Pediatric Burn Care: A Case Study

BACKGROUND

A.D.

• 9 y.o. male with 50% TBSA mixture of 2nd and 3rd degree burns to BUEs, BLEs, anterior and posterior torso, neck and face, intubated and sedated, hypotensive

• The injury was sustained while he was pouring gasoline into a GoKart and the fumes ignited. He was intubated and sedated prior to arrival due to the large size of burn and in order to secure his airway

- Date of Admit: 6/24/20-
- Date of Discharge: 9/2/20- (PBD# 70)
Primary Survey/Stop the burning process
• Universal Precautions
• Airway Management
• Breathing
• Circulatory Management
  – Start 1 or more large bore IV’s
  – Initiate Fluid Resuscitation
• Avoid Hypothermia

Initial Burn Management
• Primary Survey/Stop the burning process
• Universal Precautions
• Airway Management
• Breathing
• Circulatory Management
  – Start 1 or more large bore IV’s
  – Initiate Fluid Resuscitation
• Avoid Hypothermia

Airway and Stabilization
• Evaluate for upper airway injuries – edema formation
• Evaluate for lower airway injuries – inhalation
• Carbon Monoxide injuries
  – 100% Humidified Oxygen or Intubation if indicated
• Airway control
  – Chin lift/ Jaw thrust
  – Insert oral pharyngeal airway
  – Assess need for ET intubation
Breathing and Ventilation

• Listen and verify breath sounds
• Assess rate and depth
• Monitor chest wall excursion in presence of full thickness torso burns
  – Restriction of ventilation

Circulation

• Monitor BP, pulse rate, skin color
• Establish IV access
  – 2 large bore PIVs
  – Initiate resuscitation
• Assess circulation status of circumferentially burned extremities
• 5 P’s
• Look beyond the surface

Disability, Neurologic Deficit

• Typically alert & oriented...If not, consider:
  – Associated Injuries?
  – CO poisoning? Cyanide poisoning?
  – Substance abuse?
  – Hypoxia?
  – Pre-existing medical conditions/medications?

A – Alert & Oriented
V – Responds to verbal stimuli
P – Responds only to painful stimuli
U – Unresponsive
Exposure and Environmental Control

• Remove all clothing and jewelry
• Prevent hypothermia
  – Warm room and ambulance
  – Keep patient covered
    • Dry sheets, blankets, saran wrap
    • Dry dressings
  – Warm IV fluids
• Maintain core temperature

---

INITIAL STABILIZATION

Referral Hospital

• 20:30 → Time of injury
• 22:18 → Arrival at OSH via Eagle Med
• VS: BP 119/8, P166, RR 17, SpO2 99%, Temp 36.7
• 23:15 → Intubated 6.5 ETT
• 23:55 → Depart OSH (~1.5 hours)
Referral Hospital

- Referral Hospital Resuscitation:
  - Scene: 300mL NS
  - LR @ 370mL/hr.

- Wound care:
  - Xeroform to all wounds except back

- Medication: 9mg Morphine, 30mcg Fent.

HOSPITAL COURSE

- 00:38 → Direct admission to Burn ICU
- VS: BP 40/22, P 156, RR 16, SpO2 100%, Temp 38.7
- Bilateral LE escharotomies
- PICU consult
  - Aline placement
  - Developed an arterial clot → no pulse/cold foot
  - Vascular consulted → line removed
  - Heparin gt
- Enteral feedings: 8.5 hours after admission
- Time to first Excision: 2 days
Admission Photos (6/24/20-)

[Image of tables and graphs related to medical data]
**Resuscitation**

2011 ABLS Resuscitation Guidelines

- **Initiation criteria:**
  - Pediatrics: greater than 10% TBSA
  - Adults: greater than 15% TBSA

- **Fluid Management**
  - ≤ 5 years: 125 ml LR/hr.
  - 6-13 years: 250 ml LR/hr.
  - ≥14 years: 500 ml LR/hr.

- **Caution:**
  - Start IV fluid at 250mL/hr. for patients with pre-existing cardiac disease, pulmonary disease or age >70
  - Avoid fluid challenges unless patient is hypotensive due to trauma

**Fluid Resuscitation Formula**

- **Children ≤ 14**
  
  \[
  3 \text{ ml LR} \times \text{TBSA} \times \text{kg}
  \]

- **Adults**
  
  \[
  2 \text{ ml LR} \times \text{TBSA} \times \text{kg}
  \]

- **Electrical**
  
  \[
  4 \text{ ml LR} \times \text{TBSA} \times \text{kg}
  \]

- Give ½ in first 8 hours of injury and remainder over next 16 hours.

- Adjust rate to maintain urinary output

**ABLS Resuscitation Formula ≤ 14 yrs (40 kg)**

\[
\%\text{TBSA} \times \text{wt. kg} \times 3 \text{ mL} = 24\text{hr total}
\]

- 50% x 42.5 kg x 3 mL = 6,375/24 hrs

- ½ in the first 8 hrs (3,187 mL or ~400mL/hr)

- ½ in the remaining 16 hours (3,187 mL)

- Trigger Volume: 12,750 mL/24 hrs
Resuscitation

- Initially under resuscitated
  - Received 975 mL crystalloid in first 4 ½ hrs en route
  - Required 1700 ml crystalloid

- Resuscitation orders: LR @ 450mL/hr.

- Estimated 8 hour total: 3,187 (actual: 4,368)

- Estimated 24 hour total: 6,375 (actual: 10,812)
  - 25% Albumin started at 11 hours post burn

---

### Trigger Volume

\[
\%TBSA \times \text{wt. kg} \times 6 \text{ mL} = 12,750 \text{ mL}
\]

Over-resuscitation can result in serious morbidity / mortality. Patients who receive over 6 mL/kg/%TBSA burn in the first 24 hours are susceptible to severe complications including ALI, ARDS, and compartment syndromes of the extremities and/or abdomen.

---

Estimated 8 hour total: 3,187 (actual: 4,368)

Estimated 24 hour total: 6,375 (actual: 10,812)
Wound Management

- Procedures:
  - 6/24: escharotomies to bilateral lower extremities
  - 6/25: excision and allograft placement
  - 6/29: excision and allograft placement
  - 7/1: excision and STSG placement
  - 7/3: excision, allograft and dermal regeneration template placement
  - 7/14: excision and dermal regeneration template placement
  - 7/23: excision and allograft placement
  - 7/28: excision and STSG placement
  - 8/12: excision and STSG placement

PBD # 11 (7/5/20-)

- “Takedown”
PBD # 11 (7/5/20-)

- “Takedown”

Week 4 – Standing for the 1st time

PBD # 24 (7/18/20-)
PBD # 40 (8/3/20-)

• Donor Site - Scalp

PBD # 56 (8/19/20-)

• Donor Site – anterior feet

PBD # 63 (8/26/20-)

• Wound Closure
PBD # 63 (8/26/20-)

PSYCHOSOCIAL NEEDS
Special Visitors
Tools for Thriving

- Phoenix Society for Burn Survivors

- S.T.E.P.S
  - Smile: warm & kind
  - Posture: Up/Shoulders back
  - Eye Contact: Look them in the eye
  - Tone of Voice: Friendly/Enthusiastic
  - Self-Talk
R.Y.R. – Rehearse Your Response

- Survivors & Family often feel awkward, angry or embarrassed when strangers ask questions about their burn injury

- 3 Sentence Tool
  - How or when you were burned
  - How you are doing now
  - End the conversation

  "I was burned in a GoKart accident; I’m doing better now, Thank you for asking!"

Staring

- Survivors may not be able to change the public’s reaction to a burn injury, but they CAN change their own reaction to the staring

- Stand up straight, look the person in the eye, smile & initiate small talk “How are you doing today?”

- Response is usually equally as friendly & the staring ends.

Conversation Distracters

- Remove the attention away from the burn injury to another subject

  “Do you shop here a lot?”

  “I really like that shirt, where did you get it?”
• http://fox4kc.com/2015/09/02/9-year-old-boy-who-received-thousands-of-get-well-letters-heads-home-after-three-months-in-hospital/#ooid=o4ZTNjdzrG05Ge2cIGjYMEy4MTnZHrw

THANK YOU