The Basics of Analyzing Injury Causation

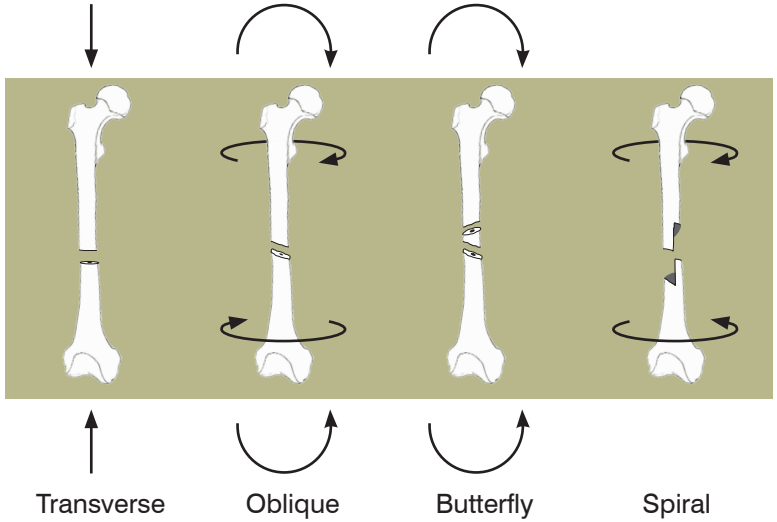
As a simplified example, we can look at basic fracture patterns of the bones to the right. Based on the type of bone fracture and applying knowledge of injury mechanisms, it is then possible to analyze the event to determine whether the pathological loading was generated to cause the injury.

Transverse - is perpendicular to the long axis of the bone. Often results from axial loads or a force whose direction is coincident with the long axis of the bone.

Oblique - results from a combination of loads, bending and torsion. The break is at an angle relative to the long axis of the bone.

Butterfly - results from a bending load. Characterized by a wedge shaped bone fragment.

Spiral - occurs when a bone is twisted beyond its ultimate strength. Characterized by a helical break about the long axis of the bone.



Biomechanical Analysis of Sports Injuries

- *A tractor trailer strikes a bicyclist and the bicyclist falls to the ground...*
- *A snowboarder and skier collide on the slopes and tumble to the ground...*

Each of these scenarios includes at least two collisions, a primary collision with the truck/bicyclist and snowboarder/skier, as well as additional collisions with the ground and associated sports equipment. The bicyclist and the skier were both severely injured. There was no dispute in either instance that the injuries were related to the incident, but in each instance our client's legal strategy required a detailed understanding of the injury mechanisms and the related forces that caused the specific injuries.

This type of injury causation analysis falls under the purview of biomechanics. Biomechanics is the science that deals with the time and space response characteristics of biologic solids, fluids and viscoelastic materials to imposed internal and external forces. In more general terms, biomechanics is the science of how the human body responds to applied external and internal forces. Injuries can result due to specific applied loads. A capable biomechanical engineer is able to examine specific injuries and use reverse engineering by applying knowledge of injury mechanisms to determine if the pathologic loading was provided within the event in question to cause the injuries claimed.

An injury causation analysis can often verify whether or not events took place as described by witnesses. It can also be used to determine if the use/misuse of protective equipment played a role in the cause of an injury.

Analysis of the Bicyclist's Crash

In the case of the bicycle crash, our expert was able to demonstrate that the ensuing sequence of motions by the bicyclist was due to the impact with the truck, which subsequently led to the bicyclist's collisions with the curb and road resulting in injuries.

Analysis of the Skier's Crash

In the case of the skier/snowboarder crash, our expert was able to show which angle the pathological loading had to be directed from in order to sustain the specific injuries. This in turn enabled our expert to determine which athlete was higher up on the hill and who therefore had the responsibility of avoiding downhill participants.

Scope of Injury Causation Analyses

An injury causation analysis can be applied to any type of incident, whether it involves sports, automobile crashes, industrial mishaps, or slips and falls. If your case strategy calls for an understanding of the injury mechanisms, contact Dr. Ngai to discuss your case and how we can help.

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Dr. Ngai is an expert in biomechanical engineering. She has been conducting research in biomechanics for nearly a decade, including five years of research conducted for the Department of Orthopedic Surgery at Rush University Medical Center. Dr. Ngai provides investigations, reports, and testimony toward the resolution of disputes and litigation involving traumatic injuries, including medical implants and devices; motor vehicle crashes; and premises liability, workplace and sports injuries.