

CASE REPORT

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Distinguishing Between Damage to Clothing as a Result of Normal Wear and Tear or as a Result of Deliberate Damage: A Sexual Assault Case Study

ABSTRACT: This paper focuses on bra damage, specifically damage observed in hook and eye fasteners that are generally located at the backstraps of bras. We describe bra design including the method by which hook and eye fasteners are generally constructed. We assess bra damage in two situations where the damage observed was unexpected given the case scenarios. These were: (i) the complainant of an alleged rape attributed damage to her bra hooks to force during a struggle and (ii) the complainant had earlier manipulated her bra hooks in an incident not related to her complaint. Stereomicroscopy and reconstruction experimentation were necessarily used to assess the bra damage. A systematic approach to damage analysis was employed by the forensic practitioners to correctly identify damage as being a result of mechanical manipulation and therefore as falsified. This paper suggests that more examples of falsified damage should be documented.

KEYWORDS: forensic science, damage, normal wear and tear, bra, sexual assault, false reports

Wear and tear is defined in the dictionary (1) as damage, depreciation, or loss due to normal use. *Damage* is defined (1) as injury or harm impairing the function or condition of a person or thing. The assessment of the difference between normal wear and tear and damage in clothing is an integral part of the investigation of sexual assault cases. A facet of damage analysis is whether or not the damage was falsified to appear relevant. In the literature, there are a number of papers where the characteristics of normal wear and tear and damage are described and examples of both are detailed (2–4). Indeed, there is one paper where falsified damage has been reported (5). This study describes the comparison of bra damage in two situations where: (i) the complainant of an alleged rape attributed damage to her bra hooks to force during a struggle and (ii) the complainant had earlier manipulated her bra hooks in an incident not related to her complaint. These two case studies detail the role of the forensic scientist in assessing damage and how important it is to correctly distinguish between normal wear and tear, damage due to the alleged incident, or damage as a result of deliberate intent.

Bra Design

In general, a bra is designed with two cups, a band (the fabric that goes all the way round the rib cage) and two over-the-shoulder straps. The fabric between the cups has many names such as center panel, bridge, and gore and it can be a triangular shape or an extension of the bra band. The higher the bridge the greater the support and ideally this fabric should lie flat against the sternum for a good fit. The cup size of a bra, i.e., A, B, C, D, DD, E, etc.

defines the breast's projection from the body and the band size i.e., 32, 34, 36, 38, or 40 inches or above, measures the body's circumference. The over-the-shoulder strap length adjustment mechanism is called an "adjustment slide" and the ring that can link the straps to the cup or the back straps is called an "o-ring." Most bras are constructed to fasten at the back but in some instances they can fasten between the cups at the front. Generally the bra is designed such that the band, bridge, hooks, and eyes are proportional to the support required and to the cup and body size; the bigger the cup and body size the longer the band length, the wider the breast diameter and the back strap, and the more hooks and eyes required. The hook and eye attachments are sewn into small pieces of fabric which are then stitched on to the ends of the side straps. The hook and eyes are generally constructed out of a single piece of iron, nylon coated metal wire, brass, or stainless steel. The hook is constructed by twisting the single piece of metal to form two loops and a u-bend. The ends of the original piece of metal are now positioned at a loop and at the center of the u-bend forming what we have described as a "strengthening rod." The eye is constructed by twisting the metal to form a small loop, then a square shape at one end and then a second loop. Both loops are curled back in on themselves (Fig. 1). The loop parts of both the hook and eyes are used to stitch them in place (Fig. 2).

Case Study 1

A 41-year-old woman claimed that a local man she knew had raped her. She alleges that he followed her home after a night out and that after the babysitter left, he pushed her on to the living-room couch and then on to the floor where the rape took place. When spoken to, the suspect said he was invited back to her house for tea and that they had consensual sex on the living-room floor. Three hours later she was medically examined. The samples from her medical examination (swabs) and her clothing (a pair of

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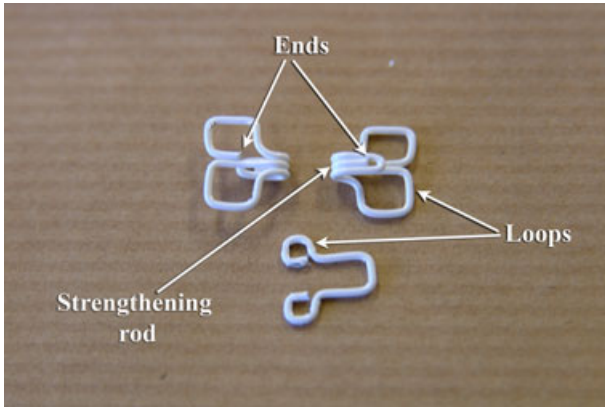


FIG. 1—Front and back aspect of bra hooks and the eye.



FIG. 2—Bra hooks and eyes stitched in position.

trousers with a belt, a pair of panties, socks, a bra, a white top, and a cardigan) were submitted for analysis. Samples from the suspect's medical examination (swabs) and clothing (a shirt, a pair of jeans, and a denim jacket) were also submitted. Four months later a button was submitted to the laboratory. The complainant said that this button was from her trousers and that it was removed from them at the time of the incident.

Vaginal and oral rape was alleged with no external ejaculation. A trace of semen was found on the external vaginal swab and on the inside lower back of her cardigan. DNA profiling of the semen found in the case was not carried out as both parties agreed that sexual intercourse took place and therefore no further probative value would have been yielded by generating a profile. A scene examination was carried out at the time of the alleged incident by a trained Scene of Crime investigator who did not find a button in the living room. The facts as outlined indicated that damage to her clothing would be of significant value.

Damage Analysis

The bra in this case was a size 36DD and was fashioned to fasten at the back with three hook and eye components (Fig. 2). The hooks and eyes of the bra were examined using a stereomicroscope, which utilizes low magnification (range 6–40 \times) and reflected light. It was observed that the hooks were all bent open with one (number three in Fig. 3.) displaced from its normal position (Fig. 3). Tool marks were observed on the plastic coating at positions other than those at the bends or created by normal wear and tear. Tool

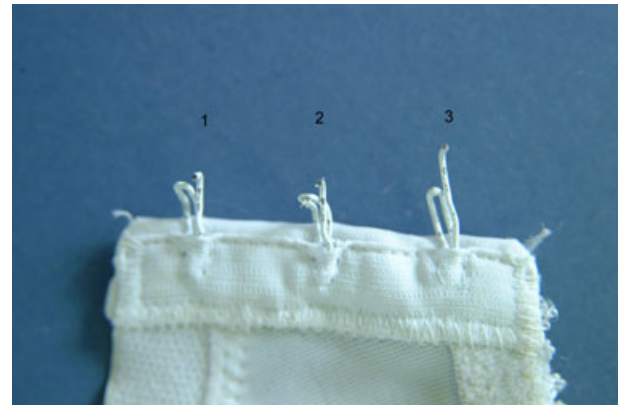


FIG. 3—Damage to bra hooks.

marks are described as impressions caused by contact between an implement and a surface that may yield sufficient characteristics (e.g., indentations, striations) to identify the implement used.

Given the design of the hook and the evaluation of the strengthening rod it was apparent that the damage was not as a result of the bra being pulled apart. There was no damage to the eyes of the bra other than two of them were slightly angled and pulled up from their normal position as would be attributable to normal wear and tear. The considerable force that would have been required to distort the hooks in this way if they were locked into their respective eyes should have manifested itself in greater damage to the weakest point, the stitching around the hooks and eyes, and there should have been visible signs of stretching of the bra strap fabric. In this case, the damage was confined to the hooks. A small stick threaded through each hook indicates that all three hooks had been manipulated in a similar manner (Fig. 4). The bra could not be worn in this condition.

Reconstruction Experiments

A number of simulation experiments were carried out in an attempt to recreate this damage. Four new bras were purchased which were fashioned with a three hook and eye clasp at the back. In one scenario, one of the scientists wore one of these bras, lay down on the ground and asked her partner to attempt to force open the bra without her cooperation. The resulting damage showed that the weakest part of the hook and eye fastening, the stitching, gave way and the hooks and eyes were distorted in shape. This in combination with the break in stitching allowed some of them to come



FIG. 4—Small stick threaded through hooks.

away completely from their position (Fig. 5). In addition, the fabric of the bra strap was stretched. This was repeated a second time using a new bra. Using four worn bras consisting of a two hook and eye clasp donated by members of staff, the hooks were manipulated with various tools such as tweezers, pliers, and a screwdriver. In these experiments the damage to the hook was not accurately recreated. The damage to the hooks was accurately reproduced when a pair of scissors was used. Firstly, the u-bend of the hook was pulled open and then the strengthening rod was held between the scissor blades and pulled firmly out. This was repeated on each of the hooks. A small stick threaded through the hooks indicates the uniformity of the damage. This damage was then recreated using a newly purchased bra fashioned with a three hook and eye clasp (Fig. 4). One of the newly purchased bras was used to study the design of bras, in particular the hooks and eye clasps. It was noted that washing machine damage to the hooks of a bra could produce damage that appeared superficially similar to the damage caused by the scissor manipulation. However, on detailed inspection there were important differences. The strengthening rod of the hook is not pulled out of position and the damage has been caused mainly to the u-bend, opening out from its normal position. This damage is what would be expected when the longer u-bend was pulled in one action, leaving the shorter strengthening rod in position (Fig. 6). The damage to the white plastic coating is also different. The bra could be worn in this condition.

On examination of the complainant's trousers, using a stereomicroscope, which utilizes low magnification (range 6–40×) and



FIG. 5—Damaged hooks, eyes, and bra fabric as a result of considerable force in an attempt to pull the bra off the wearer.



FIG. 6—Damage to bra hook by washing machine.

reflected light, it was noted that the waistband button was missing and that there was no damage to the fabric of the trousers. The anchoring threads used to secure the button in place were also missing. This indicated one of two scenarios: that the button and threads were lost due to normal wear and tear or, less likely, the button broke off and the threads came dislodged. The button that was submitted had all of the anchoring threads intact in the button indicating that the fabric that the button was attached to would have been torn in order for the button to be in its present condition. We concluded that the button presented could not have come from her trousers as the fabric of the trousers was undamaged.

Case Study 2

In a case of unlawful carnal knowledge, a 14-year-old girl went out drinking in the early evening with a 21-year-old man. The family of the girl reported her missing and she was subsequently found, by police, in the house of the suspect, naked and in his bed. She agreed that consensual sexual intercourse took place. The suspect when interviewed made no comment.

Damage Analysis

The bra in this case was a size 34AA and was fashioned to fasten at the back with two hook and eye components. The hooks and eyes of the bra were examined using a stereomicroscope, which utilizes low magnification (range 6–40×) and reflected light. It was observed that only the lower hook was bent open and there was no damage to its corresponding eye. The u-bend of the hook and strengthening rod were completely stretched open (Fig. 7). The bra could be worn in this condition. Following the examination of the bra the forensic scientist contacted the police and was told that the girl said the bra was old and that she had manipulated the hook herself so that she could still wear it. The damage to this bra hook was similar to the damage on the bra in the first case study in this report.

Discussion

Other studies have demonstrated the successful use of damage analysis and simulation experiments in providing valuable information in a wide range of cases (6–9). In addition, damage analysis

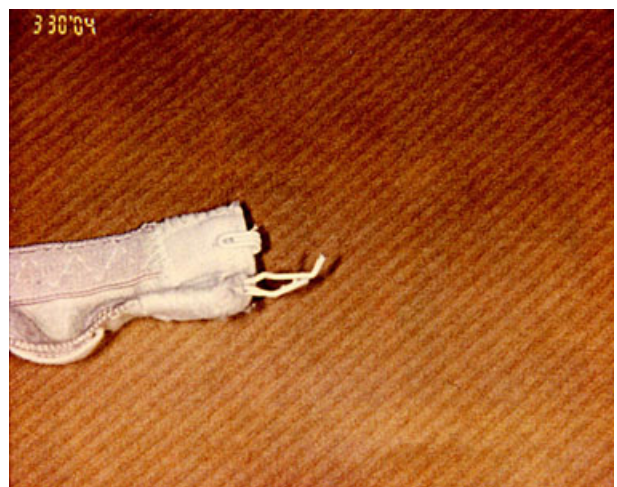


FIG. 7—Deliberate damage to bra hook as described in case study 2.

has been demonstrated as useful in determining the age and cause of damage (10,11). The use of simulation experiments and their limitations has been discussed before (3,9) indicating that caution should be exercised in their interpretation due to the high variability and difficulty in replicating the case circumstances. Simulation experiments should be carried out, where possible; however, it is very important that they are designed in such a way as to answer the relevant questions. In these cases, the simulation experiments were conducted to assess the possibility that the damage could have been caused as a result of a struggle. In addition a number of different implements were used to test the hypothesis that the damage was caused by deliberate manipulation. The purpose of forensic examination in damage cases is to determine if the observed damage could be caused by mechanisms alleged by complainants or suspects. In these cases, it may be the recognition that an implement was used, as opposed to damage caused by pulling in a struggle, is sufficient. The question will not be which tool was used but rather was a tool used? A systematic approach to damage assessment was carried out in these cases as described in Boland et al. (12), that is: gross observation, microscopic examination, reconstruction and assessment and interpretation. This approach can be used to reduce the subjectivity of this type of evidence.

Damage analysis has been underutilized by the forensic science community and the crime scene officers in helping to quickly identify rape allegations that are genuine or false. Very few case reports of garment damage have been published ([5] was the only reference found by the authors), making examinations in these types of cases difficult. The stereotypical view of rape is one where the complainant has their clothes ripped/torn off, is in a dishevelled state, and displays physical injuries such as bruising, black eyes, etc. What happens in the complainant's mind when their experience does not reflect this? Exaggeration of the damage to their clothing is a simple, effective, and visual method of proving that sexual intercourse occurred without their consent. In the first case study, the investigating officers did not believe this to be a false allegation. The nuances of the damage to the bra hooks in these cases were unfamiliar to the investigating police officer such that he believed that her clothes had been forcibly removed. When the police officers were shown the damage to the bra hooks and the button of the trousers they still professed their belief in the complainant's version of events. This case went to trial despite the statements of the forensic scientist and the suspect was found not guilty.

It is the belief of the authors that the work of the forensic scientist and crime scene investigators in this area can be greatly enhanced if more examples are published to expose practitioners to damage analysis and interpretation.

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