thickness Burns

Superficial:

- Epidermis only
- Coloration from vascular plexus in dermis being irritated
- No blisters, surface is dry
- Tenderness to touch, edema
- Heals itself without evidence of scarring usually in 3 to 5 days

Superficial partial-thickness:

- Through the epidermis downward into the papillary layer of dermis
- Coloration because the dermal tissue has become inflamed
- Blanching with pressure, brisk capillary refill upon release
- Thin-walled, fluid-filled blisters develop within minutes
- Blisters break, nerve endings exposed so pain/light touch/temperature
- Moist because of loss of waterproofing of epidermis - body fluid leaks
- Edema due to dermal vascular network involvement

Deep partial-thickness:

- Extend downward into the reticular, or deeper, layer of the dermis
- Present as mixed red or waxy white
- Areas of redness will blanch with pressure, but capillary refill may be absent
- Blisters usually absent
- Exposed surface of the wound is wet or moist
- Edema marked with altered sensation

Full-thickness and subdermal burns:

- Affect every body system and organ
- Extends through the dermis and into the subcutaneous tissue layer
- Damages muscle, bone, and interstitial tissue
- Fluid and protein shift from capillary to interstitial space, causing edema
- Immediate immunologic response makes wound sepsis a potential threat
- Increase in metabolic rate - aggressive nutritional support

Soft Tissue Injury Burns

- Scald burn (immersion and spill/splash)
- Contact

Spill Patterned Burn

Scald or splash injury from liquids usually results in a single burn that diminishes in intensity from point of contact.

Dunk Burn

Typical immersion burns have an immersion demarcation line and a uniform degree of injury with interspersed protection areas where the skin has been spared by flexion.

Spill Vs. Immersion

SPILL

- Scatter or satellite lesions
- Generally less severe
- Can be accidental or inflicted

IMMERSION

- Sharp demarcation
- Uniform depth
- Circumferential
- Typical patterns of sparing
- Can be accidental or inflicted

Immersion Accidental Vs. Inflicted

ACCIDENTAL

- Less severe due to briefer contact time
- More satellite burns due to struggle

INFLECTED

- Deeper
- More sharp demarcation
- Simultaneous feet, perineum and buttocks
- Bilateral symmetric hands and feet

Spill Accidental Vs. Inflicted

ACCIDENTAL

- Head, face and neck

INFLECTED

- Lower torso, buttocks and legs

Contact and Flame Burns

- May have recognizable pattern or shape
- When inflicted tend to be deeper and have sharply demarcated margins
- When inflicted may be on clothing covered parts of the body
- Accidental burns from hot implements tend to be partial

Cigarette Burns

- Round
- Well demarcated
- 7 – 10 mm
- Deep central crater with raised edges
- When accidental tend to be oval, eccentric and more superficial

Burn Or Mimic

- Diaper dermatitis (particularly after laxative ingestion)
- Bullous impetigo
- Phytophotodermatitis
- Ecthyma

Laxative Induced Dermatitis of the Buttocks Incorrectly Suspected to Be Abusive Burns

- Leventhal, et.al. *Pediatrics*
- Active ingredient in ExLax – Senna
- Perianal and intragluteal skin may or may not be spared
- Straight line and diamond shaped representing absorbent diaper

Burns from stun guns

- Superficial burn without tissue damage
- 0.5 cm diameter
- Pairing of lesions 5 cm apart
- Acute - may be raised, slight erythema if acute
- After - hypopigmented circular macules

Conditions Confused with Burning

- Moxibustion
- Herpetic whitlow
- Staphylococcal scalded skin syndrome (SSSS)
- Insect and arachnid bites
- Manifestations of cold thermal injury

Cold Thermal Injury

- Acute freezing of tissues due to exposure to temperatures below freezing point of intact skin.
- Crystallization of tissue water into ice, leading to free radical formation and tissue damage
- Especially in acral body parts including the face
- Young, elderly, and intoxicated persons are at risk of frostbite
- Usually occurs at temperature of 0°C (32°F) or below

Popsicle Panniculitis

- Acute cold injury to fat of cheeks
- Red, indurated nodules
- Appear 1-3 days after exposure
- Gradually soften and return to normal (1-2 weeks)
- Caused by subcutaneous fat solidification
- Painful but no systemic symptoms

References

- Greenbaum AR, Horton JB, Williams CJ, Shah M, Dunn KW. Burn injuries inflicted on children or the elderly: A framework for clinical and forensic assessment. *Plast Reconstr Surg*. 2006 Aug; 118(2):46e-58e.
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