D25 Killing-Power Ranking of Blunt Instruments — Establishment of a Method to Evaluate Human Injury

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After attending this presentation, attendees will understand the relationship between impact velocity and maximum impact force by typical blunt instruments in order to determine a technique for quantification of impact force

This presentation will impact the forensic science community by determining the existence or non-existence of murderous intent for a criminal trial.

In a murder case and accident, evaluation of human injury was conducted at the same time as a postmortem examination and investigation. It is difficult to quantify when the size of impact force from human injury is evaluated. There are many parameters presented in this study, such as acting force, maximum force, and acting time. Then, in the case of bone fracture-risk evaluation by blunt instrument, the circumstances of a murder case and accident can be explained. According to an on-the-spot investigation report and recording of a statement, it's possible to perceive the circumstances of a murder case and accident.

This study investigates and analyzes the following: (1) estimation and selection of impact position by blunt instrument; (2) impact force that an assailant can show (physical or environmental factor); (3) the case of situation which a sufferer receives (a back or a wall); and, (4) choice of injury parts.

The results of the analysis were carefully examined. Then, the condition of impact force-measuring experiment was set and the impact experiment was conducted by the same or similar blunt instrument compared to the actual weapon. In a murder case and accident, the range Fmin~Fmax of impact force F were narrowed. Furthermore, as a result of the examination, bone fracture limits force f of the sufferer was presumed. Last, impact force F and bone fracture limit force f were compared: Fmin>f=bone fracture risk low; Fmin<f<F max=there is the possibility of the bone fracture; Fmax<f=bone fracture risk high. Judging from this, a test result is assumed.

Using a variety of blunt instruments, the following three experiments were performed: (1) a difference in impact force of impact position by blunt instrument; (2) measuring of down swing velocity from an individual difference; (3) an impact experiment concerning artificial human soft tissue.

As a result of the experiments, the following were suggested: (1) it was found that down velocity by blunt instrument was so fast as to be below the impact position; (2) because of material and impact velocity, it was clear that the tendency is to decrease load from a position which is measured maximum force to the tip; (3) there were good relationships between impact velocity and maximum impact force using a modeled skull made of formed styrol; and, (4) the blunt instrument confirmed that it's possible to estimate the maximum impact force the skull receives from impact velocity.

Human Injury, Human Soft Tissue, Impact Velocity