Medical Emergencies I

EMC 420: Maternal & Child Emergency Care

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Objectives

- Identify rashes that indicate serious illnesses.
- Formulate a diagnostic evaluation for a child with fever.
- Describe emergencies seen in children with sickle cell disease.
- Recognize GU emergencies in male patients.
- Describe the causes of and management of hypertensive emergencies.

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Case Study 1: "Petechial Rash"

- 15-month-old boy with rash, fever, "not acting right," decreased oral intake
- The boy is tired and irritable, breathing without retractions, and has scattered petechiae on abdomen with mottled extremities.

Initial Assessment (1 of 2)

PAT:

– Abnormal appearance, normal breathing, abnormal circulation

Vital signs:

– HR 160, RR 40, T 39.6°C [103.3°F], Wt 13 kg, O_2 sat not correlating well with pulse

Initial Assessment (2 of 2)

A: No stridor or obstruction

B: Effortless tachypnea at 40 breaths/min

C: Skin mottled, cool, with scattered petechiae. CR=4 seconds

D: Alternating lethargy and irritability

E: Exam otherwise normal

Question

What is your general impression of this patient?

General Impression

- Shock
  - Abnormal appearance and circulation to the skin suggest shock.
  - Fever, scattered petechiae below nipple line, and shock suggest bacterial sepsis.
  - Effortless tachypnea to compensate for metabolic acidosis

What are your initial management priorities?

Management Priorities

- 100% oxygen.
- IV access (2 large bore)
- Provide fluid resuscitation (NS).
- Obtain blood specimens.

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Case Progression

- Rapid screening glucose, [38] mg/dL
  - Hypoglycemia : common in septic shock, and the first drop of blood should be used for screening glucose.
  - treat immediately with 0.5g/kg [2mL/kg D25W] glucose IV
- Blood sent to laboratory (clotting studies).
- Cultures (blood); LP / CSF studies deferred until patient more stable

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Case Discussion: Critical Issues

- Poor skin perfusion and altered mental status: consistent with shock.
- Petechiae/purpura is consistent with septic shock.
- Meningococcemia : the most common cause of septic shock beyond the newborn period.

Background

- Up to 20% of mortality with ***meningococcal sepsis***.
  - Prognosis may largely depend on early aggressive ED resuscitation of shock
- Pathophysiology:
  - Severe hypovolemia
  - Low cardiac output
  - Oxygen delivery determines oxygen consumption
  - Hypoglycemia; hypocalcemia.
- Clinical continuum
  - Mild infection, to sepsis and shock

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Clinical Features: Your First Clue

- Tachycardia, poor skin perfusion, cool extremities, and presence of petechiae
- Effortless tachypnea with clear lungs
- Irritability / lethargy (altered mental status)

Case Outcome

- Patient was paralyzed and intubated and ventilation was supported.
- 60 mL/kg NS given; dopamine drip was started at 10 µg/kg/min.
- Urine output was at 1.5 mL/kg, and BP was stable at 90/66.
- Patient transferred.

Case Study: "Painful Swollen Hands/Feet"

- 18-month-old girl with sickle cell disease and painful swollen hands and feet
- Diagnosed SS by neonatal screening
- Two prior hospitalizations for pain
- She is alert and crying, has unlabored respirations, and normal skin color.

Initial Assessment (1 of 2)

PAT:

– Normal appearance [Irritable and crying, but otherwise alert and nontoxic], normal breathing, normal circulation

Vital signs:

– HR 140, RR 30, BP 80/60, T 37.2°C, Wt 11 kg, O_2 sat 98% on room air

Initial Assessment (2 of 2)

A: Clear, no stridor
B: Non-labored
C: Swelling of the hands and feet, strong peripheral pulses, pale mucous membranes
D: Alert, non-focal neurologic exam
E: No rash, no signs of injury

Focused History

- Onset insidious (was not recognized immediately by the caretaker) over 2 days
- Started with irritability
- Pain and swelling of both hands, increased with movement or touching
- Child had a similar episode 4 months earlier.

Detailed PE

- Head: Sclera, oral mucous membranes pale
- Neck: Supple, no adenopathy
- Lungs: Clear, nonlabored, mild tachypnea
- Abdomen: Spleen 2 cm below costal margin
  [incr size: splenic sequestration (SSD) - -> crisis]
- Neurologic: Irritable, crying, nonfocal exam
- Extremities: Painful swelling of hands and feet ; warm [not hot or febrile]

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Question

What is your general impression of this patient?

General Impression

- Stable
  - This patient is stable but is likely in significant pain from dactylitis.

What are your initial management priorities?

Management Priorities

- Assess pain using a standardized pain scale that can monitor results of treatment.
- Give analgesics:
  - Morphine 0.1 mg/kg; repeat as needed for relief of pain
- Give fluid replacement if patient is dehydrated or vomiting.

Background: Sickle Cell Disease

- Chronic hemolytic anemia:
  - Most common in African-Americans (1:600)
  - Hemoglobin ß chain abnormality, affecting adult hemoglobin
  - First symptoms occur after about 4 to 6 months of age as fetal hemoglobin is replaced by adult.
  - VOCs are the most common emergent complication.

VOC [vaso-occlusive disease]

- Occlusion of blood flow by deformed red blood cells [regional obstruction]
- Dactylitis is caused by vaso-occlusion [ischemia + infarction] of the metacarpal and metatarsal bones:
  - May be the earliest presentation of SSD.
  - most commonly between 6 months and 2 years
  - Presents with diffuse swelling of hands/feet.
  - Swelling may last up to 2 weeks but resolves spontaneously.

Clinical Clues

- Dactylitis:
  - Swelling of dorsum of hands/feet in infants 6 months to 2 years
  - Irritability, crying, in obvious pain
- VOC in older children:
  - Onset of ***pain*** in long bones, abdomen, back
  - Recurrences often in same anatomic region
  - Most common presenting problem in sickle cell disease

Differential Diagnosis: What Else?

- Osteomyelitis [*Salmonella*]:
  - If there is fever, or if symptoms are unilateral
- Septic arthritis [*Salmonella*]:
  - Unilateral, fever, limitation of joint mobility
- Bone and joint infections
  - Must always be considered in sickle cell patients with bone pain.

Case Discussion

What other complications should you anticipate in patients presenting with sickle cell disease?

Complications

- Splenic sequestration (of deformed RBCs)
  - Results in falling Hb, and increasing spleen size
- Cerebrovascular accident
  - Acute onset of focal neurologic finding; headache
- Aplastic crisis
  - Associated with infection by parvovirus 19
    - The "*slapped cheek virus*" because rash develops an intense rose-red color on both cheeks (and does not involve the area around the mouth)

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Aplastic Crisis

- Secondary to infection; eg., parvovirus 19
  - PCR Parvovirus B 19 test positive
- Aka "erythema infectiosum," or 5th Disease
- Usually, a mild, self-limited viral illness
- Viral invasion of bone marrow
  - In Sickle Cell, leads to aplastic anemia
  - In the fetus, leads to condition known as "hydrops fetalis

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Photo 1; 2 : ***www.med.nagoya-u.ac.jp; www.dgipd.de***

Other Complications: Sickle Cell Disease

- Acute chest syndrome
  - Chest pain and respiratory distress
  - Hypoxemia and fever are often present.
  - This can be a result of pneumonia or pulmonary vaso-occlusion [infarct].
- Infection
  - Bacteremia, sepsis, pneumonia, osteomyelitis, septic arthritis:
    - *Staph* ; *pneumococcus*, *Salmonella*

Acute Chest Syndrome

- Leading cause of death in sickle cell disease
  - Mortality : 3%
- Clinical definition
  - Chest pain
  - Fever
  - Pneumonia or pulmonary infarction
  - Pulmonary Sx and Sn (cough; wheezing…)
- Delayed Dx and slow recovery are common
  - Use Albuterol (*even* in absence of wheezing !)
- Worse prognosis: >20 yr old; pain in arms + legs; neuro complications (~ 50%: respiratory failure)

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Case Progression/Outcome

- Hct=22, Hgb=8 g/dL
- Pain persisted after morphine 0.1 mg/kg x 3.
- Patient on 1.5 maintenance IV fluids; irritability persisted.
- Admission arranged for further monitoring and analgesia.

Next Case : "Penile Swelling"

- 11-month-old boy with penile swelling presents to his pediatrician's office.
- Uncircumcised male with chronic diaper rash, increasing penile swelling, edema, and erythema for 4 days
- He is alert; breathing is without retractions, and skin color is normal.

Question

What is your general impression of this patient?

General Impression

- Stable
  - Nontoxic, very stable 11-month-old male with 4-day history of penile erythema and swelling involving foreskin and glans
- Continue with your detailed physical examination.

What are your initial management priorities?

Management Priorities

Observe to make sure infant has NO potentially life or limb-threatening cause of ***inconsolability***

- Testicular torsion
- Incarcerated hernia
- Child abuse
- Meningitis
- Cellulitis of perineum

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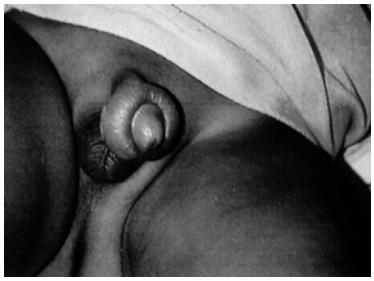
Balanoposthitis

- Occurs in 3% of uncircumcised males
  - Rare in circumcised infants, but must be differentiated from paraphimosis when it occurs.
- Often associated with candidal or chronic irritant diaper dermatitis
  - Treat the diaper dermatitis as indicated.
  - Consider diabetes with recurrent candidal infection.
- Circumcision for recurrent problems
- Etiology: Group A strep, *Staphylococcus*

Phimosis

Paraphimosis



Case Study : "Scrotal Swelling"

- 6-month-old boy with swelling of scrotum
- Previously healthy uncircumcised male with irritability for 24 hours
- Mother noticed painful swelling of scrotum.
- He is alert and consolable; breathing and skin color are normal.

Initial Assessment (2 of 2)

A: Clear, no stridor, no obstruction

B: Nonlabored, normal

C: Pulse strong and regular, cap refill 2 sec

D: Alert

E: Swelling, erythema of left scrotum, no evidence of trauma

Question

What is your general impression of this patient?

General Impression

- Stable
  - Fussy, but alert and nontoxic
  - Acute scrotal swelling indicates potential for epididymitis, testicular torsion, or torsion of the appendix testis.
- Continue your focused history and detailed physical examination.

Differential Diagnosis

Scrotal swelling with pain:

- Testicular torsion
- Torsion of appendix testes
- Incarcerated hernia
- Epididymitis
- Inguinal Hernia
  - Trauma (traumatic rupture)

Inguinal Hernia

Case Study: "Headache, Blurry Vision"

- 14-year-old [girl] with headache, blurry vision for 2 days
- Vomiting since this morning, denies trauma
- [She] is alert and cooperative. Breathing is unlabored, and skin color is normal.

Initial Assessment

PAT:

– Normal appearance, normal breathing, normal circulation

Vital signs:

– HR 96, RR 18, BP 174/106, T 37.2°C, Wt 50 kg, O_2 sat 100%

Detailed PE

- Eyes: 4 mm, reactive, papilledema bilaterally
- Heart: RRR no murmurs, rubs
- Lungs: Clear, no rales
- Abd: Soft, nontender, no masses
- Ext: No edema, 2+ pulses; no rash
- Neuro: Cranial nerves intact, strength 5/5, DTRs 2+ bilat symmetrical

Questions

What is your general impression?

What are your concerns?

Is there any additional information needed?

General Impression

- Stable
  - Elevated blood pressure, with symptoms and papilledema
  - Additional patient and histories needed ?

Focused History

S: Headache, blurry vision for 2 days

A: None

M: None

P: No history of UTI, no family history of hypertension or kidney disease. Patient had a sore throat 1 month earlier.

L: Vomiting

E: No history of fever

Differential Diagnosis ?

- 1º: Essential hypertension
  - Unlikely in this case
- 2º: Secondary to other causes
  - Renal: ARF, renovascular [renal artery stenosis]
  - Vascular: Coarctation
  - Neurologic: Tumor, bleed
  - Endocrine: Hyperthyroid, pheochromocytoma
  - Drugs/toxins: Cocaine, steroids, decongestants, [herbals, candy (licorice)]
  - Pregnancy

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Hypertension

- Hypertensive urgency: Elevations in BP >160/105 if <10 yrs; >170/110 if >10 yrs, no end-organ damage
- Hypertensive emergency: End-organ damage: Neuro changes, pulmonary edema, myocardial ischemia, severe proteinuria
- Hypertensive encephalopathy: Vomiting, ALOC, vision problems, seizures, stroke

Case Outcome

- Elevated BP probably renal in origin
- Lower BP 10%-20% , over hours:

  IV nitroprusside, esmolol, phentolamine, or ***labetalol***
  - 1 mg/kg/hr IV infusion

    [Adult:: 20-80 mg IV; Q 2 min; up to 300 mg]
- Patient symptoms and BP were monitored in the PICU