

The Trauma Bulletin



The Fracture We Didn't See

A Lesson in Cognitive Bias

Issue twenty five



Case summary



A young female patient presented after a high-speed motor vehicle crash. Initial assessment identified multiple rib fractures, a pelvic ring fracture, and several soft tissue injuries. A primary survey, secondary survey, and later a tertiary survey was completed.

On Day 3, a senior trauma doctor revisited the patient and noticed that the left leg appeared unusually positioned. However, after a brief review, the doctor attributed the deformity to the pelvic fracture, and no further imaging or examination was arranged. A mid-shaft femoral fracture was missed. The femoral fracture was diagnosed a day later, on a follow up pelvic x ray. In hindsight, the patient had complained about thigh swelling and pain.

Learning point

Even with a completed tertiary survey, clinically significant injuries can still be missed if:

Examination is incomplete or rushed

Findings are misattributed to other injuries

Cognitive biases override objective reassessment

The missed femoral fracture in this case was not due to documentation gaps, but rather errors in clinical interpretation and decision-making.



The tertiary survey: definition and purpose

The image shows two versions of the 'TRAUMA: TERTIARY SURVEY' form. The left form is a standard version, and the right form is a version with additional sections for 'Physical Examination' and 'Neurological' findings. Both forms include sections for patient information, history, physical examination, and management plan.

The tertiary survey is a systematic, head-to-toe reassessment of all trauma patients, performed around 24 hours (and before 48 hours) of admission, with two core goals:

Avoiding missed injuries

Reconcile clinical findings with imaging and investigations

At RPH - the tertiary survey

Include complete exposure and examination of every limb, joint, and body region.

Reconciliation of all imaging findings with the physical examination.

Be documented and signed off.

Trigger specialist review when discrepancies arise.

This form is a detailed version of the 'TRAUMA: TERTIARY SURVEY' form. It includes sections for 'Physical Examination (cont'd)', 'Neurological', and 'Tendon Reflexes'. The 'Physical Examination' section includes checkboxes for Chest, Abdomen, Pelvis, Thoracolumbar Spine, and Musculoskeletal. The 'Neurological' section includes checkboxes for Cranial Nerves, Gait, and Coordination. The 'Tendon Reflexes' section includes checkboxes for Biceps, Triceps, Supinator, Knee, Ankle, and Plantar.

This form is another detailed version of the 'TRAUMA: TERTIARY SURVEY' form. It includes sections for 'Investigations to Date', 'Radiological Review', and 'Teams consulted'. The 'Investigations to Date' section includes checkboxes for Laboratory and Radiological Review. The 'Radiological Review' section includes checkboxes for Chest, Abdomen, Pelvis, Thoracolumbar Spine, and Musculoskeletal. The 'Teams consulted' section includes checkboxes for various medical specialties.



Understanding why missed injuries happen

Missed injuries are rarely due to a single failure; they typically arise from a combination of human, cognitive, and system factors.

Factor

Impact in this case

Complex Injury Patterns

The pelvic fracture distracted from concurrent femoral pathology

Incomplete Interpretation

The leg deformity was attributed to the known pelvic injury without further testing

Cognitive Bias

Anchoring, confirmation, and premature closure drove the fellow to a false conclusion

High Cognitive Load

Busy trauma service, multiple competing priorities, and shift handover increase risk



Introduction

Missed injuries have always been a complex problem in trauma surgery. Scalea et al., in 1988, published a milestone paper that encouraged surgeons to recognize their significance and explore strategies to mitigate their negative impact on trauma patients [1]. Missed injuries may be defined as injuries that are not detected until

after a patient has been discharged from the hospital [2]. Usually, these injuries would be found with the appropriate diagnostic investigation and tests. Some consider a "missed" injury in alert and stable patients, as the diagnostic accuracy is limited in hemodynamic instability and tracheal intubation scenarios [3]. Ong et al. modification of Goldmann's classification has three different categories: Class I, their timely diagnosis would change the



Cognitive bias in trauma decision making

This case illustrates how cognitive biased contribute to missed injuries, even when a tertiary survey has been completed:

Bias	Definition	Manifestation	Mitigate
Anchoring Bias	Fixating on the first piece of information, ignoring conflicting data.	Fellow assumed the abnormal leg position was due to the known pelvic fracture.	Force yourself to deliberately consider alternative explanations before concluding.
Confirmation Bias	Seeking evidence to support an initial assumption and dismissing contradictory findings	Lack of tenderness over the femur reinforced the pelvic-injury explanation, so the femur wasn't imaged.	Ask: "What evidence disproves my current diagnosis?"
Premature Closure	Accepting a diagnosis before sufficient evaluation is complete	"Odd leg position → must be the pelvis → move on" therefore no further exam or imaging.	Use a systematic checklist and avoid finalising a diagnosis until all findings are reconciled.
Availability Bias	Overestimating likelihood based on recent or familiar cases	Previous pelvic fracture cases had leg deformity – subconsciously influenced assessment.	Discuss "atypical" cases at handover and morning rounds.
Outcome Bias	Judging the quality of a decision by the result rather than the process	The team assumed the tertiary survey was complete, so diagnostic momentum slowed.	Always revisit the patient irrespective of previous assessments when new signs appear.



Key clinical lessons

1 A completed tertiary survey $\neq$ no missed injuries.
Reassessment must be dynamic - physiology and injuries evolve.

Do not attribute abnormal findings to a single known injury.
Always consider coexisting injuries, especially with pelvic, femoral and acetabular trauma.

2

3 Re-examine when things don't add up. Odd positions, swelling, bruising and persistent pain demand further imaging, *even if the tertiary is 'signed off'*.

Cognitive bias awareness saves lives. Embedding bias mitigation into daily trauma rounds improves diagnostic accuracy.

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* No clinical photos are used in Trauma Bulletins *