Case #120

NAME Educational Activities Committee

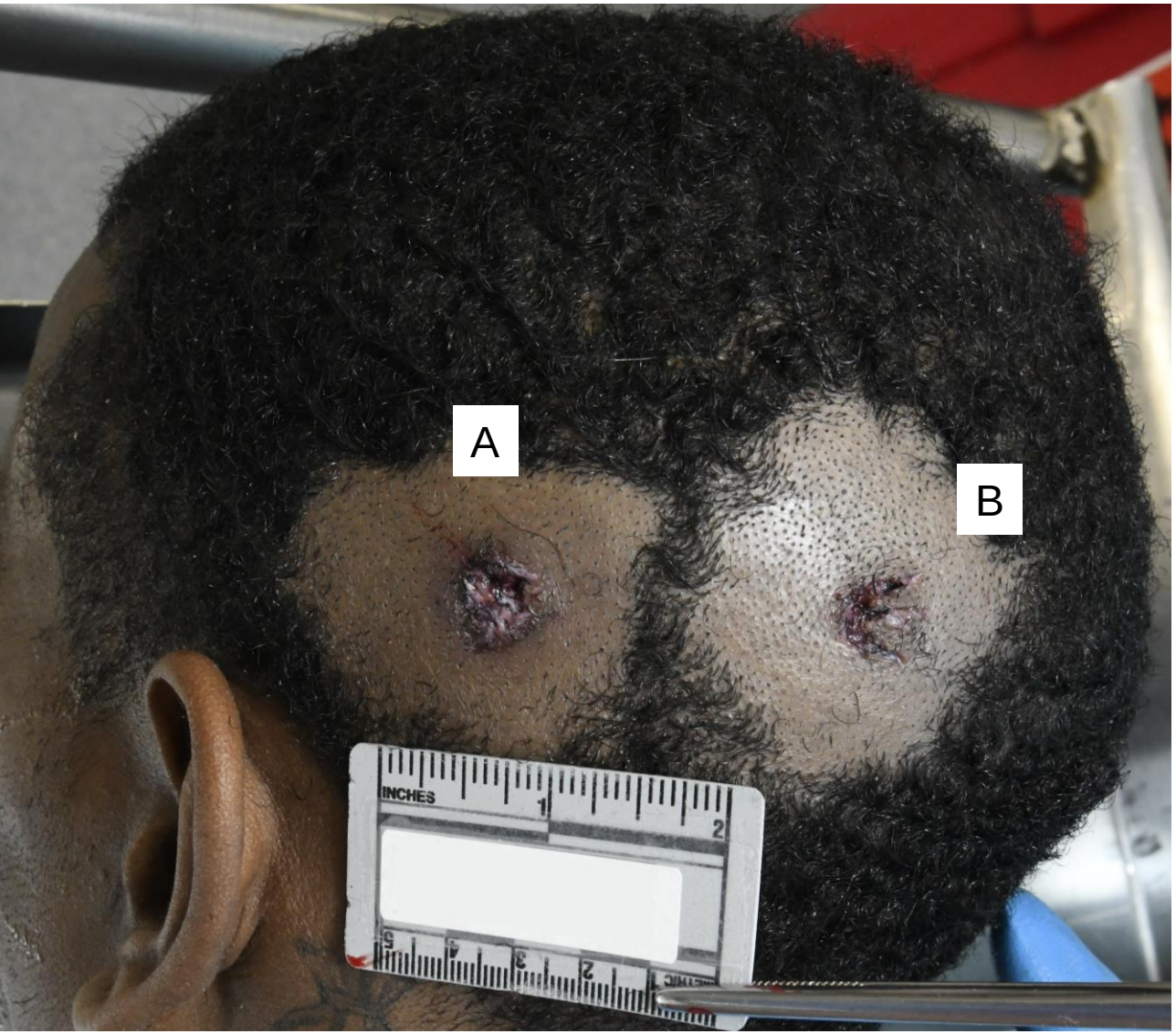
Case provided by:

Bartlomiej Radzik, MD
Assistant Medical Examiner

And

Lorenzo Gitto, MD
Assistant Medical Examiner, Research Director

Cook County Medical Examiner’s Office, Chicago, IL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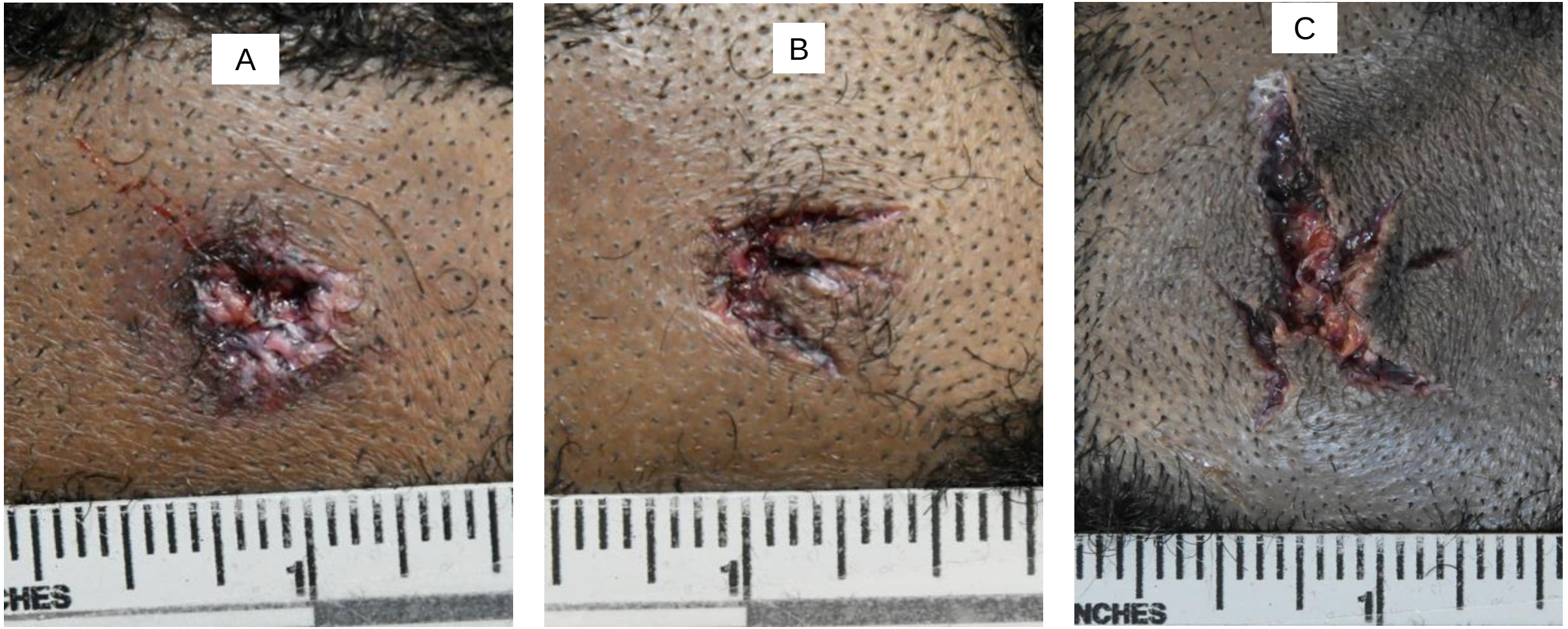
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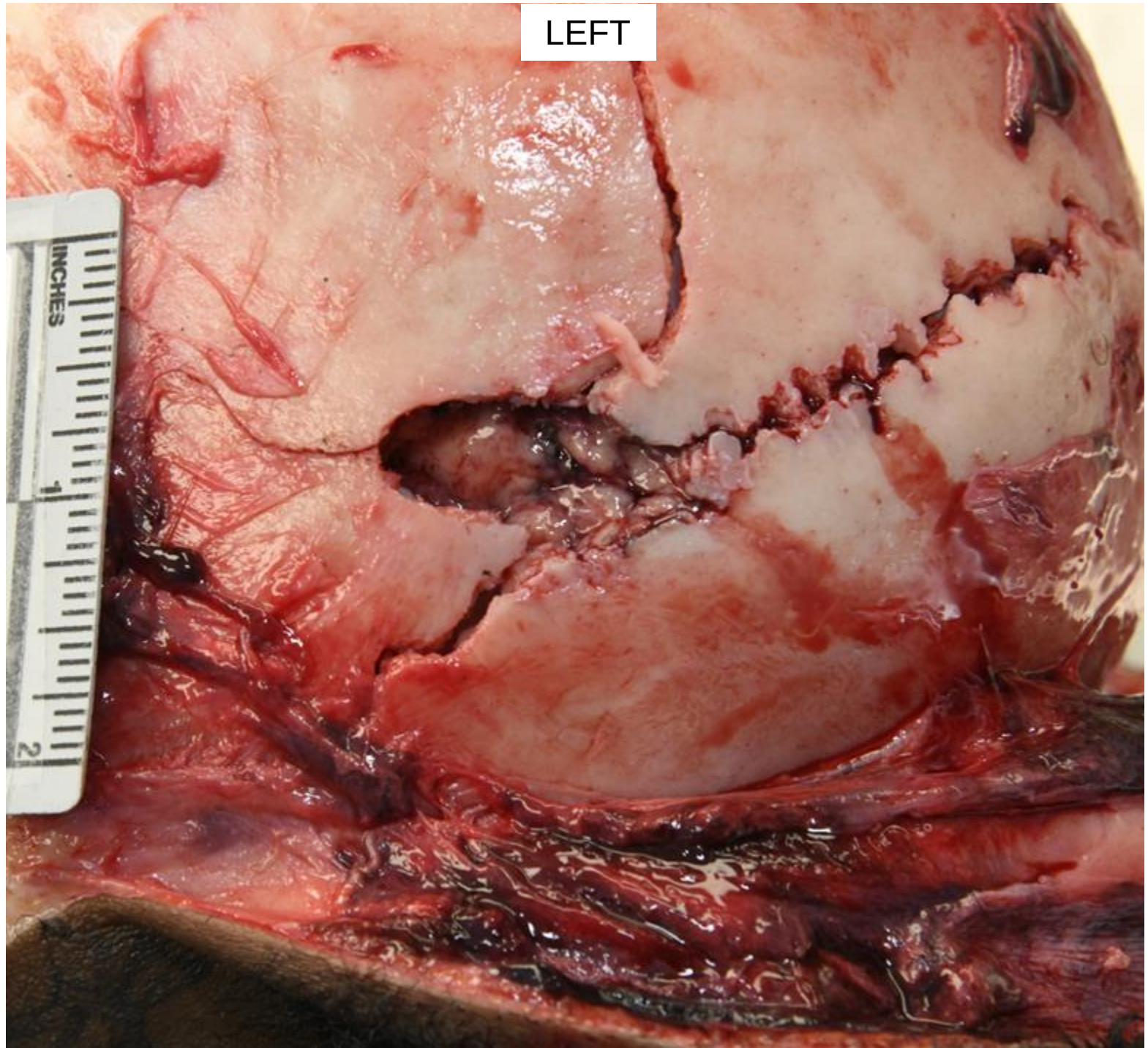
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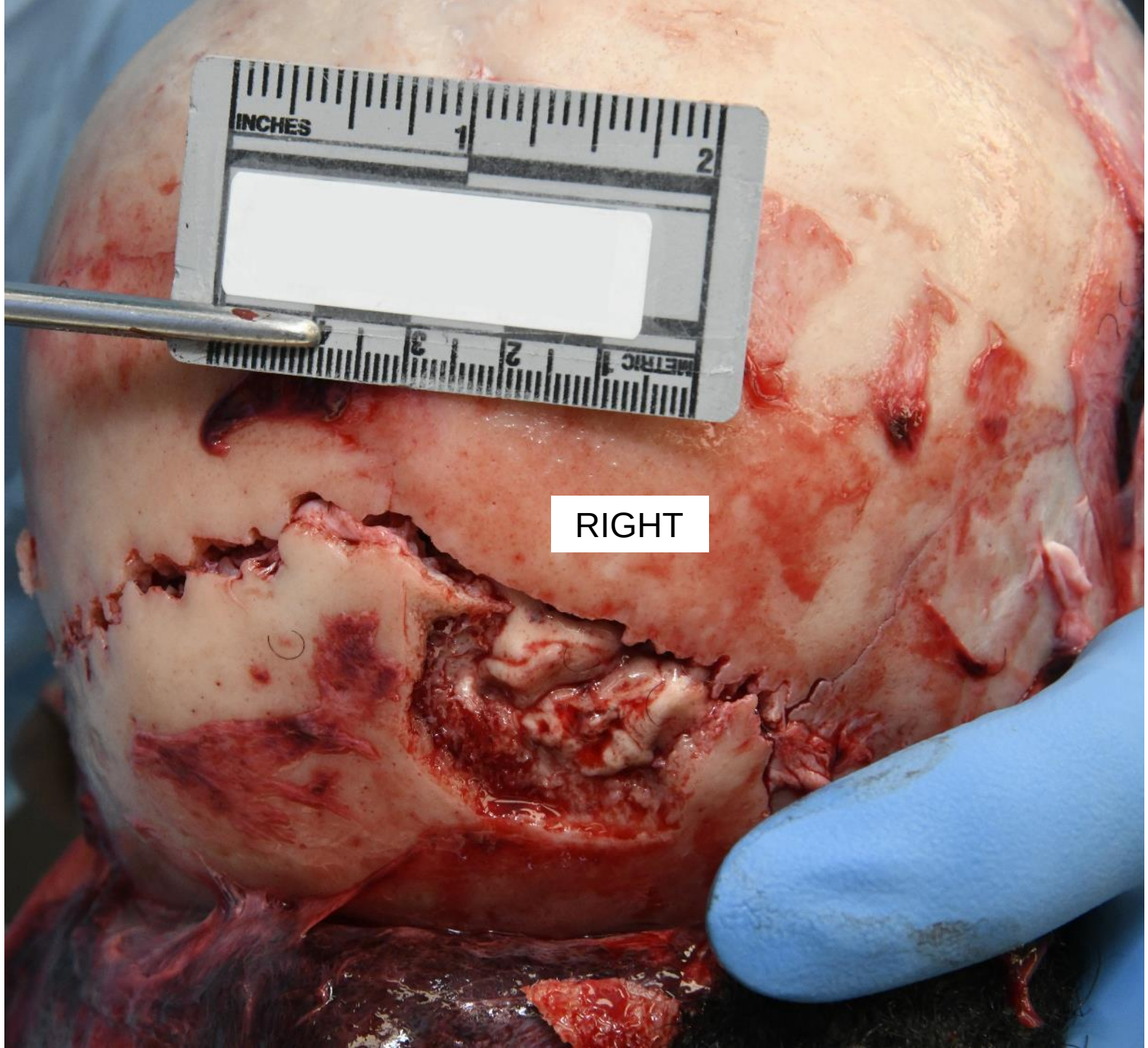
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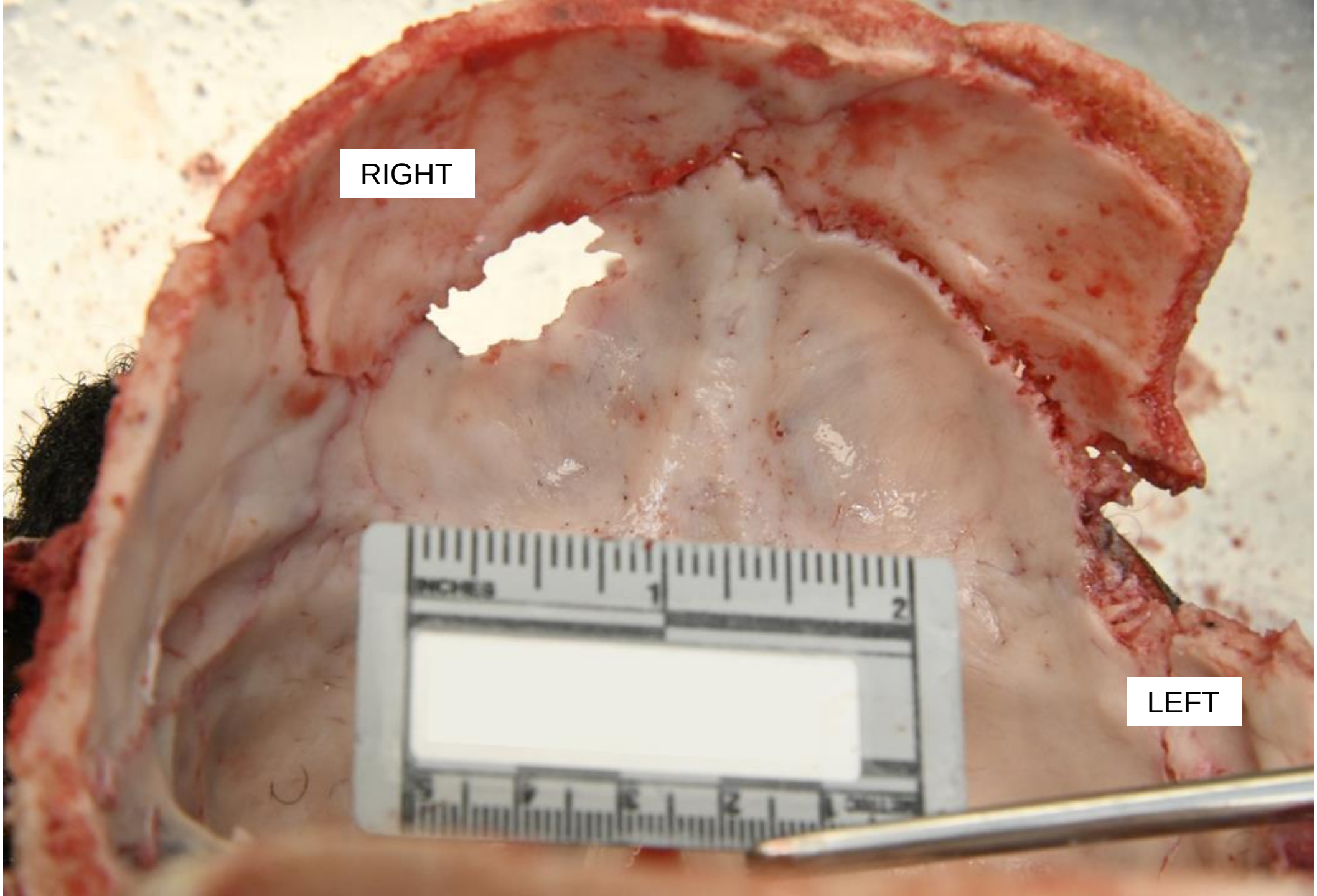
RIGHT
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An adult male is found dead after being shot. Four to 5 shell casings were recovered on the scene. At autopsy, three gunshot wounds to the head were identified (see photos). No retained bullets were present.

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

A. Tandem bullets

B. Tangential entrance and fragmentation of the bullet

C. Single gunshot from a high velocity rifle with additional scalp laceration due to skull bone fragments.

D. Ricochet bullet

ANSWER

B. **Tangential entrance and fragmentation of the bullet**
(CORRECT ANSWER, 71.48% of responses)

Jacket-core separation occurs when the outer jacket of a bullet separates from the core, typically after impacting a target. This separation can leave distinctive marks or evidence on the target or within a wound, which forensic pathologists and investigators analyze to reconstruct events. This phenomenon can disrupt accurate quantification of gunshot wounds, especially when assessing them prior to autopsy.

In this case, there were three defects on the skin (one entrance – A – and two exits – B, C) and two defects on the skull (one keyhole – left – and one exit – right). This suggests that a single bullet hit the skull tangentially and subsequently fragmented: the core likely entered the cranial cavity, travelled for a short distance along the internal skull curvature, and exited to the right side of the occipital bone and scalp (exit B), while the jacket likely traveled along the external skull curvature, exiting on the midline of the occipital scalp (exit C). The trajectory was predominantly from front to back and left to right (green arrow).

Fragmentation of the bullet should be considered in cases where the number of observed wounds does not match (e.g., one entrance wound with two radiopaque foreign bodies at X-rays, or one entrance wound with two exit wounds).


INCHES
METRIC

INCORRECT ANSWERS

A. Tandem bullets (11.19% of responses)

A tandem bullet injury occurs when two or more bullets are expelled from a firearm barrel in a single pull of the trigger, or when the firearm is fired so rapidly that the second bullet follows closely behind the first through the barrel. This causes both bullets to enter the target together through a single entrance gunshot wound. This phenomenon can be due to insufficient quantity of propellant in the cartridge case or incomplete combustion of the propellant or if wrong ammunition is used. A weapon malfunctioning can also occur.

When two bullets travel in tandem, they can create a single entrance wound with two distinct bullet paths originating from it and potentially inflict more extensive internal damage due to the presence of multiple projectiles. In rare instances, the tandem bullets may fuse together when the latter bullet penetrates the former, resulting in a single irregular fused tandem bullet upon recovery.

While both bullets may exit the body, when they involve the skull, the injuries are generally more severe than those observed in the presented case. Additionally, a single keyhole lesion suggests a single bullet hit the skull tangentially rather than separate bullets.

C. Single gunshot from a high velocity rifle with additional scalp laceration due to skull bone fragments.
(13.18% of responses)

While bone fragments can act as ‘secondary missiles’ and produce multiple pseudo-exit wounds, high-velocity rifle wounds to the head typically result in devastating injuries that are easily identifiable at autopsy.

Compared to regular gunshot wounds, rifle bullets possess higher velocities that generate extensive temporary cavitation effects. In the skull, this generally results in complex fractures and severe cranial deformation. Moreover, rifle bullets—particularly full metal jacket types—frequently shed jackets or cores, creating multiple severe secondary injury tracks that amplify the overall damage.

In the presented case, the skull fracture, although multiple, and the entrance and exit bone defects are more consistent with a regular bullet rather than a high-velocity one.

D. **Ricochet bullet** (4.15% of responses)

‘Bullet ricochet’ refers to a projectile that deflects off a surface after initial impact rather than penetrating directly into it. When a bullet strikes a hard object such as metal, concrete, or even the ground, it can bounce off at an angle due to the projectile's high velocity and the hardness of the surface.

Entrance wounds caused by ricocheting bullets often exhibit unusual characteristics. Unlike typical gunshot wounds, ricocheting bullets tend to penetrate rather than perforate tissue due to the projectile's deformation upon impact, resulting in reduced velocity and energy transfer. The impact can scatter minute fragments into the superficial soft tissues, complicating wound analysis and reconstruction. Partial-metal-jacketed bullets are particularly prone to fragmentation when hitting hard objects compared to lead- or full-metal-jacketed bullets.

References

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