

Blast Injuries Versus Sports Injuries

Source: Produced by Vicky Youcha and Brian King

Video Link: <http://www.brainline.org/content/multimedia.php?id=3509>

Dr. Jeffrey Barth: I've been very fortunate to be involved with the Defense and Veterans Brain Injury Center because of my work in concussion in sports. Early on in the process after the war began I was asked to come in and talk about sports concussion and the similarities to our blast injuries. Naively, I thought they were the same injury. It looked like there was a lot of acceleration deceleration going on and blunt injury going on but it took me about six months of working with the Department of Defense and the Defense and Veterans Brain Injury Center to realize that these were different injuries. In fact they were the same injury but much more complex.

To compare and contrast them, the blast injury is essentially has about four phases, a primary part of the injury is the explosion itself which is an atmospheric pressure that hits the individual and pushes on all of the organs of the body. In particular the hollow organs are most affected and then it is immediately followed by a vacuum so there's in essence a pushing or a compressing and then a vacuum that pulls us back out so it actually has some of the same characteristics of an acceleration deceleration or shaking injury but it does other things.

Certainly there's a lot of barotrauma associated with this which is the lungs being injured. You hear about blast injury affecting the eardrums, broken eardrums and bleeding from the ears. That's because these are hollow organs. The brain is not hollow in most people but it does have fluids associated with it, the vascular system, the cerebrospinal fluid, and ventricular system so there are relatively hollow-er parts to the brain and these fluids can develop a thing called acute gas emboli which are just very small micro-bubbles and we have no idea what those things do. There's a lot of research going on about this with using mice and actually pigs in giving them these blast injuries and seeing what the atmospheric pressures and vacuums do to them.

The second part of this injury is the objects being placed in motion and hitting the service person so that's rocks and anything else that might hit them. So that's a blunt injury, which is similar to some aspects of our sports types of injuries. The third is the most similar to sports injuries and that's the acceleration deceleration where the service person is blown away and you know picked up and thrown and then hits objects. That's very much like someone being hit by a linebacker for example and then hitting the ground and having multiple hits and multiple accelerations and decelerations.

Finally there's the quaternary phase [assumed spelling] which is the injury that's caused by burns and toxic fumes and crush injuries that can be a part of blast injury. So the two are similar really in the secondary and the tertiary forms of the injury and so we are applying much of what we know in sports concussion to those combat injuries where for example identifying the injury, that it has happened, that it has affected them and then the Department of Defense and particularly DVBIC have come up with clinical practice guidelines which I've been fortunate

to be involved in where a medic in the field that knows someone has been exposed, documents that and then pulls that person out, checks their symptoms, gives them a sideline assessment in essence which is called the MACE. It's their Military Acute Concussion Evaluation and it's made up of the SAC which is a Standardized Assessment of Concussion and other things and if you don't pass that, you're pulled out and you're observed for anywhere up to two days with your unit.

If your symptoms all clear up and you're back to normal, you are sent back into duty because it's important to make our mission, complete our mission but we also don't want to put that particular soldier in harms way or their unit in harms way with them not being able to think right when they are in fact in the fray. If they do not clear up in two days, they're sent to a far forward hospital type unit where they are further observed for up to seven or fourteen days -- I've forgotten now exactly how much -- but this is all listed in the clinical practice guidelines so they have a similar situation to what we have for our sideline assessment in sports.