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Rape and the laboratory

Rape has recently attracted a lot of attention with public debate of issues such as the proportion of true rape to spurious allegations. Partisan positions have been taken up, and in these circumstances medical and scientific confirmation of sexual attacks has become all the more vital. The Sexual Offences Act (1956) states that "a person shall not be convicted of an offence on the evidence of one witness only unless the witness is corroborated in some material particular by evidence implicating the accused." This corroborative evidence is most likely to come from clinical examination backed up by forensic laboratory investigations.

The laboratory can not only confirm recent sexual intercourse but also often provide evidence of an assault with sexual overtones—and also of the identity of the rapist. Evidence of recent sexual intercourse is clearly not in itself evidence of rape, but it is an important corroboration. The woman's clothing, external genitalia, and vagina should be examined for the presence of semen, which on occasion may also be found on the skin, among the pubic hairs, in the anus, and in the mouth.

Laboratory techniques for detecting seminal fluid are now far more sensitive and specific than they used to be. Screening tests on clothing may still be carried out by ultraviolet light, but the acid phosphatase enzyme test has become the standard screening technique. In Britain this is rarely used as a definitive test, though in the United States high concentrations of acid phosphatase in vaginal samples may be accepted as proof that semen is present. The vaginal mucosa itself may secrete acid phosphatase, but the different types of enzymes in the semen and the vagina can now be distinguished.

In Britain great emphasis is still laid on detecting spermatozoa under the microscope as legal proof of seminal emission, but azoospermia may frustrate this most unequivocal of tests. Fortunately the increasing use of vasectomy seems not to have created practical problems: the sterilised man rarely seems to commit rape. Moreover, when spermatozoa cannot be identified serological tests using antisemen sera may give an equally definite result.

Spermatozoa may be detectable for much longer after intercourse than was once thought possible: they may be identified on vaginal swabs as long as 48 hours later. Acid phosphatase concentrations may be raised for 18 to 24 hours, and seminal blood group antigens may be detectable for at least 24 hours. Recognisable sperm heads from dried seminal stains on fabric may be seen under the microscope after many months or even years. Clearly in a case of alleged rape the medical examiner should send specimens to the laboratory even when the victim presents herself after a long delay. In addition to detecting seminal stains modern techniques also allow the grouping of very small quantities of semen in the 80% of cases where blood group substances are secreted into the body fluids. As in paternity testing, this is only an exclusory test and can never definitely pinpoint one individual, but it may corroborate other evidence of rape.

Apart from seminal stains the laboratory can help with several other problems in sexual assaults. Bite marks are not uncommon, especially on the neck and breasts, and, besides matching the dental pattern, the laboratory may on occasions detect and group saliva stains around the marks. Hairs, from either the head or the pubic area, may be recovered from the assaulted woman and compared with hairs from the alleged assailant. Again, a positive identity match is impossible, but the laboratory may note similarities of vital importance. When children are the victims, the recovery of an adult pubic hair from the body or clothing is naturally of great importance.

If the woman resists violently she may scratch her attacker and so accumulate skin fragments under her fingernails, which the laboratory may identify microscopically and blood group by serological methods. Even more commonly her fingernails may trap fibres from the assailant's clothing. These form valuable pieces of corroborative evidence when linked with scratch marks found on the accused or compared with the fibres of the suspect's clothing. Foreign particles recovered from the woman's skin or clothing may also provide evidence—examples being grass, leaves, soil, and other foreign material that can be traced to the scene of the crime. Blood smears and venereal infection may indicate an intimate contact between the victim and the accused and are all potentially vital items of evidence.

These scientific investigations show the importance of awareness and co-operation between the medical examiner—usually a police surgeon—and the laboratory. If he is not sufficiently aware of the potential value of laboratory techniques the doctor may ruin the whole investigation. The legal necessity for scientific confirmation means that the prosecution may founder entirely on deficiencies in the medical and scientific aspects of the evidence. The consequences of incompetent handling are so serious that only experienced practitioners should examine the victims of alleged sexual assaults: medical errors can and do lead to miscarriages of justice.

Homologous artificial insemination

Interest in artificial insemination techniques that use the husband's semen to try to improve the chance of conception has recently been renewed. Homologous artificial insemination (AIH) is of undoubted value when potentially normal semen does not reach the cervix because of ineffectual intercourse—which accounts for perhaps 5% of all referrals to a general subfertility clinic. This may be due to some local anatomical anomaly such as hypospadias, to impotence, or to vaginismus; any simple technique that delivers the semen to the cervix is likely to prove successful. Ideally the method should be one that the couple can be taught to use themselves at home, such as the Malleson syringe or the cervical insemination cap. The cervical cap can also be used where the only barrier to conception is the inaccessibility of a retroverted cervix, or in retrograde ejaculation, where active spermatozoa can be salvaged from urine which has been made alkaline.

When analysis of the semen shows subfertility or the cervical mucus is impenetrable to spermatozoa, the value of AIH becomes more debatable, though most clinicians believe it has a useful part to play. Impaired fertility in men seldom responds to any form of drug treatment, and techniques designed to gain some advantage for the effective spermatozoa offer a more rewarding approach. Whatever the method chosen the couple are likely to find it aesthetically objectionable and so will be willing to persist with it for only a limited time. Its use must coincide with ovulation, and effective spermatozoa must be available. There is no specific lower limit to the number necessary; the emphasis is on quality. Poorly motile, agglutinated, or malformed spermatozoa, however numerous, are not likely to give a successful result.