On-Field Assessment and Management of Injuries

Michael Anacker, MD

Sports Medicine; Pediatrics

Adjunct Team Physician

University of Michigan

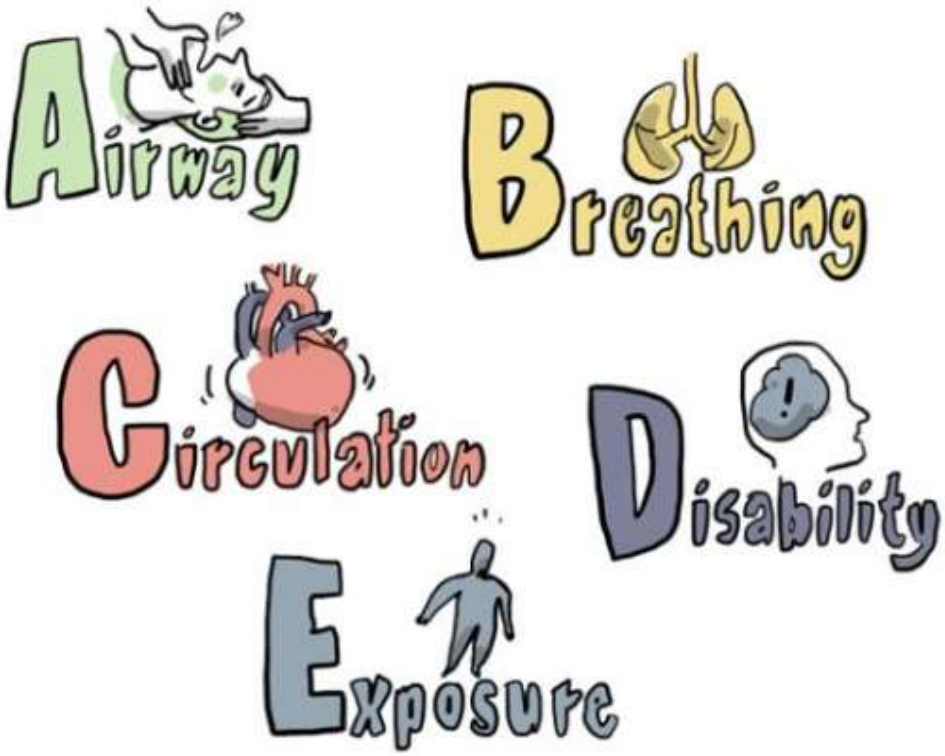
Disclosures

- I have no disclosures.

Sideline Coverage Principles

- Introduce yourself to medical personnel
- Emergency Action Plan (EAP)
- Review location of AED and medical equipment/resources
- Emergency Services – transportation
  - Onsite vs Offsite

Life threatening injury?



Limb threatening injury?

- Vascular compromise
- Open fracture
- Neurologic compromise
- Overlying skin integrity

Objectives

- Determine the extent of the injury
- Describe initial assessment strategies
- Make a decision regarding return to play

Cases

Case 1: Ocular injury

- 20 y.o. baseball athlete attempting to bunt, ball deflected striking him in the right eye
- Reports blurred vision and swelling

Sideline Evaluation

- Assess visual acuity first
  - Count fingers vs letters
- Examine structures of the eye
  - Globe, sclera, lacrimal duct, pupil size/shape
- Extraocular movements
  - Symmetry, nystagmus
- Palpate orbital rim

Urgent Referral to Ophthalmology

Examination Finding	Potential Problem
1. Unequal visual acuity in one eye compared with the other	Various (nonspecific problem)
2. Unequal pupils	Traumatic mydriasis
	Anterior chamber inflammation
3. Restricted extraocular movements	Extraocular muscle entrapment in orbital fracture
	Cranial nerve injury
4. Photophobia with penlight examination	Anterior chamber inflammation (traumatic iritis, microhyphema)
5. Iris not visualized in detail	Anterior chamber inflammation (traumatic iritis, microhyphema)
	Corneal injury
	Increased intraocular pressure

Hyphema

Traumatic Hyphema

- Blood in the anterior chamber
- Eye pain, photophobia, blurred vision
- ~37% of hyphema from sports injuries
- Avoid NSAIDs
- Common sports – racquet sports, baseball, and softball

Hyphema Treatment

- Eye shield placed over the affected eye
- Treat vomiting
- Keep supine and head elevated to 30 degrees
- Transport to ER for evaluation with ophthalmology

Return to play - Hyphema

- Limit activity for one week after initial injury
- Many ophthalmologists will limit reading given concern for stress on blood vessels
- If hyphema remains present > 7 days continue with activity limitation

Case 2: Dental Injury

- 21 y.o. field hockey athlete struck in the face with a stick
- Comes to sideline holding a tooth in her hand
- No headache or loss of consciousness

Sideline Management - Tooth Avulsion

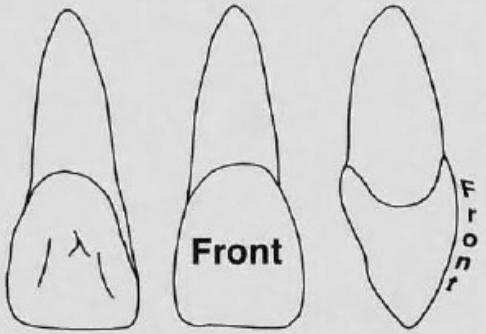
- Replantation within 5-10 minutes
- Rinse debris off root
- Hold pressure to limit bleeding
- If unable to replant, place tooth in milk or other storage media
- Transport to dentist

Return to play – Avulsed tooth

- Athletes who undergo replantation with splinting should wait at least 2-4 weeks before return
  - Mouth guard necessary

- Athletes who do not undergo replantation could return within 48 hours, assuming no bone fracture
  - Mouth guard needed

Emergency Treatment of Athletic Dental Injuries



Professionally-made, properly fitted Custom Mouthguards are recommended for all contact and collision sports. See www.academyforsportsdentistry.org

AVULSION (Entire Tooth Knocked Out)

Replantation within 5-10 minutes is critical for replantation. Minutes matter. If the root of the tooth has debris on it, rinse the root with water. If the root appears clean, grasp the crown between your thumb and first finger with the smooth flat surface forward.
(see diagram above)

If it is an upper tooth place the other hand on top of the person's head to stabilize it then push firmly and hold the tooth in place. When the tooth is seated into its original position, it must be held there by hand or with a wad of wet paper tissue to keep it in place. Do not worry about getting the tooth in 'correctly' it can be adjusted by the dentist later during splinting. Bleeding can be controlled by uninterrupted direct pressure for 5 minutes.

If no one is prepared to replant the tooth, if the injured patient is unwilling or unable to cooperate with immediate replantation, or if the damage to the socket and adjacent teeth is substantial; control bleeding with pressure, place the tooth in liquid such as milk or other storage media to keep it from drying.

TRANSPORT THE PATIENT AND TOOTH TO A DENTIST IMMEDIATELY.

LUXATION (Tooth in socket, but wrong position)

THREE POSITIONS
EXTRUDED TOOTH - Upper tooth hangs down and/or lower tooth has been pushed up.
1. Reposition tooth in socket using firm finger pressure like replantation.
2. Stabilize tooth by gently biting on towel or wet paper tissue.
3. **TRANSPORT IMMEDIATELY TO DENTIST.**

LATERAL DISPLACEMENT - Tooth pushed back or pulled forward.
1. No treatment at accident scene as tooth is locked in bone.
2. **TRANSPORT IMMEDIATELY TO DENTIST.**

INTRUDED TOOTH - Tooth pushed into gum-looks short
1. No treatment at accident scene as tooth is locked in bone.
2. **TRANSPORT IMMEDIATELY TO DENTIST.**

FRACTURE (Broken tooth)

1. If tooth is in pieces, save the broken portion and bring to the dental office in water or milk.
2. The nerve of the tooth may be exposed causing pain from cold, heat and air passage. Analgesics are recommended.
3. **THE PATIENT MAY COMPLETE THE GAME OR ACTIVITY BUT WILL REQUIRE DENTAL TREATMENT WITHIN 24 HOURS TO SAVE OR TREAT THE DENTAL PULP. SOONER IS BETTER.**

Academy for Sports Dentistry
118 Faye Street
P.O. Box 364
Farmersville, IL 62533
1-800-273-1788
1-217-227-3431
www.academyforsportsdentistry.org

The Academy for Sports Dentistry gratefully acknowledges the support of Dr. Samuel D. Harris for partially funding this public service project.
The Academy would also like to acknowledge Dr. Alex M. Della Bella of Cincinnati, Ohio for the development of this Emergency Treatment Card.
The Academy for Sports Dentistry, a professional organization dedicated to the dental needs of athletes at risk to sports injuries, recommends that every sports medicine team includes a dentist knowledgeable in sports dentistry.

PROPERLY FITTED MOUTHGUARDS SHOULD BE STANDARD EQUIPMENT

Case 3: Shoulder Injury

- 18 y.o. football athlete went to tackle an opposing running back
- Felt a sharp, burning pain radiating down his right arm
- Tingling sensation in fingers

On field/Sideline Management

- Palpate for any spinal tenderness
- Neurovascular examination upper extremities
  - Strength
  - Sensation
  - Pulses
- Range of motion
  - Neck and upper extremities

C5: Blocker
Arm abduction
Elbow flexion

C6: Beggar
Elbow flexion
Wrist extension

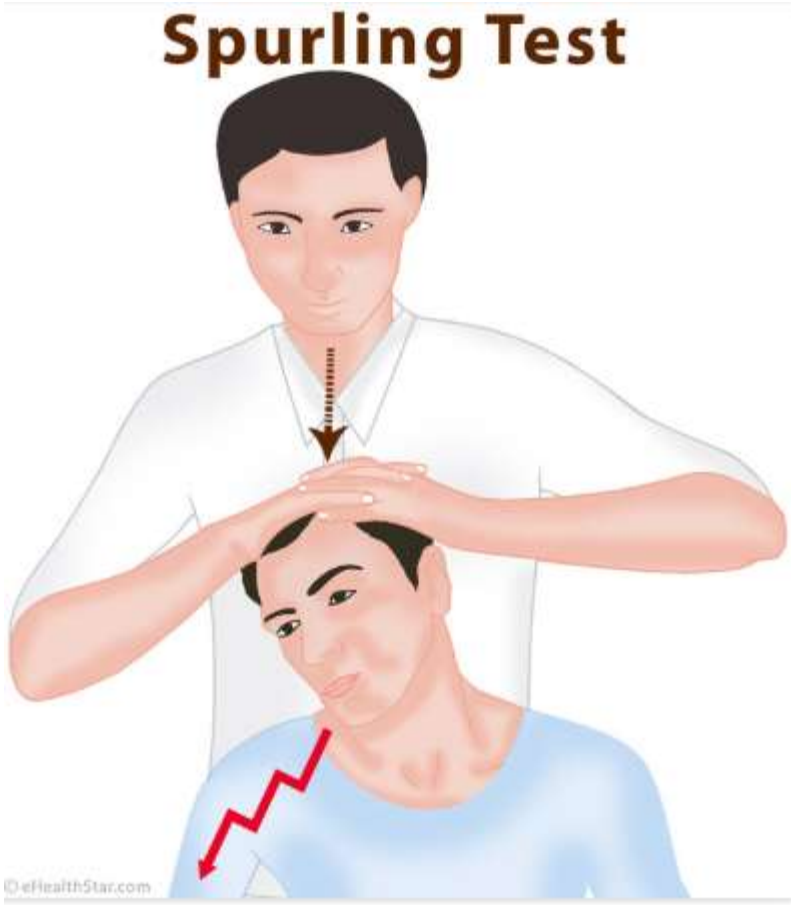
C7: Kisser
Elbow extension
Wrist flexion
Finger extension

C8: Grabber
Finger flexion

T1: Spock
Finger abduction

Source: South-Paul JE, Matheny SC, Lewis EL: *CURRENT Diagnosis & Treatment in Family Medicine, 3rd Edition:* www.accessmedicine.com

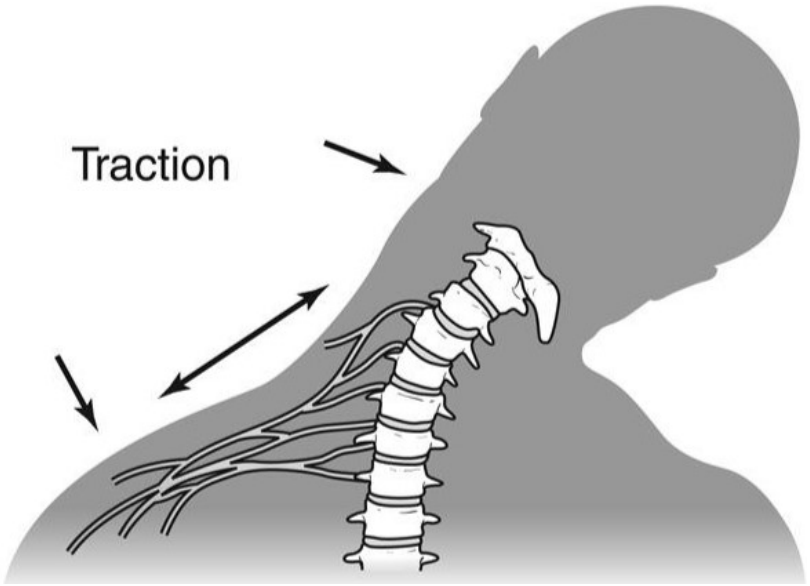
Spurling's Test



Burner/Stinger

- Most common brachial plexus injury in athletes
- Collegiate football athletes incidence 49-65% in career
- Mechanism
  1. Brachial plexus stretch/traction
  2. Nerve root compression in neural foramina
  3. Direct blow to brachial plexus

Burner/Stinger



- Lateral neck flexion with contralateral shoulder
- Exam external rotator muscles, deltoid, and biceps strength
- ROM neck and shoulder

Return to play → Yes if…

- Full painless range of motion neck/shoulder
- Resolution of parathesias
- Negative Spurling's and brachial plexus stretch
- Normal motor strength – neck/shoulder

Return to play → No if…

- Midline neck pain or pain with neck ROM
- Shoulder Weakness
- Persistent parathesias
- Bilateral upper extremity symptoms
- Any lower extremity symptoms

Case 4: Head Injury

- 20 y.o. soccer goalie attempting to make a save and kicked in the head
- Develops headache and nausea
- No LOC
- No history of head injury

Concussion Sideline Testing

- Sports concussion assessment tool (SCAT) 5
  - Symptom Evaluation
  - Orientation
  - Cognitive Screening
  - Concentration
  - Neurologic Screening
- Vestibular Ocular Motor/Screening (VOMS)
- Balance Error Scoring System (BESS)

Concussion Exam Red Flags

SCAT 5

STEP 3: MEMORY ASSESSMENT MADDOCKS QUESTIONS[2]

"I am going to ask you a few questions, please listen carefully and give your best effort. First, tell me what happened?"

_____

_____

Mark Y for correct answer / N for incorrect

What venue are we at today?	Y	N
Which half is it now?	Y	N
Who scored last in this match?	Y	N
What team did you play last week / game?	Y	N
Did your team win the last game?	Y	N

SCAT 5

CERVICAL SPINE ASSESSMENT

Does the athlete report that their neck is pain free at rest?	Y	N
If there is NO neck pain at rest, does the athlete have a full range of ACTIVE pain free movement?	Y	N
Is the limb strength and sensation normal?	Y	N

Glasgow coma scale (GCS) exam
Eye
Verbal
Motor

SCAT 5

STEP 2: SYMPTOM EVALUATION

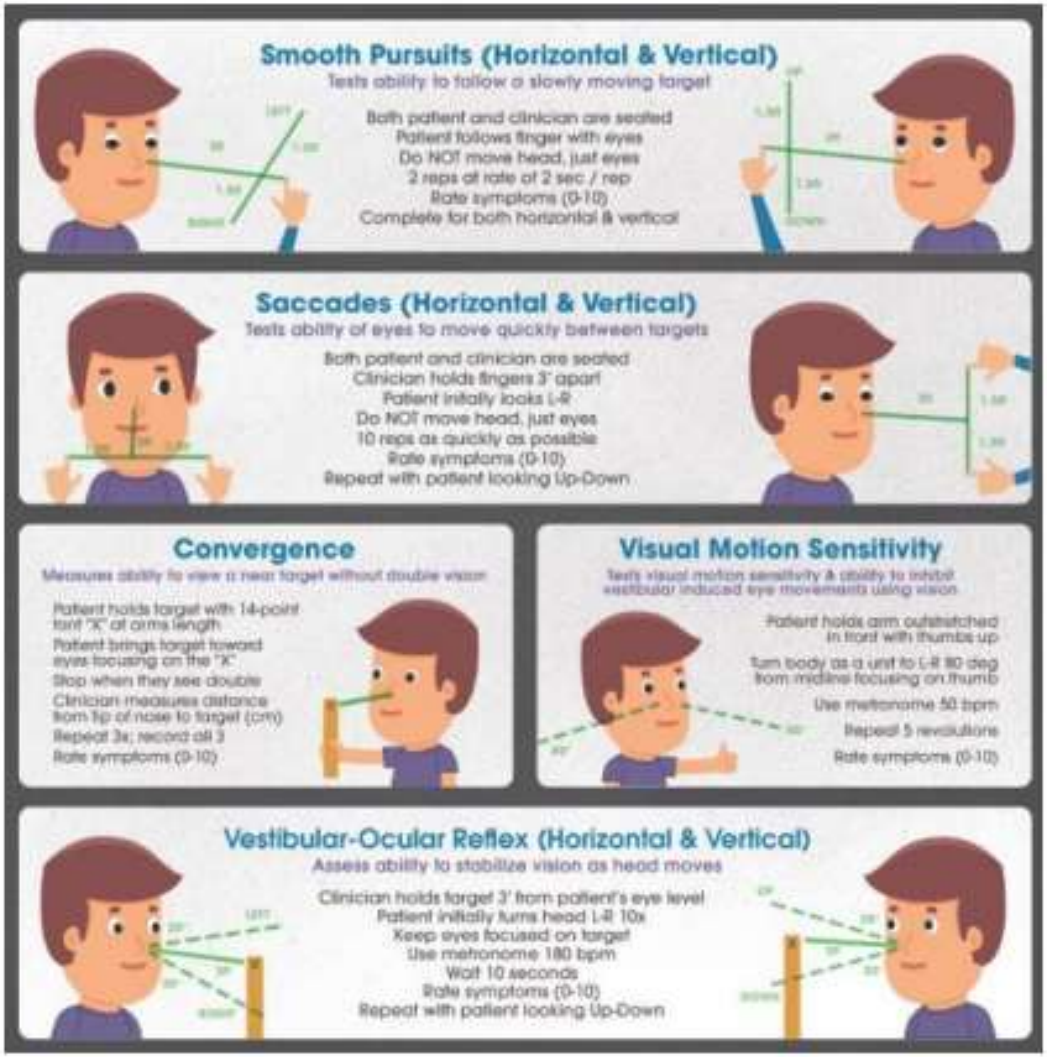
The athlete should be given the symptom form and asked to read this instruction paragraph out loud then complete the symptom scale. For the baseline assessment, the athlete should rate his/her symptoms based on how he/she typically feels and for the post injury assessment the athlete should rate their symptoms at this point in time.

Please Check: ☐ **Baseline** ☐ **Post-Injury**

Please hand the form to the athlete

	none	mild		moderate		severe	
Headache	0	1	2	3	4	5	6
"Pressure in head"	0	1	2	3	4	5	6
Neck Pain	0	1	2	3	4	5	6
Nausea or vomiting	0	1	2	3	4	5	6
Dizziness	0	1	2	3	4	5	6
Blurred vision	0	1	2	3	4	5	6
Balance problems	0	1	2	3	4	5	6
Sensitivity to light	0	1	2	3	4	5	6
Sensitivity to noise	0	1	2	3	4	5	6
Feeling slowed down	0	1	2	3	4	5	6
Feeling like "in a fog"	0	1	2	3	4	5	6
"Don't feel right"	0	1	2	3	4	5	6
Difficulty concentrating	0	1	2	3	4	5	6
Difficulty remembering	0	1	2	3	4	5	6
Fatigue or low energy	0	1	2	3	4	5	6
Confusion	0	1	2	3	4	5	6
Drowsiness	0	1	2	3	4	5	6
More emotional	0	1	2	3	4	5	6
Irritability	0	1	2	3	4	5	6
Sadness	0	1	2	3	4	5	6
Nervous or Anxious	0	1	2	3	4	5	6
Trouble falling asleep (if applicable)	0	1	2	3	4	5	6
Total number of symptoms:							of 22
Symptom severity score:							of 132
Do your symptoms get worse with physical activity?						Y	N
Do your symptoms get worse with mental activity?						Y	N

VOMS testing



BESS testing

Clinical test battery:

- Perform a total of six 20 second trials using three different stances (double, single, tandem), each one used with two different surfaces (firm, foam)

Recorded errors:

- Hands lifted off iliac crests
- Opening eyes
- Step, stumble, or fall
- Moving into >30 degrees hip flexion or abduction
- Remaining out of testing position for >5 seconds

Return to play

- No athlete diagnosed with a concussion should be returned to play in the same day

- Undergo a return to play protocol before restarting physical activity/sport

BRAIN **PROTOCOL**

A step-by-step gradual process for return to play

BIKE
Increase heart rate with sustained effort while keeping the head as still as possible.

RUN
Adds simple, repetitive movement.

AGILITY
Adds more explosive movement and asks the brain to do more complex function.

IN RED
Adds usual drills and workout while avoiding all physical contact.

("In Red" refers to the red jersey players wear to signify that they are NOT to be hit.)

NO RESTRICTIONS
A doctor must clear the athlete before this step.

			IN RED	NO RESTRICTIONS
		AGILITY		
	RUN			
BIKE				
Increase heart rate with sustained effort	Increase heart rate with sustained effort	Increase heart rate with sustained effort	Increase heart rate with sustained effort	Increase heart rate with sustained effort
	Adds simple repetitive movement	Adds simple repetitive movement	Adds simple repetitive movement	Adds simple repetitive movement
		Adds athletic movements and explosive effort	Adds athletic movements and explosive effort	Adds athletic movements and explosive effort
			Adds mental functions of normal workout/ drills. No contact	Adds mental functions of normal workout/ drills. No contact
				Must be cleared by a doctor

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Case 5: Heat Illness

- 16 y.o. F cross country athlete; after completing a 10k complains of myalgias, dizziness, and nausea. Temperature outside was 92F degrees.

On-Field Management

- ABCs
- Vital Signs (**rectal temperature**)
- Obtain more history (coach, parent, teammate)
  - Medications,
  - Past medical history
  - Possible drug use
- Assess skin for perspiration

Heat Illness

Heat Cramps

- Involuntary, painful contractions of skeletal muscle during or after prolonged exercise.
- Typically resolves with cessation of activity and stretching.

Heat Stroke

•Rectal temp > 40-41ºC (104-105 ºF) with associated symptoms.
•Heat generated exceeds heat lost, leading to rise in core temperature and thermoregulatory failure.

Heat Exhaustion

•Body temperature > 39ºC but < 40ºC with inability to continue exercising.
•Should resolve with cessation of activity and sweating.

Acute Heat Exhaustion Management

- Oral rehydration
- Remove excessive clothing
- Place in supine position with legs elevated
- Monitor mental status

Acute Heat Stroke Management

- Cold water immersion
  - “Cool First, Transport Second”
  - “Golden half hour”
- Evaporation cooling techniques
  - Cool mist while warm air is fanned over
- Cooling blanket and ice packs to axilla/groin/neck

Wet Bulb Globe Temperature (WBGT)

GUIDANCE FOR ATHLETIC TRAINERS			
WBGT	**FLAG COLOR**	**LEVEL OF RISK**	**COMMENTS**
<18°C (<65°F)	Green	Low	Risk low but still exists on the basis of risk factors.
18-23°C (65-73°F)	Yellow	Moderate	Risk level increases as event progresses through the day.
23-28°C (73-82°F)	Red	High	Everyone should be aware of injury potential; individuals at risk should not compete.
>28°C (82°F)	Black	Extreme or Hazardous	Consider rescheduling or delaying the event until safer conditions prevail; if the event must take place, be on high alert.

Return to play after heat exhaustion

- Resolution of symptoms
- Typically return to training within 24-48 hours
- Nutrition/hydration
- Sport specific issues – equipment indoor/outdoor
- Environmental conditions

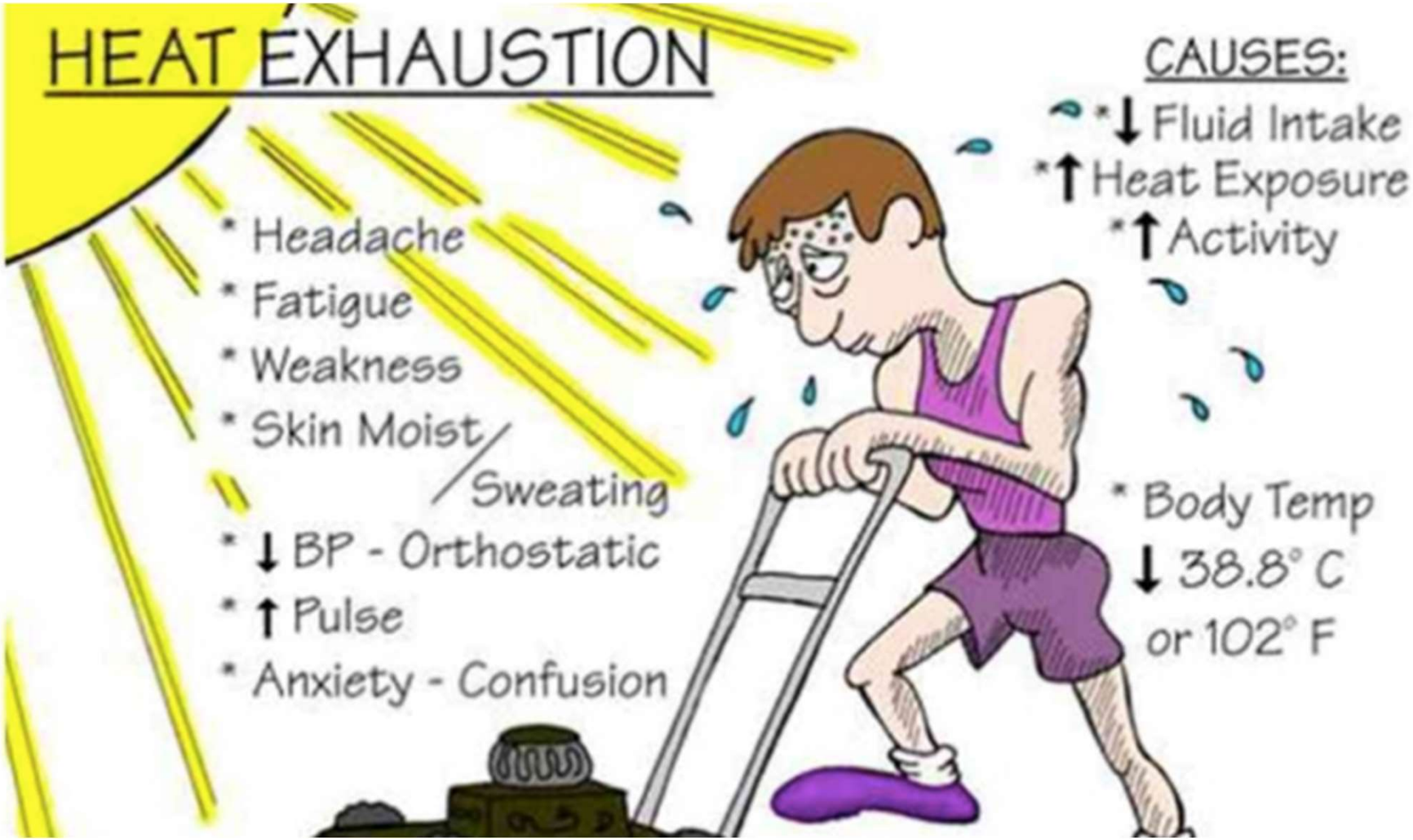
ACSM Return to play after heat stoke

1. Refrain from exercise for > 7 days
2. F/u in 1 wk for physical examination and repeat labs or diagnostic imaging of affected organs
3. When cleared, begin exercise in cool environment; gradually increase duration, intensity, and heat exposure for 2 wk to acclimatize and demonstrate heat tolerance

ACSM Return to play after heat stoke

4. If return to activity is difficult, consider laboratory exercise-heat tolerance test about 1 month post-incident

5. Clear the athlete for full competition if heat tolerance exists after 2 to 4 wk of training


HEAT EXHAUSTION
CAUSES:
* ↓ Fluid Intake
* ↑ Heat Exposure
* ↑ Activity
* Headache
* Fatigue
* Weakness
* Skin Moist / Sweating
* ↓ BP - Orthostatic
* ↑ Pulse
* Anxiety - Confusion
* Body Temp
↓ 38.8° C
or 102° F

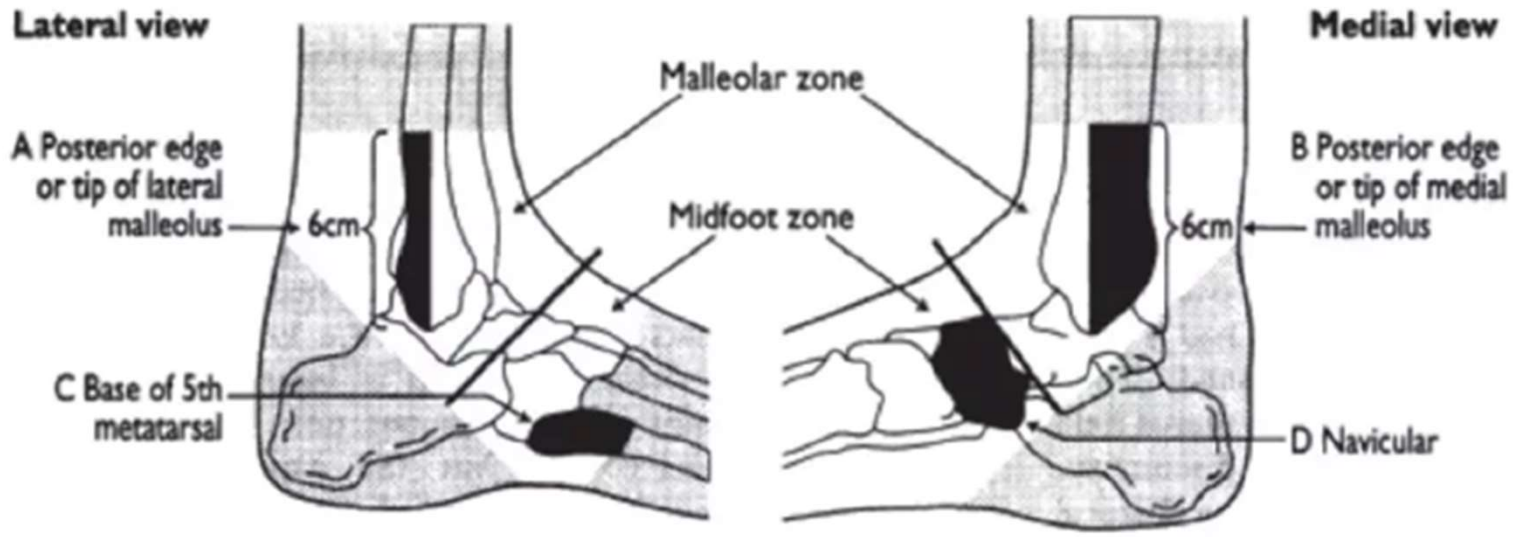
Case 6: Ankle Injury

- HPI: 17 y.o. M point guard stepped on an opponent's foot. Left ankle inverted. Developed lateral ankle pain with associated swelling. Pain with weight bearing. Denies popping or clicking.

Sideline Evaluation

- Assess for bony point tenderness
  - Medial/lateral malleolus, base of fifth metatarsal, navicular
- Assess for ligamentous laxity
- Ability to bear weight
- Neurovascular status

Ottawa Ankle Rules



An ankle *x* ray series is required only if there is any pain in malleolar zone and any of these findings:

- Bone tenderness at A
- Bone tenderness at B
- Inability to bear weight both immediately and in emergency department

A foot *x* ray series is required only if there is any pain in midfoot zone and any of these findings

- Bone tenderness at C
- Bone tenderness at D
- Inability to bear weight both immediately and in emergency department

Ottawa ankle rules for use of radiography in acute ankle injuries (adapted from Stiell et al[18])

Lateral Ankle Sprain and RTP

- Initial management with RICE
- Functional rehabilitation vs Immobilization
  - Early rehab superior to prolonged immobilization
- Bracing – ASO (ankle stabilizing orthosis)
  - Decreases risk of injury recurrence

Functional Rehabilitation

- Functional rehab
  - Proprioception exercises (wobble board)
  - Foot circles
  - Alphabet exercises
  - Marble pickups

Return to play

- Timing of return depends on severity of ankle sprain
- Functional testing
  - Proprioception, ROM, strength, testing balance, and agility
  - Lateral hop test
- Restoration of sport specific skills

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