



D28 Face It: A Dangerous Passing Maneuver in an Elite Cycling Event Can Have Fatal Consequences

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Learning Overview: The goal of this presentation is to determine the impact speed and forces involved in fatal bicycle crash using GoPro® video and testing of materials.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by discussing the techniques utilized to reconstruct a bicycle crash that occurred during the 2016 Tour of Kansas City (KC). During the race, a crash occurred, resulting in the death of one of the cyclists. The performance of the fencing material used to separate spectators from the racecourse at the Tour of KC cycling race was at issue. Tests were conducted to determine whether fastening the fence panels together with zip ties would have minimized the injuries or prevented the fatal injury that the rider sustained in the collision.

The collision between two cyclists occurred when the fatally injured race competitor attempted to overtake and pass another cyclist on the left side between fatally injured rider's position and the barricades that separated the spectators from the racecourse. The cyclists became entangled and crashed into a spectator barricade. The rider that was overtaken was wearing a GoPro® camera on his helmet. His GoPro® video captured the event.

Upon being struck by the co-joined cyclists, the subject barricade began to move laterally separated from the next barricade in the sequence. The fatally injured cyclist was ejected over the bicycle handlebars. He struck the end of the next barricade panel, exposed due to the lateral crash forces exerted on the panel, with the center of his forehead, just below his bicycle helmet.

The rider that was being overtaken wrote in an email, "I did look at my footage from previous laps and the barriers weren't separated that far as I show on the picture. I believe when he (the fatally injured rider) first made contact with the fence it pushed that panel back, exposing the corner of the next panel. I do think zip ties would fix this issue going forward."

A test protocol was developed and a series of tests were performed to determine the approximate weight of a single barricade, the force required to move an unrestrained single barricade along a paved surface, and the force required to break the zip ties provided on a set of six barricades fastened together in a line. A series of tests was also performed to determine the force required to break the zip ties when they are pulled apart.

When the barricades were aligned in sequence and fastened with a single zip tie, the pulling strap was moved upward toward the top of the barricade (approximately 42 inches above the ground). The zip tie joining the subject barricade and the next in sequence broke when the peak force reached 55.25lbs. The pulling strap was moved upward toward the middle of the barricade (approximately 26.5 inches above the ground). The zip tie joining the subject barricade and the next in sequence broke when the peak force reached 77.79lbs.

The handlebar stem of the exemplar bicycle is about 38 inches above the ground, which is about 8 inches below the top of the barricade. The top of the seat is about 40 inches above the ground, which is about 6 inches below the top of the barricade. A cyclist would tend to load the top of the barricade in a collision wherein the loading force required to break the zip tie was 55.35lbs.

The subject barricade and the barricade which was struck by the fatally injured rider were correctly placed and aligned before the collision occurred. The subject barricade was moved laterally, exposing the next barricade in sequence that the fatally injured rider struck only after subject barricade was struck by the co-joined cyclists. The testing conclusively showed that the use of zip ties to fasten the subject barricade and the next barricade in sequence that the fatally injured rider struck would not have prevented the fatal injury.

This presentation will be highlighted with the GoPro® video, video from the barricade test, and reconstruction of the collision event.

Crash, Bicycle, Reconstruction