

Skull and brain injuries: intervention options



Dömse Eszter dr.
PTE-ÁOK Sportmedicine Center



Definition



Definition 1.:

Traumatic brain injury:

- ❖ is a global health problem
- ❖ high incidence
- ❖ common long-term consequences



MINOR TRAUMATIC
brain injuries

(MAKING SURE THEY DON'T
GET OVERLOOKED)



Definition 2.:

The significance of mild cranial injuries:

- ❖ are beginning to recognize its significance
- ❖ involving a much larger population (15-30x)



MINOR TRAUMATIC
brain injuries
(MAKING SURE THEY DON'T
GET OVERLOOKED)



Age and gender distribution:



- ❖ common in the young age group
- ❖ twice as common among men
- ❖ a high proportion of the elderly population

Incidence:

- ❖ **USA:** approx. 1-2 million people / year
- ❖ **United Kingdom:** approx. 1 million people / year
- ❖ **Europe:** 2.5 million people / year



The most common causes of skull injuries:

- ❖ Traffic accidents
- ❖ Physical violence, abuse
- ❖ falls from a height
- ❖ gunshot wounds, stab wounds
- ❖ Sports and recreation activities
- ❖ Explosions, attacks in war zones



Risk factors for traumatic brain injury:



- ❖ Drug and alcohol intoxication
- ❖ Violation of traffic rules
- ❖ Lack of protective clothing or improper use

Classification of skull injuries



Classification of skull injuries :

1. open or closed (anatomical classification)
2. focal or diffuse or mass lesions (pathological classification)
3. severe, moderate / moderate or mild (severity)
4. Speed of force application
5. Pathobiology: **primary / direct damage, secondary damage**



1. Anatomical Classification: Open injuries:

- ❖ Injuries through the skull and meninges
- ❖ or skull base fractures



1. Anatomical Classification: Open injuries:

- ❖ Consequences:
 - ❖ impression fracture,
 - ❖ foreign body,
 - ❖ haematoma,
 - ❖ oedema,
 - ❖ secondary infection,
 - ❖ pneumatocele (air tumor)



1. Anatomical Classification: Closed injuries (**dura mater intact**):

- ❖ **Consequences:**
 - ❖ contusion,
 - ❖ axon injury,
 - ❖ oedema,
 - ❖ epidural and subdural haematoma



2. Pathological classification:

- ❖ focal:
 - ❖ subdural bleeding,
 - ❖ epidural bleeding,
 - ❖ contusion (mainly in the frontal and temporal lobes)
 - ❖ diffuse



3. Types of head mechanical forces



- ❖ **static / slow force:** multiple cranial fractures or cerebral compression due to adequate compressive force.
- ❖ **dynamic / fast force:**
 - ❖ impulsive (sudden movement of the skull due to force on the body)
 - ❖ impact (direct impact / impact on the skull)

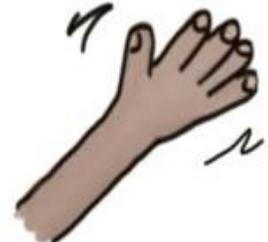
4. severe, moderate / moderate or mild
(severity)

Glasgow Coma Scale(GCS):

- ❖ ≤ 8 - severe
- ❖ 9-12 - moderate / moderate
- ❖ 13-15 - mild



4. severe, moderate / moderate or mild (severity)



	EYES	VERBAL	MOTOR
(+4) SPONTANEOUS	(+5) ORIENTATED	(+6) OBEY COMMANDS	
(+3) TO SOUND	(+4) CONFUSED	(+5) LOCALISING	
(+2) TO PRESSURE	(+3) WORDS	(+4) NORMAL FLEXION	
(+1) NONE	(+2) SOUNDS	(+3) ABNORMAL FLEXION	
(+1) NONE	(+1) NONE	(+2) EXTENSION	
(+1) NONE	(+1) NONE	(+1) NONE	

GLASGOW COMA SCALE

4. severe, moderate / moderate or mild

(severity)

Glasgow Kóma Skála (GCS):

Vizsgált válasz		Pontszám
Legjobb szemnyitási reakció	Spontán	4
	Felszólításra	3
	Fájdalomra	2
	Nincs szemnyitás	1
Legjobb motoros reakció	Felszólításnak eleget tesz	6
	Lokalizálja a fájdalmat	5
	Védekezik a fájdalom ellen	4
	Fájdalomingerre flexió	3
	Fájdalomingerre extenzió	2
	Nincs motoros válasz	1
Legjobb verbális válasz	Tájékozott	5
	Zavart	4
	Oda nem illő szavak	3
	Érthetetlen hangok	2
	Nincs verbális válasz	1
		Összesen 3–15

5. Pathobiology:

- ❖ **primary / direct damage:** damage that occurs at the time of injury;
 - ❖ intracranial haemorrhage,
 - ❖ cerebral haemorrhage,
 - ❖ diffuse axonal damage,
 - ❖ fracture, etc.

- ❖ **secondary damage:** secondary abnormalities occurring **immediately following trauma** as a result of a combination of different complicating processes.



Diagnosis of traumatic brain injuries :



- ❖ Laboratory tests:

- ❖ Ongoing research biomarkers

- ❖ Imaging tests:

- ❖ Focal lesions, cerebral contusions could relatively easily be identified by CT scan
 - ❖ Magnetic resonance (MR) examination



Incidence of traumatic brain injury in sports

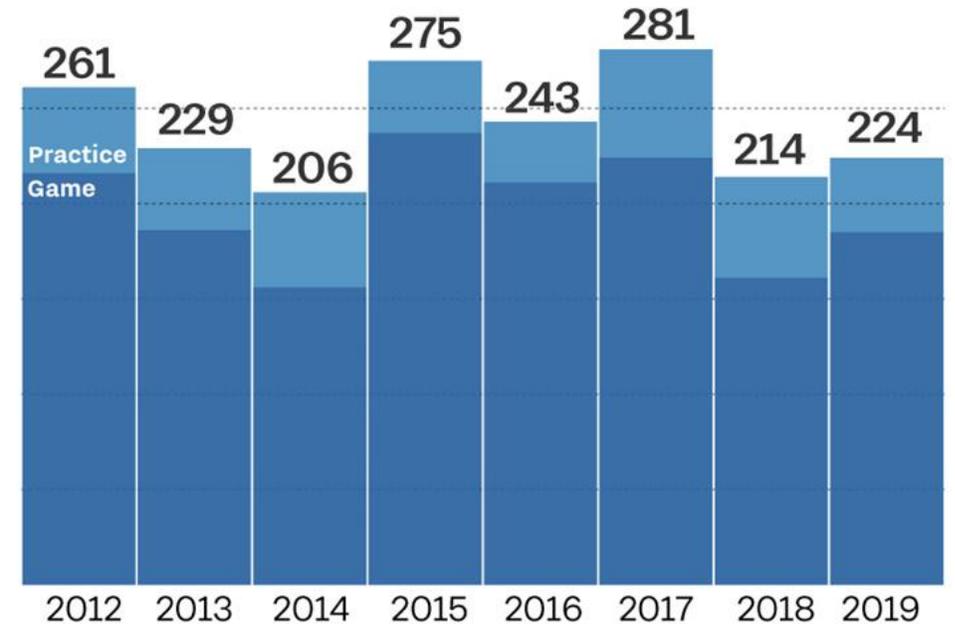


- ❖ **Concession (konkusszió)** is a closed head injury that affects the head as a result of some sudden external force (s), during which the brain hits the inner surface of the skull, leading to its damage and dysfunction.
- ❖ Concession (konkusszió) may occur
- ❖ without visible symptoms (asymptomatic subconcession)
- ❖ or accompanied by a number of symptoms (symptomatic concession).₃

Concession is common in contact sports:

- ❖ american football
- ❖ rugby
- ❖ ice hockey
- ❖ boxing / kick-boxing
- ❖ lacrosse
- ❖ wrestling
- ❖ karate

Concussions in the NFL by year
Preseason and regular season



Source: NFL

Concession in other sports:

- ❖ the horseback riding
- ❖ skiing,
- ❖ parachuting



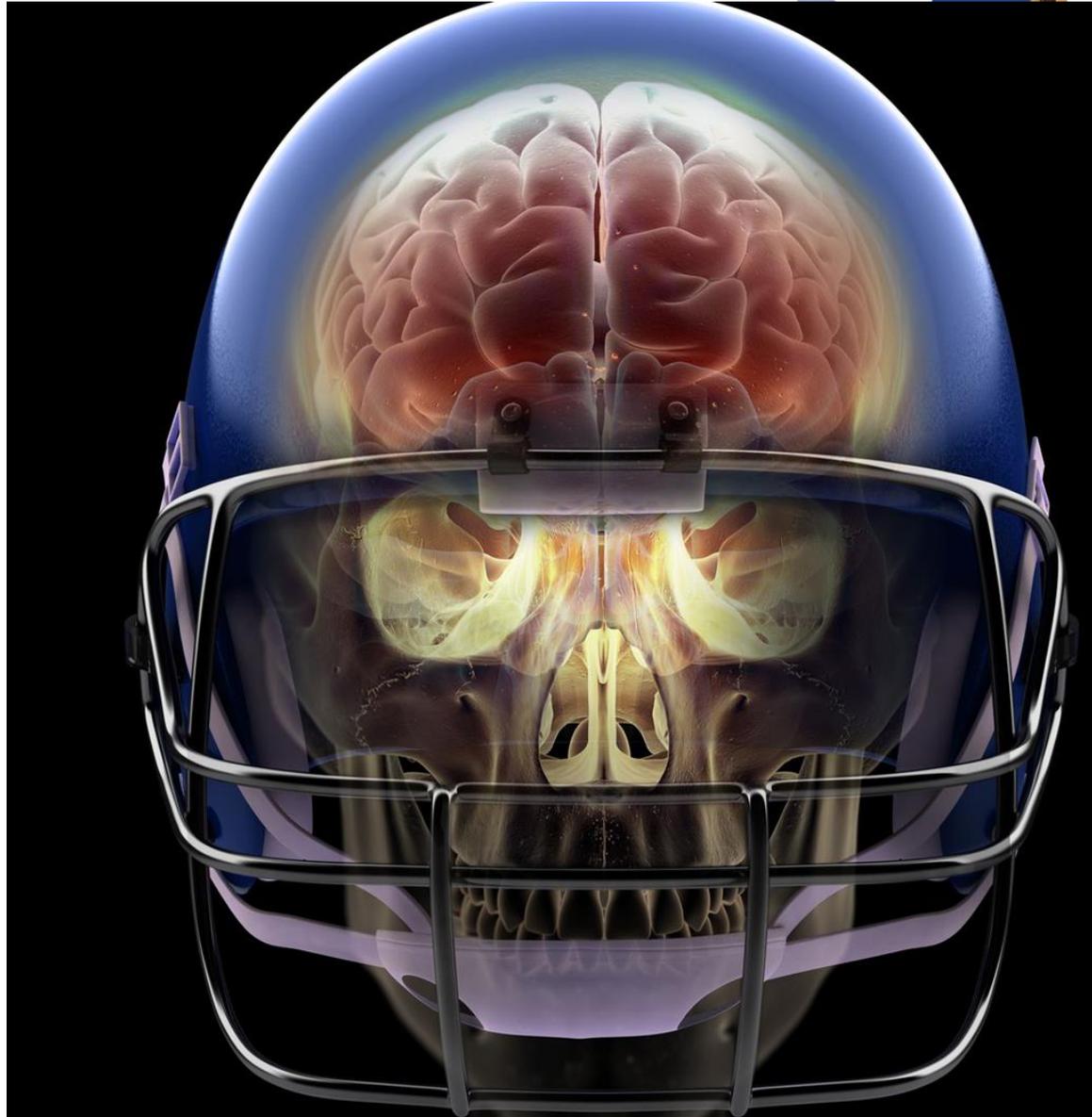
Neuropsychological consequences:

- ❖ neuro-psychological deficits
- ❖ cognitive dysfunction
- ❖ concentration disorder
- ❖ memorial and attention deficit disorder



Chronic traumatic encephalopathy:

- ❖ dementia pugilistica / parkinsonism pugilistica
- ❖ punch-drunk syndrome
- ❖ chronic traumatic encephalopathy



Progressive neuro-degenerative disease



- ❖ **Cognitive deficits** (eg. memory, attention, language impairment)
- ❖ **Emotional disorders** (eg. depression, anxiety)
- ❖ **Behavioral disorders** (eg. impulse control disorder, aggression)
- ❖ **Musculoskeletal disorders** (eg symptoms of parkinsonism: tremor, stiffness, slowness)
- ❖ **Personality change**
- ❖ **Social difficulties**
- ❖ **Suicide** (suicide attempts)

Prevention:

- ❖ control and screening
- ❖ using appropriate imaging techniques
- ❖ emphasizing a multidisciplinary approach
- ❖ Protective equipments and clothes



Köszönöm a megtisztelő figyelmet!

