

E. F. Wilson,¹ M.D.

Sperm's Morphologic Survival After 16 Days in the Vagina of a Dead Body

In preparation for a murder trial a few years ago, a number of textbooks and the recent English-speaking literature dealing with forensic pathology were reviewed for information concerning length of survival of spermatozoa in the vagina of a dead body. This literature review has been ongoing and has included examination of the most recently published textbook in forensic pathology [1], where it is written, "Even though a definite time scale for the identification of spermatozoa cannot be furnished, it is apparent that a number of days can elapse between the time of death and time of examination with identifiable spermatozoa being present."

The availability of meteorological data from near the scene of death prompted my report of rather prolonged survival of spermatozoa.

Report of a Case

History

On 10 Oct. 1969, at approximately 6:30 p.m., a 19-year-old, unmarried, white female bank teller returning alone from work to her apartment was induced by a young male stranger to leave her stalled automobile, which was standing on the emergency parking strip of a heavily traveled highway. She was driven some 40 miles southwest into a ghost town in mountainous Utah where she was raped, strangled to death, and abandoned that same evening.

On 26 Oct. 1969, at about 12 noon, approximately 16 days after the young woman's disappearance, a male elementary school teacher searching for antique bottles discovered her clothed body lying prone on top of dry, hard, and sandy soil covered with small stones and twigs about 25 ft to the side of a dirt road. Sagebrush growing close by probably provided shade for periods of time to parts of the body. The clothing and body were dry at the time of discovery.

Shortly after discovery, the body was transported by hearse approximately 90 miles northeast to the University of Utah Medical Center and placed in a body storage room at 40°F at 6:10 p.m. the same day.

Postmortem Examination (OME 661-69)

The essentially fully clothed and slightly decomposed unembalmed body was autopsied at 9:10 a.m. on 27 Oct. 1969.

Received for publication 30 July 1973; revised manuscript received 23 Nov. 1973; accepted for publication 10 Dec. 1973.

¹ Lane County Assistant Medical Examiner, P.O. Box 369, Eugene, Ore. 97401. Formerly, Deputy Chief Medical Examiner, State of Utah, Utah State Division of Health, and Department of Pathology, University of Utah Medical Center, Salt Lake City, Utah.

The body measured 5 ft. 8 in. in length and was estimated to weigh 130 lb. Although the body was clothed in a long-sleeve sweater and skirt, the entire right arm including the shoulder, right side of the thorax, and entire lower thorax were not covered. The right side of the sweater was up and the empty right sleeve wrapped tightly around the neck. Beneath the sleeve of the sweater and wrapped tightly and circumferentially around the neck was a portion of twisted and knotted panty hose. One of the knots held, in tourniquet fashion, a 24-cm long slender piece of sagebrush. Removal of the panty hose ligature revealed in the skin a horizontal furrow which completely encircled the neck. A plaid skirt covered the front and back of the lower torso and legs to just above the knees. Suntanned skin covered the right shoulder, the posterior lateral aspect of the right arm, the right posterior thorax, and the posterior aspect of each leg below the knee. The skin covered by clothing was pale in comparison.

A brassiere, half slip, and panties were in place and intact. The latter two articles of clothing were stained pink where they covered the vulva. The front of the sweater, skirt, and exposed portions of the body were covered in places with soil and twigs.

External evidence of decomposition consisted of blackened, wrinkled, and dry fingers and toes; cloudy cornea and soft eyeballs; and areas of skin slippage on the anterior aspect of each leg, especially both thighs. On the left side of the face, on both knees, and on the anterior aspect of both legs below the knees there were soil particles and whitish areas suggestive of mold. Small collections of fly eggs and early fly larvae were found on the left eyelids and in the left nostril.

The knee and elbow joints bilaterally were relatively immobile. Purplish red livor mortis was present in the left side of the face and anterior portion of the trunk.

In the fourchette there was a vertical, 1/8-in.-long, shallow laceration with dry reddish streaks extending toward the perineum. No other injuries were found.

Within the posterior fornix of the vagina there was no more than 1 cm³ of grayish liquid. A wet mount of the aspirated vaginal contents revealed a nonmotile sperm with a shortened tail. Additional slides from moist swabs of the vaginal contents were fixed and stained by the Papanicolaou method. Examination of these fixed slides revealed occasional nonmotile complete sperm.

The mucosa of the tongue, the valleculae, and the larynx contained a moderate number of petechiae. The hyoid bone, the thyroid cartilage, and the cricoid cartilage were intact. The internal organs including the brain were softened by decomposition, but healthy.

Toxicologic examination of the heart blood employing solvent extraction, ultraviolet spectroscopy, gas chromatography, and thin-layer chromatography revealed no alcohol or drugs. Acid phosphatase activity of vaginal contents was not determined.

Discussion

"There is very little reliable information concerning sperm survival and prostatic acid phosphatase activity within and without the vaginal canal, a fact which frequently leads to spirited argumentation between lawyers and medicolegal experts in court" [2]. "Such disagreement may be due, in part, to the natural variation of spermatozoal resistance and to the variation in the vaginal milieu" [3]. It is generally accepted that the amount of vaginal secretion and its chemical constituents have an effect on the residual time of spermatozoa, and it is probable that the amount of secretion and its constituents vary within the menstrual cycle and with the degree of sexual excitement [3-5]. Estrogen stimulates the endocervical glands to produce mucus favorable for survival of sperm, whereas

progesterone exerts an inhibitory effect. Sperm are diluted in the vaginal fluid and dilution shortens survival [5]. Leukocytes within the vagina appear to phagocytize sperm [6]. Sperm in the normally alkaline seminal fluid deteriorate under the influence of acid pH, products of bacterial multiplication, proteolytic enzymes, and warmth found in the vagina. Such deteriorative influences proceed much more quickly at temperatures of 80–90°F than between 20–60°F, since the higher temperature accelerates proteolytic enzyme action and bacterial multiplication [7]. Decomposition of the body probably would exert an acid influence on the usually acid pH of the vagina. Finally, it could not be determined if the milieu of the vagina had been altered in any way by the defendant or the victim prior to or following the rape.

It is well known that sperm can be preserved for long periods of time by the rapid freeze method [8]. The cold temperatures to which this body was exposed probably slowed the destructive influences of proteolytic enzymes, bacterial multiplication and phagocytosis.

The meteorological data found in Table 1 were obtained from a U.S. Department of Commerce Weather Station located approximately 3 miles north of where the body was found and at approximately the same 6000-ft elevation. Soil temperature readings were not available.

TABLE 1—*Meteorological data for October 1969.*

Date	High, °F	Low, °F	Precipi- tation, in.	Date	High, °F	Low, °F	Precipi- tation, in.
9	44	36	0	18	46	35	0.26
10	44	34	Trace	19	40	34	0.41
11	46	32	0	20	39	22	0
12	40	21	0.06	21	49	36	0
13	45	27	0.15	22	52	40	0
14	40	29	0.17	23	58	40	0
15	44	32	0.02	24	59	34	0
16	50	36	0.40	25	59	31	0
17	50	34	0.66	26	60	32	0

In the report by Pollak [5] is written, "Although the various authors give the time of survival of spermatozoa in the vagina as from 30 minutes to 28 hours and a period of their presence in the vagina as from 30 minutes to 17 days, one may safely consider the periods to be, for motile spermatozoa in the vagina after coitus, 30 minutes to 2 or 3 hours and for non-motile spermatozoa in the vagina after coitus, 30 minutes to 24 hours." Although this quotation is found on a page dealing with sperm survival in cadavers, it is not clearly written that it does apply to cadavers. Also, because the quotation is not referenced the circumstances permitting postmortem survival of sperm for 17 days in the vagina are not available.

Concerning the survival of sperm in the vagina of a cadaver, Rupp [2] recorded the case of "an old woman who was raped and murdered and embalmed approximately thirty hours prior to autopsy. Fluid aspirated from the vaginal canal revealed an occasional well preserved non-motile sperm and a strong acid phosphatase reaction." Glaister [9] demonstrated complete and well-preserved sperm from the vagina approximately 85 hours after death. "In the Christie case of 1952, 3 of the victims had recognizable sperm in the vaginae though death in one case was about three months earlier" [10]. Conditions which may have played a role in the survival of the sperm in the above cases were not recorded.

Trial (June 1970)

At the time of the murder the defendant was on parole following conviction on a rape charge in another state. In a lineup prior to the murder trial the defendant was identified by a witness for the prosecution as the man who had failed in an attempt with a knife to force her into his car on the night prior to the murder.

At approximately 9:00 p.m. on the evening of the murder, the defendant was noted by a witness to have had the "beginning of a black eye." It was also noted at that time that his hands and the inside of his car were muddy. Later that evening two couples, including the defendant, drove to Nevada for a double wedding. While on the return trip, the two couples heard a report of the disappearance of the murdered girl and two occupants testified that the defendant said, "I did it. Didn't we, Mike (the driver of the car)." The victim's roommate testified she did not know the defendant and had never seen the victim in his company.

Four witnesses identified the defendant as the man who was standing on the highway alongside the car in which the murdered girl was sitting. The victim's body was found near the house of the defendant's grandmother, the only house still standing in the ghost town. Wool fibers found on a windowsill in the defendant's grandmother's house matched the fibers of a sweater taken from the defendant's home. Hair found in the defendant's car was microscopically identical to hair of the victim.

The defendant was convicted of 1st degree murder with no recommendation for mercy.

Summary

The body of a young woman was found in mountainous Utah 16 days after her rape and murder. Autopsy revealed ligature strangulation as the cause of death. Vaginal aspirate yielded intact sperm. Daily temperatures and precipitation levels, for the 16 days from the murder to the discovery of the body, were obtained from a weather station located 3 miles from where the body was found and at approximately the same 6000-ft elevation.

References

- [1] Spitz, W. and Fisher, R., *Medicolegal Investigation of Death*, Charles C Thomas, Springfield, Ill., 1973, p. 378.
- [2] Rupp, Joseph C., "Sperm Survival and Prostatic Acid Phosphatase Activity in Victims of Sexual Assault," *Journal of Forensic Sciences*, JFSCA, Vol. 14, 1969, pp. 177-183.
- [3] Wecht, C. H., and Collom, Weldon D., "Medical Evidence in Alleged Rape" in *Legal Medicine Annual*, C. H. Wecht, Ed., Appleton-Century-Crofts, New York, 1969, pp. 271-285.
- [4] Behrman, S. J. and Kistner, R. W., *Progress in Infertility*, Little, Brown and Co., Boston, 1968.
- [5] Pollak, O. J., "Semen and Seminal Stains: A Review of Methods Used In Medicolegal Investigations," *Archives of Pathology*, Vol. 35, 1943, pp. 140-196.
- [6] Lanman, J. T., "Delays During Reproduction and Their Effects on the Embryo and Fetus," *New England Journal of Medicine*, Vol. 278, 1968, pp. 993-999.
- [7] Williams, W. W., *Sterility: The Diagnostic Survey of the Infertile Couple*, 3rd ed., Walter W. Williams, M.D., Publisher, Springfield, Mass., 1964.
- [8] Behrman, S. J. and Ackerman, D. R., "Freeze Preservation of Human Sperm," *American Journal of Obstetrics and Gynecology*, Vol. 103, 1969, pp. 654-664.
- [9] Glaister, J. and Rentoul, E., *Medical Jurisprudence and Toxicology*, 12th ed., E. and S. Livingstone Ltd., Edinburgh and London, 1966, p. 421.
- [10] Pictou, B., *Murder, Suicide or Accident: The Forensic Pathologist at Work*, St. Martin's Press, New York, 1971, p. 155.