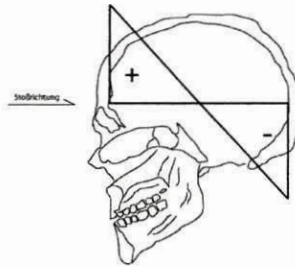


Modern Diagnoses and Treatment of Traumatic Brain Injury

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**50th Myanmar Conference,
 January 14-20, 2004
 Yangon, Myanmar**

Biomechanics / 2

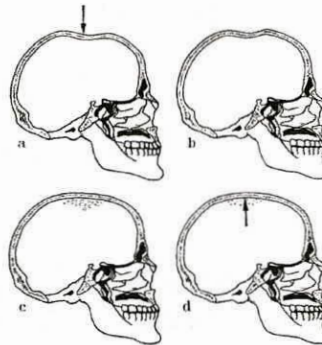


- Positive pressure at the impact pole
- Negative pressure at the counter pole

Traumatic brain injury (TBI)

- Are a frequent morbidity and mortality cause in the European countries.
- Incidence between 229 and 1.967 for 100.000 inhabitants
- Highest incidence in men between 15 and 24 years
- Most frequent cause of death for humans under 45 years in Europe

Biomechanics / 3



Damage on the impact pole:

- a, b) Direct damage due to contact of the skull bone leads to lesions on the surface of the brain
- c, d) Due to snapping back of the elastic skull bone, negative pressure occurs
 Damage on the counter pole with negative pressure causes tissue damage due to gas bubbles (gas, solved in tissue under normal pressure)

Forms and Biomechanic of TBI

Two forms of TBI

- Closed cerebral trauma sometimes combined with fracture of skull
- Open brain injury by a penetrating object (bullet, etc.)

Physical formula of TBI

- Two physical factors play a role:
 $b = v^2 / 2s$
 speed v
 acceleration b
 deceleration distance s

Biomechanics / 4

- Lesions on the surface of the brain

Periventricular lesions lateral due to negative pressure

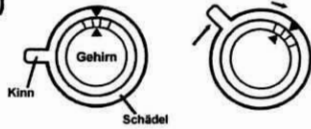


anterior, posterior lesions due to positive pressure



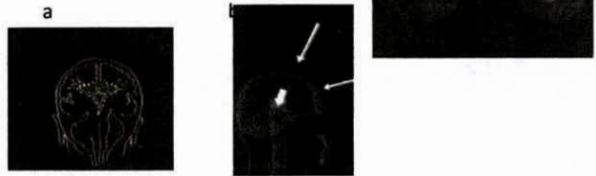
Biomechanics / 5

- Linear brain injury (Grcevic) acceleration or deceleration trauma, damage on brain tissue depends on localisation, intensity, direction of impact
- Rotational trauma (Pudenz-Shelden)



Linear brain injury

- Linear outer brain injury
Lesions on brain surface depending to direction and the intensity, contusion zones
- Linear inner brain injury
 - a) Linear inner upper brain injury (Grcevic)
lesions periventricular
 - b) Linear inner lower brain injury (Lindenberg)
lesions upper brain stem, temporal lobe, cerebellum



Biomechanics / 6

Rotational trauma

thalamic lesions

schematic

both sides



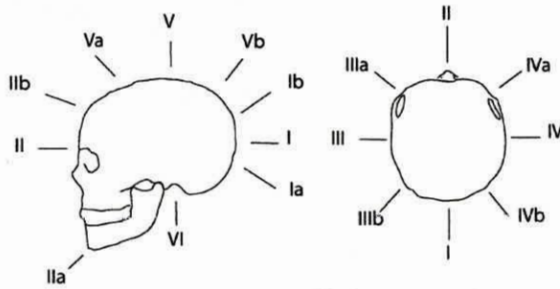
Patterns of cerebral trauma Acceleration – Deceleration

- Linear brain injury
 - Outer brain injury
Coup - local lesions on the impact region
Counter coup – opposite to the impact
 - Inner brain injury
 - a) Inner upper brain injury – lesions: corpus callosum, septum pellucidum, fornix, thalamus, hypothalamus, cingulum
 - b) Inner lower brain injury – midbrain (substantia nigra, perirubral zone, crura cerebri, tegmentum, periaqueductal gray, upper pons), perihippocampus, uncus amygdalae, cerebellum
- Rotational brain injury
Laceration (capsula int., basal ganglia),
Intracerebral haemorrhage (thalamus, hypothalamus),
Extracerebral haematoma

Impact, type II
deformation of the skull

negative, positive pressure
around the ventricles

Documentation



- After Spatz, Innsbruck modified

Different forms of traumatic lesions

- Primary lesions
- Secondary lesions -therapeutic battle field
 - Penumbra
postoedemic - diffuse/local,
posthypoxic,
posthypoxemic- diffuse/local
- Tertiary lesions
malnutrition, malabsorption, avitaminosis, bed rest
syndrome, etc.
Encephalopathy, myelopathy, pontine
myelinolyse, polyneuropathy
- Quartary lesions
Hydrocephalus occlusus, meningoencephalitis, brain abscess
- Complications
joint contraction, periarticular ossification, decubitus,
local lesion of peripheral nerves

Classification of brain injury

- Mild traumatic brain injury
(brain commotion, Commotio Cerebri, Hirnerschütterung)
Glasgow Coma Scale (GCS) = 13 – 15
- Moderate traumatic brain injury
(brain contusion, Contusio Cerebri, mild degree)
GCS = 9 – 12
- Severe traumatic brain injury
(brain contusion, Contusio Cerebri, severe degree)
GCS = 5 – 8
- Severest brain injury – upper brain stem symptoms (acute midbrain syndrome)
GCS < 5

JANUARY 17, 2004 (SATURDAY) (AUDITORIUM A)

12:00 – 13:00

LUNCH

13:00 -- 14:00

Free Paper Presentation Session**CHAIRPERSONS****PROFESSOR THEIN AUNG, PROFESSOR MYINT THEIN****Management of Chronic Leukaemia***Professor John Goldman***Emergency Maternal and Child Health***Dr. Bridget Edwards***Low Back Pain – Spinal Stenosis***Professor Donald Chan***Modern Diagnosis and Treatment of Traumatic Brain Injury***Professor F. Gerstenbrand*

X

Free Paper Presentation Session**CHAIRPERSONS****PROFESSOR YE MYINT (GEN: SURG:)**

14:00 – 14:30

**Training Opportunities For Overseas Surgeons In The
Department Of Surgery, University Of Hong Kong Medical
Centre***Htut Saing***End of today program****This programme book is sponsored by "ZIZAWA Healthcare"**



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