

TRAUMATIC BRAIN INJURY IN THE ACUTE TRAUMA SETTING

“TIPS” FOR EARLY REHAB MANAGEMENT

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Objectives:

- Understand the basics of TBI epidemiology and classification
- Be familiar with Disorders of consciousness
- Discuss briefly DOC guidelines based on ACR criteria
- Recognize and understand the Rancho Los Amigos scale of cognitive functioning
- Explore the management of post-traumatic agitation in the TBI patient

TBI Epidemiology

- 1.7 Million TBI's occur every year
- MVA's (53%); Falls (23%); Violence (13%)
- Males>>females (up to 74 %)
- Caucasian (67%); African American (20%); Hispanics (9%)
- Age: Peak 15-25 years. Second peak elderly (falls)
- ETOH main confounding factor. Polysubstance abuse.
- 14-30 per 100K die every year
- Economic impact: 60 billion/year in 2000



Classification/ assessment

CRITERIA	<u>MILD</u>	<u>MODERATE</u>	<u>SEVERE</u>
<u>Imaging</u>	Normal	NL/Abnormal	Abnormal
<u>LOC</u>	0-30 min	30 min-24 hr	> 24 hr
<u>PTA</u>	< 24 hr	24 hr- 7 days	> 7 days
<u>GCS</u>	13-15	9-12	3-8

Disorders of consciousness (DOC)

- ❖ **Consciousness**: function of RAS/cortex. Located in mid-brain->cortex
- ❖ **Coma**: lack of wakefulness. No sleep/Wake cycles. Eyes closed. No response to stimuli.
 - *transitional state*
- ❖ **Vegetative State**: + sleep/wake cycles. Opens eyes. No awareness. No tracking. Generalized Auditory startle
 - Persistent: >1 month
 - Chronic: >3 months (NTBI); >12 months (TBI)
- ❖ **Minimally Conscious State**: some awareness. Inconsistent behaviors/purposeful. Object manipulation. Tracking familiar voices. Some verbalization.

2018 Guideline recommendations

- ▶ * One study found mortality up to 32% in patients with severe TBI and DOC due to withdrawal of care !
- ▶ * 20 percent of patients with traumatic VS after rehab had some independence at one year
- ▶ MCS has better prognosis than prolonged VS within first 5 months
- ▶ MRI at 8 weeks: brainstem, corpus callosum, corona radiata--> worse prognosis at 12 months
- ▶ * Coma <2 weeks: better outcome. Coma >4 weeks: unlikely good recovery
- ▶ PTA <2 months severe disability unlikely; Good recovery unlikely > 3 months

2018 Guideline recommendations

- ▶ Patient should be evaluated by inter disciplinary team specialized in DOC
- ▶ * Identify and treat conditions that may confound diagnosis of DOC prior to establishing final diagnosis
- ▶ May use specialized neuro-imaging, electrophysiologic studies to help diagnose evidence of consciousness
- ▶ * AVOID language of universal poor prognosis in DOC during first 28 days
- ▶ Counsel family with hopeful message, understanding the reality in a considerate and compassionate environment
- ▶ AMANTADINE use

Rating System--continue

4. Level of Cognitive functioning scale: developed by Rancho Los Amigos Hospital in California , is an 8 level global measure of cognition & behavior rated as follows:

Rancho level

I
II
III
IV
V
VI
VII
VIII

Clinical correlate

No Response
Generalized Response
Localized Response
Confused-agitated
Confused-inappropriate
Confused-appropriate
Automatic-appropriate
Purposeful-appropriate

Frontal Lobe

- Problem solving
- Judgment
- Inhibition of behavior
- Planning
- Anticipation
- Speaking (expressive language)
- Emotional expression
- Awareness of abilities
- Self-monitoring
- Motor planning
- Personality
- Sexual behavior
- Behavior control
- Limitations
- Organization
- Attention
- Concentration
- Mental flexibility
- Initiation

Parietal Lobe

- Sense of touch, taste and smell
- Differentiation: size, shape, color
- Spatial perception
- Visual perception
- Academic skills
- Math calculations
- Reading
- Writing

Occipital Lobe

- Visual reception area*
- Visual interpretation*
- Reading perception and recognition*

Cerebellum

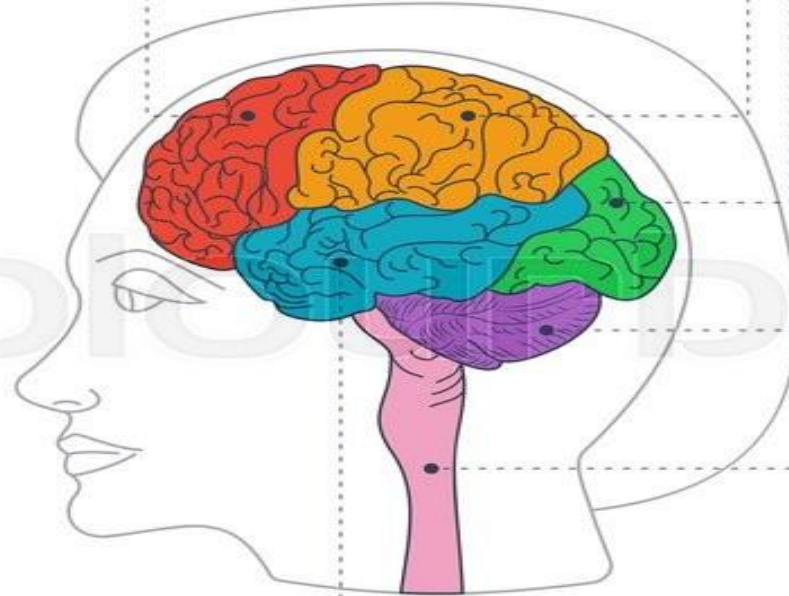
- Coordination of voluntary movement
- Balance and equilibrium
- Some memory for reflex motor acts

Brain Stem

- Sense of balance (vestibular function)
- Reflexes to seeing and hearing
- Autonomic nervous system
- Blood vessel control
- Breathing
- Heart control
- Digestion
- Heart rate
- Swallowing
- Consciousness
- Blood pressure
- Temperature
- Alertness
- Ability to sleep
- Sweating

Temporal Lobe

- Understanding language
- Organization and sequencing
- Information retrieval
- Musical awareness
- Memory
- Hearing
- Learning
- Feelings



BRAIN FUNCTIONS

Segregated by Lobes

POST-TRAUMATIC RESTLESSNESS

- Ask yourself: WHY!?
- Multiple factors not only TBI → Medical, seizures, withdrawal (ETOH, opioids, etc) Infection, altered sleep, Encephalopathy, etc.
- Risk of injury to self or others? → pharmacological vs non-pharmacological
- Modify Environment → Low stimulation, soft restraints, sitter, avoid noxious stimuli → NG tube, early void trials !
- minimize lines, Education to family and nursing staff
- Floor/posey beds, Consider early PEG TUBE !!! (for DOC patients or ongoing restlessness > 3 weeks).



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PHARMACOLOGICAL MANAGEMENT

- ❑ **Sleep/Wake cycles:** Trazodone, Melatonin. Sedation from other agents.
- ❑ **Propranolol:** Best evidence for post traumatic agitation (Cochrane review)
- ❑ **NO Haloperidol:** slows motor recovery and prolongs PTA in humans (Feeney et al 1982)
- ❑ **Atypical anti-psychotics:** block less D2 receptors, lower incidence of motor SE: Olanzapine (Zyprexa), Risperidone, Quetiapine (Seroquel), Aripiprazole (Abilify)
- ❑ **Mood Stabilizers:** Valproic Acid, Lamotrigine. CMZ, Gabapentin: side effects
- ❑ **Benzodiazepines:** may cause paradoxical agitation!

Early chronic use may impair motor recovery. May worsen amnestic effects

If needed: Short acting for severe cases. Midazolam or Lorazepam

Cucurullo SJ. PM&R review 3rd edition. 2015;80-84

[Brain Inj.](#) 1988 Oct-Dec;2(4):309-11.

Amantadine for the agitated head-injury patient.

[Chandler MC](#)¹, [Barnhill JL](#), [Gualtieri CT](#).

⊖ [Author information](#)

1 Rebound, Inc., University of North Carolina.

Abstract

Traumatic brain injury may be associated with agitated aggressive behaviour and the potential for injury to the patient and staff. We report two cases of recovering brain injury patients with difficult-to-treat destructive behaviour, whose agitation and aggression responded to amantadine. Direct-acting dopamine agonists such as amantadine may be the preferred treatment for patients with behaviour problems in the acute stages of recovery from coma.

PMID: 3203176 DOI: [10.3109/02699058809150901](#)

[J Neuropsychiatry Clin Neurosci.](#) 1997 Spring;9(2):222-30.

Effect of amantadine hydrochloride on symptoms of frontal lobe dysfunction in brain injury: case studies and review.

[Kraus MF](#)¹, [Maki PM](#).

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Abstract

Symptoms consistent with dysfunction of the frontal lobes can occur following traumatic brain injury (TBI) or other types of acquired brain injury (stroke, aneurysm). These symptoms can include problems with short-term memory, attention, planning, problem solving, impulsivity, disinhibition, poor motivation, and other behavioral and cognitive deficits ("frontal lobe syndrome"). These symptoms may respond to certain drugs, such as dopaminergic agents. This case series describes results of using amantadine in 7 patients with this type of symptom profile (6 with TBI, 1 with meningitis following sinus surgery). Patients received neuropsychiatric examinations and serial neuropsychological testing. All patients showed some degree of positive response. One had side effects that resolved upon discontinuation of drug. The rationale for using dopaminergics is discussed, and pertinent literature is reviewed.

summary/conclusions

- TBI is major contributing factor for disability in US
- Economical Impact
- Prognostication is difficult
- Coma is a transitional state
- Most patients recover if given the chance and appropriate multi-disciplinary treatment/rehab
- Medical/behavioral management is complex
- Haloperidol worst friend of TBI patient
- Amantadine Best friend of TBI patient