Kiran Parmar: Abstract

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Stabbing is the most common cause of homicide in Britain. Weapons used include knives, swords, screwdrivers and glass shards. To quantify the exact force used in a stabbing incident is considered to be difficult area due to the sheer number of variables present. The aim of this research has been to find out how much force is required to penetrate the synthetic skin simulants using blunter objects such as screwdrivers, pens and chisels. The mechanism behind their penetration and is it possible to relate tool geometry to the skin wound? Having quantifiable data would allow a forensic pathologist to make a more informed decision when it comes to answering the commonly posed question in court ‘what was the degree of force involved the stabbing incident?’ The answer to this question is considered significant in determining an alleged assailant’s intent to cause harm.

Research groups in Cambridge, UK and New Zealand have both used silicone rubber as a skin simulant successfully as it has similar mechanical properties to that of human skin. The silicone rubber was cast on top of a polyurethane sponge (foam) to simulate skin. The piece of foam is meant to represent the flesh. Other simulants tested are pork leg and Wonderflex (a medical grade silicone). Testing has been carried on an instrumented force-displacement measuring system and high speed video analysis has been used in order to understand the penetrative mechanisms involved.

Different screwdrivers of varying shape and size have been tested (i.e. slotted, Phillips, posidriv, Torx), as well as other implements including chisels and pens. Weapon characterisation has been undertaken, noting significant measurements e.g. the cross-sectional area of the screwdriver heads. Our results show that there appears to be a direct correlation between the cross-sectional area of the head and the amount of force required for penetration.

The wound profiles of the various screwdrivers have been determined and the mechanisms by which they penetrate deduced.

The conclusions that can be drawn from the experimental work are that the screwdrivers with the larger cross-sectional areas require a significantly greater force to penetrate (forces in the region of 100-120 N) with the ‘sharper’ flat screwdrivers penetrating with much lower forces (~30N). The forces involved are larger than ‘sharp’ knives, and therefore if a screwdriver was used in a stabbing incident it would not be unreasonable to infer that the assailant would want to cause severe harm.