

# ILLUSTRATED MEDICINE: MECHANISM OF INJURY

## Exploring how demonstrative evidence elucidates medicine in personal injury litigation

By Stephen Mader

### Mechanism of injury

Mosby's Medical Dictionary (2013) defines the Mechanism of Injury (MOI) as – "the circumstance in which an injury occurs, for example, sudden deceleration, wounding by a projectile, or crushing by a heavy object". The underlying mechanics of how an injury occurred (the "primary" MOI) can assist in explaining not only liability issues, but can also help communicate how long-term outcomes and possible future deterioration issues (the "secondary" MOI) arise in a personal injury case.

### Depicting the Primary MOI

The primary mechanism of injury is typically the more readily understood concept – a blow to the arm results in a fractured elbow; the sudden impact of a vehicle results in whiplash injury to the occupant. While in some cases this cause-and-effect is intuitively clear, in other cases more complex actions are at play. To be understood and believed, these concepts must be communicated clearly.

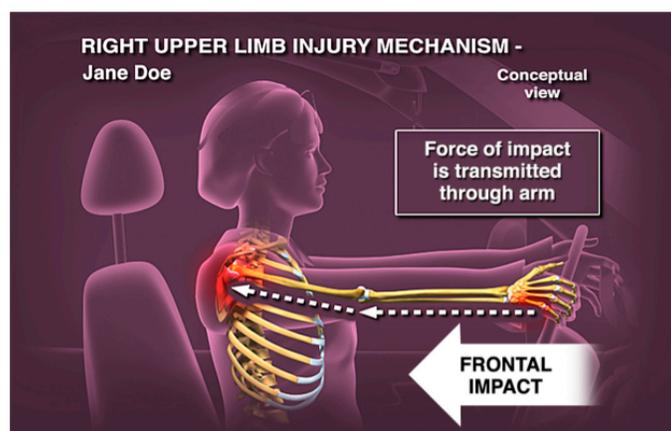


Figure 1 – Image showing MOI to shoulder from longitudinal loading force through arm.

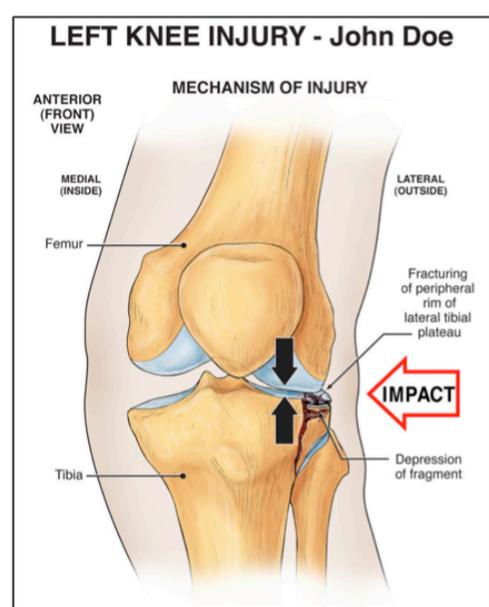


Figure 2 – Illustration showing knee fracture mechanism from 'hinge' impact with compression of lateral compartment.

With a primary MOI, trauma results from energy being transferred to, and absorbed by, the tissues of the body. Associated physics include: tissue deformation rates; impact stressors; and tissue acceleration/deceleration factors.

These are all issues best explained visually.

Types of forces involved can include:

- medial/lateral direction (e.g., penetrating wound)
- rotational (e.g., shearing injury to brain)
- compression (e.g., vertebral burst fracture)
- distraction (e.g., avulsion fracture)
- longitudinal loading (e.g., force applied to shoulder through arm)

In Figure 1, a longitudinal loading force, originating from a front-end collision, has transferred through the gripped steering wheel, along the arm, and to the shoulder, resulting in tearing in the rotator cuff. While one may more readily accept a skull fracture from a direct impact, this is a somewhat more unexpected type of injury, needing greater explanation to be accepted.

Similarly, the direction of impact to the knee is reflected in the configuration of the presenting injury. A blow to the outer side of the leg – such as a pedestrian being hit at the level of the defendant's bumper – causes a lateral tibial plateau fracture from a bending force being applied (see Figure 2).

### Depicting the Secondary MOI

In many cases a secondary injury will develop as a direct result of the primary injury. The connection between secondary sequelae and the original incident may be much more tenuous in the minds of a judge or juror and warrants reinforcement with explanatory depictions.

One such example is a plaintiff who initially suffers from an ankle fracture and develops low back pain months later. Defense counsel may deny this part of the claim. Showing the mechanics of the altered gait, due to lack of push off of the injured foot with compensatory hip-hiking, and associated stresses on the back muscles, makes clear the connection between the original and secondary injuries. A gait animation video that explains these altered biomechanics can bring clarity in this type of case (see Figure 3).

Other examples of secondary MOI include:

- development of osteoarthritis in the joints above and below a fused spinal segment
- sequelae from overuse of the opposite, initially uninjured, limb due to temporary loss of function of the primarily injured limb
- fractures due to development of osteoporosis in a paraplegic client

### Why demonstrate the MOI?

Visual depictions of the injury mechanism are key to identifying trauma patterns and corroborating a claim. They serve to clarify the primary injury factors and explain why secondary injuries may result. Finally, they enhance understanding and add credibility to the severity of the pathology, assisting in liability issues in PI claims.

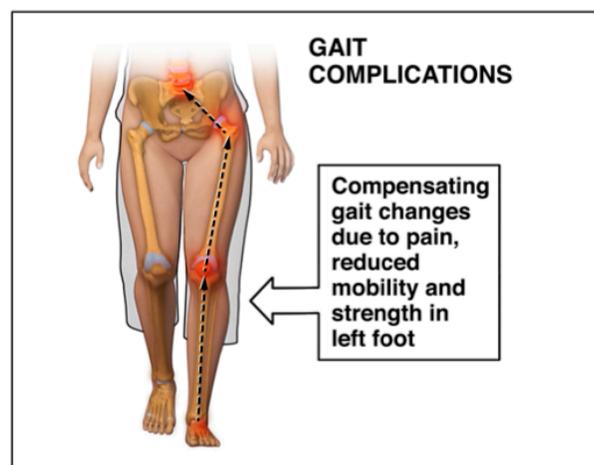


Figure 3 – Frame from a gait animation showing secondary injuries to other joints of the body after ankle trauma, due to altered kinetic chain.

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