

# TRAUMATIC BRAIN INJURY IN THE ELDERLY



Emergency Medicine  
Perspective

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3/4/2026

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## CASE STUDY 1:



- 78-year-old male, mechanical fall
- On DOAC for AFib
- GCS 15 with a headache, no LOC

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## CASE STUDY 2:



- 70-year-old female, restrained driver
- Positive LOC
- Airbag deployment
- Unknown Medications
- Obtunded and combative at the scene

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## EPIDEMIOLOGY

- In 2024, the U.S. population aged 65+ 61.2 million -> 18.0% of the national population
- By 2050, the number of Americans ages 65+ is projected to increase from 58 million (2022) to 82 million, a 42% increase.
- The share of older adults will rise from 17% in 2022 to 23% by 2050.



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## MECHANISMS

- Falls cause ~75% of cases
- Higher hospitalization
- Higher mortality



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## WHY ELDERLY TBI IS DIFFERENT

- Brain atrophy
- Frailty
- Comorbidities
- High anticoagulant and anti-platelet use



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## DIFFERENCES?

- Elderly patients may maintain a GCS of 15 despite significant intracranial hemorrhage due to increased intracranial space (atrophy) delaying mass effect symptoms.
- Baseline Cognition: Dementia can mask subtle neurological changes.
- "Normal" for them might be "baseline confusion."

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## GERIATRIC TBI

- Brain Atrophy: As the brain shrinks, the "dead space" between the brain and skull increases.
- Bridging Veins: These veins are stretched taut across that increased space, making them highly susceptible to shearing from even minor acceleration/deceleration.
- The Result: Chronic and acute-on-chronic Subdural Hematomas (SDH) are the hallmark of geriatric TBI

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## TRAUMATIC BRAIN INJURY



- Mild GCS 13-15
- Moderate GCS 9-12
- Severe CGS <8

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## NEW ORLEANS CT RULE

- Age <60 Years
- GCS of <15
- Headache
- Vomiting
- Drug or alcohol intoxication
- Persistent anterograde amnesia
- Visible trauma above the clavicle

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## CANADIAN CT SCAN RULES

- < 65 years old
- GCS <15 two hours after injury
- Suspected open or depressed skull fracture
- Any sign of basilar skull fracture
- Two or more episodes of vomiting
- Amnesia before impact of 30 or more minutes
- Dangerous mechanism

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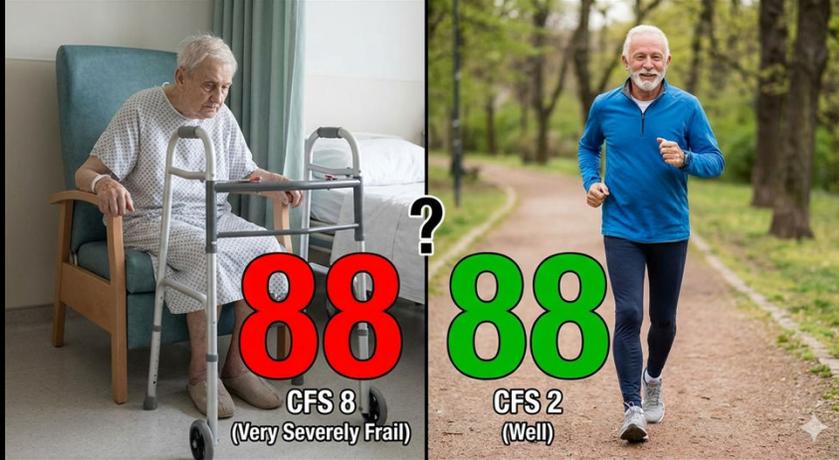
## CLINICAL FRAILITY SCALE (CFS)

- 1 – Very Fit: Robust, active, energetic.
- 2 – Well: No active disease, less fit than 1.
- 3 – Managing Well: Medical issues controlled.
- 4 – Vulnerable: Symptoms limit activities.
- 5 – Mildly Frail: Need help with complex tasks.
- 6 – Moderately Frail: Need help with basic ADLs.
- 7 – Severely Frail: Completely dependent for care.
- 8 – Very Severely Frail: Completely dependent, nearing end of life.
- 9 – Terminally Ill: Life expectancy < 6 months.

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# FRAILTY



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# ED ASSESSMENT



## PRIMARY SURVEY?

- ABC's
- ATLS/Trauma Assessment
- MMSE

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## MANAGEMENT OF TBI

AVOID

- HYPOXIA
- HYPOTENSION
- HYPOGLYCEMIA
- HYPERTHERMIA

Give Supplemental O<sub>2</sub>

- RSI early if necessary

Give hemodynamic support

- IVF, Pressors or blood products

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## ANTICOAGULANT REVERSAL

- FFP
- 4 Factor PCC
- Vitamin K
- TXA
- Idarucizumab
- Andexanet Alpha

**ANTICOAGULANT REVERSAL TARGETS IN THE COAGULATION PATHWAY**

```

    graph TD
      subgraph Intrinsic_Pathway [INTRINSIC PATHWAY]
        F12[Factor XII] --> F11[Factor XI]
        F11 --> F9[Factor IX]
        F9 --> F10[Factor X]
      end
      subgraph Extrinsic_Pathway [EXTRINSIC PATHWAY]
        TF[Tissue Factor] --> F7[Vitamin K]
        F7 --> F7a[Factor VIIa]
        F7a --> F2[Prothrombin II]
      end
      F10 --> F2
      F7a --> F2
      subgraph Common_Pathway [COMMON PATHWAY]
        F2 --> F5[Factor V]
        F5 --> F1[Fibrinogen]
        F1 --> F1n[Fibrin]
      end
      AT[Antithrombin] -.-> F10
      VK[Vitamin K] -.-> F7a
      F7a -.-> F2
      F2 -.-> F5
      F5 -.-> F1
      F1 -.-> F1n
      TH[Thrombin] -.-> F2
      FB[Fibrinogen] -.-> F1
      F1n -.-> F1n
    
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## REHABILITATION & DISPOSITION

- Early multidisciplinary rehab
- Fall prevention
- Medication review



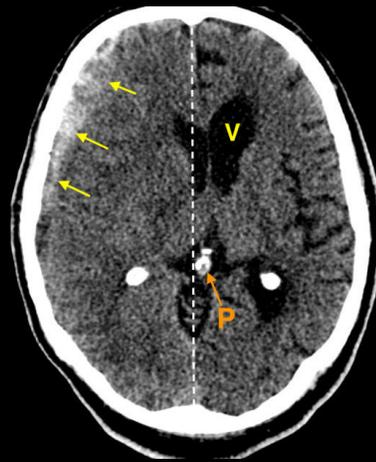
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## CASE 1 – GROUND LEVEL FALL

- Acute SDH
- On DOAC
  - Required reversal
- Airway Stable
- CGS 15
- Repeat CT head at 6 H stable
- PT discharged after 12 hours
- Returned within 24H for admission



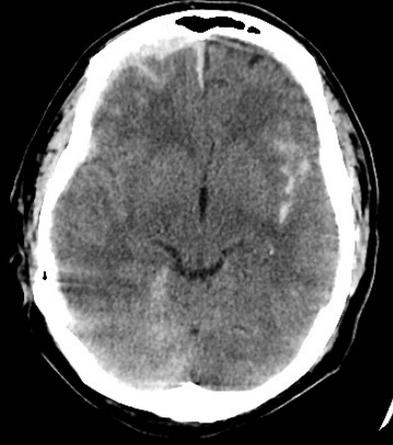
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## CASE 2 - MVC

- Multiple Hemorrhages
  - Subdural
  - Epidural
  - Intraparenchymal
- Hemodynamic instability
- Frailty score 6
- Admitted to ICU with prolonged recovery in doubt



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## KEY TAKEAWAYS

- Lower imaging thresholds
- Avoid age-based nihilism
- Premorbid function guides prognosis



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