*Karl Landsteiner Institute for Neurorehabilitation and Space Neurology*

## Posttraumatic Mental Disturbances

F. Gerstenbrand [1),2),3)], W. Struhal [4)],
G. Pichler [1)]

[1)] Karl Landsteiner-Institute for Neurorehabilitation and Space Neurology, Vienna
[2)] Austrian Aerospace Medical Society, Vienna
[3)] Department of Neurology, Medical University Innsbruck
[4)] Department for Neurology, General Hospital, Linz
[5)] Apallic Care Unit „Franz Gerstenbrand", Albert Schweitzer Clinic, Graz

9th MHAA Conference
Neurological Workshop

November 21-24, 2009
Yangon, Myanmar

## Definition of „Mental Disturbance"

A psychological disorder of thought or emotion.
A more neutral term than mental illness

Source: World Web Dictionary Definition

## Posttraumatic mental disturbances

- Different syndromes depending on time and impact
  - Acute
  - Post-acute
  - Chronic (defect state)
- Different syndromes depending on the lesion in the brain
  - Local
  - Regional
  - Diffuse

## Posttraumatic neuropsychiatric syndromes Acute state (Arciniegas, Beresford)

- Posttraumatic delirium
- Posttraumatic amnesia (PTA)
- Posttraumatic agitation in acute/ post acute period

## Posttraumatic neuro-psychiatric syndromes - I Defect syndromes (Arciniegas, Beresford)

- Dementia (mixed dementia)
- Chronic confusional state
- Mood disorders
  - Depression
  - Mania
- Anxiety disorders
  - Obsessive-compulsive disorders (OCD)
- Aggression
  - Persistent irritability
  - Uncontrolled behavior
  - Personality disorder
  - Tendency to rage reaction
  - Acquired sociopathy
- Klüver-Bucy syndrome
  - Limbic anarchy

## Posttraumatic neuro-psychiatric syndromes - II Defect syndromes (Arciniegas, Beresford)

- Psychotic disorders
  - Schizophrenia-like psychosis
  - Associated with schizophrenic psychosis
- Personality changes
  - Alteration in self of sense
  - Alteration in behavior
  - Reversals of premorbid personality
  - Irritability, irascibility
  - Affective lability
  - Intellectual dullness
  - Klüver-Bucy-like behavior
- Post concussive syndrome (PCS) – multiple and distributed lesions
  - Somatic complaints (headache, fatigue, insomnia, dizziness, tinnitus, sensitivity to noise or light)
  - Affective complaints (depression, irritability, anxiety)

## Posttraumatic neuro-psychiatric syndromes
## Defect syndromes, local based
## European Classification

- Frontal lobe syndromes
  - Fronto-convex syndrome (Schmieder)
  - Fronto-orbital syndrome
    Orbitofrontal syndrome (Kretschmer)
  - Fronto-polar syndrome (Gerstenbrand)
- Temporo-basal syndrome
  Pseudo-psychopathy syndrome (Peters)
- Klüver-Bucy syndrome (Gerstenbrand, Lücking)
- Korsakow syndrome (Wernicke)

## Pathophysiology of Traumatic Brain Injury

(Arciniegas, Beresford)

- Primary component
  - Biomechanical effects
  - Cytotoxic effects
- Secondary component
  - Increased intracranial pressure
  - Systemic effects (metabolic perturbations, hypoxia, anemia, electrolytic disturbance, infections)
  - Cerebral edema
  - Traumatic haematoma
  - Hydrocephalus

## Biomechanics of Traumatic Brain Injury

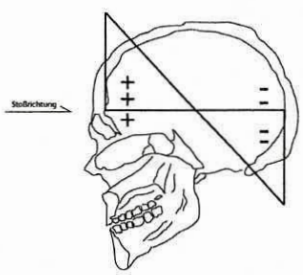
- Two physical factors are important:
  speed $v$
  acceleration $b$

$$b = v^2 / 2s$$

where $s$ is the deceleration distance

## Biomechanics (impact trauma)

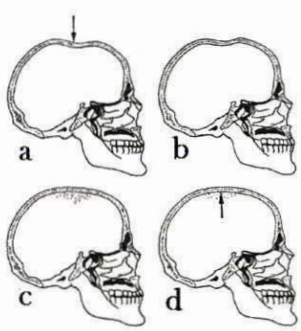
after Sellier and Unterharnscheidt, 1963




- Lesions on the impact pole (coup pole):
  Direct damage due contact of the brain tissue on the skull bone (positive pressure) leads to lesions on the brain surface (cortical region)
- Lesions on the counter pole (contre coup):
  Negative pressure causes tissue damage cortical region due to gas bubbles (gas solved in tissue under normal pressure)

## Biomechanics, cavitation trauma

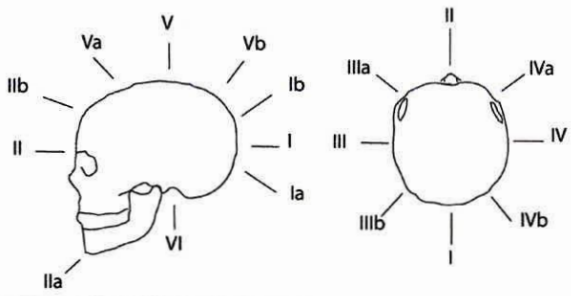
after A.G. Gross, 1958




- Lesions on the impact region (a):
  Direct damage due to impressed skull bone , positive pressure, leads to lesions on the brain surface, cortical region (b)
- Due to snapping back of the elastic skull bone negative pressure emerges gas bubbles (c), cortical lesions (d)

## Scheme of traumatic impact in closed skull trauma producing brain lesions

**Documentation** after Spatz,
modified to Innsbruck impact scheme

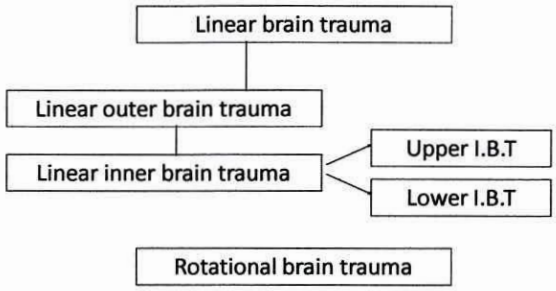


## Traumatic brain lesions

Brain tissue damage depends on

- Form of the impact (blunt, open)
- Direction of the impact
- Location of impact
- Intensity of the force

## Different Types of Brain Trauma
## Classification by biomechanical analysis




## Patterns of cerebral trauma

Acceleration – Deceleration trauma

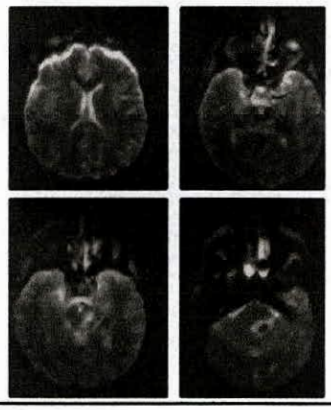
- Linear brain injury
  - Outer brain injury
    1. Coup - local lesions on the impact region (positive pressure)
    2. Contre coup – opposite to the impact (negative pressure)
  - Inner brain injury
    1. Inner upper brain injury – lesions: corpus callosum, septum pellucidum, fornix, thalamus, hypothalamus, cingulum
    2. Inner lower brain injury – lesions: midbrain (substantia nigra, perirubral area, crura cerebri, tegmentum, periaqueductal gray, upper pons), parahippocampus, uncus amygdalae, cerebellum

## Linear Outer Brain Trauma
## (Type I, II, III, IV)

- Coup lesions, contre-coup lesions
  - Cortical, sub-cortical, meningeal damage, funnel-shaped
  - Type I severe lesions fronto-temporal Contre-coup negative pressure
  - Type II minor lesions frontal forces absorption by facial skeleton
  - Type III, IV mostly combined with rotational brain trauma

## Linear outer brain trauma

- Lesions on brain surface depend on direction, intensity and contusion zones

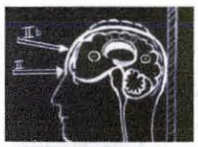


## Linear outer brain injury

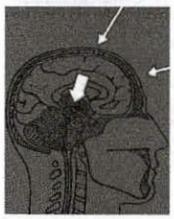
- Lesions on the surface of the brain (cortical-subcortical, meninges, funnel-shaped)

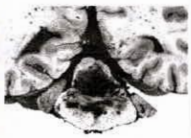
## Linear Inner Brain Trauma

a) Linear inner upper brain trauma (Grcevic) butterfly lesions
Type IIb, Ia (II)



b) Linear inner lower brain trauma (Lindenberg) lesions brain stem, surrounding brain region
Type V, Va





## Posttraumatic neuro-psychiatric syndromes
## Defect syndromes, local based
## European Classification

- Frontal lobe syndromes
  - Fronto-convex syndrome (Schmieder)
  - Fronto-orbital syndrome
    Orbitofrontal syndrome (Kretschmer)
  - Fronto-polar syndrome (Gerstenbrand)
- Temporo-basal syndrome
  Pseudo-psychopathy syndrome (Peters)
- Klüver-Bucy syndrome (Gerstenbrand, Lücking)
- Korsakow syndrome (Wernicke)

## Fronto-convex syndrome
## Symptoms

- Apathy, listlessness, leading to distractibility
- Affective flattening
- Shallow emotional response
- Loss of "perceptive power", leading to defective attention and object recognition
- Reduction of memory
- Reduction in "associative power", lack of coordination of individual steps, severe difficulty solving anything but the most simple problem
- Motoric slowing

- Neurological frontal lobe symptoms (predominance of grasping reflex)
  - snout reflex
  - glabellar reflex
  - grasping reflex
  - pollicomental reflex
  - palmomental reflex

## Fronto-orbital syndrome
## Symptoms

- Moria (verbal)
- Loss of critical capability
- Changes in social connections
- Loss of decency
- Loss of moral concept
- Emotional dysbalance
- Tendency to psychomotoric irritation
  - Wisecracking while legs perform non-directional movements ("Witzelsucht der Beine")

- Neurological frontal lobe symptoms (predominance of grasping reflex):
  - snout reflex
  - oral reflexes (oral grasping)
  - pollicomental reflex
  - palmomental reflex

## Frontopolar syndrome
## Symptoms

- Slowness of mental activity
- Slowness of thinking
- Impairment of memory
- Impairment of executive function
- Impairment of emotional reactions
- Mild hypo arousal
- Lack of initiative
- Apathy
- Motoric akinesia
- Emotional flattening

- Neurological frontopolar symptoms:
  - Grasping reflex (phasic)
  - snout reflex
  - pollicomental reflex
  - palmomental reflex
  - Lean reaction

## Temporo-basal syndrome
## Pseudo psychopathy syndrome
## Symptoms

- Emotional irritability
- Lack of realistic long term goals
- Irresponsibility
- Poor behavioral controls
- Impulsivity
- Revocation of conditional release
- Need for stimulation / prone to boredom
- Glibness / superficial charm
- Many short term relationships
- Promiscuous sexual behavior

- Memory disturbances

## Klüver-Bucy Syndrome
## Main symptoms

- Grasping of objects in the surrounding, moving target to mouth (categorically)
- Total failure of optic recognition and oral testing of the objects (eating soap)
- Hyper sexuality
- Missing shame reaction
- Caress behavior

## Klüver-Bucy syndrome
## Traumatic Apallic Syndrome

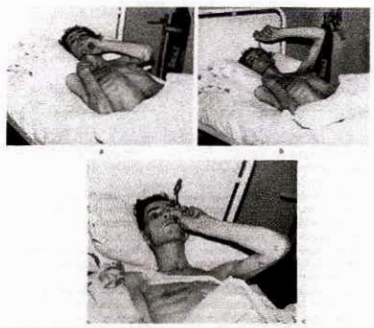


Abb. 36 a, b, c. Traumatisches apallisches Syndrom im Remissionsstadium (Fall 31). Im Greiffeld befindlicher Reflexhammer wird prompt zum Mund geführt und daran gesaugt. Reflexhammer wird ähnlich einer Zigarette gehalten.

Patient G.F., 23a
Grasping of objects taking to the mouth, cigarette smoking pattern

## Klüver-Bucy Syndrome
## Traumatic Apallic Syndrome, remission stage V

Abb. 37. Traumatisches apallisches Syndrom im Remissionsstadium (Fall 57). Klüver-Bucy-Stadium. Handkuß-Schablone.

Patient A.S., 20a
Handkiss pattern

## Korsakow syndrome
## Symptoms

- Normal consciousness
- Memory impairment (short-term memory)
  - Disturbance of new memories in connection with time and situation
  - No disturbances of old memories
- Disorientation in space and time
- Confabulation
- Pseudo-reminiscence
- Loss of critical facility
- Logical disagreement not discovered
- Euphoric mood to disinterest
- General passivity
- Severe fatigue

## Apallic Syndrome, traumatic,
## remission stage VI, Korsakow-Syndrome

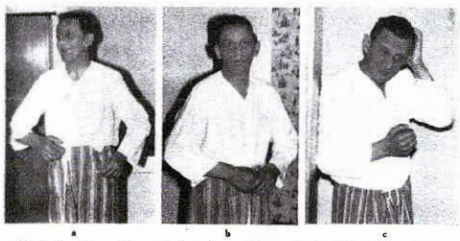


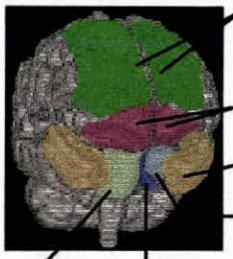
Abb. 43 a, b, c. Traumatisches apallisches Syndrom, Defektzustand (Fall 8/38), 18 Monate nach dem Unfall: schwere organische Demenz, emotionelle Enthemmung. a) Verlegenheitsbewegung bei freudiger Überraschung. b) Verlegenheitshaltung bei Ratlosigkeit. c) Verlegenheitskratzen.

J.D., 45a, emotional dysbalance:
a) joyful surprise, b) perplexity, c) disconcertedness

## Posttraumatic neuro-psychiatric syndromes
## Local or regional lesions

- Frontal lobe syndromes
  - Frontoconvex syndrome – prefrontal cortex
  - Frontobasal syndrome – orbitofrontal cortex
  - Frontopolar syndrome – frontal cortex
- Temporobasal syndrome
  - Anterior temporal cortex
- Korsakow syndrome
  - Amygdala, limbic system
- Klüver-Bucy syndrome
  - Hippocampus, limbic system

## Cortical areas particularly vulnerable to TBI



Dorsolateral prefrontal cortex (executive function, including sustained and complex attention, memory retrieval, abstraction, judgement, insight, problem solving)

Orbitofrontal cortex (emotional and social responding)

Anterior temporal cortex (memory retrieval, sensory-limbic integration)

Amygdala (emotional learning and conditioning, including fear/anxiety)

Ventral brainstem (arousal, ascending activation of diencephalic, subcortical, and cortical structures)

Hippocampal-Entorhinal Complex (declarative memory)

Source: D. Arciniegas, T. Beresford: Neuropsychiatry. An introductory approach.

## Posttraumatic disturbances
## No fixed neuroanatomic lesions

- Acute form in direct time connection to the cranial impact
  - Posttraumatic amnesia – PTA
  - Post concussive syndrome – PCS
  - Posttraumatic delirium
- Defect syndromes
  - Posttraumatic dementia
  - Chronic confusional state
  - Mood disorder
  - Anxiety, obsessive-compulsive disorder
  - Aggression
  - Personality changes
  - Psychiatric disorders, schizophrenic-like psychosis

## Different diagnostic positions
## Defect syndromes

- Neuroanatomic lesions → local orientated diagnosis
  - Frontal lobe syndromes
  - Temporo-basal syndrome
  - Klüver-Bucy syndrome
  - Korsakow syndrome
- Multilocular, diffuse lesions → phenomenological orientated diagnosis
  - Dementia
  - Mood, anxiety disorder
  - Psychotic disorder, personality changes, aggression
  - Post concussive syndrome

- Clear diagnostic decision
- Neuroanatomical connection
- Directed treatment

- Description of phenomena
- No neuroanatomical relation
- Reduced treatment results

Established 1914

The NEW LIGHT OF MYANMAR

Volume XVII, Number 220 6th Waxing of Nadaw 1371 ME Sunday, 22 November, 2009

# 9th Conference of MHAA held

YANGON, 21 Nov— The opening of 9th Conference of Myanmar Health Assistants Association was held at University of Nursing here this morning.

Patron U Win Kyi of MHAA and Chairman U Aung Khin made speeches and wellwishers made donations. The officials later viewed the documentary photos and booths displayed at the hall and paid respects to the senior health assistants.

*Patron U Win Kyi of Myanmar Health Assistants Association making speech at the opening of 9th MHAA Conference.*—MNA

At the paper reading session of the conference's first day, retired health assistant U Than Win extended greetings. Next, the activities—reading the minutes of 8th Conference, submitting the work done in 2007-2009 fiscal year of CEC members, giving educative talks, displaying clinics and sample medicines, presenting advice on reports of CEC — took place.—*MNA*

Neurology workshops Prof. Gerstenbrand

| | |
|---|---|
| Nov. 21, 09 | Posttraumatic mental disturbances |
| Nov. 21, 09 | Neurorehabilitation – an obligation in the treatment of every neurological patient |
| Nov. 22, 09 | Space neurology and its benefit for neurorehabilitation |