CASE REPORT

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A Condom—the Critical Link in a Rape

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ABSTRACT: An intact condom, reputedly used during a rape, was submitted for forensic examination. Conventional biochemistry results indicated that blood found on one side of the condom may have originated from the victim. Semen from the other side of the condom was not characterizable by conventional biochemical methods. Pubic hairs recovered from the condom matched those of the victim and not those of the suspect.

Testing the blood and semen from the condom by DNA analysis gave the profile of the victim from the blood and the profile of the suspect from the semen.

KEYWORDS: pathology and biology, condom, semen, blood, DNA profiling, rape

By finding the semen of a suspect and the blood of a victim on opposite sides of the *same* condom, the strongest possible link was established between a suspect and a victim in a rape case.

Case Report

This case report concerns the rape of a minor by a suspect previously known to her. The day prior to the rape, the suspect made the acquaintance of the victim. The following day, the suspect took the victim to a secluded area and while wearing a condom, raped her. Subsequently, the suspect discarded the condom. Two days later, a condom was recovered from the area in which the rape was reported to have taken place. A suspect charged with the rape, denied having any physical involvement with the victim.

The minor underwent a medical examination in which her hymen was found to have been torn not long prior to the examination. This finding was consistent with the complainant's claim of having been a virgin before the rape. Further, she claimed that she had not had sexual intercourse prior to the rape. A vaginal swab was taken at the time of the examination.

Laboratory examination of the condom revealed the presence of blood on one side of the condom and semen on the other. Pubic hairs were also found on the condom.

The determination of blood on the condom was made by carrying out a phenolphthalein test followed by a precipitin test for human hemoglobin. Both results were positive.

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Moreover, the blood was found to be uncontaminated by semen. A presumptive test for the presence of semen (the Brentamine test) and the precipitin test for the presence of human semen and prostatic acid carried out on the blood from the condom, were all negative.

The blood from the condom and that of the suspect and the victim were typed by the simultaneous four enzyme phenotype method [*1*,*2*]. Of the four enzyme phenotypes obtained from the blood on the condom, two, ESD and ADA, were reportable and two, EAP and PGM, were not. Both the ESD and ADA were found to be type 1, the same as those of the victim. The suspect's blood contained EsD 2 and ADA 2-1.

The semen from the condom was not found to be contaminated by blood, as confirmed by a negative presumptive test for the presence of blood (phenolphthalein). Complete sperm cells (with tails) were observed microscopically. Subsequently, the semen was tested for PGM and blood group antigens. No enzymatic activity (for PGM) was detected in the semen by the starch gel electrophoresis method.

Antigen A was detected in the semen by the absorption-inhibition and the absorption-elution methods. As the condom was entirely covered with semen, no control was available for parallel testing. Consequently, this result was not reported. Blood samples of the victim and the suspect revealed that the former was an O secretor and the latter was an A secretor.

The five pubic hairs removed from the condom were compared to pubic hair samples of the victim and suspect. A match was found between hairs from the condom and the victim's hairs. The suspect's pubic hairs were not found to match the hairs from the condom. Results are presented in Table 1.

By microscopic examination of vaginal samples taken from the victim, no sperm cells were seen—a finding consistent with the circumstances of the case. White blood cells and epithelial cells, however, were noted to be present.

TABLE 1—*Results of assays on blood, semen, and hairs found on the condom as compared to those of the victim and the suspect.*

	Condom		Victim	Suspect
	Side 1	Side 2		
	Blood stain	Semen stain		
Assay				
Brentamine test	−	+	. . .	. . .
Microscopic examination for sperm cells	. . .	+	. . .	. . .
Phenolphthalein	+	−	. . .	. . .
Precipitin test for:				
human hemoglobin	+	. . .	. . .	. . .
human semen	−	. . .	. . .	. . .
human prostatic acid	−	. . .	. . .	. . .
EsD	1	. . .	1	2
ADA	1	. . .	1	2-1
PGM (starch gel)	. . .	nr[a]	. . .	. . .
Blood group antigens	. . .	A[b]	. . .	. . .
Blood group	. . .	. . .	0	A
Secretor status	. . .	. . .	secretor	secretor
Pubic hairs from condom	. . .	. . .	match (pubic hairs)	non-match (pubic hairs)

[a]No result.
[b]Result not reported − no control available.

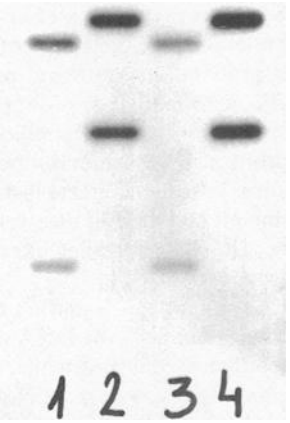

FIG. 1—*DNA profiles of the blood sample of the suspect (lane 1), of the blood of the victim (lane 2), of the semen from the condom (lane 3), and of the blood from the condom (lane 4). The DNA was probed with D2S44.*

The condom, along with the blood stains of the victim and suspect were then submitted for DNA analysis. Each side of the condom was swabbed separately with a piece of wet sterile gauze pad. DNA was extracted from these two pieces of gauze as well as from the blood stains of the victim and suspect. One to two micrograms of the restricted DNA (Hinf I, BioLabs) and five microlitres of the BRL ladder (DNA analysis marker system) were separated on an agarose gel and blotted on to a nylon membrane (Zeta-Probe, Bio-Rad). The membrane was successively probed with D2S44, D12S11, D14S13 and D7S21.

The results of all four probes showed that the DNA profile of the blood-stained side of the condom matched the victim's profile, while that of the semen-stained side of the condom matched the suspect's profile. An example of one probe (D2S44) is shown in Fig. 1.

Because the blood and the semen were separated by the intact condom, preferential extraction of the body fluids was not necessary.

The laboratory findings in this case were not required to be presented in court. During the trial, the suspect, of his own accord, changed his plea from noninvolvement to one of consentual sexual intercourse with the victim. Based on testimony, the suspect was found guilty of rape and sentenced.

Discussion

A condom, used in a rape, was submitted for forensic analysis. On one side of the condom, blood was found and on the other side, semen. Also attached to the condom were pubic hairs.

EsD 1 and ADA 1, characterized from the blood on the condom, are the two most common phenotypes of each of these two polymorphic enzymes. Together EsD 1 and ADA 1, found in approximately 70% of the population, do not strongly connect the victim to the condom.

No reportable results were obtained on the semen from the condom by conventional biochemistry methods. Only tentative information (the possible blood group) of potential suspects could be surmised.

The pubic hairs recovered from the condom, which matched those of the victim and not the suspect, only added some weight to the former's version of rape but again were of no use in connecting a suspect to the crime.

The results of the DNA assay, however, gave a clear-cut profile of the victim from the blood-stained side of the condom and of the suspect from the semen-stained side of the condom with four different probes. The statistical probability that another person would have the same DNA profile, with these four probes, as the victim is approximately 1 in 219,000 and as the suspect is 1 in more than 18 million! (These figures are based on a statistical analysis of DNA profiles, by the four probes, of 96 individúals randomly selected from the Israeli population.) As biochemical tests demonstrated that the semen on the condom was not contaminated by blood or vice-versa, preferential separation for DNA profiling was unnecessary. The DNA profiles likewise showed no contamination of blood with semen or semen with blood.

Although, in this particular case, blood was found on the condom, it could not have been the red blood cells (enucleated) that gave the DNA profile of the victim. The DNA profile was obtained from the epithelial cells and white blood cells that were secreted together with the blood. Consequently, even in most cases in which blood may not be present on a condom, it may still be possible to obtain a DNA profile from a victim of a sexual assault. This DNA profile coupled to that of a suspect's on the same condom, presents very strong evidence in a sex crime case.

Over the past few years, the use of condoms has become more commonplace in the general population in the prevention of AIDS. It is likely that the prospect of infection by AIDS will also lead to an increased use of condoms by those engaging in sex crimes. As a consequence, a greater number of cases involving condoms may be expected to reach forensic laboratories. DNA profiling would appear to be the method of choice in characterizing body fluids found on these items.

References

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