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Case Report

A Rare Combination of Moderate TBI and Occipital Condyle Fracture in a Teenager: When Radiology Overrides GCS

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Abstract

Traumatic brain injury (TBI) severity assessed by the Glasgow Coma Scale (GCS) does not always reflect the extent of intracranial pathology. Occipital condyle fractures are rare injuries of the craniocervical junction that are frequently overlooked due to minimal neurological manifestations. We report the case of a 15-year-old female who presented after a motorcycle accident with a GCS score of 12, consistent with moderate TBI. Despite preserved consciousness, head computed tomography revealed a left acute subdural hematoma with a 5 mm midline shift and associated cerebral contusion, while cervical imaging demonstrated an undisplaced occipital condyle fracture. Based on the radiological evidence of significant mass effect, emergency decompressive craniectomy with hematoma evacuation was performed. The occipital condyle fracture was managed conservatively with cervical immobilization. The patient recovered well, achieving a favorable neurological outcome at follow-up. This case underscores the critical role of radiological assessment in guiding surgical decision-making in moderate TBI and highlights the risk of missing clinically silent occipital condyle fractures when evaluation relies solely on clinical grading systems.

Keywords: Moderate TBI, Glasgow Coma Scale, Subdural Hematoma, Decompressive Craniectomy, Occipito-Condylo Fracture

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Introduction

Traumatic brain injury (TBI) remains a major contributor to death and disability among children and adolescents globally, often resulting from high-impact incidents such as road traffic accidents.[1] The Glasgow Coma Scale (GCS) is widely used to assess injury severity and guide treatment decisions in pediatric TBI. However, increasing evidence suggests that GCS may not always reflect the true extent of brain injury, particularly in younger populations or when imaging reveals more serious pathology than the clinical presentation implies.[2]

Although the GCS is a valuable initial tool for assessing traumatic brain injury (TBI), its reliability diminishes in cases involving pediatric patients or multi-trauma scenarios. Notably, midline shift—a radiographic sign indicating mass effect and elevated intracranial pressure—does not always correlate with GCS scores. In a prospective cohort of 150 TBI patients, moderate injury (GCS 9–13) was frequently accompanied by modest midline shifts (>5 mm), which were strongly associated with worse outcomes and higher mortality, despite only moderate reductions in consciousness.[3]

Despite this, current international guidelines, including those from the Brain Trauma Foundation (BTF), provide limited or no specific recommendations for decompressive craniectomy in moderate TBI.[4] Most existing protocols focus on patients with severe TBI (GCS ≤8) and refractory intracranial hypertension, often supported by invasive Intra Cranial Pressure (ICP) monitoring. In moderate cases without ICP monitoring or rapid clinical deterioration, decision-making becomes less standardized, leaving physicians to rely heavily on radiologic and contextual judgment. This creates a clinical gray zone where intervention may be justified based on imaging severity alone.

This case exemplifies a rare but clinically significant scenario in which radiological findings—not clinical severity as measured by the Glasgow Coma Scale—determined the need for emergency decompressive craniectomy. Although the patient presented with a moderate TBI and a relatively preserved GCS score of 12, the presence of a 5 mm midline shift on non-contrast CT was a critical indicator of mass effect requiring urgent surgical intervention. Current clinical guidelines recognize that acute subdural hematomas with a midline shift greater than 5 mm on CT warrant surgical evacuation irrespective of GCS, because radiological evidence of mass effect correlates more strongly with impending cerebral herniation than the numerical GCS alone, which may not fully reflect intracranial dynamics in certain cases.[5] This emphasizes the importance of multimodal assessment and supports the growing view that early surgical intervention in selected moderate TBI cases may prevent secondary brain injury, even in the absence of overt clinical deterioration.

Furthermore, the occipital condyle fracture (OCF) identified in this case highlights an additional diagnostic challenge in the evaluation of head trauma. OCFs are relatively rare injuries and are often clinically silent, as patients may present without significant neurological deficits or marked reductions in consciousness despite substantial involvement of the craniovertebral junction. Consequently, these fractures can be easily overlooked when clinicians rely primarily on clinical assessment alone. This limitation underscores the importance of comprehensive imaging, particularly CT of the craniocervical junction, which has been shown to be significantly more sensitive than plain radiography. Previous studies have demonstrated that OCFs are frequently missed during initial radiologic evaluation and that their detection improves substantially with the routine use of high-resolution CT protocols in cases of high-energy trauma, thereby emphasizing the insufficiency of clinical evaluation alone in identifying such injuries.[6]

In pediatric and adolescent populations, occipital condyle fractures typically result from mechanisms such as axial loading or lateral flexion of the neck during high-speed trauma. The clinical presentation is often nonspecific and may include posterior neck pain, restricted cervical range of motion, cervico-occipital headache, or tenderness over the upper cervical spine. Notably, these symptoms may be absent in up to 20–30% of cases, further complicating early diagnosis. If unrecognized, OCFs may lead to serious complications, including craniovertebral junction instability and spinal cord compression, both of which carry a significant risk of life-threatening outcomes if not promptly identified and managed.[7]

Although the patient appeared clinically stable and conscious, imaging revealed a significant mass effect requiring urgent decompressive craniectomy. This radiology-guided decision highlights the limitations of using GCS alone in managing moderate pediatric TBI.

The case uniquely presents moderate TBI with surgical-level intracranial injury, an occult cervical fracture, and a pelvic fracture without neurological deficits—an uncommon trauma combination. It reinforces the value of early imaging and the need for more comprehensive guidelines in moderate TBI management.

Case

A 15-year-old female was brought to the emergency department by ambulance approximately three hours after a motorcycle accident. According to the history of trauma, she had been riding alone without a helmet when she attempted a sudden right turn. A vehicle following behind was unable to stop in time and struck her motorcycle, causing her to fall and sustain a direct impact to the right side of her head against the sidewalk. Immediately after the accident, she experienced loss of consciousness accompanied by an episode of projectile vomiting.

Pre-hospital care included cervical spine immobilization with a neck collar, administration of certain drugs such as Nacl 0,9% 1 L, ketorolac 3% inj, Ondansetron 8mg injection. Upon arrival at the emergency department, the patient underwent a structured trauma assessment following the Advanced Trauma Life Support (ATLS) protocol.

Primary survey revealed a patent airway and adequate circulation. Breathing assessment demonstrated no chest wall retraction; however, oxygen saturation was 92% on room air, prompting initiation of oxygen therapy via non-rebreathing mask (NRM) at 10 L/min, which improved SpO_2 to 97%. The initial neurological assessment, including Glasgow Coma Scale (GCS) scoring, was performed by an on-duty surgical resident formally trained in Advanced Trauma Life Support (ATLS), in accordance with standard emergency department trauma protocols. The neurological examination demonstrated features suggestive of intracranial hypertension, with a GCS score of 12, consistent with a diagnosis of moderate traumatic brain injury. Complete exposure during the primary survey did not reveal any additional external injuries.

Secondary survey indicated no history of drug or food allergies. The patient had no previous hospitalizations, no history of smoking, and no chronic medication use. Hemodynamic observation revealed blood pressure 111/72 mmHg, heart rate 87 bpm, respiration rate 22 times per minute, and without sign of fever. The Body Mass Index (BMI) of the patient revealed normoweight.

The physical examination revealed a vulnus excoriatum on the zygomaticum sinistra with slight tenderness, there were no signs of basilar skull fracture

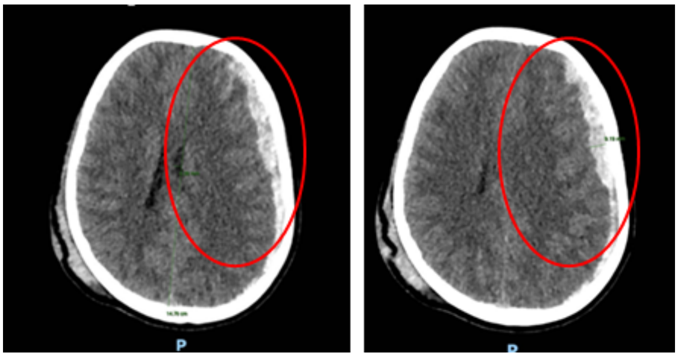

Figure 1. Head CT-Scan axial view

Head CT scan revealed a right temporoparietal subgalea hematoma. A “salt-and-pepper” appearance was noted in the left parietal region, consistent with cortical contusion. A contrecoup injury was identified in the left front temporoparietal region, presenting as a hyperdense area within the brain parenchyma. A midline shift of approximately 5 mm toward the right was observed. Bone window evaluation demonstrated no calvaria fracture (**Figure 1**). The anteroposterior view demonstrated preserved cervical alignment without evidence of gross craniocervical malalignment. On the lateral view, a focal cortical irregularity and subtle discontinuity were identified at the left occipital condyle region, adjacent to the craniocervical junction. This radiographic abnormality raised suspicion for an occipital condyle fracture.

Although plain radiography has limited sensitivity for detecting occipital condyle fractures, the observed cortical disruption on the lateral view was considered suggestive of an occipital condyle injury. Based on the radiographic appearance, the lesion was preliminarily consistent with an Anderson–Montesano type II fracture and corresponded to a potentially stable injury pattern (Tuli type I). Given the inherent limitations of plain radiographs in visualizing the craniocervical junction, further evaluation with high-resolution computed tomography was deemed necessary to confirm the diagnosis, assess fracture morphology, and evaluate craniocervical stability. Laboratory investigations were within normal limits. (**Figure 2**)

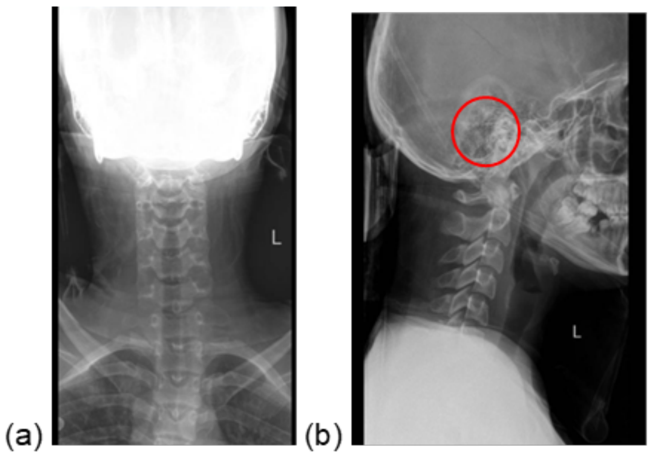

Figure 2. (a). Anteroposterior cervical radiograph demonstrating the craniocervical junction without apparent malalignment **(b)**. Lateral cervical radiograph showing a suspected left occipital condyle fracture (circled), characterized by cortical irregularity at the craniocervical junction, radiographically consistent with an Anderson–Montesano type II and Tuli type I occipital condyle fracture.

After further examination, the patient was diagnosed with moderate traumatic brain injury with a Glasgow Coma Scale score of 12, traumatic subdural hemorrhage, and cerebral contusion. In addition, cervical radiographic evaluation raised suspicion of an associated occipital condyle fracture. Based on the radiographic characteristics observed on plain cervical radiographs, the fracture was preliminarily classified as an Anderson–Montesano type II occipital condyle fracture, corresponding to a potentially stable injury pattern according to the Tuli classification (type I). This fracture pattern is typically associated with minimal displacement and preserved craniocervical stability, allowing for non-operative management.

The focus of this case is to emphasize radiology as a central component in the evaluation of patients with moderate traumatic brain injury, particularly in identifying concomitant injuries at the craniocervical junction and addressing discrepancies between clinical presentation and radiological findings in TBI. Given the stability suggested by the fracture classification, conservative management of the occipital condyle fracture was chosen, consisting of rigid cervical immobilization and close clinical and radiological monitoring, without the need for surgical stabilization.

The patient subsequently underwent craniectomy and hematoma evacuation for the traumatic subdural hemorrhage. This procedure was performed by a neurosurgeon at our general hospital and lasted approximately three hours, depending on the patient's intraoperative hemodynamic status. The surgery was conducted without assistance from other surgical specialties.

The operation was performed with the patient in the supine position under general anesthesia. Preoperative prophylaxis consisted of intravenous ceftriaxone (1g), omeprazole (40 mg), a mannitol loading dose (250 ml followed by 4x125 ml), and paracetamol (1 g). After sterile preparation, a question mark–shaped skin incision was made over the left frontotemporoparietal region. A burr hole craniotomy was carried out, revealing a bluish, tense dura. A semilunar dural incision was created, and a subdural hematoma was evacuated. Hemostasis was secured; however, because of ongoing cerebral swelling, duraplasty was performed. A subdural drain was inserted, and the bone flap was not replaced. The wound was closed in anatomical layers, and the procedure was concluded without intraoperative complications (**Figure 3**).

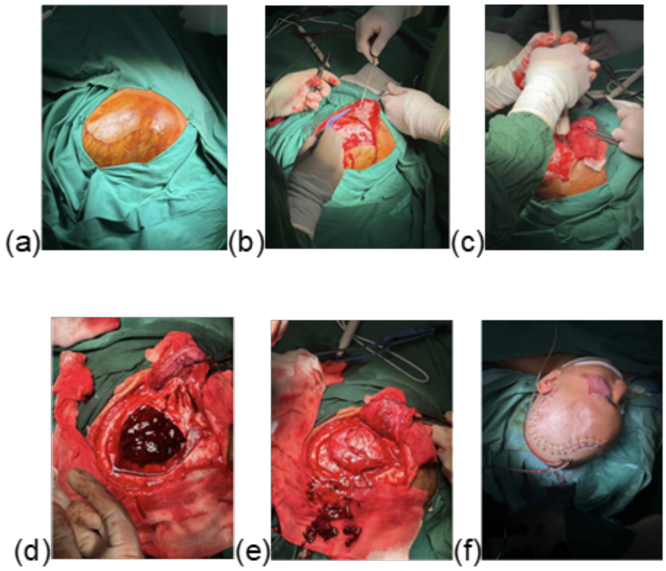

Figure 3. Intraoperative photographs demonstrating the steps of the decompressive craniectomy procedure: **(a)** exposure of the left frontotemporoparietal region, **(b)** craniotomy following skin incision, **(c)** opening of the tense dura mater, **(d)** evacuation of the subdural hematoma, **(e)** duraplasty due to cerebral swelling, and **(f)** final operative field prior to wound closure.

During the first postoperative day, the patient remained under sedation but demonstrated stable hemodynamic parameters. Neurological examination showed a GCS of E4M6Vett, with pupils equal and reactive. The subdural drain produced approximately 25 ml of serohemorrhagic fluid over 24 hours. Sedation was tapered on the second postoperative day. At that time, the patient's vital signs were stable, GCS remained at E4M6Vett and drain output had decreased to 10 ml/24 hours. By the third postoperative day, neurological improvement was evident on reduced sedation. As she maintained spontaneous ventilation with adequate tidal volume, a respiratory rate of 20 breaths per minute, and SpO_2 of 94% on supplemental oxygen, extubation was carried out. Airway protective reflexes, including cough and gag, were intact, and pupils were symmetric and reactive without new focal deficits. On the fourth day after surgery, she was transferred from the intensive care unit to the neurosurgical ward. Following an additional four days of stable clinical observation without complications, the patient was discharged home with instructions for regular follow-up.

Two weeks after surgery, the patient showed consistent neurological improvement. She was fully conscious, oriented, and capable of walking with only minimal support. The operative wound had healed satisfactorily, without clinical evidence of infection, and there were no episodes of seizure or recurrent vomiting. By the first month, she regained independence in ambulation and was able to perform daily self-care activities. Neurocognitive evaluation revealed mild impairment in short-term memory, whereas motor and speech functions remained intact. A follow-up cranial CT scan confirmed complete evacuation of the subdural hematoma, with no signs of hydrocephalus or residual mass effect. At the 3-month review, the patient had nearly complete functional recovery. She returned to school, managed all activities of daily living without assistance, and did not report headaches or seizures. Relatives noted occasional lapses in concentration; however, overall neurological performance was satisfactory. The Glasgow Outcome Scale–Extended (GOS-E) score was 8, consistent with good recovery with no cognitive sequelae.

Discussion

Globally, TBI represent a critical public health problem, contributing significantly to both morbidity and mortality. More than 20 million cases were documented in 2021, with a large proportion categorized as moderate or severe. In acute care settings, the GCS is still regarded as the principal tool for the rapid determination of injury severity and for directing immediate management. Nevertheless, recent clinical guidelines highlight that neurological examination alone may be insufficient, recommending the adjunctive use of neuroimaging, most notably Head CT to ensure a more comprehensive evaluation.[8,9]

Although GCS scores often correlate with radiological findings, this relationship is not absolute. Discrepancies have been reported in recent studies, influenced by factors such as the timing of assessment, the nature of the lesion, and the limitations of specific diagnostic modalities.[10,11] For example, in Traumatic Axonal Injury (TAI), CT frequently lacks sensitivity, whereas MRI can detect microscopic lesions with important clinical and prognostic implications. Evidence also indicates that early MRI in severe TBI improves the accuracy of outcome prediction.[12]

Conversely, certain injuries such as Occipital Condyle Fractures (OCFs) are more reliably identified on CT of the skull base, yet they do not consistently produce a reduction in GCS. As a result, such fractures may be overlooked if evaluation is based solely on clinical status. Current literature highlights CT as the modality of choice for diagnosing OCFs, with MRI reserved for assessing ligamentous integrity and brainstem or spinal cord involvement.[13]

Therefore, an approach that combines clinical assessment with evidence-based radiological examinations is crucial. Integrating these two aspects can reduce the risk of missed diagnoses, facilitate more accurate injury classification, and support optimal therapeutic decision-making from the earliest stages of treatment.

Glasgow Coma Scale in Traumatic Brain Injury

The GCS is the most widely used clinical instrument to assess the level of consciousness in patients with traumatic brain injury. In clinical practice, the GCS serves as the basis for classifying the severity of a TBI. A score of 13–15 is defined as mild TBI, a score of 9–12 as moderate, and a score of 3–8 as severe.[14] This classification plays a crucial role in determining initial management, including the need for close monitoring in the intensive care unit, indications for surgical intervention, and rehabilitation strategies.[11]

However, the limitations of the GCS have been widely highlighted in modern literature. External factors such as sedation, intubation, intoxication, and post-seizure status can influence the score. Furthermore, several recent studies have shown that the GCS does not always reflect the severity of structural injury seen on imaging, particularly in diffuse injuries such as TAI.[3,11]

Nevertheless, the GCS remains a practical tool with prognostic value, especially when combined with brain imaging findings. Recent evidence supports that integrating clinical examination with CT or MRI provides greater accuracy in risk stratification and outcome prediction in patients with TBI.[15]

The Role of Radiology in Traumatic Brain Injury

Radiology plays a central role in the evaluation of patients with TBI. Non-contrast head CT remains the primary modality in the acute phase due to its widespread availability, rapidity, and ability to detect intracranial hemorrhage, skull fractures, and cerebral edema.[16]

However, CT has limitations in identifying microscopic lesions or diffuse injuries such as TAI. In this context, MRI has proven superior due to its ability to demonstrate lesions not visible on CT, with specialized sequences such as susceptibility-weighted imaging (SWI) and diffusion tensor imaging

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(DTI) able to detect microbleeds and nerve fiber tract damage.[16,17]

Recent evidence also suggests that the use of MRI in the early phase of severe TBI can improve the accuracy of outcome prediction, especially when combined with clinical assessments such as the GCS.[16,17]

In specific conditions, such as OCF, skull base CT is preferred due to its high sensitivity for detecting fractures. However, OCF is not always accompanied by a decrease in the GCS score, so the diagnosis can be missed if relying solely on clinical examination. Therefore, MRI remains important to assess involvement of ligamentous structures and the spinal cord.[6]

Radiology plays a role not only in the acute phase but is also crucial in long-term monitoring. Serial CT scans are used to monitor the development of hematoma or cerebral edema, while MRI is useful in the subacute-chronic phase to assess atrophy and gliosis associated with cognitive deficits.[16]

Therefore, the use of multimodality radiology—from acute CT scans and structural MRI to functional imaging techniques—is a crucial component of modern TBI management. However, the interpretation of radiology results must always be integrated with the clinical examination to ensure a more targeted management strategy.[15]

Clinical Implications of Mismatch in Clinical and Radiological Findings in TBI

The discrepancy between clinical presentation and radiological findings in traumatic brain injury has significant implications for patient management. Such discordance increases the risk of both undertriage and overtriage, complicating decisions on surgical timing. Patients with a moderate Glasgow Coma Scale score may present with disproportionately severe imaging features, including extensive subdural hematoma, marked cerebral edema, or substantial midline shift. These situations raise critical questions regarding the need for early decompressive craniectomy, even when the clinical score has not yet reached the severe category.[2,3,15]

DC for traumatic brain injury is mainly indicated for evacuation of epidural or subdural hematomas and for relief of intracranial pressure caused by contusions or intraparenchymal hemorrhage. Comatose patients with a large hematoma should undergo immediate surgery if meaningful recovery is possible. Hematomas larger than 25 milliliters should be removed promptly, even in patients with higher Glasgow Coma Scale scores, to prevent deterioration from swelling or expansion. Posterior fossa lesions generally warrant earlier intervention. Patients who deteriorate after admission due to delayed hematoma formation or enlargement also require urgent evacuation. In acute subdural hematoma, large craniotomy is recommended to enable complete clot removal, identification of the bleeding source, and meticulous hemostasis.[14]

Several recent studies have shown that early Early (within 24 hours), with consideration of ultraearly (within 6–12 hours), decompressive craniectomy for severe TBI should be offered to pediatric patients in settings with refractory ICP elevation. Reduction of ICP allows for prompt disruption of pathophysiologic cascades and improved neurologic outcomes, can reduce the risk of herniation and improve cerebral perfusion. However, other evidence confirms that although early DC can reduce mortality, the patient's long-term quality of life does not always significantly improve.[18]

Ultimately, understanding this discrepancy encourages the use of a multimodal approach, which integrates clinical scores, radiological imaging, and to improve diagnostic accuracy, outcome prediction, and therapeutic decisions. Therefore, collaboration between clinical and radiology teams is key to modern TBI care.[2,11,14,15]

Occipital Condyle Fracture of the Craniocervical Junction: Radiological Diagnosis and Management Implications

Fractures of the occipital condyle are rare injuries involving the craniocervical junction that have become increasingly recognized in trauma populations with the widespread use of high-resolution CT. Although the overall incidence remains low, these fractures may occur in patients exposed to high-energy blunt cranial or cervical trauma and can coexist with moderate to severe traumatic brain injury. A recent retrospective study of 43 patients with occipital condyle fractures reported that 9.3% presented with moderate injury, defined by Glasgow Coma Scale scores of 9–12, indicating that such fractures may be present even when the initial neurological assessment does not suggest severe impairment. Thin-slice CT imaging with coronal and sagittal reconstructions is essential for accurate detection, as conventional radiographic examinations frequently fail to identify these injuries.[19]

Clinically, OCFs often present with *nonspecific symptoms* such as neck pain, swelling, reduced range of motion, or lower cranial nerve deficits due to the close anatomical relationship between the occipital condyles and neural structures.

High-energy mechanisms of injury, such as motor vehicle collisions or falls, are commonly implicated. The variable, and sometimes subtle, clinical presentation contributes to OCFs being overlooked during initial evaluation if *comprehensive imaging* is not performed promptly.[19]

From an imaging perspective, CT remains the *gold standard* for diagnosing OCFs. High-resolution CT enables visualization of the craniocervical junction and delineation of fracture patterns that would not be apparent on plain radiographs, which lack sufficient sensitivity and detail for this region. Accurate classification of OCFs (e.g., using Anderson-Montesano criteria) and identification of associated injuries inform management decisions, which may range from conservative external immobilization to surgical stabilization depending on fracture stability and the presence of craniocervical misalignment.[6,20]

Pediatric occipital condyle fractures have been addressed in a recent systematic review that outlines a stepwise management algorithm emphasizing prompt recognition and appropriate imaging to evaluate cervical stability. Clinical manifestations in children commonly include altered levels of consciousness, neck pain, restricted cervical range of motion, and cranial nerve deficits. Diagnostic evaluation may involve computed tomography, magnetic resonance imaging, and functional radiographic studies to assess ligamentous integrity and craniocervical stability. Early and accurate identification of occipital condyle fractures is therefore essential to enable timely intervention and minimize the risk of subsequent complications.[20]

Together, these findings reinforce the importance of considering OCF in trauma cases — particularly in moderate to severe head injury settings — and support the decision in this case to pursue advanced imaging beyond clinical examination alone. Implementation of high-resolution CT imaging protocols in the initial trauma assessment increases detection rates of OCFs and thereby improves clinical outcomes by guiding appropriate stabilization and management.[19,20]

Management of occipital condyle fractures depends primarily on fracture classification and craniocervical junction stability. In stable OCFs (e.g., Anderson–Montesano type I and II or Tuli type I), conservative management with external immobilization is generally preferred. This includes rigid cervical collars or semi-rigid collars to restrict motion and facilitate healing, often applied for a period of weeks to months based on clinical and radiologic follow-up, with the goal of achieving fracture consolidation and preventing late instability.[20]

Pediatric management is generally guided by a sequential strategy that begins with cervical spine stabilization, followed by early CT and/or MRI to assess fracture characteristics and ligamentous involvement, and subsequently the selection of appropriate immobilization methods, including soft or rigid cervical collars or halo fixation, according to injury severity.[20,21]

Stable pediatric OCFs, including many type II fractures, often respond well to conservative immobilization, whereas unstable injuries (e.g., Tuli type IIB or Anderson–Montesano type III with ligamentous disruption) may require more rigid devices like halo vests or, rarely, surgical occipital-cervical fusion if there is significant instability or neurologic compromise.[21]

Despite the limited level of evidence inherent in rare injury patterns, immobilization as first-line therapy for isolated OCFs demonstrates high rates of fracture consolidation and symptom resolution across reported studies, with surgical intervention reserved for complex cases.

Prognosis

The Glasgow Outcome Scale–Extended (GOS-E) is widely recognized as a standardized tool for assessing long-term functional outcomes in patients with traumatic brain injury. It provides an eight-point scale ranging from death (score 1) to upper good recovery (score 8), thereby offering a more detailed stratification than the original five-point GOS. This expanded scoring system allows clinicians and researchers to better capture subtle cognitive, behavioral, and social impairments that may persist despite apparent neurological recovery.[22] The classification system is summarized in Table 1, which outlines the correspondence between the traditional five-point GOS and the eight-point GOS-E, including the domains assessed and the criteria defining each category.

Several studies have emphasized the importance of incorporating GOS-E in outcome reporting, as it correlates not only with survival but also with the patient's ability to reintegrate into daily life and society.[22]

Table 1. Summary of the Classification Criteria within the GOS-E.[22]

GOS 5-point scale	GOSE 8-point scale	Domain	Criteria
Dead	1. Dead		
Vegetative State	2. Vegetative State	Consciousness	
Severe Disability (SD) Conscious but dependent	3. Lower SD	Function in Home	Unable to look after themselves for 8 h
	4. Upper SD	Function in Home Function Outside the Home	Unable to look after themselves for 24 h OR Unable to shop OR Unable to travel
Moderate Disability (MD) Independent but with limitations in one or more activities	5. Lower MD	Work/Study Social and Leisure Activities Family and Friendships	Unable to work/study OR Unable to participate OR Constant problems
	6. Upper MD	Work Social and Leisure Activities Family and Friendships	Reduced work capacity OR Participate much less OR Frequent problems
Good Recovery (GR) Return to normal life	7. Lower GR	Social and Leisure Activities Family and Friendships Symptoms	Participate a bit less OR Occasional problems OR Some symptoms affecting daily life
	8. Upper GR		No problems

GOSE: Glasgow Outcome Scale-Extended; GOS: Glasgow Outcome Scale.

In this case, a GOS-E score of 8 indicated complete recovery without residual cognitive or psychological deficits, consistent with the favorable prognosis frequently reported in younger patients who undergo timely surgical management and structured neurorehabilitation. The use of GOS-E in this context highlights the importance of functional outcome scales that surpass traditional neurological assessments such as the GCS, offering a broader and more nuanced appraisal of recovery following traumatic brain injury.

Multiple investigations have highlighted the value of incorporating the GOS-E into outcome reporting, as the scale reflects not only survival but also the patient's capacity to reintegrate into daily and social activities. Prognostic evaluation in traumatic brain injury, therefore, should extend beyond intracranial findings to also encompass associated cranio-cervical injuries, such as occipital condyle fractures, which can have a meaningful impact on long-term function and quality of life. In particular, impacted and undisplaced occipital condyle fractures are generally associated with a favorable prognosis under conservative management. Evidence from a retrospective series of 24 patients managed nonoperatively showed that most individuals achieved pain relief within six weeks and demonstrated neither neurological deficits nor radiographic displacement during follow-up of up to 14 weeks.[23]

Furthermore, a systematic review that included multiple studies found that conservative management with immobilization, most often using a cervical collar, was associated with favorable clinical and radiological outcomes. Most patients experienced uncomplicated healing, and long-term follow-up demonstrated minimal or no persistent disability in cervical function.[24]

Conclusion

This case demonstrates that clinical grading alone may not fully capture the severity of traumatic brain injury, as discrepancies can arise between Glasgow Coma Scale scores and radiological findings. Comprehensive neuroimaging, therefore, is indispensable in guiding timely and appropriate interventions. In this patient, emergency decompressive craniectomy effectively addressed the intracranial mass effect, while the concurrent undisplaced occipital condyle fracture was safely managed conservatively. The favorable neurological and functional recovery observed highlights the importance of an integrated approach that considers both intracranial and cranio-cervical injuries. Early recognition, individualized treatment strategies, and structured follow-up are essential for optimizing outcomes in complex head trauma cases.

Ethics approval

Our institution has exempted ethical approval from reporting this case.

Consent

Written informed consent was obtained from the patient to publish this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Competing interests

The authors have no conflicts of interest to declare

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Author's contribution

All Authors have contributed to the case report.

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