Archives of Legal Medicine 16 (2025) 200624

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CASE REPORT

# Combined vertebral artery and internal jugular vein transection by broken beer bottle: A forensic case report

**Anna Laura Santunione** [a], **Jessika Camatti** [b,*], **Luca Alemanno** [c], **Rossana Cecchi** [a]

[a] *University of Modena and Reggio Emilia, Modena, Italy*
[b] *University of Parma, Parma, Italy*
[c] *University Hospital Modena, Modena, Italy*

Available online 4 November 2025

**KEYWORDS**
Vertebral artery;
Internal jugular vein;
Broken bottle;
Forensic pathology;
PMCT;
Neck injuries

**Summary** Sharp force injuries to the neck are frequently fatal due to the high density of vital structures. While knives are the most common implements, broken glass bottles are readily available in public settings and can act as lethal stabbing weapons. Most documented cases describe superficial wounds or isolated vascular lesions. We present the first forensic case report of combined vertebral artery and internal jugular vein transection from a glass bottle assault. A 39-year-old man was found dead on a public street, surrounded by blood and scattered glass fragments. Witnesses reported that the assailant smashed a 330-mL green glass beer bottle before stabbing the victim in the neck. Postmortem computed tomography (PMCT) revealed a latero-cervical wound (75 × 40 mm) extending from C3 to C7, complete transection of the left vertebral artery at C6, and multiple irregular radiopaque fragments embedded in surrounding soft tissues. Autopsy confirmed these findings and additionally revealed multiple discontinuities of the left internal jugular vein, dissection of the vagus nerve, and extensive hemorrhagic infiltration of adjacent muscles. Numerous greenish glass fragments were recovered from the wound tract. Death resulted from irreversible haemorrhagic shock due to combined arterial and venous injuries. This case highlights the destructive potential of broken glass bottles, the diagnostic value of PMCT in detecting vascular damage and foreign bodies prior to autopsy, and the clinical relevance of recognising such rapidly fatal injuries. From a preventive standpoint, replacing glassware with shatter-resistant materials in high-risk public venues could reduce the incidence of similar lethal assaults.


* Corresponding author.
*E-mail addresses:* annalaura.santunione@unimore.it (A.L. Santunione), jessika.camatti@unipr.it (J. Camatti), alemanno.luca@aou.mo.it (L. Alemanno), rossana.cecchi@unimore.it (R. Cecchi).

https://doi.org/10.1016/j.aolm.2025.200624

## Introduction

Neck injuries are particularly dangerous due to the high density of vital vascular, nervous, and respiratory structures within a confined anatomical region. Causes of death following sharp force injuries to the neck include hemorrhagic shock from arterial or venous transection — particularly of the carotid or jugular vessels — airway obstruction from blood aspiration, air embolism through open jugular veins, acute cardiac arrest secondary to injury of the medulla oblongata or upper cervical spinal cord, and vasovagal inhibition [1].

While knives are the most common instruments in sharp force assaults, improvised weapons such as broken glass bottles are readily available in public environments and can inflict devastating injuries. In nightlife and urban settings, assaults involving glassware account for a relevant share of alcohol-related violence. It is estimated that 'glassing' incidents represent about 8–9% of alcohol-related assaults in licensed premises in the UK and Australia, particularly involving young intoxicated males in pubs and nightclubs [2]. Nolan et al. (2012) classified these objects as ''impulsive weapons'', highlighting their potential to inflict irregular, deep wounds capable of severing major vascular and neural structures [3]. The fracture patterns of glass bottles generate alternating sharp and blunt edges, producing distinctive injury morphologies that are important for forensic interpretation [3].

To our knowledge, no previously published case has documented the combined transection of the vertebral artery and the internal jugular vein from a broken beer bottle attack. We present this unusual homicide, documented through postmortem computed tomography (PMCT) and autopsy, with emphasis on wound morphology, mechanism of injury, and the implications for both forensic practice and public safety prevention strategies.

## Observations

The victim, a 39-year-old male, was found supine on a public street in a pool of blood, with multiple glass fragments — some blood-stained — scattered nearby. Witnesses reported a prior altercation over drug-related disputes, during which the assailant smashed a green 330-mL beer bottle against a concrete pillar before pursuing the victim. Testimonies consistently indicated a specific brand of beer, and on the crime scene the recovered fragments were greenish in color; one shard still bore a label consistent with the brand described by witnesses.

The Public Prosecutor ordered PMCT, external examination, and autopsy.

PMCT was performed with a 64-slice scanner (LightSpeed VCT 64; GE Healthcare). Whole-body scout views and a volumetric acquisition (slice thickness 1.25 mm, interval 1 mm) were obtained, with standard parameters (300–400 mA, 120–140 kV). Images were reconstructed in multiple planes and archived in the Picture Archiving and Communication System (PACS).

Whole-body PMCT demonstrated a left latero-cervical wound extending from C3 to C7, with exposure of transverse processes. The left vertebral artery was completely transected at the level of C6, associated with a small bone avulsion fragment (8 × 2 mm) (Figs. 1 and 2). Multiple irregular radiopaque foreign bodies ($\leq$ 4 mm) were detected within the surrounding soft tissues. No additional traumatic injuries were identified.

External examination revealed extensive blood staining of clothing and skin, sparse hypostasis, and pale mucous membranes. A large semicircular stab wound (75 × 40 mm), concavity facing superiorly, was located in the left latero-cervical region, with both ends acutely angled (Fig. 3). Wound depth was uneven — shallower anteriorly and deeper posteriorly — accompanied by irregular tissue dilacerations and marked hemorrhagic infiltration. Multiple superficial wounds (65 × 35 mm area) were present cranially.

At autopsy, dissection of the wound tract showed: full-thickness skin and platysma disruption; complete transection of the sternal head of the sternocleidomastoid muscle; multiple discontinuities of the left internal jugular vein approximately 60 mm above the clavicle (Fig. 4a); transection of the left vagus nerve approximately 70 mm above the clavicle (Fig. 4b); intact left carotid artery with marked perivascular hemorrhage (Fig. 4c); complete transection of the left vertebral artery within the C6 transverse foramina (Fig. 4d); dissection of the left C6 nerve root and extensive

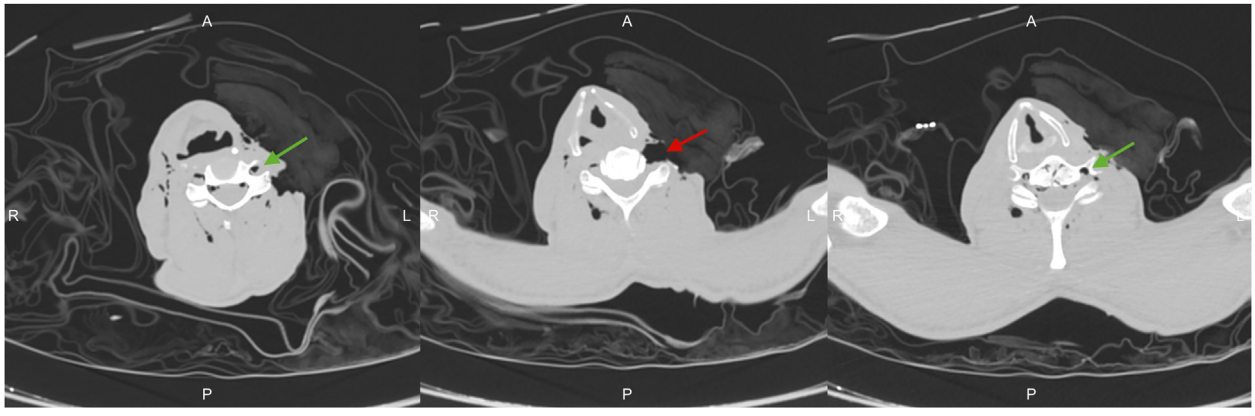


**Figure 1** Sequential PMCT images (a–c) showing the course of the left vertebral artery, outlined by intraluminal air, which delineates its trajectory (green arrow). The interruption of the vessel is evident at the site of the traumatic lesion (red arrow). A: anterior; P: posterior; R: right; L: left.

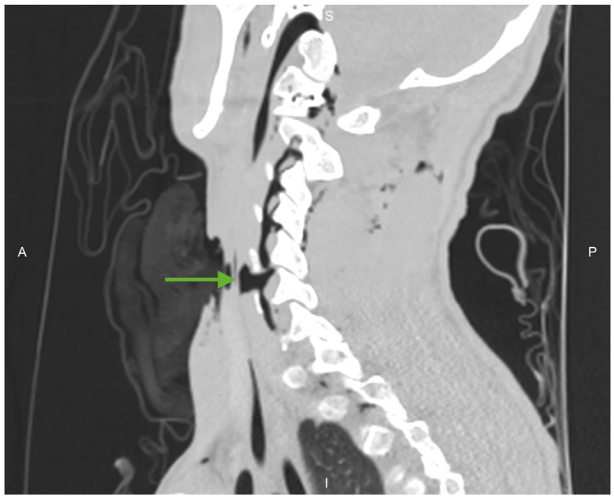


**Figure 2** Sagittal multiplanar reconstruction of the PMCT demonstrating the course of the left vertebral artery, outlined by intraluminal air, with clear visualization of the site of vessel interruption (green arrow). A: anterior; P: posterior; R: right; L: left.

**Figure 3** Left latero-cervical region, external examination. Large semicircular stab wound with acute ends, concavity facing superiorly, and multiple superficial stab wounds cranial to it.

hemorrhage in the scalene and levator scapulae muscles, with exposure of the transverse processes from C3 to C7, consistent with direct penetration by glass fragments. Numerous greenish glass fragments were retrieved during wound plane dissection. Other organs displayed multi-visceral pallor, consistent with severe anemia.

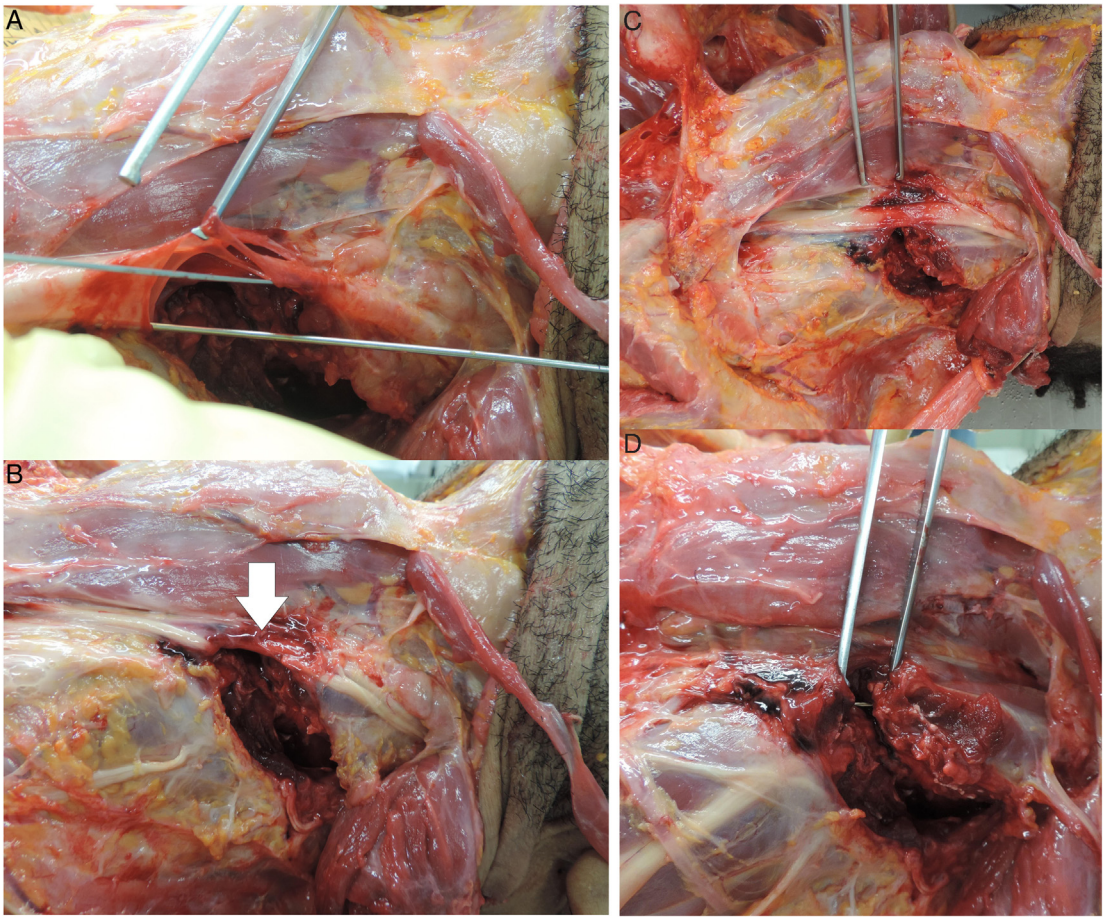


**Figure 4** Autopsy of left latero-cervical region: a: multiple discontinuities of the left internal jugular vein (calipers/specillum); b: dissection of the left vagus nerve (arrow); c: hemorrhagic infiltration adjacent to intact left carotid artery (calipers); d: transection of left vertebral artery at C6 (calipers).

The cause of death was determined to be irreversible hemorrhagic shock resulting from the combined transection of the left internal jugular vein and left vertebral artery. The death was classified as homicide, later corroborated by video footage recovered during the investigation.

Indeed, the homicide was documented by closed-circuit television (CCTV) from a nearby commercial premises. Although the video, recorded from a distance and at low resolution, did not allow precise measurement of speed or biomechanical force, it clearly showed the dynamics of the assault: the assailant, on foot, waited for the victim, who was riding a bicycle, and then suddenly struck him with a single, forceful blow to the neck. Immediately after the aggression, the perpetrator fled the scene, while the victim staggered for a few seconds before collapsing to the ground. Bystanders promptly alerted the emergency services, which arrived within approximately 15 minutes.

## Discussion

This case illustrates the destructive potential of broken glass bottles when used as stabbing weapons, producing complex neck injuries involving multiple vital structures. Previous literature mainly describes either superficial glass-related injuries or isolated vascular lesions [4,5]. To our knowledge, no previous case has reported the combined transection of the vertebral artery and the internal jugular vein from such an implement.

The vertebral artery is anatomically well-protected within the transverse foramina of the cervical vertebrae, while the internal jugular vein lies more superficially along the sternocleidomastoid muscle. A simultaneous injury to both vessels require a specific penetration trajectory and considerable force, making this lesion biomechanically exceptional. In our case, the trajectory was directed superior-to-inferior and postero-anterior, consistent with the observed exposure of the transverse processes from C3 to C7. Such a pathway implies the application of substantial kinetic energy, sufficient to reach deeply located structures such as the vertebral artery within the transverse foramina. The semicircular outline and alternating sharp-blunt edges correspond to fracture patterns previously described in broken glass bottle injuries [3]. Notably, the absence of defensive wounds, the lack of a weapon at the scene, and corroborating video evidence excluded accidental or suicidal mechanisms.PMCT proved invaluable for pre-autopsy planning, enabling detection of vertebral artery injury and radiopaque glass fragments, thus orienting the subsequent autopsy dissection. This is particularly relevant, as the vertebral artery is not among the vascular structures most frequently examined by forensic pathologists in routine cases. PMCT therefore enhanced diagnostic accuracy and contributed to a more complete reconstruction of the mechanism of injury, in agreement with prior studies demonstrating the utility of postmortem imaging [6—8].

Based on CCTV footage, the victim remained conscious only for a few seconds after the attack, staggering briefly before collapsing. This finding is consistent with the literature, which indicates that massive cervical vascular injuries — particularly those involving both arterial and venous transection — cause irreversible hemorrhagic shock within minutes [9]. Even in a pre-hospital setting, survival is extremely unlikely: rapid airway control and hemorrhage management represent the only possible interventions, but in cases of combined jugular vein and vertebral artery transection, the window for effective resuscitation is critically narrow. Recognizing such injuries must nevertheless be part of the professional skill set of emergency physicians and paramedics, even though immediate lethality often precludes successful treatment.

Although this case is unique for the combined transection of the vertebral artery, internal jugular vein, and vertebra by broken glass, comparison with similar reports helps situate it within the literature. Reviews of vertebral artery injuries in cervical spine trauma show that lesions are most often associated with fractures of the transverse foramina or penetrating trauma, and are frequently fatal due to massive hemorrhage and ischemic complications [10]. Rare case reports of glass-related neck trauma or injuries from unusual objects such as bottle caps confirm that sharp glassware can act as lethal improvised weapons, but generally describe isolated vascular lesions or superficial wounds [5,6,10]. The present case therefore remains exceptional for the simultaneous disruption of two major cervical vessels and adjacent bony structures.

Finally, some limitations should be acknowledged. Although CCTV footage confirmed the sudden and forceful dynamics of the attack, its low resolution and distance precluded precise quantification of the speed or biomechanical force applied. Moreover, the lack of real-time haemodynamic data at the scene limited our ability to correlate clinical parameters with the observed survival interval.

From a preventive standpoint, the availability of glass bottles in public venues represents a modifiable risk factor for severe interpersonal violence. Measures such as replacing glassware with shatter-resistant materials and increasing awareness among venue operators, as suggested by Lancia et al. (2019) [5], could reduce the incidence of similar lethal assaults.

## Conclusions

Broken glass bottles can cause exceptionally severe cervical injuries, as shown by this unique case of combined vertebral artery and internal jugular vein transection. PMCT proved valuable in detecting vascular damage and glass fragments before autopsy. Greater awareness of such mechanisms is crucial for forensic and emergency practice, and preventive measures limiting glassware use in public venues may reduce similar fatalities.

## Funding declaration

The authors did not receive support from any organization for the submitted work.

## Authors' contribution declaration

All the authors contributed to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript.

## Human ethics and consent to participate declarations

Not applicable.

## Data availability declaration

All relevant data are within the paper.

## Disclosure of interest

The authors declare that they have no competing interest.

## Acknowledgements

None.

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