Traumatic Brain Injury:
Complications Inside

Speakers

Payal Fadia, MD
Physiatrist, Shepherd Center’s Acquired Brain Injury and Neurospecialty Units

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Scott Goll
Senior Vice President, Operations, Paradigm
The focus of our discussion today is traumatic brain injury (TBI) and its medical, cognitive and behavioral implications.
First a few housekeeping points....

- Slides will advance automatically
- Question & Answer period at end
- You may submit questions at any time
  - Q&A Panel is on the lower right side (If you don’t see it, click the “Q&A” button in the upper right)
  - Type a question into the lower section of the Q&A panel that appears
  - Ask “All Panelists” and be sure to click “Send”
  - If we cannot answer during the session, we will e-mail you
- Replay will be available – look for our e-mail
- When the webinar ends, a short survey will pop up
  - There will be a CCMC section which must be completed to receive continuing education credits
- If you experience computer broadcast audio problems, please use the dial-in number posted in the Chat panel
National TBI Estimates – Center for Disease Control

Each year, an estimated **1.7 million people sustain a TBI**.¹ Of them:
- 52,000 die,
- 275,000 are hospitalized, and
- 1.4 million, nearly 80%, are treated and released from an emergency department

TBI is a contributing factor to a third (30.5%) of all injury-related deaths in the United States.¹

**Costs of TBI**
Direct medical costs and indirect costs such as lost productivity of TBI totaled an estimated **$60 billion in the United States in 2000**.²

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Most hospitalized work-related injuries (85%) fall in the mild range of the Glasgow Coma Scale, a neurological tool that describes states of consciousness\(^1\)

Head and central nervous system injuries are the most expensive types of occupational injuries to treat as determined by Workers’ Compensation Claims\(^2\)

Falls are the leading cause of work-related injury; a study of TBI workers’ compensation claims found that the next most prevalent causes included being struck by an object (26.3%) and motor vehicle crashes (18.3%)\(^2\)

Guest Speaker: Payal Fadia, MD

With us today is Payal Fadia, MD, Physiatrist at Shepherd Center’s Acquired Brain Injury and Neurospecialty Units.

Payal Fadia, MD

Physiatrist, Shepherd Center’s Acquired Brain Injury and Neurospecialty Units

- St. Georges University School of Medicine
- Residency in physical medicine and rehabilitation at Baylor College of Medicine
- Fellowship in traumatic brain injury/stroke rehabilitation and spasticity management at the University of Texas-Houston
Medical Complications in Mild and Moderate Traumatic Brain Injury

Payal Fadia, MD
Physiatrist, Shepherd Center’s Acquired Brain Injury and Neurospecialty Units
Characteristics of Mild, Moderate and Severe TBI

Our presentation today focuses mainly on moderate and mild injuries.

Severe

- Glasgow Coma Scale 3-8
  - Low arousal
  - Not mobile
  - Low responsiveness

Moderate

- Glasgow Coma Scale 9-12
  - Mobile with some physical limitations
  - Agitation/behavioral changes may include irritability and depression
  - Long residual impact

Mild

- Glasgow Coma Scale 13-15
  - May not be radiographic evidence of hemorrhage/hematoma
  - Identified as ready for discharge or short rehab
  - May be evidence of behavioral or cognitive changes
  - Difficulty with memory
Medical Complications of Traumatic Brain Injury

Primary brain injury

The damage that results directly from the sheer forces at impact (skull fracture, contusions, diffuse axonal injury [DAI], cranial nerve injuries, petechial hemorrhages)
Secondary brain injury take place after the primary injury; some can be prevented with the right interventions.

Pathologic processes that occur due to the primary injury can deter recovery (e.g., intracranial hemorrhages, cerebral edema, hypoxia, hypotension).

Secondary injury is potentially avoidable if appropriate interventions are undertaken.
Common Medical Complications

- Neurologic Issues
- Orthopedic and Musculoskeletal
- Other Medical Issues
- Cognitive and Behavioral Impairments
Secondary Major Medical Complications

- Pulmonary
- Cardiac
- Gastrointestinal
- Genitourinary
- Sleep
- Hematologic
- Dermatologic
- Endocrine
- Infectious
- Pain
Emphasis is typically on “early” symptom presentation (ER level of presentation/evaluation)

Results of most early scanning tests are negative

“Delayed” symptoms are incongruent with earlier presentation that things are “OK”

Perceptions are that “we all have these types of problems from time to time”

<table>
<thead>
<tr>
<th>Thinking/Remembering</th>
<th>Difficulty thinking clearly</th>
<th>Feeling slowed down</th>
<th>Difficulty concentrating</th>
<th>Difficulty remembering new information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical</td>
<td>Headache</td>
<td>Nausea or vomiting</td>
<td>Sensitivity to noise or</td>
<td>Feeling tired, having no energy</td>
</tr>
<tr>
<td></td>
<td>Fuzzy or blurry vision</td>
<td>(early on)</td>
<td>light</td>
<td></td>
</tr>
<tr>
<td>Emotional/Mood</td>
<td>Irritability</td>
<td>Dizziness</td>
<td>Balance problems</td>
<td></td>
</tr>
<tr>
<td>Sleep</td>
<td>Sleeping more than usual</td>
<td>Sleep less than usual</td>
<td>Trouble falling asleep</td>
<td></td>
</tr>
</tbody>
</table>
Stages of Recovery

These stages mark the usual treatment path for TBI cases.

**Inpatient**
- Acute medical e.g. ICU, Med/Surg, Trauma
- Inpatient rehabilitation

**Transitional**
- Post-acute rehabilitation (inpatient or outpatient)

**Outpatient**
- Day treatment and/or outpatient therapy

**Long-term Residential***
- Supported living/ supervised living program
- Skilled nursing facility

*For severe TBI only
At Any Level of Injury, Early Intervention is Key

Identification and prevention of these complications should begin as early as possible
  – As soon after the trauma as possible

Greater awareness and understanding
  – Minimize disruption of rehab
  – Best opportunity for recovery
Effective Early Interventions for TBI

Medication and therapy can prove effective in addressing many issues associated with TBI.

### Cognitive
Short-term memory deficits, hazy/cloudy feelings, concentration problems
- Neurostimulant medications (Ritalin, Strattera, Parlodel)
- Structured environment with a daily schedule
- Compensatory strategies for planning to address memory deficits

### Somatic/Physical
Fatigue, insomnia, headaches, vision impairment
- Hormone replacement in cases of pituitary gland impairment (as determined by endocrine work-up)
- Medications to regulate sleep-wake cycle in cases of insomnia
- Relaxation, biofeedback, muscle and nerve blocks, and medication to address headaches
- Vestibular therapy to address dizziness/imbalance
- Vision assessments

### Emotional/Behavioral
Aggression, depression, anxiety
- Counseling and/or psychotropic medications for mood issues
- Behavioral modifications
Conclusions

Acute identification and management of common medical problems associated with brain injury

- decreases secondary complications
- can improve recovery and outcome
- decreases length of stay and charges
Beyond Acute
Managing the Residual Cognitive, Behavioral, and Psychological Challenges Resulting from a Traumatic Brain Injury

Leslie Small
Associate Vice President of Clinical Operations for Catastrophic Services, Paradigm
## Identifying High Risk Cases

<table>
<thead>
<tr>
<th>Data</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Glasgow Coma Scale score</td>
<td>&lt;8</td>
</tr>
</tbody>
</table>
| Initial scan results             | • Depressed skull fracture  
• Hemorrhage  
• Multiple injury sites (bilateral)  
• Midline shift  
• Ventricular enlargement |
| Coma Duration (GCS)              | > 72 hours                                                                |
| Rancho Los Amigos scale          | • Levels 3-6 most challenging from behavioral perspective                |
| Pathognomic signs                | • Anoxic injury  
• Status epilepticus/late seizures  
• Alcohol/substance use/abuse  
• Neurologic deterioration  
• Increased ICP and/or lability |
| Psychosocial assessment          | • Family work/instability  
• Age >50  
• Psychiatric history  
• History of non-compliance  
• Education <12 years  
• History of developmental disabilities  
• Isolated learning environment  
• Previous ABI |
Mild and Moderate TBI – Signs of Trouble

Uncharacteristic emotional display – emotional lability
- Irritability
- Confusion
- Increased anger/lack of anger control

Problems returning to previously successful work activity
- Inability to pay attention or remember
- Interpersonal problems
- Inappropriate interactions with family and/or co-workers

Ongoing physical complaints
- Headache
- Fatigue
- Doctor shopping

Depression
Exaggeration of pre-injury behaviors/foibles
Patient
A 47-year-old man fell from a ladder onto concrete, landing on his head.

Diagnosis
Traumatic brain injury with a secondary diagnosis of multiple trauma.

Complications
The patient exhibited behavioral problems including non-compliance and verbal aggression. He lacked an understanding of his deficits, and threatened to run away from the facilities where he received treatment.

Outcome
After a structured cognitive remediation and behavioral management program that included cognitive and behavioral treatment with a neuropsychologist, the patient successfully transitioned into outpatient cognitive therapy. He now participates in a community skills program.
Poll: Substances and TBI

What percentage of people hospitalized for TBI have measurable amounts of alcohol in their blood?

A. 25%
B. 40%
C. 50%
D. 75%

Use the Polling Panel on the right to enter your answer now.

Be sure to click “Submit.”
A history of substance abuse in TBI patients is both common and linked to worse outcomes, including ongoing complications and poorer discharge status.

Treatment Implications

- **Concurrent treatment** for TBI and substance abuse is generally the best course of action.

- **Motivational counseling** has been shown to help patients in recovery from TBI and substance abuse.

- **Support group participation** is highly recommended. TBI support groups that are available and substance abuse treatment programs can also form their own in-house TBI support group.

- **Finding Treatment Facilities for Substance Abuse** can help the patient cope with and heal further from TBI.

Patient
A 35-year-old warehouse worker fell 16 feet while working in a mattress factory.

Diagnosis
Traumatic brain injury with complex fractures to his wrist, elbow, skull and face. As a result of the brain injury, the patient suffered from a seizure disorder.

Complications
During the course of recovery, the patient tested positive for methamphetamine, though he denied using illegal drugs. The patient’s doctors and case manager were concerned that illicit drugs would interfere with the effectiveness of anticonvulsant medications prescribed for seizures, and carefully monitored his medication use to avoid potential adverse interactions.

Outcome
The patient is medically stable, independent and able to participate in his community. As part of his care regimen, he takes part in random drug screens and receives ongoing education on the adverse side effects associated with the use of illicit drugs.
TBI and Management of Behavioral Issues

Behavioral complications such as depression and anxiety can also complicate TBI treatment.

Treatment Interventions

- Psychopharmacology managed by a physician who has experience with TBI
- Psychotherapy in conjunction with cognitive remediation
- Structured support groups
- Physical exercise
- Holistic treatments which may include acupuncture, massage, biofeedback and hypnosis
- Eye Movement Desensitization and Reprocessing (EMDR)
  - http://www.emdr.com/general-information/what-is-emdr.html
Paradigm’s Systematic Care Management Approach

Scott Goll
Senior Vice President, Operations, Paradigm
Distinctive Components Paradigm’s Approach to Clinical Management of Catastrophic Injuries

In delivering our services we use distinct catastrophic specialty networks.

Paradigm’s six Catastrophic Specialty Networks:

- Traumatic Brain Injury
- Spinal Cord Injury
- Multiple Trauma
- Amputation Injuries
- Severe Burns
- Chronic Pain

Client Environment

Paradigm Medical Hub

- Medical Experts
  - NWM Onsite Nurses
  - Paradigm Clinical Team
  - PMD Physicians
- Top Providers
  - Trauma Centers
  - Acute Rehab
  - Post-Acute/Outpatient

Custom Built Infrastructure

- Data on 10,000+ Cases
- Analytics/Algorithms
- EBM+ Standards
- Provider Tracking
- Outcome Guarantees
Question and Answer Session

Please submit your questions for our panelists in the Q&A window on the right.

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