

Chapter 2

General Trauma Question and Answer Items

What are the ABCDEs of trauma resuscitation?	A airway intact? B breathing okay? C circulation okay? (& C-spine?) D disability (anything not working?) E exposure (seeing all of the patient)
What is the best radiology study for the initial evaluation of possible head injury?	Noncontrast head CT (US can only be used in very young infants with open fontanelles & is not recommended for head trauma evaluation)
When should you obtain an <i>emergent</i> MRI?	For possible spinal cord compression (if MRI is available – the images are much better than CT images)
What X-rays should be ordered for every major trauma patient?	C-spine Chest Pelvis X-ray or CT abdomen/pelvis (others as needed, depending on injuries)
In general, what is the correct management for a patient with penetrating abdominal trauma?	Exploratory laparotomy
How do you treat an <i>open</i> pneumothorax? (2 techniques)	<ul style="list-style-type: none"> • Use an occlusive dressing to cover three sides of the wound (air gets out, but not into the chest) • Intubation and positive pressure ventilation may also be needed

What is the other name for an open pneumothorax?

A sucking chest wound

(the diameter of the opening determines how much sucking it will do – bigger is worse)

What is the correct treatment for an unstable patient thought to have cardiac tamponade?

Pericardiocentesis

Can penetrating trauma cause cardiac tamponade?

Yes – usually left chest trauma

What are the five physical findings you should expect with cardiac tamponade?

(The first three are known as “Beck’s triad.”)

- 1. Hypotension**
- 2. Distended neck veins**
- 3. Muffled heart sounds**
- 4. Pulsus paradoxus**
- 5. Clear lung sounds**

How do you treat massive hemothorax?

- Chest tube and volume support
- If the bleeding does not stop shortly after insertion of the chest tube, clamp it and get the patient to the OR

What is the most common cause of a fever in the first 24-h post-op?

Atelectasis

What is a flail chest?

An injury that produces a segment of the chest wall that moves independently from the rest of the chest wall (due to rib fractures)

How do you get a flail chest?

You break multiple, adjacent ribs in *at least two places*
(This allows that segment of chest to “float free” from the rest of the ribs)

Why is flail chest a bad thing?

It causes inadequate respiration due to –

1. Pain
2. Pulmonary contusion
3. Probable shunting due to paradoxical motion

(when the patient tries to breathe in, that part of the chest wall goes in rather than expanding out with the rest)

How do you treat flail chest?	<ol style="list-style-type: none"> 1. Pain meds 2. Try to prevent paradoxical motion (lie the patient on the injury, or sand bag the area) 3. Intubation 4. Positive pressure ventilation is often necessary
What is the most common cause of death that immediately follows a motor vehicle collision?	Head injury
What is the most common cause of death that immediately follows a fall from a significant height?	Head injury
What puts a patient at risk for aortic rupture?	<p>Rapid deceleration</p> <p>(the aorta is “tethered” at the ligamentum arteriosum, and the rapid rotation can damage it)</p>
What typically causes diaphragmatic rupture?	Blunt trauma
Which side of the diaphragm usually ruptures?	Left side
What is the best thing to do with an avulsed (permanent) tooth?	Replace it in the socket ASAP
Is it alright to clean an avulsed tooth, if it has gotten dirty?	Gentle saline wash is alright, if necessary (but never scrub a tooth!!!)
What is the best thing to do with an avulsed permanent tooth if the patient cannot keep it in the socket (due to patient age, associated fracture, etc.)	<ol style="list-style-type: none"> 1. Put it in “Hanks’ solution” 2. Put it in milk if you don’t have the special solution
What is the best thing to do with an avulsed deciduous tooth?	Nothing – See a dentist for follow-up

What should you do for a choking victim who is still breathing?

Observe only.
They will usually clear the object on their own.

What should you do for a choking victim who stops breathing?

- Heimlich if they stop breathing
- Abdominal thrust if they pass out
- Back blows are for very young children

What are the signs of a tension pneumothorax?
(3)

Tracheal deviation
Hypotension
Faint heart sounds
(& sometimes heart sounds in an unusual location)

How is tension pneumothorax diagnosed?

Clinically!!!
(You are supposed to initiate treatment before an X-ray is taken)

How is tension pneumothorax treated?

Needle thoracostomy initially,
then
Chest tube (to water seal)

A proper lateral C-spine X-ray must include what portions of the spine?

C1 – T1
(Top of T1, not necessarily the whole thing)

What position should the C-spine be in when the lateral X-ray is taken?

Neutral
(Avoid hyperflexion or hyperextension)

If you suspect pneumothorax, but can't see it on the chest X-ray, what study should you order?

Exhalation chest X-ray
(this makes the pneumo bigger and easier to see)

Why does a tension pneumothorax get worse as time passes?

Air goes into the abnormal space, but cannot escape, worsening the pressure on normal structures with each breath

In a tension pneumothorax, what do you expect in terms of pulsus paradoxus?

The patient should have it
(not all of them do, of course)

What is pulsus paradoxus?

Drop in systolic BP >10 mmHg during inspiration

What is often noticed about the neck veins of patients with tension pneumothorax?

Distended neck veins

(too much pressure for the blood to enter the atrium)

In tension pneumothorax, should the diaphragm on the affected side be high or low?

Low –

that side of the chest is full of air under pressure

In a tension pneumothorax, heart sounds are often distant, but the lungs are _____?

Hyperresonant

(more empty area than usual)

If a tension pneumothorax causes tracheal deviation, which direction will the trachea go? Toward or away from the site of the tension pneumothorax?

The trachea moves away from the tension pneumothorax (the pressure pushes it)

What is the hallmark on EKG for pericardial tamponade?

QRS complexes that alternate between large amplitude and small amplitude

What is the special name for QRS complexes that alternate between large amplitude and small amplitude?

Electrical alternans

In electrical alternans, how much does the width of the QRS vary?

It doesn't –

only the amplitude varies

Supposedly, why does electrical alternans occur?

The heart is swinging back and forth through the fluid-filled pericardial sac

Aortic dissection due to trauma is associated with what types of fractures, especially?

1st or 2nd rib fractures

Aortic dissection due to trauma usually follows what type of injury?

Rapid deceleration

Traumatic aortic dissection usually begins at what anatomic location?

Between the ligamentum arteriosum & the left subclavian (has to do with where the artery is “tethered”)

What is the classic physical finding for aortic dissection?

BP is different in the two arms
(in reality, this finding is neither sensitive nor specific)

What findings on chest X-ray suggest aortic dissection?
(3)

1. Wider than normal mediastinum
2. Indistinct aortic knob
3. Esophageal deviation to the right

If an aortic dissection patient develops a new heart murmur, what does this most likely indicate?

The dissection has gone backward and damaged the aortic valve

Neurological findings, particularly paralysis of one or both lower extremities, can be a presentation of aortic dissection. How?

The dissection has cut off circulation either to a limb, or to some of the arteries feeding the spinal cord

Generally, what is the best way to diagnose aortic dissection?

CT with contrast
(TEE/US can also be used, but CT often gives more information faster)

Rarely, an aortic dissection patient might also be hoarse. Why?

Pressure on the recurrent laryngeal nerve (it wraps around the ligamentum arteriosum on that side)

Rarely, an aortic dissection patient might present with neck swelling, ruddy complexion, and distended head & neck veins. Why?

Mass effect from the dissection creating SVC syndrome

What are the three categories you are checking when you use the Glasgow Coma Scale?

1. Eye opening
2. Motor response
3. Verbal response

How many points do you get on the Glasgow Coma Scale if you're dead?

Three
(There is no zero in the scale)

What is a perfect score on the Glasgow Coma Scale?

Fifteen
(Five per category)

If a patient with head trauma requires intubation, what medication are you supposed to give first?

If you are doing a very brief trauma survey, you won't have time to do the Glasgow Coma Scale. What should you use instead?

Which three medications are most standard for rapid sequence intubation (RSI) in children?

Which benzodiazepine medication was very commonly used in RSI, but is no longer recommended as a first line choice?

Atropine used to be given routinely to older children with RSI. Why is it used less now?

For which kids should atropine nearly always be used, if doing an RSI?

Following RSI, what medications need to be given, for patient safety & comfort?

Lidocaine, 1 mg/kg
(It "blunts" the increase in ICP with laryngoscopy)

AVPU evaluation
(The choices are:
A – alert
V – verbal but not totally alert
P – pain response
U – unresponsive)

Succinylcholine (short acting paralytic)

Atropine for children ≤ 1 year old
(bradycardia prevention)

An induction agent given before the paralytic (choices include etomidate, propofol, ketamine, thiopental, or fentanyl)

Midazolam (Versed®)
(onset too slow & potency too variable between individuals)

Data have not clearly supported its effectiveness in preventing bradycardia in children older than 1 year

Atropine is still definitely useful for reducing secretions

Those ≤ 1 year old

Consider in children < 5 years old if succinylcholine will also be given

A longer lasting paralytic –
Most often Rocuronium is used
&

Something for agitation/pain –
Most often fentanyl is used

Succinylcholine should not be used in which patients? Burn & crush injury more than 24 h prior to intubation (the K⁺ takes time to rise)

Known or suspected hyperkalemia

Open globe injury (eye)

What alternative paralytic can be used in patients for whom succinylcholine is contraindicated?

Rocuronium

What is the main negative to using the alternative paralytic agent in RSI?

Much longer duration of action (if intubation unsuccessful, patient cannot breathe on his or her own for at least 30 min)

(Note: a reversal agent has been developed called Sugammadex. It is in use in the EU, but not yet in the US)

Surgical cricothyroidotomy should not be done in children less than what age?

8 years

When should you choose a needle cricothyroidotomy, rather than a more definitive airway?

If you cannot intubate the trachea, and the bag-valve-mask technique is not working well (for example, with significant orofacial trauma)

Especially in a child, inability to obtain IV access should make you consider what other options?

Intraosseous or central venous access (intraosseous is usually quicker and better in kids)

If a patient is hypotensive, the first (and second) thing you should do to try to fix the pressure is _____?

Fluid boluses –

Give normal saline or lactated ringers

If you are treating a hypotensive pediatric patient, how should you “dose” the fluid resuscitation?

20 ccs per kilogram (can dose repeatedly)

What must you watch out for if you use a central line to deliver fluids?

(2)

1. Many central lines are long – the longer the tube, the slower the fluid flows
2. Many central lines have multiple lumens – more lumens mean smaller lumens, and this slows fluid delivery

If a patient is hypotensive, is it acceptable to give pressors as a first response?

NO! Fill the tank *first!*
(Give fluids first)

How much fluid should you give a hypotensive adolescent/adult, in general, when you are initially trying to correct hypotension?

**One liter –
Okay to repeat**
(most trauma sources now recommend leaving the pressure a little low, rather than aggressively fluid resuscitating to normal BP)

If crystalloid does not correct hypotension, what type of fluid should be given next?

Blood – packed RBCs usually
(whole blood is also fine, but rarely used)

Pain in the shoulder following trauma can sometimes be a sign of what abdominal problems?

**Diaphragmatic irritation from blood in the belly
(or injury to the spleen or liver)**

Shoulder pain that is really referred abdominal pain is called _____? (eponym)

Kehr's sign

Cullen's sign refers to what finding in the belly following trauma/intraperitoneal bleeding?

Ecchymosis around the umbilicus

Grey-Turner's sign is another eponymic trauma sign. What is it?

Flank ecchymosis
(intraperitoneal
or retroperitoneal bleeding)

Where are you supposed to look for ecchymosis related to abdominal trauma?

Flanks (Grey-Turner sign)
&
Umbilicus (Cullen's sign)

What is the best diagnostic technique for evaluating abdominal trauma?

CT scan
(US FAST can be used as a "quick look" prior to more specific diagnosis)

If, for some reason, CT scan is not available, and you suspect abdominal trauma, what other diagnostic modalities are available to you?

Ultrasound “FAST” scan
(specific locations are checked for fluid – gives general but not very specific anatomic information)

&

Diagnostic peritoneal lavage (DPL)

Rarely used, but sometimes still on exams

What findings on DPL indicate that there is an abdominal injury?

(3)

1. Food/feces
2. >1,000 RBCs/cc
3. >10 ccs of free flowing blood

Adults & school-aged children usually develop traumatic diaphragmatic rupture on which side of the body?

Left

(in neonates, it is more common for diaphragms to rupture on the right)

How is a “myocardial contusion” treated?

Observation only, usually (antiarrhythmics can be used if needed – usually not necessary)

How is myocardial contusion usually diagnosed?

Abnormal wall motion (transient) on echocardiogram

How does a patient develop a myocardial contusion?

Blunt trauma to the chest

What is the main consequence of myocardial contusion?

Arrhythmia – but rarely significant (fortunately)

What is the most common sign of myocardial contusion?

Tachycardia

Splenic injury in children is usually managed in what way?

Non-operative
(increasingly common in adults, too)

Although the spleen is the abdominal organ most often injured in blunt trauma, which is the organ most often injured in penetrating trauma?

The liver
(it’s the biggest abdominal organ, so it makes the biggest target)

How is traumatic liver injury usually managed?

**Non-operative
(observation & supportive care)**

Significant splenic and hepatic bleeding that requires intervention can sometimes still be managed nonsurgically. How?

Embolization

Sudden cessation of the heart beat following trauma to the chest is called _____?

**Commotio cordis/tardus
(this medical term occurs as either cordis or tardus)**

A child or adult hit in the chest with a ball, who suddenly drops to the ground, is suffering from _____?

**Commotio cordis/commotion tardus
(cessation of heart rhythm due to sudden mechanical impact)**

**Which children are at greatest risk for injuries from abuse?
(5)**

- 1. Handicapped kids**
- 2. Premies**
- 3. Children of young/overstressed or depressed parents**
- 4. Multiple births**
- 5. Parents were abused**

If one or more retinal hemorrhages are mentioned on physical exam in a vignette, without any other physical findings, what is the likely diagnosis?

Abuse
(often from shaking)

What kind of rib fracture is pathognomonic of child abuse?

Posterior

In terms of fractures, the overall pattern you expect to see in child abuse is _____?

Multiple fractures in multiple stages of healing

If something in the history or physical suggests child abuse, what radiology study do you need to order?

**“Skeletal survey”
(X-ray the whole skeleton to look for old fractures)**

On head CT, what finding is pathognomonic for child abuse?

Interhemispheric subdural hematoma

Especially in very young children, what type of long bone fracture commonly occurs with abuse?

Metaphyseal corner fractures (aka “bucket-handle” fractures)

For children older than 1 year, what type of fracture most often occurs with abuse?

Diaphyseal fractures (fractures of the middle of the bone – not the very end)

Is a diaphyseal fracture pathognomonic for child abuse?

No – of course not (could have happened in a car accident, fall, etc.)

Is a metaphyseal corner fracture pathognomonic of child abuse?

Yes (with rare exceptions)

What aspects of the history should especially tip you off to investigate *possible* abuse?

If the story doesn’t fit the injury

Are non-depressed skull fractures suggestive of child abuse?

Yes (only suggestive, though – most will not be abuse)

In terms of skin findings, what is most suggestive of child abuse? (3)

- 1. Unusual burn patterns (perineal or stocking & glove patterns)**
- 2. Linear injuries or other shapes consistent with a particular object**
- 3. Multiple bruises, especially those not over bony prominences (not where you would expect them)**

(judging the age of bruises is very difficult to estimate, so it is no longer recommended to look for bruises “in different stages of healing”)

If a child develops anogenital warts in the first year of life, what are the likely causes?

Abuse is possible, *but* perinatal acquisition of this common pathogen also occurs

Are laryngeal papillomas suspicious for sexual abuse?

No – Usually acquired perinatally

Which STD is pathognomonic for sexual abuse?

Gonorrhea

(Chlamydia is sometimes vertically transmitted from mother to child)

What risk factor is *most associated* with physical abuse?

Family history of abuse

Round or wide linear bruises along the back may indicate what health practices seen mainly in Asian populations?

Cupping

Or

Coining

If a parent has used coin rubbing or cupping to treat his/her child, should you evaluate for abuse?

No –

It is a normal practice within certain cultures, and does not result in any significant harm

What is the leading cause of death in pediatrics and young adults?

Trauma

(mainly motor vehicle accidents)

Trauma causes what proportion of pediatric deaths?

1/2

What is the most common (general) cause of death for children in the first year of life, in developed nations?

Developmental & genetic conditions already present at birth

What is the second most common cause of death for children ≤ 1 year old in developed nations?

SIDS (sudden infant death syndrome)
(*followed by prematurity & low birth weight-related conditions*)

What is the most common cause of death in the first year of life, worldwide?

Infectious disease
(especially due to pneumonia, diarrhea, & malaria, often complicated by decreased immune function due to malnutrition)

What is the leading cause of death for children & young adults age 2–24 years, in North America?

Trauma

What are the other very common (general) causes of death for children 2–5 years old, in developed nations?

How is the pattern for likely causes of death different in the 5–14 year old group, compared to the 1–5 year old group?

How is the pattern for general causes of death different for the oldest pediatric group, ages 15 & above in the US?

What is the most common lethal injury in pediatrics?

When should you definitely *not* try nasotracheal intubation, based on patient injuries?

Is nasotracheal intubation recommended in children who have not yet reached adolescence?

Which fractures generally carry the biggest risk of severe blood loss?

Developmental & genetic conditions already present at birth

&

Cancer

They are the same except that the second & third most common causes reverse:

2–5 year olds:

Trauma

Developmental & genetic conditions present at birth

Cancer

5–14 year olds:

Trauma

Cancer

Developmental & genetic conditions present at birth

Trauma remains #1, followed by

Homicide – #2

Suicide – #3

Head trauma

Same situations in which you shouldn't place an NG tube –

Significant orofacial trauma or

Basilar skull fracture

&

If the patient isn't breathing at all

No

Femur

&

Pelvis

Which blood type is the universal blood donor?

O negative

(It is okay to use O positive in an acute trauma setting, if that is the best answer choice available.)

What does “universal blood donor” mean?

This blood type doesn’t generate an immune response in anyone

What is the best early indicator of blood loss on physical exam in pediatrics?

Delayed capillary refill (>2 s)

When shouldn’t you place an intraosseous line in a particular bone?

It’s fractured

OR

an IO has already been attempted and placement failed (meaning the bone already has a hole in it from the attempted placement)

What complications do you worry about with intraosseous lines?
(4)

1. Infection (osteomyelitis)
2. Growth plate injury (angle away from it)
3. Fat emboli
4. Fluid leak/compartment syndrome

What sort of laryngoscope blade is usually recommended in pediatrics?

Straight (Miller)

How do you know how far to insert the ET tube?

3× the diameter of the tube
(gives you the number of centimeters from the lips)

How do you know how large of a tube you can use in small patients?

$$\frac{\text{Age} + 4}{4}$$

Which is more common in children, C-spine fractures or C-spine injuries?

Injuries

What is it called if you have a spinal cord injury, but no fracture or other X-ray abnormality?

**SCIWORA
(Spinal Cord Injury WithOut Radiological Abnormality)**

If a patient is in a motor vehicle collision, and is not conscious upon arrival, but has no evidence of specific head trauma or injury, what is the likely explanation?

Axonal shear injury aka diffuse axonal injury—
Common with rapid deceleration
(might get better, might not)

What is the 2-year mortality for undiagnosed child abuse?

>25 %

Does intracranial bleeding lead to hypotension?

No –
If anything, it tends to cause *hypertension*, as a reaction to the bleed

What is “Cushing’s response?”

Hypertension
Bradycardia
Apnea

In response to elevated ICP

Is Cushing’s response (or reflex) usually seen early in the course of an intracranial bleed, or late?

Late (and it is not always seen at all)

Does scalp bleeding lead to hypotension?

Yes – bleeds profusely
(especially in kids)

In addition to motor vehicle collisions and burns, what other types of trauma frequently cause pediatric injury & death?

Assaults
Falls
Bicycle related

If a pregnant Mom is injured, what is the guiding principle in taking care of the baby?

Resuscitate the Mom

If there is head trauma, what must you always remember to check?

The C-spine
(5 % will have a C-spine fracture!)

What is a contrecoup injury?

The part of the brain that gets hurt when it sloshes and hits the part of the skull *opposite the original impact*

Which stuff dripping out of the head tells you that you might be dealing with a basilar skull fracture?

**CSF –
Can drain from the nose (rhinorrhea)
or the ear (otorrhea)**

What unreliable test still sometimes appears on board exams, that is meant to tell you whether the fluid coming from someone's head is CSF or not?

The ring test –
Put a drop of the liquid on filter paper (or a sheet) and if a ring forms around the outside edge, it is supposed to be CSF

If your head trauma patient has hemotympanum, how likely is it that he/she has a basilar skull fracture?

80 %

What other signs of bleeding on the face or head tells you to look for a basilar skull fracture?
(2)

Battle's sign – blood over the mastoid
Raccoon eyes – blood around the orbit

If you find a basilar skull fracture, what should you do about it?

Usually observe and alert neurosurgery –
(Antibiotics not useful)

If your trauma patient has rib fractures, what should you do?

If they are isolated fractures (not flail chest), give pain management

(Binding the area sometimes helps the pain, but is a risk for complications such as hypoventilation & pneumonia. You need to encourage deep breathing)

What is it important to give to a rib fracture patient, to encourage deep breathing, other than adequate pain management?

An incentive spirometer & instructions on how to use it!
(helps to prevent atelectasis & pneumonia)

What should you look for in any patient with a rib fracture?

Pneumothorax or pulmonary contusion

If a patient fractures a lower rib, what problems must you consider, in addition to lung issues?

Spleen or liver injury

Are rib fractures diagnosed by X-ray?

Diagnosis is clinical –
50 % will not show on X-ray

What is most worrisome about a sternal fracture?

It took a *lot* of force to do that
(other structures may be damaged)

Decreased breath sounds on the right, *dullness to percussion*, and respiratory distress combined with right sided blunt trauma suggests what diagnosis?

Hemothorax
(patient may also be tachycardic/hypotensive)

A child is restrained in the rear seat in the rear seat with a lap belt only. A motor vehicle collision occurs. What fracture is this child at special risk to develop?

Chance fracture of the lumbar vertebra (unstable)

What intraabdominal injury is a child with a Chance fracture at unusually high risk for?

Perforated gut/viscus

An adolescent is riding in the passenger seat with just the shoulder belt on. A frontal motor vehicle collision occurs. What intraabdominal injury is this child at special risk to develop?

Pancreatitis/pancreatic injury

A child has a problem while riding his bike. He goes over the handlebars. What intraabdominal injuries should you be considering for this child? (2 main injuries)

**Pancreatitis/pancreatic injury
&
Duodenal hematoma**

What urological exam findings should you be especially looking for in trauma?
(3)

1. Blood at the meatus
2. Perineal bruising
3. Boggy prostate (if age appropriate)

If any of the trauma urological exam signs is positive, what do you need to do next (assuming your patient is stable)?

Retrograde urethrogram –
Do not place foley until the urethra is confirmed to be intact!

Which physical exam finding means you need radiological evaluation of the kidney (IVP, CT, etc.)?

Gross hematuria
(Most injuries are minor & managed conservatively)

Bladder injury is usually associated with what sorts of trauma?

Penetrating

Or

Compression of the abdomen

Are you more likely to die of trauma in a city, or in a rural area?

Rural

(70 % of trauma fatalities are rural)

Your patient has an apparent spinal cord injury, and is hypotensive. What is the likely reason?

Neurogenic shock

(vasodilation in response to the sudden spinal cord injury)

- You should still look for other bleeding sources, of course!

If your trauma patient can't feel anything below the belly button, where is the spinal cord lesion?

T10

The nipple line is approximately which dermatome?

T4

How can you remember which dermatomes are at the nipple line and umbilicus level?

Imagine a patient who's a little heavy set sitting down – the waist line makes the mouth of a smiling face. The nipples above look like eyes.

Imagine the smiley face winking at you and saying: 10–4 Good buddy!

If your trauma patient can't feel anything below the clavicle, where is the spinal cord lesion?

C5

There are two main groups of local anesthetics. What are they, and why is it important?

- Amides & esters
- If a patient is allergic to one, you can use an agent from the other group

How do you know which local anesthetics are in the same group?

Amides all have two "I's" in the generic name

When should you avoid combined lidocaine with epinephrine preparations, according to traditional teaching?

Areas at the edge of the body –
Digits, ears, penis, and end of nose

(Current evidence supports the safety of lidocaine with epinephrine use in digits, & to some extent in other locations – but this is an area of transition, at the moment)

What is the minimum acceptable urine output for a pediatric trauma patient?

1 cc/kg

What is the minimum acceptable urine output for an adolescent/young adult patient?

0.5 cc/kg

What are the most common complications of large quantity blood transfusions?

(3)

1. Hypothermia (use a blood warmer)
2. Low platelets
3. Low factors 5 & 8

If a patient with a femur fracture suddenly decompensates, and goes into DIC, what happened?

**Fat embolus
(from the long bone fracture) –**

Very high mortality

What is the best overall study to evaluate for possible blunt abdominal injury?

**CT scan –
With IV contrast & water soluble oral
(or per NG) contrast, if possible**

The brain has several different ways to herniate. One of the most common for patients who still might survive is called “uncal” herniation. What are the signs of uncal herniation?

- *Dilated nonreactive pupil on same side (due to CN III compression)*
- **Central hypoventilation**
- **Contralateral hemiparesis**

Closed head trauma that does not result in any bleeding or swelling, but still produces a temporary period of altered consciousness, or other cognitive changes, is called _____?

A concussion

How many “grades” are there, when you are grading a concussion?

Three

Note: There are now several classification systems for concussions. Many clinicians have moved away from using the scoring systems, due to confusion about the best way to score them, and how useful the scoring really is. It may still be utilized on the boards, or by other clinicians with whom you speak, though.

If your patient lost consciousness due to a closed head injury, what grade of concussion are you dealing with?

Three

Following a concussion, how long must your patient avoid contact sports?

Until ALL symptoms, including any memory or concentration difficulties have completely resolved

What additional testing is often recommended prior to a return to contact sports, after a concussion?

“Provocative testing” – Have the patient do an activity that increases BP & heart rate, such as sit-ups or jogging. Check whether any symptoms recur. IF SO, NO RETURN TO SPORTS YET

In both grades 1 and 2 concussions, the patient remains conscious. How are grades 1 and 2 different?

Grade 2 has amnesia for the event – Grade 1 does not

What is a grade 1 concussion?

Transient confusion only

How long must a grade 1 concussion patient sit out from contact sports?

No return to sports until symptoms completely resolve

&

Evaluated by a medical professional

What are post-concussive symptoms?

**Dizziness
Persistent headaches
Memory problems
Difficulty sleeping/concentrating
Sensitivity to light or noise
Depression, anxiety & fatigue**

How long do symptoms from a concussion (also known as “mild traumatic brain injury” or MTBI) typically last? (2 symptom categories)

Most have headache resolution within 2–4 weeks

Most have recovery of neuropsychological functions within 72 h

Why is it important to avoid a second closed head injury, if a concussion has recently occurred?

Increases likelihood of more serious neurological sequelae from apparently minor closed head injuries

In addition to avoiding sports or other possible head injury, how should a concussion be treated?

Which typical sports are high risk for MTBI (concussion)?

Do concussion patients require evaluation at a medical facility?

In a trauma patient, what is the “second C” of the ABC’s?

What does “tube & fingers in every orifice” refer to?

Which patients are at especially high risk for hyperkalemia?
(2 trauma-related;
2 condition related)

Adults often suffer cardiopulmonary arrest due to a sudden cardiac event. What is the typical path to cardiopulmonary arrest in children?

What type of medication is succinylcholine?

Physical & cognitive rest!

Boxing
Football/rugby/soccer
Ice hockey
Wrestling

Grades 2 & 3 do
(Grade 1 requires medical evaluation, but not necessarily at an institution)

C-spine
(Airway, breathing, circulation, C-spine)

Trauma patient evaluation & management may require:
1. NG or orogastric tube
2. ET tube (possibly)
3. Foley (if no sign of urethral trauma)
4. Rectum checked for gross blood & tone
5. TMs checked for blood

(Note: The need for routine rectal examination in trauma is currently an area of debate. Recent research suggests it may not be helpful & some clinicians now omit it.)

1. Crush injuries/rhabdomyolysis
2. Burn patients
3. Renal failure
4. Dig toxicity patients

Gradual deterioration – usually respiratory cause

Depolarizing paralytic
(Depolarizing meaning it activates the muscles. It’s the only depolarizing agent we use!)

In children <5 years old, what premedication should you avoid giving, before administering succinylcholine?	<p>A “defasciculating” dose of a non-depolarizing paralytic agent</p> <p>(Very young children have insufficient muscle mass to cause significant ICP changes with fasciculations & some cases of bradycardia/asystole have occurred in very young children given a non-depolarizing agent combined with succinylcholine.)</p>
How long does succinylcholine’s effect last?	3–5 min (for most patients)
Succinylcholine should be avoided in patients who are thought to have what metabolic derangement?	Hyperkalemia
Is succinylcholine a reasonable choice for maintenance of paralysis? Why or why not?	<p>No –</p> <p>It lasts only for 3–5 min</p> <p>&</p> <p>Persistent depolarization of the muscles could be damaging & lead to other metabolic problems</p>
What is the Sellick maneuver?	Gentle pressure on the larynx, toward the posterior neck, during intubation
What is the current status of the Sellick maneuver? Is it still recommended?	<p>It is an area of controversy –</p> <p>Was used to improve visualization of the larynx & to reduce reflux of gastric contents, but recent studies suggest it may not be helpful for either</p> <p>Not recommended currently, but not clear what the final answer will be following further research</p>
If the Sellick maneuver is in use, is it intended to prevent active reflux (vomiting)?	<p>No –</p> <p>Restricting vomiting can cause esophageal rupture!!!</p>
What is ketamine’s medication class?	<ul style="list-style-type: none"> • A dissociative anesthetic • Essentially no respiratory depression
What makes ketamine unique among this general class of medications?	

What situations is ketamine especially good for, and why? (2 situations)

- Trauma – it increases BP
- Reactive airway patients – it bronchodilates

What respiratory problem can occur with ketamine use?

Copious secretions – can give atropine first to reduce them

Ketamine is great for most trauma patients. Which trauma patients specifically should not receive ketamine, though?

Head trauma –
It increases ICP

(this is now being debated, but for board exams, avoid ketamine with head trauma)

What annoying but not dangerous ketamine side effect can limit its use?

Emergence reactions/hallucinations – most patients tolerate the drug well, though!

What is the average heart rate for school-aged children?
(preschool & school-aged)

80 beats per minute

What is a normal heart rate for children 10 and older?

**Same as adults –
about 75 beats per minute**

What is the typical respiratory rate for a preschooler?

Thirty

What is the typical respiratory rate for a school-aged child?

**Twenty-four
(double the adult rate)**

What is IV lidocaine used for? (2)

- Arrhythmia control
- To minimize the ↑ ICP that occurs with intubation (one-time dose)

Which other intervention is important to minimize possible increases in ICP, due to intubation?

Paralyzing the patient with succinylcholine or a non-depolarizing paralytic agent before intubation

(this is probably the most important preventative against increasing the ICP with intubation – & is also important to preventing multiple intubation attempts – success is more likely when the patient is paralyzed during intubation)

What CNS manifestations would you expect in a very mild hemorrhage (class I – <15 %)?

Anxiety

Severe hemorrhage (class 4 – $\geq 40\%$) usually produces what sort of CNS changes?

Coma or at least deep lethargy

What CNS manifestations do you expect to see with moderate hemorrhage (between 15 and 40 %)?

Irritable/confused/combative

Or

Lethargic (moderate)

How is the dose of epinephrine changed when you give it by ET (endotracheal tube)?

It is 10 \times larger

(Use 1:1,000 rather than 1:10,000 to keep the volume small)

What type of blood is given to children when transfusion is needed emergently, and type & cross is not ready?

O negative

(O positive is alright, if O negative is not readily available)

How often can transfusion boluses be repeated?

Every 20–30 min is typical, but depends on the situation – more frequent is fine if needed

Why do opioids cause hypotension (mainly)?

They cause histamine release which dilates vessels

How could you calculate the lower limit of systolic BP for children aged 1–10 years?

70 + (child's age in years \times 2) = Minimum BP

How can you calculate the average or expected systolic BP for a child 10 years or less?

90 + (child's age \times 2) = Expected BP

What is the normal respiratory rate for a toddler?

Thirty

(same as a preschooler, just a different word)

What is the typical heart rate for children 3 month to 2 years old?

About 100–130

(increasing age lowers heart rates)

At what level of hemorrhage will *central* pulses seem “thready?”

Severe
(Class 4)
(>40 % blood loss)

Capillary refill will slow down with what percentage of blood loss?

≥ 15 %
(Class 2 or worse)

How many breaths should initially be given to a patient who is not breathing?

Two slow breaths
(This has changed from earlier BLS protocols.)

Which changes first in a pediatric patient in trouble – the capillary refill or the blood pressure?

Capillary refill slows
(heart rate will also increase before BP drops)

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