Delayed headache 11 years after a pub fight: an unusual spontaneous intracerebral hemorrhage succeeding a temporal glass shard injury. Illustrative case

Attil Saemann, MD,1 Victor Schulze-Zachau, MD,2 Raphael Guzman, MD,1,3 and Gregor Hutter, MD, PhD1,3

1Department of Neurosurgery, and 2Diagnostic and Interventional Neuroradiology Department, University Hospital of Basel, Basel, Switzerland; and 3Faculty of Medicine, University of Basel, Basel, Switzerland

BACKGROUND Intracerebral hemorrhage (ICH) in young patients is rare and often associated with vascular malformations, drug abuse, or genetic conditions. Early diagnosis and treatment are critical because of the potential risk of rebleeding and long-term consequences. This case report presents an unusual correlation between a prior traumatic incident and the manifestation of an atypical ICH 11 years later.

OBSERVATIONS A 37-year-old male presented with retroorbital headaches, confusion, and seizures. Imaging revealed an atypical ICH in the left middle temporal gyrus, accompanied by retained glass shards in the adjacent temporal muscle and bone. Angiography ruled out vascular malformations but suggested an eroded middle cerebral artery branch underneath an osseous defect potentially caused by a bone-transgressing glass shard. Surgical exploration confirmed the vessel as the source of the ICH and was followed by an uneventful hematoma removal and postoperative course.

LESSONS This case underscores the significance of recognizing delayed complications resulting from retained foreign bodies (FBs). Complete removal of extracranial FBs is imperative to prevent further harm. Clinicians should maintain an awareness of the potential long-term consequences and complications associated with FBs, utilizing comprehensive diagnostics to detect and localize FBs. Timely intervention such as resection or planned follow-up is essential for effective management and mitigation of adverse outcomes.

https://thejns.org/doi/abs/10.3171/CASE23364

KEYWORDS ICH; glass; cortical vessel; seizure

Nontraumatic intracerebral hemorrhage (ICH) is a critical health problem traditionally associated with older (age >50 years) adults and is often linked to hypertension or vasculopathies.1 Spontaneous ICH in patients younger than 50 years is surprising and may hint at potentially dangerous vascular malformations, coagulopathies, or tumors.2 Their relatively rare occurrence and varied causes can make diagnosis and treatment more complicated in this age group.3 Although clinical presentation can be similar across age groups, the causes of ICH in young patients differ from those in the older population. Among these, vascular malformations (arteriovenous malformation [AVMs], cavernomas, aneurysms), drug abuse (especially stimulants and anticoagulants), and certain genetic conditions play a significant role.2,4 Early identification and prompt treatment of ICH in young patients is crucial because of the profound impact on their quality of life and long-term health and the potential risk of rebleeding. Although it is less prevalent in the older population, ICH in younger patients warrants dedicated research and public health attention because of its significant implications for morbidity and mortality.2,4 Even though the concept of delayed ICH after traumatic brain injury (TBI) is well known, our case presents a unique association between the initial trauma, a hit from a glass bottle to the head, and the manifestation of the atypical ICH 11 years later.

ABBREVIATIONS 3D = three-dimensional; AVM = arteriovenous malformation; CSF = cerebrospinal fluid; CT = computed tomography; CTA = computed tomography angiography; DSA = digital subtraction angiography; FB = foreign body; ICH = intracerebral hemorrhage; MCA = middle cerebral artery; NC-CT = noncontrast computed tomography; NIHSS = National Institutes of Health Stroke Scale; TBI = traumatic brain injury.

INCLUDE WHEN CITING Published September 4, 2023; DOI: 10.3171/CASE23364.
© 2023 The authors, CC BY-NC-ND 4.0 (http://creativecommons.org/licenses/by-nc-nd/4.0/)
Illustrative Case

A 37-year-old male patient was referred to our tertiary treatment center after a generalized seizure. The patient complained of retro-orbital headaches for 2 days, whereas on the day of the presentation, he showed noticeable confusion and slightly slurred speech. Later he was not able to communicate and showed upward eye tilt, foaming at the mouth, and subsequent tonic-clonic generalized utterances. No recent history or evident signs of head injury, hypertension, or malignoma were present. On arrival, he presented with a Glasgow Coma Scale score of 14 and National Institutes of Health Stroke Scale (NIHSS) score of 2 and was slightly disoriented and normotensive. He showed no focal neurological deficit, and his pupils were reactive. For further diagnosis, we obtained an immediate noncontrast computed tomography (NC-CT) and computed tomography angiography (CTA) of the head, which showed an atypical ICH of 43 × 22 × 60 mm with perifocal edema in the left middle temporal gyrus, extending to the lateral surface of the temporal lobe, without signs of mass effect or cerebrospinal fluid (CSF) circulation disturbance (Fig. 1A). There was no suspicion of a vascular malformation or signs of an aneurysm or venous thrombosis. We identified several hyperdense triangle-shaped objects with a mean attenuation of 2080 HU in the suprazygomatic masticator space on the left side and in the adjacent subcutaneous soft tissue (Fig. 1B). One of these objects was located deep within the temporalis muscle and was oriented with its tip toward a focal osseous defect within the temporal bone with a close spatial relationship to the hemorrhage.

After detailed interrogation, the patient reported an incident from 11 years ago when he was hit by a glass bottle during a pub fight with subsequent percutaneous penetration of several fragments. He had presented to a different hospital then with presumably incomplete removal of the fragments. He stated that he still could feel the movement of glass fragments while masticating. The patient was admitted to the surveillance unit and started on antiepileptic medication. Because the patient mentioned a venous thrombosis in his arm from 2 years ago, an additional hematological workup was initiated, which excluded coagulation disorders such as thrombophilia or anti-phospholipid syndrome. Digital subtraction angiography (DSA) showed no evidence of vascular malformation or aneurysms as a potential source of bleeding (Fig. 1C and D). However, three-dimensional (3D) rotational angiography with an injection of the left internal carotid artery and with reconstruction in high spatial resolution revealed a small terminal middle cerebral artery (MCA) branch located just beneath the above-mentioned osseous defect with abrupt discontinuation (Fig. 1E).

The imaging findings were discussed during an interdisciplinary meeting and deemed to be highly suggestive of secondary ICH with underlying vascular injury from the glass fragment. The patient was scheduled for navigation-assisted operative exploration and hematoma evacuation.

Intraoperatively, we removed several residual glass shards from the deep layers of the temporal muscle. A clearly circumscribed calvarial opening with a penetrating piece of glass could be exposed temporobasally. After resecting the small glass shard and enlarging the osseous defect with a Kerrison instrument, a microsurgery was performed. Underneath the preexisting opening of the scull, a focal defect of the dura and an eroded ball of vessels became apparent. After opening of the dura, the ICH adjacent to the eroded vessel was visualized. We identified the above-mentioned cortical vessel, which was bleeding when manipulated gently, further giving evidence to the origin of the ICH (Fig. 1F and G). The eroded formation of the vessel, which showed an enlarged diameter and multiple damages to its wall, was excised microsurgically, and the ICH was completely evacuated.

Postoperatively, the patient showed complete regression of the headaches and no new neurological deficits. He was discharged home on the third postoperative day in an improved general condition.

Patient Informed Consent

The necessary patient informed consent was obtained in this study.

Discussion

This case illustrates an exceptionally delayed complication of a retained foreign body (FB) by a repetitive abrasive motion of an intramuscular glass shard with subsequent osseous erosion and secondary intracranial vascular injury. Generally, the presence of retained foreign objects can lead to acute complications such as infection, inflammation, and scarring, as well as more delayed complications such as chronic pain and migration of the object within the body.5,6 Especially within soft tissue structures, secondary migration of a dense object, such as glass, can lead to site-specific injury of vascular or neural structures in a delayed fashion, with potentially devastating effects.7,8

FBs are a notable aspect within the context of traumatic wounds observed in patients seeking treatment in emergency departments. These retained materials constitute a considerable proportion, accounting for approximately 7% to 15% of cases, particularly when injuries involve the extremities.9,10 Although certain FBs can be easily identifiable, others can exhibit asymptomatic characteristics and go unnoticed. It has been observed that a significant proportion, up to 38%, of FBs evade detection during the initial physical examination.11 The presence of a FB triggers an intriguing granulomatous tissue response referred to as an “FB reaction.”12 This reaction signifies the body’s pathological endeavor to isolate the foreign object from the host tissue. Glass, metal, and wood are among the most commonly encountered materials as FBs.

Given the high availability of a range of imaging possibilities, allowing for a prompt examination within an emergency room setting, a thorough examination and consecutive excision of an FB is vital. The literature discusses various options for imaging modalities, which differ in disposability and scope. Multiple case reports, as well as one meta-analysis, indicate the relatively high sensitivity and specificity of ultrasound to accurately identify an FB consisting of various materials.10,13 Ultrasound additionally offers the advantage of real-time guidance when resecting FBs.13 For a hyperdense FB, especially when embedded in deeper-lying structures, radiography-based detection remains the first-line choice because of its broad availability and low-cost.14 If neither radiography nor ultrasound is able to visualize an FB but clinical suspicion remains high, further imaging with CT or magnetic resonance imaging is indicated.14

In our case, the patient described a persistent “crunching” sensation when opening and closing his mouth. A series by Steele et al.15 observed that patients who perceived the presence of a glass fragment in their wounds had a higher prevalence when the wound actually contained glass (41%) compared to cases in which no glass was present (17%). Nevertheless, it is noteworthy that this subjective sensation exhibited a relatively low predictive value (31%) in accurately identifying a retained glass FB.15 Consequently,
these findings suggest that such reports should primarily serve as a supplementary indicator, warranting further diagnostic workup.

In today’s age of increasing medicolegal proceedings, a comprehensive workup of wounds contaminated with an FB and subsequent resection or planned follow-up seem to increase in importance, especially when considering the possible consequences due to its array of possible complications over the short and long term. If complete removal of the FB is not achievable, follow-up can be considered in these cases, avoiding possible bad surprises.

Observations
To the best of our knowledge, this is the first report of a primarily extracranial FB (i.e., glass shards) that transgressed the skull bone over time, most probably by repetitive temporal muscle activity, leading to dural penetration, cortical vessel erosion, and, subsequently, ICH. The submuscular position of the culprit shard is critical in this process since contraction of the temporal muscle during mastication must invariably press this fragment against the temporal bone. This illustrative case aimed to increase awareness of this rare occurrence and to emphasize the utility of early resection or follow-up.
The main limitation of this study lies in its nature. A case report cannot provide strong evidence for the hypothesized causative pathophysiology.

Lessons
Foreign objects, especially those within or near mobile body parts and muscles, can have the tendency to erode underlying bony structures. This is especially relevant for extracranial foreign objects since penetration inside the neurocranium can be associated with severe complications. Complete removal of extracranial foreign parts may thus be warranted to prevent further harmful sequelae. Deeply located and difficult-to-reach foreign objects should not be omitted during removal.

References

Disclosures
Dr. Hutter reported grants from Leica outside the submitted work.

Author Contributions
Conception and design: Saemann, Hutter. Acquisition of data: Saemann, Schulze-Zachau, Hutter. Analysis and interpretation of data: Saemann, Schulze-Zachau, Hutter. Drafting the article: Saemann. Critically revising the article: all authors. Reviewed submitted version of manuscript: all authors. Approved the final version of the manuscript on behalf of all authors: Saemann. Administrative/technical/material support: Schulze-Zachau, Guzman. Study supervision: Guzman, Hutter.

Correspondence
Attill Saemann: University Hospital of Basel, Switzerland. attill.saemann@bluewin.ch.