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VASECTOMY, AS A MODERN METHOD OF CONTRACEPTION - A REVIEW OF THE LITERATURE

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ABSTRACT

A vasectomy is a procedure that involves the severing of the sperm ducts on both sides, thus stopping sperm from moving from the testicles through the ducts to the ejaculatory ducts. The procedure of vasectomy is relatively simple. It is also associated with few complications. The good news is that it can be performed in an outpatient setting, meaning that the patient doesn't need to stay in hospital. The convalescence period following the procedure is approximately several days. Currently, the most widely used technique is minimally invasive non-scalpel vasectomy (NSV). This technique uses specialised tools: ring forceps to grasp the vas deferens percutaneously and a chisel. Before the procedure begins, the doctor applies a local anaesthetic by injecting it into the scrotal skin or using a pneumatic injector for a needle-free anaesthetic. Using the three-finger technique, the surgeon locates and grasps the vas deferens percutaneously with forceps. The next step is to separate the skin over the vas deferens without cutting it, creating a wound smaller than 10 mm in diameter. Once revealed, the vas deferens is cut. This is achieved either by excising a short segment (approximately 3 cm) of the vas deferens, or without this step. There are a number of ways to close the ends of the cut vas deferens, and the most suitable one is selected based on the particular circumstances. One option is to sew the two ends together. Use surgical thread. Alternatively, they can be closed with surgical clips. Another option is to seal them using electrocautery or wrap and stitch them up. This reduces the risk of the vas deferens opening again, which is a key consideration in this field. A further possibility is to tie off one end of the vas deferens, leaving the other end open on the side of the testicle. This is intended to reduce the risk of post-operative testicular pain. Surgeons perform this procedure on both sides of the scrotum. The wounds are not sutured, leaving only small scars following the healing process.

It is estimated that the effectiveness of vasectomy as a contraceptive method is 99.9%, with the risk of pregnancy being 1 in 2,000. This is due to the possibility of spontaneous recanalization of the cut vas deferens, which can result in the formation of new channels within the tissue. Following a vasectomy, it is possible to restore the continuity of the vas deferens. The effectiveness of these procedures in specialised clinics is 80%, but they are associated with high costs and are much more technically challenging than vasectomy. Another option is to collect sperm directly from the testes. Then the sperm can be used for in vitro fertilisation (IVF). It is also worth considering the option of cryopreservation (freezing) of sperm obtained before vasectomy, which can be used for fertilisation in the future. Undergoing a vasectomy is a decision that should be made with full awareness of the fact that the procedure is intended to make the man completely infertile.

KEYWORDS

Contraception, Post-Vasectomy Pain, Minimally Invasive Vasectomy, No-Scalpel Vasectomy, Vasectomy Reversal, Recanalization, Sterilization, Vasectomy

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Introduction.

Vasectomy is a male contraceptive method that involves cutting and tying the vas deferens. It is the most effective form of male contraception, and the procedure itself is safe, with complications occurring very rarely and being temporary. Vasectomy is one of two available male birth control methods, the other being the use of condoms. It involves bilateral cutting of the vas deferens, which prevents the transport of sperm from the epididymis, where they are stored, to the ejaculatory ducts during ejaculation.[1] During a vasectomy, the vas deferens are cut on both sides, which prevents sperm from traveling from the epididymis through the vas deferens to the ejaculatory ducts. The other elements of the ejaculation act remain unchanged, so only the composition of the ejaculate changes (there are no sperm in it), while the volume and other parameters of the semen after vasectomy should not change. Vasectomy is a relatively simple procedure with few complications that can be performed on an outpatient basis without the need for hospitalization. Recovery time after the procedure is a few days.

Methods

A literature review was conducted using PubMed and Google Scholar with terms such as “vasectomy”, “male contraception”, “recanalization”, “post-vasectomy pain”. Priority was given to studies from last decade, including clinical trials and systematic reviews.

Discussion

Vasectomy remains a safe and effective method of contraception for men. Many variations in surgical technique currently are used by surgeons in the United States, each with its own benefits and drawbacks. Regardless of the surgical method used, the most important factor for successful vasectomy remains the experience and skill of the surgeon. The amount of evidence-based literature on the rationale for the different techniques for vasectomy remains limited. Careful study and innovation of vasectomy techniques will ensure that the most commonly performed urologic surgical procedure remain an excellent form of contraception in the future.[6] The American Urological Association published guidelines on vasectomy in 2012, which clearly outlined patient counseling, vasectomy techniques to maximize successful occlusion, and post vasectomy care. However, there are certainly areas of further improvement to be addressed. Vasectomy is severely underutilized compared with tubal ligation for sterilization, likely due to lack of patient awareness. Although the majority of vasectomies are performed in the office with local anesthesia, some patients are still routinely prescribed opioids for postprocedural pain, despite the well-described opioid pandemic. Finally, although patients are counseled on the necessity of a post vasectomy semen analysis to confirm sterility prior to the discontinuation of alternative contraceptives, more than 50% of men do not complete this test. Therefore, alternative strategies must be pursued to improve patient compliance.[7] Spontaneous recanalization of the vas is more common than generally recognized and is often transient. Simple ligation and excision has an unacceptably high risk for failure. Techniques that include cautery seem to have a lower risk for failure than techniques that do not include cautery. There is insufficient evidence to recommend a particular standardized cautery technique, but adding fascial interposition to cautery seems to be associated with the lowest risk for failure.[8]

Study follow-up ranged from 2 weeks to 37 years and sample sizes from 12 to 723 patients. The overall incidence of post-vasectomy pain was 15%. The incidences of post-vasectomy pain following scalpel and non-scalpel techniques were 24% and 7%, respectively. Post-vasectomy pain syndrome occurred in 5% of subjects, with similar estimates for both techniques. We conclude that the overall incidence of post-vasectomy pain is greater than previously reported, with three-fold higher rates of pain following traditional scalpel, compared to non-scalpel vasectomy, whereas the incidence of post-vasectomy pain syndrome is similar.[9] Retrospective analysis of 350 men who underwent no-scalpel vasectomy shows a significant proportion of post-vasectomy pain at the three-month followup appointment, although most cases are resolving or minor and only one patient has required surgical management. This highlights the importance of counseling men undergoing vasectomy regarding the risks of post-procedure orchialgia and the small proportion of men who will require additional surgical intervention.[10] Two randomized controlled trials evaluated the no-scalpel technique and differed in their findings. The larger trial demonstrated less perioperative bleeding and pain during surgery, scrotal pain, and incisional infection during follow up than the standard incisional group. Both studies found less hematoma with the no-scalpel technique. Operations using the no-scalpel approach were faster and had a quicker resumption of sexual activity. The smaller study did not find these differences; however, the study could have failed to detect differences due to a small sample size as well as a high loss to follow up. Neither trial found differences in vasectomy effectiveness between the two approaches to the vas. The no-scalpel approach to the vas resulted in less bleeding, hematoma, infection, and pain as well as a shorter operation time than the traditional incision technique. No difference in effectiveness was found between the two approaches.[11] Post-vasectomy pain syndrome (PVPS) affects a small but significant percentage of men following vasectomy. PVPS is characterized by persistent scrotal pain that disrupts daily activities and requires medical intervention. With hundreds of thousands of vasectomies performed annually in the US, and PVPS being a real and often devastating potential consequence, understanding its etiology and treatment options is crucial. Managing PVPS can be challenging, yet with thorough evaluation, it can be effectively addressed. It is imperative to undergo a comprehensive diagnostic process, including physical examination, urine studies, and imaging studies, to distinguish PVPS from other potential causes of scrotal pain. Spermatic cord blocks are effective in diagnosing and managing chronic orchialgia, particularly when conservative treatments fail. Surgical interventions, including microsurgical denervation of the spermatic cord (MDSC), epididymectomy, vasovasostomy, and orchiectomy, are considered after exhausting non-invasive options. Various studies demonstrate the effectiveness of these surgical methods, highlighting their potential as treatment options depending on the

individual case. An algorithmic evaluation method followed by a patient-specific treatment approach is key to managing PVPS, given its varied etiology and the differential effectiveness of treatment options. Understanding and addressing this complex condition is crucial to improving the quality of life for affected individuals. In conclusion, an algorithmic evaluation method followed by a patient-specific treatment approach is key to managing PVPS, given its varied etiology and the differential effectiveness of treatment options. Understanding and addressing this complex condition is crucial to improving the quality of life for affected individuals.[12] Men with post-vasectomy pain should be evaluated to rule out other sources of discomfort. Conservative therapy with or without medical management is the appropriate initial treatment for most. How long to continue conservative treatment before proceeding to surgery is unclear. There are currently no guidelines or standardized protocols for which patients should proceed to surgical intervention. In the United States, vasectomy reversal generally remains an out-of-pocket expense and can carry significant financial burden which may delay or prevent its use entirely. Following failure of more conservative therapies for PVPS, however, vasectomy reversal remains a reasonable treatment option. In the end, choice of surgery should be made after engaging in an in-depth discussion and using a patient-centered approach. Better studies are needed to characterize the incidence of PVPS according to standardized measures beginning shortly after the procedure and continued for long-term follow-up. In a similar fashion, larger studies equipped to evaluate the incidence of chronic pain and its varying severities and those patients reporting impaired quality of life, seeking medical help and receiving surgical procedures need to be better captured. Without better data, improvements in the diagnosis and treatment of PVPS will remain elusive.[13]

Vasectomy has been recognized as a simple and highly effective contraceptive method. In order to recommend further research on vasectomy, researchers conducted a systematic review of the literature on the safety and effectiveness of vasectomy between 1964 and 1998. Early failure rates are 1%; however, effectiveness and complications vary with experience of surgeons and surgical technique. Early complications, which include hematoma, infection, sperm granulomas, epididymitis-orchitis, and congestive epididymitis, occur in 1-6% of men undergoing vasectomy. Incidence of epididymal pain is poorly documented. Animal and human data suggest that vasectomy does not increase atherosclerosis and that increases in circulating immune complexes following vasectomy are transient. The weight of the evidence regarding prostate and testicular cancer suggests that men with vasectomy are not at increased risk of these diseases. The findings indicate that publications to date continue to support the conclusion that vasectomy is a highly effective form of contraception. Future research should include evaluations of the long-term effectiveness of this method, evaluating criteria for post-vasectomy discontinuation of alternative contraception for use in settings where semen analysis is not practical, and characterizing complications including chronic epididymal pain.[14]

Although reversal of vasectomy can be technically performed for most candidates, the appropriateness and ultimate success depends on both male and female fertility factors. The age and fertility status of the female partner should be included in the discussion of success rates. General medical problems that would complicate any surgical procedure should be considered prior to vasectomy reversal. Patients who desire vasectomy reversal for reasons other than fertility (psychologic reasons or discomfort) should be advised to seek counseling or more conservative means of pain reduction prior to proceeding with vasectomy reversal. They also should be informed that neither epididymectomy nor reversal of the vasectomy necessarily will relieve their scrotal discomfort. Physical examination may reveal that a very long segment of the vas deferens was removed during the vasectomy, thus alerting the surgeon to the possible need for a nonstandard incisional approach. Examination also may reveal testicular abnormalities or epididymal induration, which indicates that vasoepididymostomy may be necessary when the reversal is performed. After macrosurgical vasovasostomy, sperm appear in the semen of about 80% of men, and 20% to 40% of their wives become pregnant. After microsurgical vasovasostomy, sperm appear in the semen of 85% to 90% of men, and 50% to 70% of their wives become pregnant. The Vasovasostomy Study Group found that results were progressively less favorable after microsurgical vasectomy reversal as the obstructive interval (time from vasectomy until its reversal) lengthened. That group reported rates of return of sperm to the semen and pregnancy, respectively, in 1,247 patients to be 97% and 76% if the obstructive interval was less than three years, 88% and 53% if three to eight years, 79% and 44% if nine to 14 years, and 71% and 30% if 15 years or longer. The Vasovasostomy Study Group similarly reported less favorable results after bilateral vasovasostomy with progressively poorer qualities of sperm in the intraoperative vas fluid. Rates of return of sperm to the semen and pregnancy, respectively, were 94% and 63% when grade 1 sperm quality was present bilaterally in the intraoperative vas fluid, 91% and 54% for grade 2, 96% and 50% for grade 3, 75% and 44% for grade 4, and 60% and 31% for grade 5. The Vasovasostomy Study Group 1 confirmed Lee's report that the results of microsurgical modified

one-layer and microsurgical two-layer anastomoses are comparable. After microsurgical end-to-side vasoepididymostomy performed for the purpose of vasectomy reversal, a recent large series reported that sperm appeared in the semen in 84% of men followed six months or more, and 42% followed 12 months or longer achieved a pregnancy.[15]

Vasectomy is the most reliable method of birth control. More than 33 million couples now rely on it in the United States, the United Kingdom, India, China, Thailand, South Korea, Canada, the Netherlands, and New Zealand. Many of the problems associated with vasectomy can be prevented by discussion about the procedure beforehand with the couple concerned, with clear warning that complications can sometimes occur. Recently, a no-scalpel technique has been introduced by Dr Li Shunqiang in China with good results. During 10 and 12 weeks follow-up, semen should be examined. The detailed study of 1000 vasectomies performed under local anesthetic at the Margaret Pyke Centre in London defined the expected complication rate. Two patients suffered vasovagal attacks during the operation and required resuscitation. Minor hematomas occurred in 3.5%. 12 developed minor sepsis but only one abscess occurred. Three cases of epididymo-orchitis were seen. Altogether, 5.6% of patients complained of minor local symptoms including bruising. In the large Oxford Series, 7.7% sought medical advice for local pain and 3.6% for bleeding. Scrotal hematoma developed in 0.9%. 80% returned to work in 3 days and 96% within 1 week. Spermatozoa have been found in a para-aortic lymph node one year after vasectomy in a man undergoing laparotomy, and circulating antisperm antibodies can be detected by sperm-agglutination tests in the serum of 60-80% of men following vasectomy. Technical difficulties with vas anastomosis and secondary changes in the epididymis make the chances of successful restoration of fertility only a little better than 50%. There are four causes of failure of vasectomy reversal: 1) in about half of patients there is stenosis or blockage of the previous vaso-vasostomy, 2) the second most common cause is epididymal blockage, 3) development of a very high antisperm antibody response to the vasectomy, and 4) cessation of spermatogenesis.[5]

Conclusions

Vasectomy can be performed by means of various techniques, although each vasectomy technique requires isolation and division of the vas and operative management of the vasal ends. Removal of at least 15 mm of vas is recommended, although division of the vas without removal of a segment is effective when this technique is combined with other techniques for handling the vasal ends, such as thermal luminal fulguration and proximal fascial interposition. Ligation of the ends without the aid of surgical clips may result in necrosis and sloughing of the ends, which may cause early failure. Leaving the testicular end of the vas open has been shown to be effective and to result in a lower incidence of epididymal congestion and sperm granuloma. The no-scalpel technique offers shorter operating time, less pain and swelling, and faster recovery.[3] Vasectomy is the most effective form of sterilization for men. With approximately 500,000 vasectomies performed each year in the United States, 1-2% of these patients will experience chronic testicular pain for greater than three months after the procedure. Post-vasectomy pain syndrome (PVPS) is diagnosis of exclusion, and may be caused by direct damage to spermatic cord structures, compression of nerves in the spermatic cord via inflammation, back pressure from epididymal congestion, and perineural fibrosis. Treatment should begin with the most noninvasive options and progress towards surgical management if symptoms persist. Noninvasive therapies include acupuncture, pelvic floor therapy and pharmacologic options. Ultimately, management of PVPS requires a multimodal approach. Thorough understanding of the potential etiologies of PVPS along with the therapeutic options currently available is important to improve quality of life.[4] Fertility can be successfully restored by vasovasostomy in 50% of men who wish to have their vasectomies reversed, which often is due to a change in circumstances beyond their direct control.[5]

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