



### **G29 The Difficult Task of Interpreting Cut Marks, Gunshot Wounds, and Ligature Marks on Skin: A Cautionary Note**

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After attending this presentation, attendees will gain knowledge concerning the pitfalls of morphological criteria for the evaluation of traumatic skin lesions, for example, in distinguishing injuries due to single- or double-edged blades.

This presentation will impact the forensic science community by revealing the pitfalls in evaluating traumatic skin wounds (cutmarks, stab wounds, gunshot wounds, and ligature marks) on skin.

Gunshot, sharp force, and constriction injuries are common in forensic pathology. Regardless of the type of lesion, the morphological assessment usually performed during autopsy is crucial. Standard “rules” exist for distinguishing between the different types of injuries, such as between an entrance and exit gunshot wound or between a lesion due to a single-edged blade and a double-edged blade. But are these parameters really applicable? If so, how reliable are they and how much interobserver variability among professionals exists?

This study proposes to quantify the diagnostic difficulties in the assessment of sharp force, gunshot, and constriction wounds by macroscopic observation of the lesions. Three questionnaires (one for sharp force, one for gunshot, and one for ligature marks) were given to eight experts (forensic pathologists) and eight non-experts (trainees in forensic pathology) in which the analysis of photographs of different injuries was requested. In the test concerning sharp force wounds, which included 15 photos of single-edged blade and double-edged blade stab wounds as well as cut marks performed with smooth and serrated blades, the observers were requested to state if each injury was performed by a single- or double-edged weapon or by a smooth or serrated blade. For gunshot wounds, the observers were given 15 images and were asked to say whether they were looking at an entrance or exit wound. For constriction marks photographed from soft tissues tied with different types of ligatures, the operators were asked to state if the mark represented in ten photos could be a ligature mark, and if its morphological profile showed signs of concordance with one of eight types of ligatures whose images were provided within the text. In all tests, photographs were high-quality close-ups.

Results showed that for sharp force wounds, the percentage of correct answers was 48% in the group of forensic pathologists, 42% in the group of trainees: in total, 53% of the subjects gave the correct answer on the type of blade, whereas 55% correctly diagnosed the characteristics of the blade. Lesions caused by scissors yielded an even lower success rate, with only 21.6% being correct answers.

In the test on gunshot wounds (whether entrance or exit), the type of lesion was correctly assessed in only 41% of cases, without relevant differences between experts and non-experts. The assessment of gunshot entrance was correct in 49% of the cases, versus 28.7% for exit wounds. For constriction lesions, only 24% of answers were correct. The lesion was recognized in 69% of cases, and the percentage of correct answers was even higher in the trainees’ group (74% versus 60% by forensic pathologists). The identification of the type of ligature for specific cases frequently failed, with positive results amounting to 19%.

These results show a simple but important fact: even among expert forensic pathologists open wounds on well-preserved skin can frequently be misinterpreted if classification is only based on external morphology. Theory may give indications of how different stab wounds from single-edged blades and double-edged blades may be, for example, but real-life interpretation may be extremely dangerous and misleading. Basic morphological assessment should always be performed with caution and backed up by complementary analyses when possible.

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#### **Sharp Force Injuries, Gunshot Wounds, Skin**