H45 Fracture Patterns in Fleshed and De-Fleshed Pig Femora Inflicted With Various Ammunition Types

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Upon the completion of this presentation, those in attendance will have received a broader knowledge of the field of ballistics and a greater under- standing of the effects of bullets of varying construction, velocity, energy, and calibre impacting on the femur before and after being de-fleshed.

The findings of this study will assist the forensic community in exploring new methods of estimating calibre size and ammunition type from long bone fracture patterns, which will assist investigators in identifying and/or excluding potential types of ammunition and weapons in the absence of fired cartridge casings. Discovering if there is a significant difference between bullet impact on fleshed and de-fleshed bones will help researchers conduct meaningful, accurate studies.

In order to examine wound ballistics on long bones, controlled experi- ments were preformed on pig femora. The fleshed femora were shot from a distance of 1.5 feet between the muzzle of the gun and the target. Four repli- cates of the following ammunition were inflicted on separate femora: 9 mm jacketed soft point (JSP) bullets, 9 mm full metal jacket bullets (FMJ), .38 calibre jacketed soft point bullets, and .357 calibre full metal jacket bullets. Two replicates of the same ammunition were inflicted upon de-fleshed femora. The resulting wound ballistics was analyzed in order to make corre- lations between fracture patterns and specific ammunition.

The aim of this study is to test the hypothesis that if a certain combi- nation of calibre and type of ammunition is used to inflict injury on a femur, then the specific ammunition will produce fracture patterns and dimensions unique to that ammunition. This study also aims to determine if experiments on fleshed bone will produce similar results to experiments on de-fleshed fresh bones. Through an examination of parameters such as fracture patterns, number and length of fractures, and the number and size of bone fragments, it will become apparent whether or not there are significant differences between commonly used bullet calibres and types, as well as between fleshed and de-fleshed bones.

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The impact of bullets on bones that were shot while the bones were fleshed was different from those that were shot when they were de-fleshed. The fleshed bones broke into fewer fragments and fewer fracture lines were formed around the entrance. In addition, only rarely did butterfly fragments form when the fleshed bones were shot; however, every bone shot after being de-fleshed presented butterfly fragments.

In the first group of bones that were shot while fleshed, ammunition of the same calibre and from the same gun, but of differing bullet types, produced completely different results. The 9 mm JSP bullet caused more fragmentation, fracture lines, and more complex fractures than were presented in those bones shot with the 9 mm FMJ bullet. Though the 9 mm FMJ has a slightly higher kinetic energy, the energy transferred to the bone was more with the JSP bullet. Instead of penetrating straight through the specimen, the JSP bullet tends to deform and expand, causing the bullet to lose more energy, and hence cause more destruction, in the bone.

In the group of bones shot when de-fleshed, both the 9 mm JSP and the .357 FMJ caused entrance wounds that did not produce a circular defect with a measurable diameter. The entrance wounds were of similar size, however, the exit wound of the .357 FMJ was larger than that of the 9 mm JSP. This shows that although the construction of the JSP bullet should result in more destruction because of deformation of the soft point bullet, the ammunition with greater kinetic energy caused more damage.

Each 9 mm JSP and .38 JSP ammunition showed a complex spiral fracture with more than 3 intermediate fragments as well as complex irregular fractures with shattering, while the .357 FMJ and 9 mm FMJ showed only complex irregular fractures with shattering as labelled through the A/O Clas- sification System (Orthopaedic 1996).

The slight differences in calibre among the .38, .357 and 9mm did not seem to affect the specimen.

Ballistics, Fracture Pattern, Gunshot Wound

 ** Presenting Author*