

Introduction

Penetrating traumatic brain injuries (pTBI) from gunshot wounds to the head are rare but devastating injuries with high mortality and morbidity. Survivors often experience complex neuropathic, somatic, and central pain syndromes, compounded by significant craniofacial trauma and neurological deficits. Effective pain management in this population remains a challenge due to altered mental status, polypharmacy, and concerns about opioid-induced ventilatory depression. This case report highlights a multidisciplinary pain management approach in a young male survivor of pTBI with extensive craniofacial fractures.

Objectives

To describe the evolution and management of acute and subacute pain in a patient with pTBI, and discuss multimodal strategies including interventional and non-pharmacologic approaches to optimize outcomes in complex neurotrauma.

Clinical Course

A 22-year-old male with no prior pain conditions presented to the ED after sustaining a self-inflicted gunshot wound to the head.

On arrival:

- GCS: 3
- Injuries: Penetrating right temporal bone and orbit trauma with bullet trajectory through the right sphenoid into the left frontal lobe, causing cerebral edema, comminuted fractures, and bilateral orbital damage.
- Interventions: Emergent frontal ventriculostomy, multiple debridement procedures, endoscopic sinus surgery, and PEG/trach placement.

Pain management included:

- ICU phase: Opioid-based PCA (fentanyl then hydromorphone), adjunctive acetaminophen, gabapentin titration.
- Neuroprotection protocols limited sedative/analgesic choices.
- Subacute rehab phase: Transitioned to enteral morphine and acetaminophen, gabapentin 600 mg TID, baclofen for spasticity, and amitriptyline at night.
- Non-pharmacologic: Early PT/OT engagement, music therapy, caregiver-mediated distraction.
- No regional blocks due to anatomical distortion and skull fractures.

Results

Despite extensive trauma, the patient gradually regained consciousness and showed signs of recovery in pain reporting and tolerance. Pain was initially assessed via behavioral pain scale and later via self-report with assistive communication. Reported VAS pain scores ranged from 7–9 in early rehab to 3–5 at discharge. No signs of opioid induced hyperalgesia or withdrawal were noted. No complications from medications occurred. The patient was successfully transitioned to a multimodal oral regimen and discharged to subacute neurorehabilitation.

Conclusion

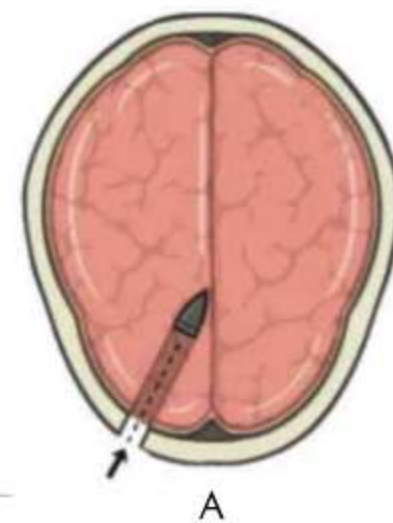
This case underscores the need for flexible, evolving pain management strategies in pTBI with craniofacial trauma. While opioids remain necessary in the acute phase, early incorporation of neuropathic agents and non-pharmacologic support is essential.

Communication barriers, anatomical disruption, and risk of sedation-related complications make pain management in these patients particularly nuanced, requiring interdisciplinary coordination.

References

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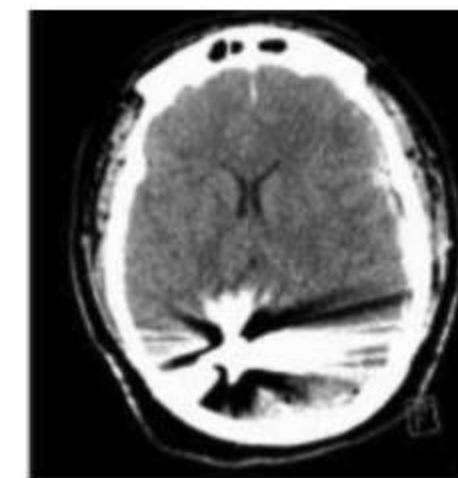
Image Demonstration



A



B



C

A. Penetration injury

B. MRI: Sagittal view of representative injury with trajectory through orbit posteriorly to occipital lobe

C. MRI: Axial view of representative injury with location of projectile