

TECHNICAL NOTE

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Hair Transfers in Sexual Assault: A Six-Year Case Study

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ABSTRACT: Associative head and pubic hair transfers can provide a circumstantial connection between persons and objects in sexual assault cases. The occurrences of reported hair transfers in one analyst's casework are presented.

KEYWORDS: criminalistics, criminal sex offenses, hair, forensic hair comparison, hair transfer, sexual assault

Forensic science analysts are often confronted with questions from attorneys and law enforcement personnel about the meaning of their hair comparison results. While the implications of a positive finding (that is, the report of an associative hair transfer between the victim and the suspect) are fairly self-evident, confusion can arise when a negative report is issued.

Published controlled hair transfer studies are a valuable source of clarifying information, but, as Gaudette [1] pointed out, such studies are disappointingly few in number. Data gleaned from the analyst's own casework may be used to augment the statistics from the existing controlled studies. In addition, casework data have the advantage of presenting a regional perspective.

This paper presents the author's case work data on the incidence of reported associative transfers of head and pubic hairs in sexual assault cases over a period of six years. The data which have been published in other authors' controlled studies on head and pubic hair transfers will be compared with the author's case work data.

Methods

Data collection

Information from 112 cases was included in this study. The qualifying criteria for case inclusion were that the evidence was submitted to the crime laboratory in connection

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with the investigation of a nonhomicidal sexual assault and that each case involved one or more female victims and one or more male suspects.

All hair comparison examination results were reported between 1 Jan. 1983 and 6 Dec. 1988. Data were collected through the review of the author's laboratory reports. Questions concerning the origin of a particular item of evidence were addressed by returning to the original case file contents or by reading the microfilm record of the original case file contents.

The term "significant transfer" as it appears in this study refers to associative transfers of one or more head or pubic hairs between victims and suspects in sexual assault cases. No attempt was made to distinguish between primary and secondary hair transfers in case-related submissions.

Collection of Evidence

Items of physical evidence which had been collected by law-enforcement and medical personnel from victims and suspects in connection with alleged sexual assaults were considered for this study. These items consisted of pubic hair combings and clothing.

The State of New Mexico provided all requesting hospitals with victim rape kits for the collection and preservation of sexual assault evidence and standards. This kit included specifically labeled bags and envelopes for swabs, slides, pubic combings, clothing, hospital sheets, a blood standard, a saliva standard, and pubic hair and head hair standards. A kit for the collection and preservation of suspect standards was recently introduced. Prior to the introduction of the suspect kit, suspect standards were placed in collector-provided containers or in small plastic bags from unused victim kits.

Pubic hair combings were submitted to the author's crime laboratory in paper envelopes or plastic bags. Virtually every submission included the comb which had been used on the subject during the course of his or her examination. The most frequently used comb type was black plastic, approximately 12 cm long, with teeth separations of 1 and 2 mm. Victim pubic hair combings were always performed in the hospital. Suspect combings were performed in a hospital or in a custodial setting.

Victim clothing collections were also included as part of the hospital examination. The underwear and the outerwear were segregated in previously labeled brown paper bags. In a few cases, panties were retrieved from the victims' laundry hampers.

If the suspect was arrested within a reasonable period of time after the assault, his clothing was submitted to the crime laboratory for analyses. Suspect clothing was submitted to the crime laboratory in paper or plastic bags. Undergarments were not always packaged separately from outerwear. For the purposes of this study, combined underwear and outerwear submissions were listed as outerwear.

Examination of Evidence

Each item of evidence was initially subjected to a visual examination. Hairs which appeared to have visual significance (hairs which were visually dissimilar to the hair standards from the same labeled subject) were removed from the item with forceps and placed in plastic bags for temporary storage. Upon the completion of the visual examination of each item, the hairs which had been judged as having visual significance were removed from the plastic bags and each was individually measured and characterized on the basis of length, relative diameter, color, and degree of curl or curve. These questioned hairs were then mounted on glass slides using Permout[®] mounting medium in preparation for microscopic comparison against the submitted head and pubic hair standards. The hair standards were similarly measured, characterized, and mounted.

The microscopic comparison of the questioned hairs with known hair standards was

accomplished using an American Optical transmitted light comparison microscope at magnifications of $\times 100$ to $\times 400$. Proposed significant hair matches were reexamined by the case analyst and another experienced hair analyst using a comparison microscope equipped with a binocular training head. Each point of comparison between the questioned hair and the case standards was viewed and discussed. If both analysts agreed on the validity of the proposed match, the match was accepted. Disagreements, which occurred in less than 1% of such reexaminations, were settled by rejecting the proposed hair match.

Results and Discussion

Pubic Hair Combing

Victim pubic hair combings were submitted in 96 of the 112 qualified cases. The results of hair comparison examinations on victim pubic hair combings are reported in Table 1.

The low reported incidence of significant pubic hair transfers from suspect to victim of 4% is within range of the study by Soules et al. [2]. They reported no male pubic hair contributions in female pubic combings following one episode of sexual intercourse by each of 15 volunteer test couples. These observations of no transfer conflict with Keating's [3] 45% transfer rate from male to female following 20 acts of sexual intercourse by one volunteer test couple. Interestingly, Keating reported that 3 of the 20 female pubic combings (15%) did not result in the collection of any pubic hairs, and the author found 18 out of 96 female combings (19%) contained no hair.

The suspects in the author's study underwent pubic combings in 18 of the 112 submitted cases. The results of the examinations of these combings are also reported in Table 1.

The author's results directly parallel those of Keating in that in no case was there a recognizable transfer of the victims' pubic hairs to the suspects' pubic area. Further, Keating reported the absence of any hairs in the male's pubic combings 20% of the time. The author's case work showed an absence of hairs in 28% of the submitted suspect pubic combings.

Underwear

Underwear from the victims of sexual assault, primarily panties and bras, were submitted for hair comparison examinations in 68 cases. Suspect underpants were submitted in 17 cases. Table 2 gives the reported results of these examinations.

Suspect head hair transfers to the victim's undergarments were reported at the rate of 4%. Pubic hair transfers from the suspect to the victim appeared in 3% of the examined victims' underwear. No significant transfers were reported in 78% of the examined victims' undergarments when hairs from those items were removed for examinations. Fifteen percent of the submitted victims' underwear contained no hairs.

TABLE 1—*Results of hair comparison examinations of pubic hair combings submitted in sexual assault cases.^a*

	Total Cases	No Hair Present	Pubic Hair Present, No Significant Transfer	Significant Pubic Hair Transfer
Victim	96	19% (18)	77% (74)	4% (4)
Suspect	18	28% (5)	72% (13)	0% (0)

TABLE 2—Results of hair comparison examinations of underwear submitted in sexual assault cases.

	Total Cases	No Hair Present	Hair Present, No Significant Transfer	Significant Head Hair Transfer	Significant Pubic Hair Transfer
Victim	68	15% (10)	78% (53)	4% (3)	3% (2)
Suspect	17	0% (0)	100% (17)	0% (0)	0% (0)

Although all of the suspects' underwear submissions contained hair, none of those hairs were found to be consistent with the victim's head or pubic hair standards.

Outerwear

Submitted items of outer clothing were examined for the presence of hair transfers when the individual case history dictated that legitimate chance transfers as a result of uncontested, normal interactive behavior were not indicated. Outerwear from sexual assault victims was examined in 62 of the 112 qualified cases. Twenty-nine submissions of suspects' outerwear were examined. Table 3 provides the author's findings with regard to the examination of victims' and suspects' outer garments.

The incidence of no significant hair transfers to the victims' and the suspects' outer clothing were 84% and 83%, respectively. Only one case included victim outer clothing which contained no hair. All of the suspect clothing items included hair.

Quill [4] reported 11 (18%) recognizable transfers of one or more head hairs following 62 tapings of his outer clothing over a 31-day period. All of these hairs were identified as belonging to members of his immediate family, with whom he had frequent physical contact. One of 9 secondary hair transfer experiments performed by Gaudette and Tessarolo [5] showed a 16% transfer rate of fluorescently dyed head hairs from a volunteer assailant's outer clothing to a volunteer victim's outer clothing following a series of simulated assaults.

Quill's transfer rate and that of Gaudette and Tessarolo are generally similar to the author's case work observations. The reported casework occurrence of significant head hair transfers from the victim's to the suspect's outer apparel was 14%. From suspect to victim, the figure was 13%.

The presence of pubic hair consistent with the suspect's standard on the victim's outer apparel was reported in one of the author's cases. Significant pubic hair transfers from victim to suspect outerwear were also reported in only one case.

TABLE 3—Results of hair comparison examinations of outerwear submitted in sexual assault cases.

	Total Cases	No Hair Present	Hair Present, No Significant Transfer	Significant Head Hair Transfer	Significant Pubic Hair Transfer
Victim	62	1.5% (1)	84% (52)	13% (8)	1.5% (1)
Suspect	29	0% (0)	83% (24)	14% (4)	3% (1)

Conclusion

This study is offered as one forensic hair comparison analyst's attempt to respond to questions concerning the meaning of hair comparison results. While controlled transfer studies and the results of casework examinations should not be given equal weight, the cumulative data from numerous casework studies may form the basis of a judiciously utilized approach to general numerical trend comparisons.

Analytical colleagues are encouraged to look to their own casework as well as to the published controlled hair transfer studies for the information they may be required to present in investigative and courtroom situations.

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