

Physiologic consequences and complications of vasectomy

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Sterilization of men and women is the most popular method of contraception in Canada. The contraceptive effect of a vasectomy usually occurs within 3 months. The production of sperm, however, is not interrupted, and an increase in pressure proximal to the ligation site may cause rupture of the epididymis or the ductus deferens, with extravasation of spermatozoa and the formation of granulomas or sperm antibodies. Increased pressure may also explain the post-vasectomy pain syndrome.

Parmi les méthodes contraceptives, la stérilisation masculine et féminine connaît la plus grande faveur au Canada. Si la vasectomie réalise habituellement la contraception dans les 3 mois, la spermatogénèse n'est pas supprimée pour autant. La surpression en amont de la ligature, qu'on a mise en cause dans la douleur post-opératoire, peut amener la rupture de l'épididyme ou du canal déférent, l'extravasation de spermatozoïdes, la formation de granulomes ou l'élaboration d'anticorps anti-spermatiques.

Voluntary sterilization through vasectomy is a frequent topic of discussion between patients and physicians. In the United States more than 500 000 vasectomies are performed annually,¹ and it is estimated that more than 15 million men have undergone the procedure since 1969.² Although urologists perform most vasectomies, other physicians do them too. Recent controversies concerning the possible immunologic consequences, such as atherosclerosis, prompted us to review the current literature on the consequences of vasectomy. The result should help physicians in their discussions of this form of sterilization with their patients.

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Basic considerations

Millions of spermatozoa are produced daily in men, and the entire process of spermatogenesis requires approximately 64 days.³ However, testicular spermatozoa are not motile and cannot fertilize ova. Additional maturation occurs in the epididymis. The ductus deferens is mainly involved with the transportation of sperm from the epididymis to the ejaculatory duct. Spontaneous peristalsis or peristaltic contractions in response to adrenergic or mechanical stimuli seem to underlie this transportation. The function of the ductus deferens is probably androgen dependent.³ The transportation of sperm through the human reproductive tract may take 1 to 21 days, the time depending on age and sexual activity.⁴

Vasectomy is the surgical interruption of spermatozoa transportation through the ductus deferens. Regardless of the particular technique, some spermatozoa remain in the distal part of the ductus after surgery,⁵ and this delays the onset of infertility. In a review of 357 procedures, Tailly and associates⁶ found that 90% of the patients became azoospermic within 82 days. However, one patient had nonmotile spermatozoa 257 days after the vasectomy. Should motile spermatozoa persist after 180 days, failure of vas occlusion must be considered.⁶ Reasons for failure include an accessory ductus deferens, ligation of an anatomic structure other than the ductus deferens and spontaneous recanalization, which may occur in up to 1% of cases.^{7,8} It is not known whether the frequency of ejaculation affects the time of onset of azoospermia. The delay in the onset of infertility and the need for postvasectomy contraception until azoospermia has been established by means of spermography must be emphasized to the patient.

Immediate consequences

The morbidity and mortality rates associated with vasectomy are low. In one recent study concerning 200 patients the overall morbidity rate was 7.5%; the complications included scrotal hematoma, infectious and noninfectious epididymitis, and superficial wound infection.⁹ Interestingly,

most of the infectious complications arose in patients with known genital tract infections. This suggests that postvasectomy infections are most often endogenous and that prophylactic antibiotic therapy should be used when genital tract infections are present. Strict aseptic techniques must be used, as infections from skin flora have been reported, especially in developing countries. With proper precautions, deaths related to anesthesia and infection after vasectomy are rare.^{10,11}

Delayed consequences

Changes in the testicle, epididymis and prostate

Vasectomy does not seem to alter testicular volume,¹² spermatogenesis^{8,13} or testicular hormonal function.¹⁴⁻¹⁶ However, the sperm quality is affected by the time elapsed since vasectomy.¹⁷ Poor quality of sperm after vasectomy may contribute to the low success rate (less than 50%) of vasovasostomy. Because spermatogenesis is normal and the quality of sperm in the ductus deferens is decreased after vasectomy, Silber⁸ suggested that increased hydrostatic pressure results in dilatation and distention of the epididymis (usually asymptomatic) and is responsible for "epididymal blowouts" and secondary sperm extravasation. Moreover, Silber showed that the principal site for these blowouts is the junction of the body and the tail of the epididymis.

Granulomas may form at the sites of sperm extravasation. Histopathological studies have suggested that these granulomas are probably inflammatory reactions to extravasated sperm.¹⁸ Although no anatomic changes in the prostate have been described, there is some evidence that vasectomy decreases the secretory function of the prostate.¹⁹ The mechanism and possible consequences of this observation are unknown.

Postvasectomy pain syndrome

Patients have complained of pain long after vasectomy. In some cases the pain corresponded with ejaculation.²⁰ This distressing symptom is rare and has been relieved by means of vasovasostomy or decompression of the distended ductus deferens to free spermatozoa into the scrotal cavity.²⁰ The exact mechanism underlying this pain is not known, but we believe that the pain is related to the active transport of spermatozoa from the cauda epididymis to the surgically obliterated ductus deferens, as demonstrated in a study of sexually stimulated rabbits.³

In other cases the pain may be more persistent and sometimes may last many years. Selikowitz and Schned² used the term "late postvasectomy syndrome" to describe this clinical entity. In their series 18 patients with this syndrome underwent epididymectomy and partial vasectomy to relieve the pain. They attributed the scrotal discomfort to dilatation of the epididymal ducts, extravasation of

sperm and development of sperm granulomas. However, the relation between pain and granulomas is debatable. Silber⁸ stated that granulomas are always present after a vasectomy and that they are rarely associated with pain. He suggested that epididymal tenderness is less likely in patients with a sperm granuloma than in those without granulomas, because the epididymal hydrostatic pressure is decreased after sperm extravasation at the granuloma site.

Psychosocial problems

Although anecdotal cases of behavioural problems have been reported,²¹ vasectomy does not seem to have adverse effects on relationships if there are no pre-existing marital or sexual problems and if informed consent is obtained from both partners.²¹ Most couples are satisfied with the operation.²²⁻²⁴

Thorough collection of information and discussion of the procedure with the patient and his partner are important for discovering any misconception or false expectation either may have about the operation. If there is any disagreement sexual counselling should be sought.

Questionnaire surveys of couples after vasectomy have revealed almost complete satisfaction with the procedure as a contraceptive method. The data suggest that two primary changes are frequently observed postoperatively. Men who have experienced anxiety in conjunction with intercourse because of a fear of contraceptive failure or pregnancy tend to report a decrease in both anxiety and inhibition of sexual arousal postoperatively. In addition, in some cases the relationship between partners has changed when the man has adopted "masculine" behaviour, presumably to deny any suggestion that he is less masculine because of the operation.²⁵

Immunologic disorders

There is still a great deal of interest in immunologic disorders after vasectomy.^{1,13,26} The procedure results in sperm antibody production because of a "break" in the blood-testis barrier, which normally prevents an autoimmune reaction. Different mechanisms have been suggested to explain this autoimmune sensitization:²⁷ antigen leakage involving degenerated sperm products, phagocytosis of degenerated sperm within the ductus deferens and leakage of sperm antigens at sites of granuloma formation. Sterilization by means of occlusion without transection of the ductus deferens does not reduce the prevalence of postvasectomy serum sperm-agglutinating antibodies.²⁸

Three types of sperm antibodies have been studied most extensively:¹ the serum sperm-immobilizing antibody, the serum sperm-agglutinating antibody and the seminal plasma sperm-agglutinating antibody.

Two basic immunologic questions are current-

ly being debated. The first involves the hypothesis that vasectomy, through the production of sperm antibodies and possibly of circulating immune complexes, predisposes to atherosclerosis. This hypothesis was the result of animal studies in which monkeys were found to have more extensive atherosclerosis after vasectomy.¹ Although Soderdahl¹⁶ considered that vasectomy should not be performed in men with cardiovascular risk factors such as hypertension, smoking and hyperlipidemia, there is no evidence that men who undergo the procedure are at increased risk for atherosclerosis.²⁹⁻⁴⁰ Moreover, there are no convincing data to suggest that vasectomy is related to immunologic disease.³⁸ The second question concerns the possible role of sperm antibodies in persistent infertility despite successful vasovasostomy.^{24,35,41,42}

Conclusion

After reviewing the current literature on the complications and consequences of vasectomy we realize that this rather simple procedure may result in a wide range of changes, but it remains an effective and safe method of sterilization.

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