Section: Paediatric Surgery

Case Report

PAEDIATRIC TRAUMATIC ASPHYXIA FOLLOWING BLUNT TRAUMA: A CASE REPORT

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ABSTRACT

Background: Traumatic asphyxia is a rare but distinctive clinical syndrome resulting from sudden compression of the thorax or upper abdomen, leading to a rapid rise in intrathoracic pressure and retrograde venous flow into the head and neck. It is characterized by facial edema, cyanosis, petechiae, and subconjunctival haemorrhage, often producing the classical "ecchymotic mask." Despite its alarming presentation, the condition is generally reversible with timely recognition and appropriate supportive care.

Case Presentation: Two paediatric cases of traumatic asphyxia after blunt thoracoabdominal compression injuries are reported. In the first instance, a 14-month-old boy suffered chest compression following an accident involving a motorcycle. Imaging showed pneumothorax with pulmonary contusion, and he had face petechiae and right-sided chest ecchymosis. He recovered fully after receiving supportive care and intercostal chest drainage. In the second instance, a 6-year-old girl was engaged in a car accident and suffered thoracoabdominal compression. She had bilateral subconjunctival haemorrhage, facial congestion, petechiae, and a distinct upper body demarcation line. Imaging showed a frontal contusion, grade II kidney damage, and grade III liver damage. She recovered well after receiving conservative treatment that included oxygen therapy, fluid resuscitation, blood transfusions, and close observation.

Conclusion: These cases highlight the importance of early recognition of traumatic asphyxia based on characteristic clinical features. While the external appearance may be dramatic, the prognosis is generally excellent in children when associated injuries are promptly identified and managed. A high index of suspicion, thorough evaluation, and supportive care are essential to ensure optimal outcomes and prevent complications.

Keywords: Traumatic asphyxia; Paediatric trauma; Ecchymotic mask; Thoracic compression; Subconjunctival haemorrhage.

INTRODUCTION

Traumatic asphyxia, also referred to as Perthes syndrome, crush asphyxia, or ecchymotic mask, is a rare but distinctive clinical condition that occurs following sudden, severe compression of the thorax or upper abdomen. This compression leads to an abrupt and marked increase in intrathoracic pressure, particularly when the glottis is closed at the time of injury. As a result, there is a retrograde surge of venous blood into the valveless venous system of the head, neck, and upper chest, causing capillary rupture and venous congestion.[1,2] This pathophysiological mechanism produces the characteristic clinical features associated with the condition.

The hallmark presentation of traumatic asphyxia includes facial edema, cyanosis, petechial haemorrhages, and subconjunctival haemorrhage, often accompanied by a sharp line of demarcation between affected and unaffected areas of the body. The striking facial appearance, commonly described as an "ecchymotic mask," can be alarming and may initially suggest severe or life-threatening injury. However, despite its dramatic presentation, the condition itself is often benign and reversible, particularly in paediatric patients.[2,3]

Traumatic asphyxia is most commonly associated with blunt thoracic trauma, such as motor vehicle accidents, falls, or crush injuries. In children, such injuries frequently occur in road traffic accidents or accidental compressive events during play or transportation. While the external manifestations are prominent, the clinical outcome largely depends on the presence and severity of associated injuries, including pulmonary contusions, pneumothorax, rib fractures, solid organ injuries, and central nervous system involvement.[3,4] Therefore, a thorough evaluation is essential to identify potentially life-threatening complications.

The paediatric population tends to have a better prognosis compared to adults, likely due to greater chest wall compliance and fewer comorbidities. In most cases, management is primarily supportive, including oxygen therapy, head elevation, and close monitoring. Early recognition of the condition is crucial to avoid unnecessary interventions and to focus on identifying and managing associated injuries.[4,5] Despite its characteristic clinical features, traumatic asphyxia remains underreported in the literature, especially in children. Increased awareness among clinicians is essential for prompt diagnosis and appropriate management.

In this report, we present two cases of paediatric traumatic asphyxia following blunt thoracoabdominal compression injuries, highlighting their clinical presentation, associated injuries, management strategies, and favourable outcomes. These cases emphasize the importance of early recognition and supportive care in ensuring optimal recovery.

CASE PRESENTATION

Case 1: A 14-month-old male child was brought to the emergency department following a fall from a motorbike, during which the vehicle subsequently ran over his chest, resulting in blunt thoracic trauma. The child was brought immediately after the incident.

On arrival, he was conscious, crying, and responsive. His vital parameters revealed a heart rate of 146 beats per minute, respiratory rate of 36 breaths per minute, and an oxygen saturation of 95% while on supplemental oxygen. His Glasgow Coma Scale (GCS) score was 14, indicating mild impairment of consciousness but overall preserved neurological status.

On physical examination, multiple petechial haemorrhages were noted over the face [Figure 1], consistent with features of traumatic asphyxia. There was also ecchymosis over the right side of the chest, corresponding to the site of impact. Notably, there were no signs of respiratory distress, and the child did not exhibit any use of accessory muscles or abnormal breath sounds. The remainder of the systemic examination, including cardiovascular, abdominal, and neurological assessments, was unremarkable.

Radiological evaluation was performed to assess internal injuries. A chest X-ray revealed a right-sided pneumothorax, which was further confirmed by computed tomography (CT) scan. The CT scan also demonstrated a right lung contusion, with no evidence of associated solid organ injury.

Given the presence of pneumothorax, an immediate right-sided chest tube insertion was performed. The child was managed with conservative supportive care, including oxygen supplementation and close monitoring.

During the hospital course, the patient showed steady clinical improvement with no complications. The facial petechiae gradually resolved, and respiratory parameters remained stable. The child had an uneventful recovery and was discharged in stable condition.

Figure 1: Clinical image of Case 1 showing facial petechial haemorrhages with associated right-sided chest wall ecchymosis following blunt thoracic compression injury, characteristic of traumatic asphyxia

Case 2: A 6-year-old female child presented to the emergency department approximately one hour after sustaining injuries in a road traffic accident involving a two-wheeler collision with a trolley. The child had sustained significant compression injury to the chest and abdomen during the incident.

On arrival, the child was alert but appeared lethargic, with a Glasgow Coma Scale (GCS) score of 15. Her vital signs showed a blood pressure of 110/60 mmHg and a heart rate of 130 beats per minute. She was noted to have tachypnoea and active right-sided epistaxis.

Clinical examination revealed diffuse facial swelling with multiple petechial haemorrhages over the face and neck, along with a characteristic sharp demarcation line over the upper body [Figure 2], suggestive of traumatic asphyxia. Additionally, bilateral subconjunctival haemorrhages were present [Figure 3], although visual acuity and fundoscopic

examination were normal. There was an abrasion over the right hypochondrium associated with localized tenderness, indicating possible abdominal injury.

Further evaluation with imaging studies was carried out. Contrast-enhanced CT (CECT) of the abdomen revealed a grade III liver injury and grade II right renal injury. A non-contrast CT (NCCT) of the head demonstrated a right frontal contusion. Electrocardiogram (ECG) showed sinus tachycardia, and laboratory investigations revealed low haemoglobin levels, indicating blood loss.

The patient was admitted for close monitoring and managed conservatively. Treatment included oxygen therapy, intravenous fluid resuscitation, blood transfusion, and analgesics. The head-end of the bed was elevated to facilitate venous drainage and reduce facial congestion.

Over the subsequent days, the patient showed gradual clinical improvement. The facial edema and petechiae began to resolve, and the subconjunctival haemorrhages diminished on follow-up. Her hemodynamic status remained stable, and no further complications were observed.

The patient had a favourable outcome with complete recovery, and was discharged with advice for follow-up.

Figure 2: Clinical image of Case 2 demonstrating facial congestion with diffuse petechiae and a well-defined upper body demarcation line, indicative of venous backflow following thoracoabdominal compression

Figure 3: Clinical image of Case 2 showing bilateral subconjunctival haemorrhages without associated visual impairment, consistent with features of traumatic asphyxia

Clinical Findings

Both cases demonstrated classic features of traumatic asphyxia:

- Facial edema and cyanosis
- Petechial haemorrhages over face and neck
- Subconjunctival haemorrhage (Case 2)
- Sharp upper body demarcation line

Systemic findings varied based on associated injuries:

- Case 1: Pneumothorax and lung contusion
- Case 2: Liver injury, renal injury, and head contusion

Diagnostic Assessment

Case 1: The diagnosis in Case 1 was based on the combination of clinical features and radiological findings. The presence of facial petechial haemorrhages following a clear history of blunt thoracic compression strongly suggested traumatic asphyxia. Because chest trauma can be associated with potentially serious internal injuries, radiological evaluation was performed immediately.

A chest X-ray demonstrated a right-sided pneumothorax. This finding indicated the presence of air within the pleural cavity, most likely resulting from blunt injury to the lung parenchyma or pleural surface. Given the child's mechanism of injury and radiographic findings, further imaging was performed.

Computed tomography of the thorax confirmed the right-sided pneumothorax and also revealed right lung contusion. Pulmonary contusion represented injury to the lung tissue caused by blunt trauma, leading to alveolar haemorrhage and edema. Importantly, thoracoabdominal CT did not show any associated solid organ injury.

The absence of abdominal organ injury and the child's stable neurological status supported a conservative approach apart from management of pneumothorax. Based on the clinical presentation of facial petechiae after thoracic compression, together with imaging evidence of pneumothorax and pulmonary contusion, the final diagnosis was traumatic asphyxia with right-sided pneumothorax and right pulmonary contusion.

Case 2: In Case 2, the diagnosis was established through clinical examination supported by targeted imaging and laboratory investigations. The presence of facial swelling, petechiae over the face and neck, bilateral subconjunctival haemorrhages, and a sharply demarcated upper body discoloration following thoracoabdominal compression was highly characteristic of traumatic asphyxia.

Because the child had abdominal tenderness and external abrasion over the right hypochondrium, contrast-enhanced computed tomography of the abdomen was performed to assess for internal injuries. Imaging revealed a grade III liver injury and grade II right renal injury [Figure 4]. These findings confirmed significant solid organ trauma resulting from the compressive mechanism of injury.

A non-contrast CT scan of the head was also performed due to the history of trauma and lethargy at presentation. It showed a right frontal contusion. Although the child had a GCS score of 15 and no focal neurological deficit, this finding emphasized the importance of neuroimaging in children with significant blunt trauma and altered sensorium or lethargy.

Electrocardiography showed sinus tachycardia, which was likely secondary to pain, stress, trauma, and possible blood loss. Laboratory evaluation revealed low haemoglobin levels, supporting the presence of traumatic blood loss, likely related to solid organ injury. Ocular assessment showed bilateral subconjunctival haemorrhage, but visual acuity and fundus examination were normal, excluding major ocular complications.

Based on the typical external clinical features and supportive imaging findings, the final diagnosis was traumatic asphyxia with associated grade III hepatic injury, grade II right renal injury, and right frontal cerebral contusion.

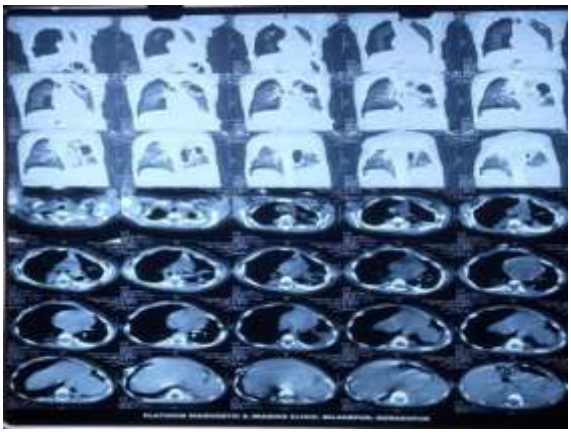

Figure 4: Axial and coronal CT sections showing parenchymal liver injury and renal involvement, with associated thoracic findings consistent with traumatic asphyxia-related blunt compression injury

Therapeutic Intervention

Case 1: The patient was managed with a prompt and targeted approach, focusing on stabilization and treatment of thoracic injury. Given the radiological evidence of right-sided pneumothorax, an immediate intercostal chest tube drainage (ICD) was performed on the right side under aseptic precautions. This intervention resulted in adequate lung re-expansion and stabilization of respiratory function.

Supportive care was initiated simultaneously. The child was maintained on oxygen therapy to ensure adequate oxygenation. Continuous monitoring of vital parameters, including heart rate, respiratory rate, and oxygen saturation, was carried out throughout the hospital stay.

Analgesics were administered for pain control, and the patient was kept under close observation for any signs of respiratory compromise or deterioration. No invasive surgical intervention was required beyond chest tube placement, as there was no evidence of solid organ injury.

The patient showed steady clinical improvement with resolution of symptoms. The chest tube was removed after confirmation of lung re-expansion and absence of air leak. The child was discharged in stable condition with advice for follow-up.

Case 2: The second patient was managed conservatively with a multidisciplinary supportive approach, given the presence of multiple associated injuries, including hepatic, renal, and cerebral contusions.

Initial management focused on hemodynamic stabilization and supportive care. The patient was administered oxygen therapy to maintain adequate oxygen saturation. Intravenous fluid resuscitation was initiated to ensure circulatory stability and maintain organ perfusion.

Given the presence of anaemia, likely secondary to internal injury, the patient received blood transfusion, which resulted in improvement of haemoglobin levels and overall clinical status. Analgesics were administered for pain management.

To reduce venous congestion and facilitate drainage from the head and neck region, the head end of the bed was elevated. This measure also contributed to gradual reduction in facial edema associated with traumatic asphyxia.

Close monitoring was undertaken for progression of solid organ injuries. As the hepatic and renal injuries were classified as moderate (Grade III liver and Grade II renal injury), they were managed non-operatively with serial clinical assessments and supportive care. No surgical intervention was required.

Neurological status was continuously monitored due to the presence of a right frontal contusion. The patient remained neurologically stable throughout the hospital stay, with no signs of deterioration.

Over the course of hospitalization, the patient demonstrated gradual clinical improvement. Facial edema, petechiae, and subconjunctival haemorrhages showed progressive resolution. Hemodynamic parameters remained stable, and no complications developed.

The patient was discharged after clinical stabilization with advice for follow-up and monitoring.

Follow-Up and Outcomes: Both patients were closely monitored throughout their hospital stay with serial clinical assessments and supportive management.

In the first case, following intercostal chest tube drainage, there was marked improvement in respiratory parameters. Oxygen saturation remained stable on minimal support, and no signs of respiratory distress were observed during the course of hospitalization. Repeat chest imaging confirmed complete lung re-expansion with resolution of pneumothorax and no evidence of persistent air leak. The chest tube was subsequently removed after ensuring both clinical and radiological stability. The

facial petechiae and chest wall ecchymosis gradually resolved over the next few days. The child remained hemodynamically stable with no neurological deficits or additional complications. At discharge, the patient was active, feeding well, and clinically stable. Follow-up evaluation revealed complete recovery without any residual respiratory or neurological sequelae.

In the second case, the patient required close observation due to associated thoracoabdominal and neurological injuries. Following initial stabilization with oxygen therapy, intravenous fluids, and blood transfusion, there was gradual improvement in hemodynamic status. Respiratory parameters normalized, and tachypnea subsided over time. The characteristic facial edema, petechiae, and subconjunctival haemorrhages showed progressive resolution during the hospital stay. Serial clinical monitoring did not reveal any worsening of hepatic or renal injuries, and the patient remained stable without the need for surgical intervention. Hemoglobin levels improved following transfusion, and no further bleeding complications were noted. Neurological status remained stable throughout, with no focal deficits despite imaging evidence of frontal contusion.

On follow-up, both patients demonstrated continued improvement with complete resolution of external manifestations of traumatic asphyxia. There were no late complications, and both children achieved full recovery. At the time of discharge and subsequent follow-up visits, they were clinically stable, active, and without any functional impairment, highlighting the excellent prognosis associated with timely recognition and appropriate supportive management of traumatic asphyxia.

DISCUSSION

Traumatic asphyxia is an uncommon but clinically distinctive consequence of sudden thoracoabdominal compression, characterized by a dramatic constellation of facial edema, cyanosis, petechiae, and subconjunctival haemorrhage. First described by Perthes, this entity results from a rapid rise in intrathoracic pressure, particularly when the glottis is closed at the moment of impact. The resulting retrograde transmission of pressure into the valveless venous system of the head and neck leads to capillary rupture and venous congestion, producing the characteristic “ecchymotic mask” appearance.[5,6]

The two cases presented here highlight the classical clinical features of traumatic asphyxia in the paediatric population, along with the spectrum of associated injuries. In both patients, the mechanism involved blunt compressive forces to the thorax, consistent with the most commonly reported etiologies such as road traffic accidents and crush injuries. The presence of petechiae, facial congestion, and subconjunctival haemorrhage with a clear upper body demarcation line was highly suggestive of the diagnosis, emphasizing the importance of clinical recognition.[7]

A key aspect in the management of traumatic asphyxia is the identification and treatment of associated injuries, which often determine overall prognosis. In the first case, the primary associated injury was a pneumothorax with pulmonary contusion, which required intercostal drainage. In contrast, the second case demonstrated a more complex injury pattern, including hepatic and renal trauma along with a cerebral contusion. This variability underscores the need for a systematic evaluation using appropriate imaging modalities such as CT scans to assess thoracic, abdominal, and neurological involvement.[8,9]

Despite the alarming clinical presentation, the prognosis of traumatic asphyxia is generally favourable, particularly in children. This is attributed to greater chest wall compliance and a lower likelihood of severe underlying comorbidities compared to adults. Both patients in this series showed excellent recovery with conservative management, aligning with existing literature that emphasizes supportive care as the cornerstone of treatment. Interventions such as oxygen therapy, head-end elevation, and careful hemodynamic monitoring play a crucial role in facilitating recovery by reducing venous congestion and maintaining adequate tissue perfusion.[10]

Neurological outcomes in traumatic asphyxia are typically good, although transient alterations in consciousness may occur. In our second case, despite imaging evidence of a frontal contusion, the patient remained neurologically stable without long-term deficits. This finding supports previous observations that neurological impairment, when present, is often reversible if prompt care is instituted.[11]

The rarity of this condition, particularly in paediatric practice, often leads to under recognition. However, awareness of its characteristic presentation can prevent unnecessary interventions and guide appropriate management. Differential diagnoses such as superior vena cava syndrome and skull base fractures should be considered but can usually be distinguished based on clinical context and imaging findings.[6,8]

In conclusion, these cases reinforce that traumatic asphyxia, while visually striking, is a largely reversible condition with excellent outcomes when recognized early. A high index of suspicion, combined with thorough evaluation for associated injuries and timely supportive management, is essential for optimal patient recovery.[12]

CONCLUSION

The presence of an “ecchymotic mask” is a key clinical indicator that should prompt immediate consideration of traumatic asphyxia, particularly in

the context of blunt thoracoabdominal trauma. Although the presentation may appear severe and alarming, the condition is often reversible with timely recognition and appropriate management. Careful evaluation to identify associated injuries is essential, as these largely determine prognosis. Early diagnosis, vigilant monitoring, and supportive care remain the cornerstone of treatment. With prompt and appropriate intervention, most paediatric patients achieve complete recovery without long-term complications, highlighting the importance of clinical awareness in ensuring favourable outcomes.

Informed Consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. The patient was assured that all personal identifiers would be kept confidential, and anonymity has been maintained.

Ethical Approval

Ethical approval was obtained from the institutional ethics committee in accordance with local regulations and guidelines. The study was conducted in compliance with the principles of the Declaration of Helsinki.

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