

A case report of Traumatic Asphyxia

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ABSTRACT:

Traumatic asphyxia is a condition presenting with cervicofacial cyanosis and edema, subconjunctival hemorrhage, and petechial hemorrhages of the face, neck, and upper chest that occurs due to a compressive force to the thoracoabdominal region.

In this case report a 52 years old lady who was brought to the mortuary because of death due to traumatic asphyxia as a result of being stampeded by her own cows upon her chest was discussed. Congestion on both the conjunctiva, cyanosis on chin and adjacent upper left side of neck found with a well demarcated area observed between the cyanosed area over face and the normal area of neck. Hematoma was present in the chin and the adjacent neck region.

Apart from quickly eliminating organ pathologies and initiation of supportive therapy in a case of traumatic asphyxia, possibility of formation of hematoma in neck after few hours of getting injured should also be considered, as this type of hematoma may contribute to the cause of death.

Keywords: Autopsy, Cyanosis, Hematoma, Stampede, Traumatic asphyxia

INTRODUCTION

Traumatic asphyxia is a rare condition presenting with cervicofacial cyanosis and edema, subconjunctival hemorrhage, and petechial hemorrhages of the face, neck, and upper chest that occurs due to a compressive force to the thoracoabdominal region¹. It was first reported by Olivier approximately 170 years ago in victims trampled by crowd in Paris^{2,3}. Although the exact mechanism is controversial, it is probably due to thoracoabdominal compression causing increased

intrathoracic pressure just at the moment of the event. The fear response, which is characterized by taking and holding a deep breath and closure of the glottis, also contributes to this process^{1,4}. This back pressure is transmitted ultimately to the head and neck veins and capillaries, with stasis and rupture producing characteristic petechial and subconjunctival hemorrhages⁴. Traumatic asphyxial deaths can occur in variety of situations, such as motor vehicle accidents, railway-related fatalities, elevator accidents, buildings

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collapse, landslides and stampede. However, motor vehicle accidents are the most common cause of traumatic asphyxial deaths². In patients with traumatic asphyxia, injuries associated with other systems may also accompany the condition. Jongewaard et al. reported chest wall and intrathoracic injuries in 11 patients, loss of consciousness in 8, prolonged confusion in 5, seizures in 2, and visual disturbances in 2 of 14 patients with traumatic asphyxia⁵. In this case report a female patient with traumatic asphyxia because of being stamped by her own cows was discussed.

CASE HISTORY

In this case report, a 52-years-old female who was brought to the mortuary after death due to traumatic asphyxia was discussed. From the anamnesis of the patient, the lady was stamped by her own cows on the evening of 9th March 2014. As per eyewitnesses, the mishap took place when she was about to put fodder for the cows. One cow suddenly turned her head and tried to hit the lady by her horns. Sensing something wrong, the lady suddenly turned and tried to run away to save herself. However, due to sudden turning, she lost her balance and fell near the legs of the cow. Three cows eventually stamped upon her. She was then rescued and brought to the hospital (BP Koirala Institute of Health Sciences). As per her relatives, she was declared normal by the clinical examinations and radiological investigations (X-rays and Ultrasonography) done by the attending doctor and because of no any organ pathology being detected, she was suggested to go back home the same day but because of request from the relatives, she was kept in observation for that day. Next morning at about 9 am, she was not responding to the attending nurse. She

was immediately resuscitated but could not be saved. Postmortem examination was conducted approximately 8 hours after her death. Death in this case was because of traumatic asphyxia contributed by neck hematoma. She was not known to have been suffering from any diseases that could have either caused or contributed to death.

AUTOPSY FINDINGS

Autopsy examination revealed distinct cyanotic, edematous, and multiple petechiae on the chin, upper left side of neck of the victim. Bilateral subconjunctival hemorrhage was detected. A well demarcated area was observed between the congested area over face and the normal area of neck along with linear abrasion present on the left side of mid neck region (Figure 1). Left seventh, eighth, ninth and tenth ribs were fractured. Internally, hematoma was present in the chin and the adjacent neck region; the lungs were congested and cut surface revealed oozing of frothy blood. The rest of the internal organs were unremarkable.



Figure 1: Linear abrasion in the mid of the neck and contusion in the chin region.

DISCUSSION

Traumatic asphyxia is a rare condition presenting with cervicofacial cyanosis and edema, petechial, and subconjunctival hemorrhages of the face, neck, and upper chest that occurs usually due to a compressive force to the thoracoabdominal region but has also been associated with asthma, paroxysmal coughing, protracted vomiting, and jugular venous occlusion^{6,7}. However, for these signs to be present, the following two processes should occur simultaneously⁸. The first is mechanical reflux of blood from chest into cervicofacial region. The second is vasomotor paralysis due to pressure on thoracic sympathetic nerves resulting in distension of vessels with desaturated blood. Additionally, reflex closure of glottis, which occurs to brace against the impending force as the victim has warning of being crushed^{9,10}, also augments the venous reflux. The venous reflux into cervico-facial region occurs through the competent venous valves of the internal jugular veins (IJVs), external jugular veins (EJVs) and vertebral veins (VVs). Thus for better comprehension of cervico-facial congestion and petechiae, description of anatomical pathway of the IJV, EJV, VV and function of valves is undertaken.

The IJVs are considered to be the main pathways of blood drainage from the brain, the superficial part of the face and the neck. It begins at the base of skull and then runs down the side of the neck along the carotid artery. At the root of the neck, IJV unites with the subclavian vein to form the brachiocephalic vein, which meets the superior vena cava.^{11,12} The EJVs mainly drains the scalp and the deep part of face. It begins near the mandibular angle, and then descends from the mandibular angle to the mid-clavicle superficial to the sternocleidomastoid. At the root of neck it ends in

the subclavian vein^{11,12}. The VVs along with the deep cervical veins (DCVs) represents the major non-jugular cerebrovenous drainage pathway. VV is formed in suboccipital triangle from where it goes through the canal formed by the foramina transversaria of cervical vertebra to open at the root of neck into the brachiocephalic vein. The DCV is also formed in the suboccipital region and ends in the lower part of VV.¹²

Regarding the function of craniocervical venous valves, it has been proved that competent valves of the IJV¹³, EJV¹⁴ and VV¹⁵ prevent the retrograde flow of cephalic venous blood in these veins. However, the sudden thoraco-abdominal compression in traumatic asphyxia causes acute incompetence of these valves resulting in characteristic venous discoloration of the head and neck. In contrast to this, the congestion and petechiae are not seen over lower body due to the inferior vena cava compression as a result of Valsalva maneuver produced subsequent to pre-impact fear response¹⁶.

In the present study, the case showed unusual facial congestion in the form of involvement of chin and adjacent neck region especially in the upper left neck region only. The reason for such left sided neck congestion may be due to compression of chest on left side. However, it showed well demarcated area between the congested area and normal area. This demarcation is characteristic of venous congestion caused by circumstances that are compatible with traumatic asphyxia such as entrapment beneath or within motor vehicles, or under heavy objects¹⁷. Abrasion present in the left side of mid neck region suggest the congestion in the chin and upper left neck region might be due direct trauma also. However, the congestion is at higher level than abrasion that is at the traumatic site.

In this case, all the clinical examinations and investigations revealed no any abnormality that may lead to death. However, death occurred within 24 hours of declaring that she was alright. The cause of death as per postmortem examination was found to be traumatic asphyxia contributed by compression of trachea by upper neck haematoma. The reason behind undetectable neck haematoma found at postmortem examination, by ultrasonography might be due to USG performed immediately after the incident while the haematoma contributing to cause of death might take some time for its formation and enlargement to the enough size to compress the trachea. Fractured ribs which were not detected in X-ray might be due to proper approximation or they might be fractured at terminal stage resuscitation.

CONCLUSION

When characteristic findings of traumatic asphyxia are detected in trauma patients, apart from quickly eliminating organ pathologies and initiation of supportive therapy, possibility of formation of hematoma in neck after few hours of sustaining injury should also be considered. The neck hematoma finding in this present study suggests that the clinicians should keep on re-examining such patient for neck hematoma for at least 24 hours of getting injured and also to make them aware that this type of hematoma may contribute to the cause of death. This knowledge will definitely help the clinician to save such patients by taking the needful steps.

REFERENCES

1. Richards CE, Wallis DN., Asphyxiation: a review. *Trauma* 2005;7:37–45.
2. Conroy C, Stanley C, Eastman BA. Asphyxia: a rare cause of death for motor vehicle crash occupants, *Am J Forensic Med Pathol* 2008;29:14–8.
3. Lowe L, Rapini RP, Johnson TM. Traumatic asphyxia. *Journal of the American Academy of Dermatology* 1990;23(5):972–4.
4. Williams JS, Minken SL, Adams JT. Traumatic asphyxia—reappraised. *Ann Surg* 1968;167(3):384–92.
5. Jongewaard WR, Cogbill TH, Landercasper J. Neurologic consequences of traumatic asphyxia. *J Trauma* 1992;32(1):28–31.
6. Richards CE, Wallis DN. Asphyxiation: a review. *Trauma* 2005;7(1):37–45.
7. Newquist MJ, Sobel RM. Traumatic asphyxia: an indicator of significant pulmonary injury. *American Journal of Emergency Medicine* 1990;8(3):212–5.
8. Conwell HE. Traumatic asphyxia: report of four cases, *J. Bone Joint Surg.* 1927;9:106–10.
9. Lee MC, Wong SS, Chu JJ, et al. Traumatic asphyxia, *Ann Thorac Surg* 1991;51:86–8.
10. Wardrope J, Ryan F, Clark G, et al. The Hillsborough tragedy, *Br Med J* 1991;303:1381–5.

11. Morimoto A, Takase I, Shimizu Y, Nishi K. Assessment of cervical venous blood flow and the craniocervical venous valve using ultrasound sonography. *Leg Med (Tokyo)* 2009;11(1):10-7.
12. G. Gabella, Cardiovascular system, in: L.H. Bannister, M.M. Berry, P. Collins, M. Dyson, J.E. Dussek, M.W.J. Ferguson (Eds.), *Gray's Anatomy: The Anatomical Basis of Medicine and Surgery*, 38th ed. Churchill Livingstone Harcourt Publishers Limited, London, 1995, 1451–626.
13. Fisher J, Vaghaiwalla F, Tsitlik J, et al. Determinants and clinical significance of jugular venous valve competence, *Circulation* 1982;65:188–96.
14. Lipton B. Estimation of central venous pressure by ultrasound of the internal jugular vein. *Am J Emerg Med* 2000;18:432–4.
15. Chou CH, Chao AC, Hu HH, Ultrasonographic evaluation of vertebral venous valves. *Am J Neuroradiol* 2002;23:1418–20.
16. Thompson Jr, Illescas FF, Chiu RC. Why is the lower torso protected in traumatic asphyxia? A new hypothesis. *Ann Thorac Surg* 1989;47:247–9.
17. Byard RW, Wick R, Simpson E, et al. The pathological features and circumstances of death of lethal crush/traumatic asphyxia in adults – a 25-year study. *Forensic Sci Int* 2006;159:200–5.