CASE REPORT

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Distinctive Blunt Force Injuries Caused by a Crescent Wrench

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ABSTRACT: Prompt recognition of patterned injuries by the forensic pathologist can greatly facilitate the investigation and resolution of injury and death cases. Careful observation and description of injuries may provide identification of an assault or murder weapon and contribute to the reconstruction of circumstances of injury. The two cases herein described manifest unusual and distinctive injuries resulting from multiple impacts by adjustable crescent wrenches. Detailed photographs and descriptions of these injuries are provided.

KEYWORDS: criminalistics, patterned injuries, blunt force

The recognition of patterned wounds and the correlation of wounds with potential weapons or circumstances of injury is a crucial responsibility of the forensic pathologist. The identification of patterned injuries relies on detailed examination of the injuries coupled with frequent exposure to a variety of patterned wounds and careful correlation of such injuries with weapons or trauma mechanisms. Detailed published descriptions of unique injuries should enable other forensic examiners to more rapidly and effectively evaluate and recognize patterned wounds as they correspond to specific weapons.

The following unrelated cases occurred contemporaneously in widely separated regions of the country. The very unusual characteristics of the blunt force injuries allowed the involved medical examiners to independently conclude that an adjustable crescent wrench had been used to produce the similar and distinctive injuries present in each case.

Case Number 1

The decedent, a 22-year-old theater manager, was discovered dead inside his movie theater in the middle of the day. A struggle had clearly taken place, as blood spatters were distributed throughout the theater lobby. At the autopsy examination, he was found to have numerous distinctive keyhole-shaped abraded contusions and superficial lacer-

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ations, which were concentrated over the front of the neck and on the back of the head and upper back (Fig. 1). All of these injuries were individually composed of a circular component, with parallel arms that extended from the circular region to intersect perpendicularly oriented branches that each extended outward in an L-shaped fashion (Fig. 2). Internally, these repetitive blunt force injuries caused crushing laryngeal fractures, and multiple linear skull fractures.

Investigation disclosed that the decedent had fired an employee the day before. This employee became a prime suspect in the murder of his employer. After the autopsy, on the strength of the individual injury characteristics, the pathologist advised the police to look for an adjustable crescent wrench. It was discovered that a wrench of this type had been used in the theater to open and close the valves on large pressurized soft-drink cylinders, but this specific wrench was missing, and was never recovered. The theater

FIG. 1—*(Case Number 1) The anterior neck region contains numerous overlapping similarly structured and highly distinctive blunt injuries. The majority of the injuries appear as parallel squarely angulated deep linear impact abrasions. The most complete ones exhibit a keyhole pattern better appreciated in Fig. 2.*

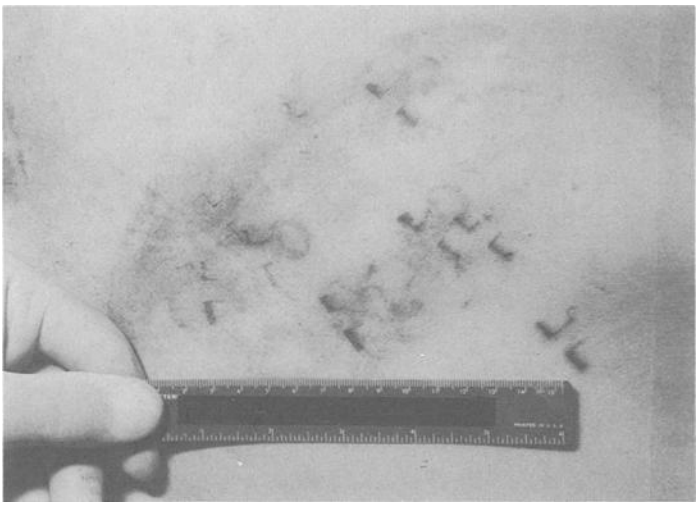

FIG. 2—*(Case Number 1) A detailed view of the upper back region shows the repetitive keyhole-shaped injuries.*

employee was later apprehended and subsequently tried for murder. During the trial, a common crescent wrench was purchased from a hardware store for illustration purposes. The size of the discrete injuries correlated best with a ten-inch sized standard wrench. The defendent, who never confessed to the killing, was convicted.

Case Number 2

The body of a 24-year-old white female was discovered lying face down in a water puddle beneath the swing set at a local playground. The bloodied head and face had numerous circular skin defects, thought at the death scene to possibly represent gunshot wounds. The autopsy, however, revealed severe blunt force craniocerebral injuries with distinctive patterning of both cutaneous and cranial wounds. At least 25 separate, blunt impact injuries were present. Skin wounds consisted of circular deep partially avulsed "cookie cutter" lacerations, occasionally contiguous with short linear abrasions and squared lacerations (Fig. 3). Other cutaneous injuries were comprised of discrete, side-by-side, squared lacerations with occasional variations of the squared lacerations including paired horizontal lacerations marginated by diagonal symmetrical short lacerations that radiated from the paired laceration extremities (Fig. 3).

Scalp reflection showed distinctive punched-in, squared and rectangular outer cranial table fractures occurring subjacent to many of the paired square and stellate scalp lacerations (Fig. 4). The other aggregated blunt impacts created massive depressed cranial fractures. Death was due to multiple, blunt-force craniocerebral injuries.

The murder weapon was not initially known, but investigators were asked to search for instruments having distinctive sharply marginated circular and paired squared edges that might account for this constellation of injuries. A warrant was obtained by investigators who executed a search of a suspicious vehicle parked near the playground where the decedent's body was found. Within the car trunk, was a second corpse. The autopsy of the second victim demonstrated that he also died of multiple blunt-force craniocerebral as well as spinal injuries; however, the second victim's wounds did not show the distinctive patterning of those seen on victim number one.

On the day of the autopsies, the forensic pathologist was summoned to the homicide

FIG. 3—*(Case Number 2) Repeating injury patterns on the right scalp and side of the face consist of discrete partially avulsed "cookie cutter" lacerations* (arrow). *Other distinctive injuries include paired parallel linear lacerations intersected by perpendicular lacerations* (double arrow) *and paired slightly curved lacerations marginated by short symmetrical lacerations radiating from the paired extremities (black and white arrow).*

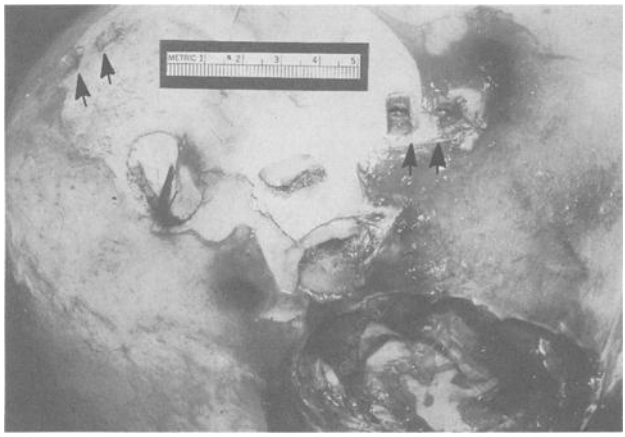

FIG. 4—*(Case Number 2) The cranium subjacent to squared and short radiating laceration pairs contains side-by-side punched in rectangular fractures. Aggregated blows produce severe comminuted fractures, obscuring the patterned fractures apparent in less confluent injuries.*

bureau to examine an injured man apprehended as a suspect in this double homicide. During the course of the examination of the suspect, a police detective happened to pick up and look at an adjustable crescent wrench. He immediately realized that this tool, variously positioned to impact the skin and bone, could account for all the peculiar cutaneous and cranial injuries observed on the first homicide victim.

Numerous bloody tools were within the car trunk where the body of the second victim had been found. No large crescent wrenches were included, and the blood on tools retrieved from the car was assumed to be that of the second victim. Adjustable crescent wrenches were later recovered from among stolen tools stored at the suspect's residence. None of the crescent wrenches was shown to contain the victim's blood. Investigators speculated that the actual murder weapon was separately disposed of by the suspect, but

the patterned injuries of victim one did correspond in size and configuration to the surface features of a 12 in. adjustable crescent wrench. Further investigation revealed that both homicide victims and the murder suspect were allegedly involved in a disharmonious drug deal the night preceding discovery of the bodies.

Discussion

A number of case reports document the correlation of patterned blunt force injuries with assault or murder weapons [*1,2*]. Typically, such reports have entailed detailed examination and documentation of injury patterns as they correspond to distinctive individual tool characteristics of a selected potential weapon [*3,4*]. The preceding cases describe distinctive injuries produced by a common tool, the adjustable crescent wrench, which by virtue of its unique design imparts highly specific patterned wounds. The described wounds result from class characteristics of the crescent wrench design [*5*].

A spectrum of patterned injuries may occur with impacts from an adjustable crescent wrench, dependent upon the surface of the tool striking the victim, the tool size, and the body site impacted. If the adjustable crescent wrench is turned on edge, this exposes the patterned raised and recessed surfaces of the fixed jaw (Fig. 5). Impacts by the edge surfaces produce the variety of wounds observed in these cases, each of which has distinct features. The wounds depicted in Figs. 1 and 2 occur on relatively soft, yielding body surfaces and thus result in comparatively superficial patterned lacerations, impact abrasions and contusions. These quite accurately reproduce the weapon edge design as demonstrated in Fig. 5. Injuries that occurred in Case Number 2 were localized on bony, partially hair covered body surfaces and also involved comparatively more blunt force. The resultant wounds vary according to the fixed jaw surface, which most directly and forcefully impacts during a given blow. Impacts against the circular bored sleeve edge of the fixed wrench jaw account for the punched-out skin lacerations. Similar defects would result with impacts from the opposite edge of the fixed jaw of the wrench. The surface of the adjustable crescent wrench edge opposite that shown in Fig. 5 is relatively smooth, slightly curved, and also has a central sharp margined keyhole shaped bore that houses the adjustable cylinder of the wrench.

In contrast, the paired squared and radiating or stellate lacerations occur with impacts favoring the protuberant rectangular surfaces of the fixed jaw that protrude above and slightly in front of the circular adjusting cylinder housing opening (Fig. 5). The closely approximated rectangular jaw extensions impacted flat against the scalp produce bridging lacerations accounting for the intersecting squarely angulated perpendicular laceration patterns seen in Fig. 5. When the same tool portion is impacted against the scalp at an angle, the rectangular edges produce short undermined paired curved linear lacerations marginated by small skin splits shown in Fig. 5. Forceful impacts with these rectangular edges also account for the unique paired depressed squared cranial fractures apparent in Case 2 (Fig. 4).

Careful photography and written documentation of such injuries may further demonstrate other unique features, which would contribute to identification of individual tool characteristics belonging to the specific crescent wrench used [*4,5*]. Documentation methods previously shown to be useful in correlating injuries with weapons include the preparation of acetate tracings of wounds and weapons followed by mechanical overlays, and meticulous one-to-one photography of wounds and potential weapons [*1–3*]. In Case Number 2, the patterned bone fractures become particularly significant in identifying weapons, as bone tends to retain and reproduce patterned weapon characteristics more accurately than soft tissues. In instances where well-delineated bony injuries are discovered, it may potentially prove useful to excise and preserve these regions for tool-mark comparison with suspected weapons. This was done in Case Number 2 and proved helpful in the process of weapon identification.

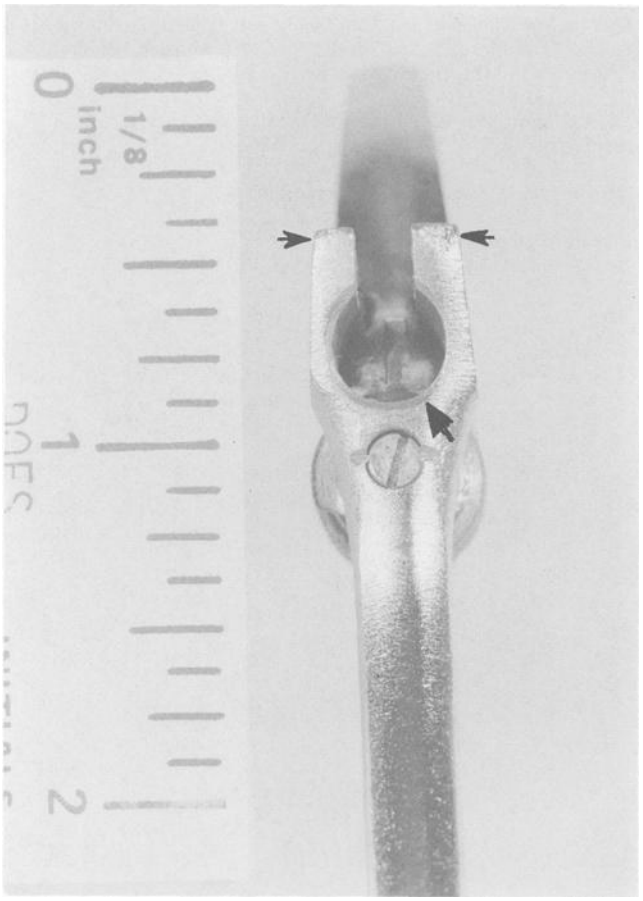

FIG. 5—*An adjustable crescent wrench turned on edge shows the fixed jaw surface containing the circular bored cylinder opening (large arrow) marginated by the projecting rectangular jaw extensions (small arrows). The depicted tool surfaces, impacted at various angles and positions, account for the patterned injuries observed in both cases.*

In summary, the preceding cases demonstrate unique patterned blunt force injuries produced by adjustable crescent wrenches. The injuries are a result of the distinctive class characteristic design features of adjustable crescent wrenches. Because the adjustable crescent wrench is a common and readily available tool that is found in a wide variety of settings, its potential for use as a weapon is increased as compared to more obscure tools or instruments. It therefore behooves those involved in injury and death investigation to be familiar with the unusual injury patterns resultant from assault by an adjustable crescent wrench. Recognition of such injuries may prove crucial to timely weapon identification and ultimate resolution of injury and murder cases, as it did for both of the cases in this report.

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