



Case #151

NAME Educational Activities Committee

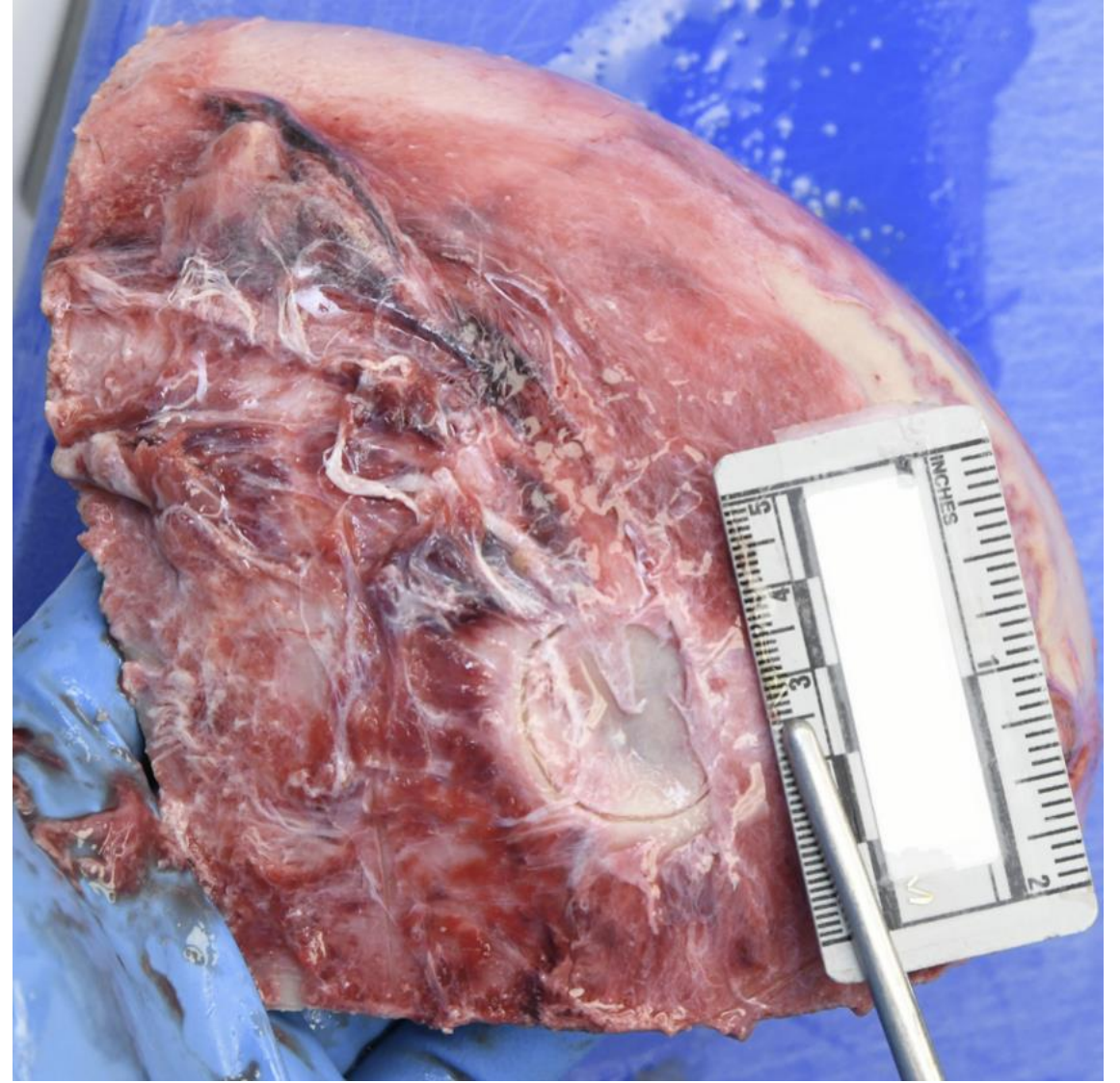
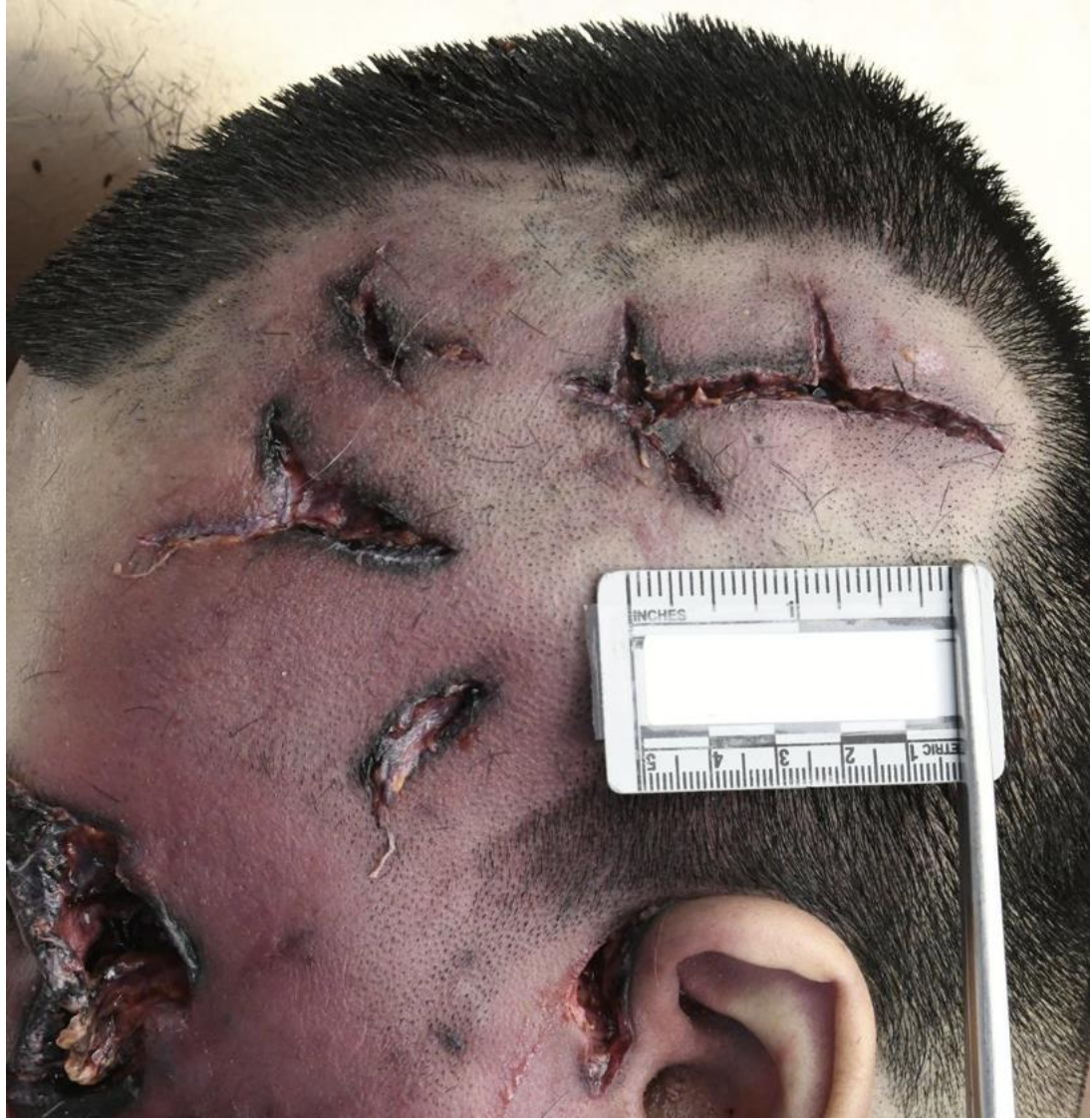
Case provided by:

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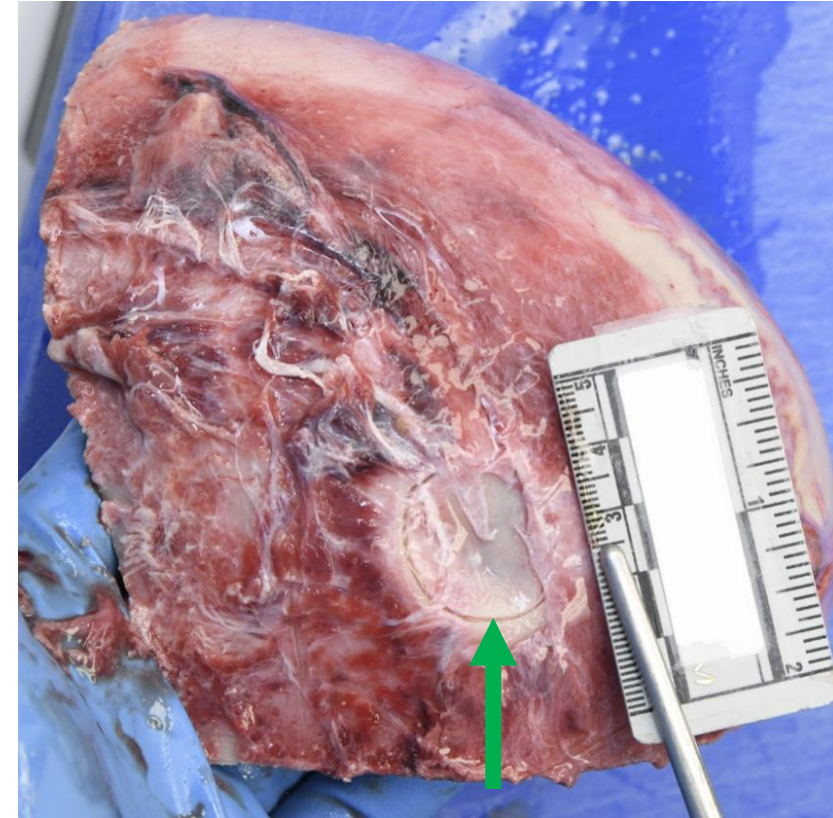
Based on the provided images, what is the most likely cause of the observed finding?

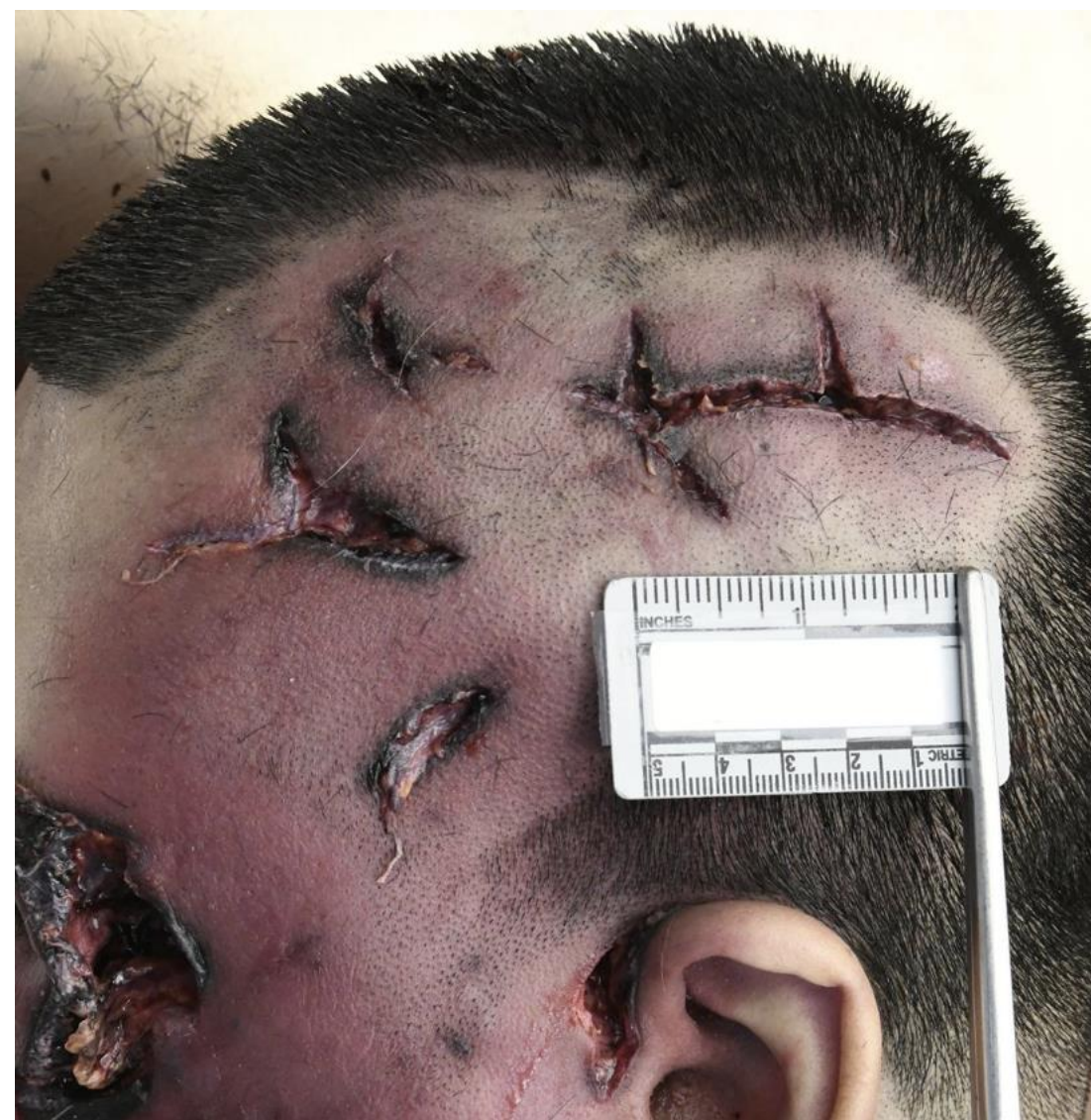
- A. Blunt force trauma due to fall from height.
- B. Blunt force trauma due to assault by hammer.
- C. Blunt force trauma due to assault by a metal cylindrical tube.
- D. Gunshot wound following passage through intermediary target.

B. Blunt force trauma due to assault by hammer.

The images depict a depressed skull fracture (*green arrow, outer table*), which is caused by localized blunt force trauma, where a high-energy impact is focused onto a concentrated surface area of the cranium, causing bone fragments to fracture and displace inward beyond the thickness of the surrounding calvarium.

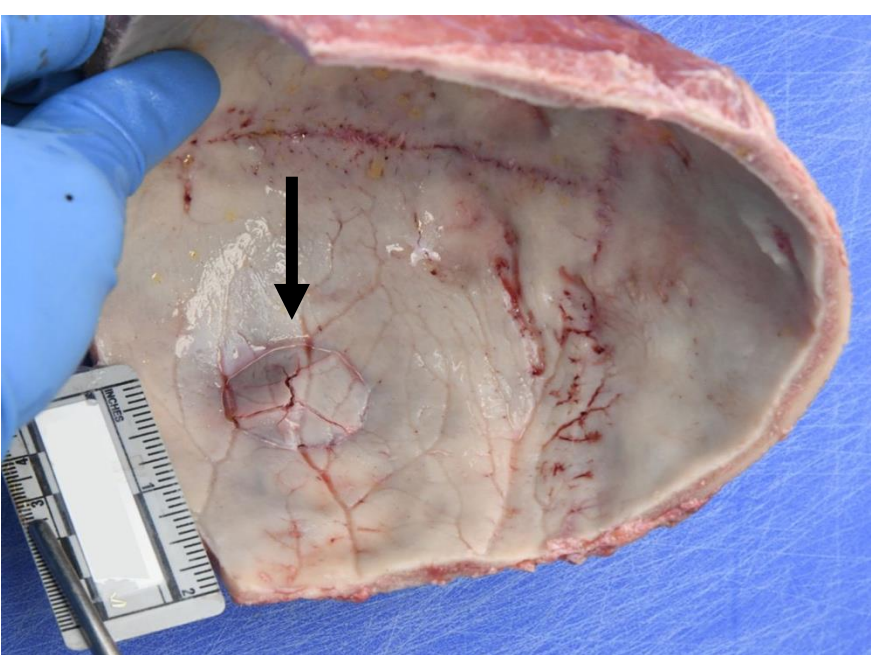
This specific fracture pattern is highly diagnostic of the wounding mechanism, typically indicating a direct blow from a dense, patterned object (such as a hammer or the end of a metal pipe). In many cases, the fracture morphology mirrors the hammer face, creating a patterned injury.





Perpendicular blows (e.g., from a hammer, pipe, bottle, or a fall onto a hard surface) typically produce straight, semicircular, or stellate (star-shaped) lacerations, with the exact shape depending on the skull contour, thickness of the subcutaneous tissue, and other local factors.

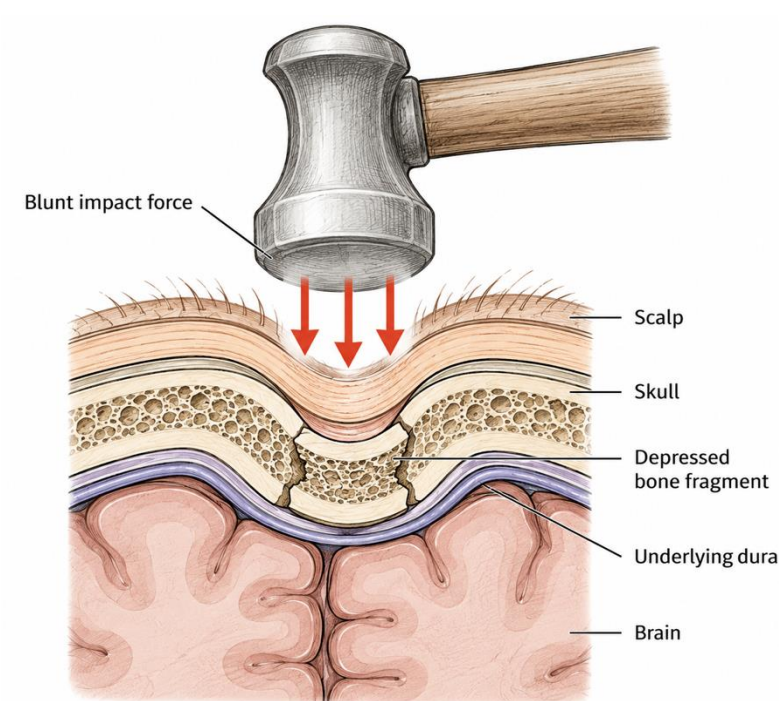
Severe impacts from **hammers** may reproduce the profile of the striking surface, either completely or partially. For example, a circular-faced hammer may produce a circular scalp defect, although more commonly only a segment or arc of the circular outline is present. In these cases, the portion of the edge that penetrates most deeply can provide an indication of the angle at which the blow was delivered.



Inner table view of the depressed skull fracture in the same case



Depressed skull fracture – radiographic finding in the same case

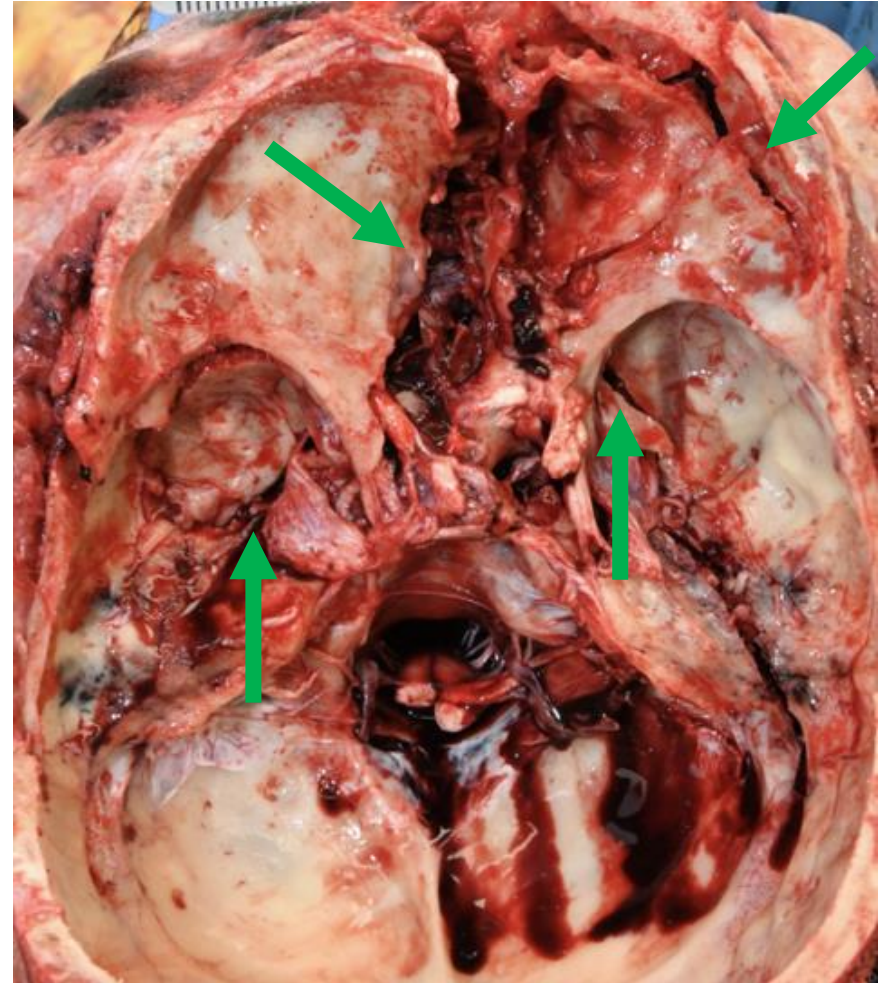
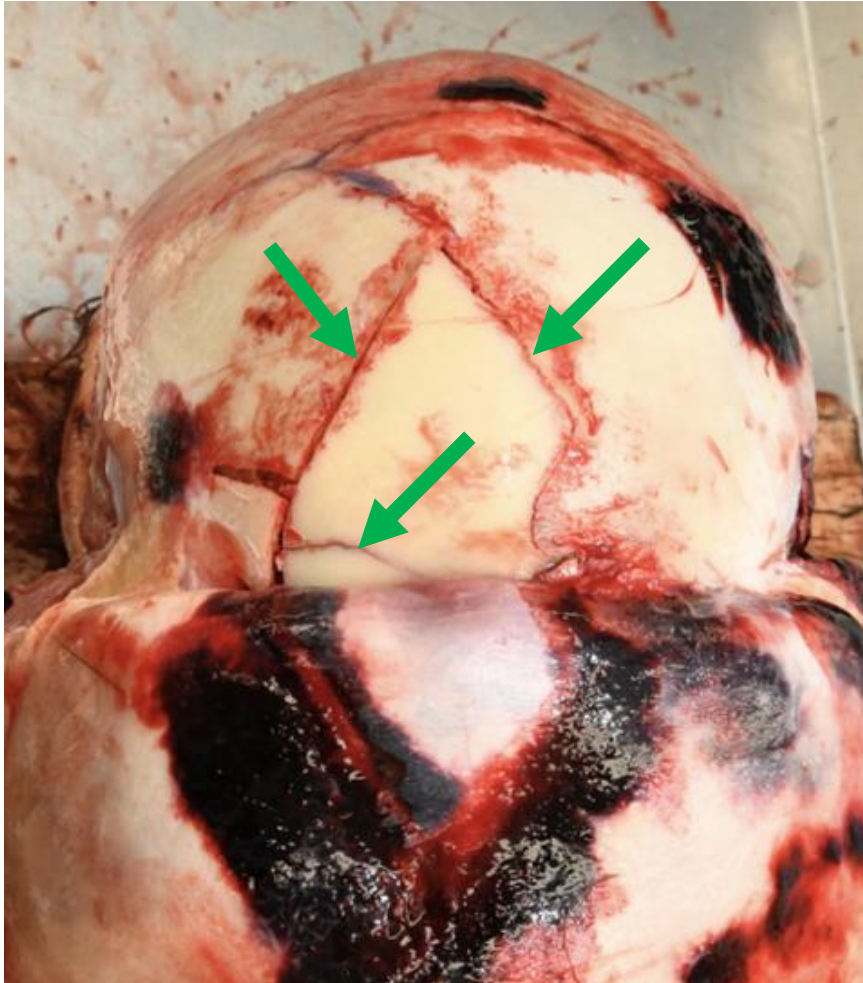


Graphic representation of the trauma dynamic – content generated with AI

In some cases, the underlying skull exhibits a depressed fracture that reflects the shape and size of the impacting object. However, the intervening scalp may cause the bony defect to be slightly larger than the weapon itself. A depressed fracture is not invariably present, and the impact may instead produce one or more linear fractures radiating from the site of impact.

A. Blunt force trauma due to fall from height.

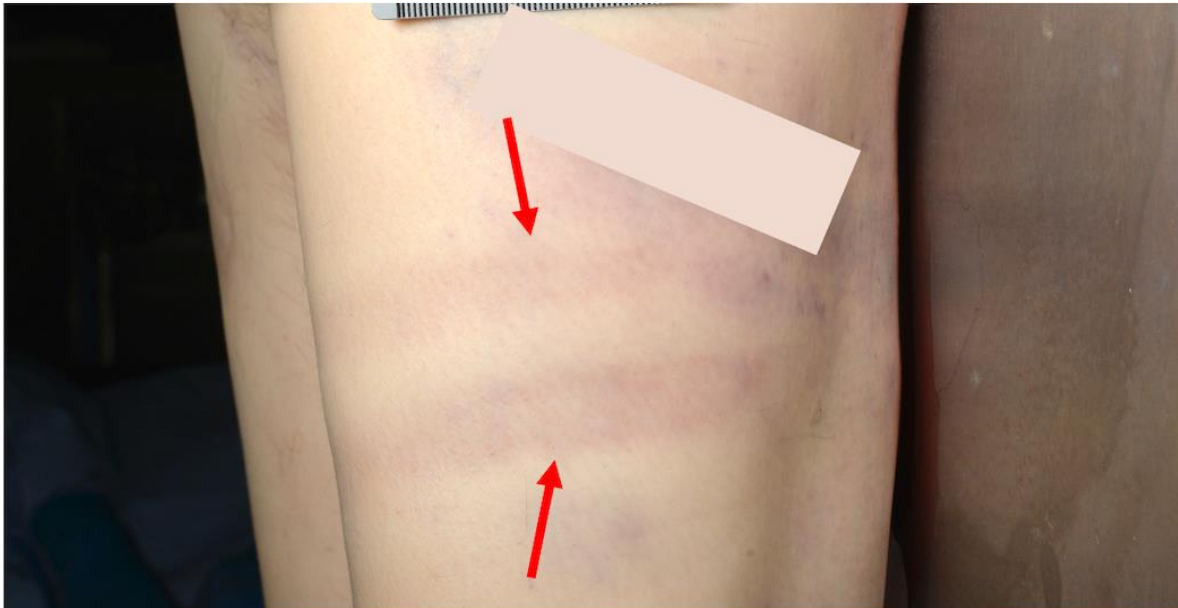
Falls more often produce irregular linear, comminuted, or basilar skull fractures that reflect the point and nature of impact. The well-defined, focal depressed defect seen here is more characteristic of impact from a small, concentrated blunt object.



C. Blunt force trauma due to assault by a metal cylindrical tube

Blunt force injuries from long objects such as from a metal round tube distributes force over a larger contact area. The impact typically produces a “tram track”-like bruise with a pale, undamaged central skin area lined on either side by 2 parallel lines of bruising. Lacerations of the scalp, when present, can be elongated and sometimes hard to distinguish from incised wound and skull fractures are generally linear.

The localized patterned depressed fracture showed in this case is more consistent with the flat disc face of a hammer, which produces a sharply punched, flat-bottomed circular depression.



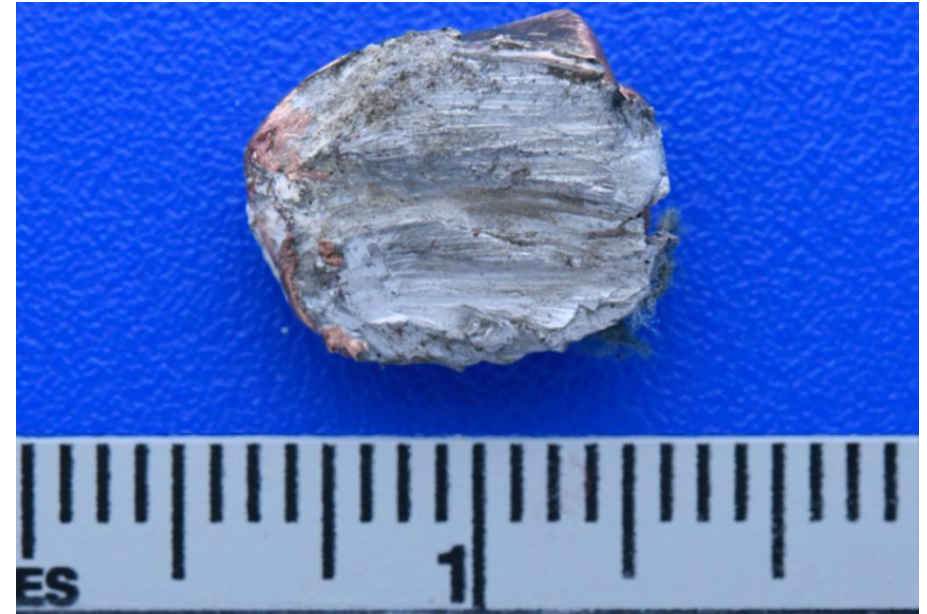
Example of “tram track” bruise on the lower extremity

(Image from PathologyOutline.com:
<https://www.pathologyoutlines.com/topic/forensicsbluntforce.html>)

D. Gunshot wound following passage through intermediary target

Although intermediary targets may result in velocity loss of a projectile and create atypical wounds, gunshot injuries to the skull generally demonstrate features of ballistic trauma, including perforation defects to the skin. The injuries shown in the photos are traditional lacerations from blunt force trauma with an associated depressed fracture that reflects the shape of a blunt impact surface rather than a projectile.

However, depressed fractures due to ricochet bullets have rarely been described [ref. 6].



Top: Numerous irregular entrances and pseudoentrances from ricochet bullets; bottom: example of ricochet bullet. From: *Gitto L. Medicolegal investigation of gunshot wounds: a narrative review. Korean Journal of Legal Medicine. 2025;49(4):111-132. doi: 10.7580/kjlm.2025.49.4.111*

References

1. Ramsthaller F, Kettner M, Potente S, Verhoff MA, Seibert H, Reis M, Diebels S, Roland M. Hammer blows to the head. *Forensic Sci Int*. 2019 Aug;301:358-370. doi: 10.1016/j.forsciint.2019.05.045.
2. Gitto L, Arunkumar P, Maiese A, Bolino G. A simple depressed skull fracture in an old man with Paget disease: forensic implications in a rare case. *Med Sci Law*. 2015 Jan;55(1):44-9. doi: 10.1177/0025802414524384.
3. Sulaiman NA, Osman K, Hamzah NH, Amir SP. Blunt force trauma to skull with various instruments. *Malays J Pathol*. 2014 Apr;36(1):33-9.
4. Fersini F, Govi A, Tsokos M, Etzold S, Tattoli L. Examples of tramline bruises in clinical forensic medicine. *Forensic Sci Med Pathol*. 2017 Dec;13(4):508-510. doi: 10.1007/s12024-017-9891-4.
5. Venkatesh VT, Kumar MV, Jagannatha SR, Radhika RH, Pushpalatha K. Pattern of skeletal injuries in cases of falls from a height. *Med Sci Law*. 2007 Oct;47(4):330-4.
6. Alossaif M, Alsalmi S, Al Manasef A, Alomair M. Ricochet Penetrating Head Injury: A Case Report and Brief Review of the Literature. *Cureus*. 2026 Jan 9;18(1):e101179. doi: 10.7759/cureus.101179.