Vasectomy as a reversible form of contraception for select patients

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Introduction: *To provide an effective form of birth control, men may choose a reversible or permanent form of contraception. Vasectomy is presently offered as a permanent option for male contraception. We have had patients who were interested in vasectomy and reversal as a temporary birth control option. The purpose of this paper is to determine if vasectomy should be offered for selected couples as a temporary form of contraception and under which circumstances.*

Materials and methods: *A literature review was conducted to determine the available reversible contraceptive options, risks, failure rates and contraindications to each, and the risks and success rates of vasectomy and vasectomy reversal.*

Results: *Reversible contraceptives include hormonally based methods for women, non-hormonal anatomic barrier devices and spermatocidal agents. Hormone based therapies may be contraindicated in women with cardiovascular disease, hypertension, and some cancers. Non-hormonal contraceptives are generally less effective and may be unacceptable for some couples due to higher failure rates, difficulty of use and lack of acceptance. Both vasectomy and vasectomy reversal are low risk procedures. Reversal may be performed with a high degree of success, particularly with a short obstructive interval (97% patency if performed < 3 years following vasectomy).*

Conclusion: *While vasectomy should be considered a permanent form of sterilization for most couples, there are select couples, unable or unwilling to use other forms of birth control, who would benefit from an informed discussion about using a vasectomy as a reversible form of contraception.*

Key Words: vasectomy, vasectomy reversal, hormonal contraception, non-hormonal contraception

Introduction

In our urology clinic we saw a couple inquiring about options for reversible contraception. She was 25 years old with two children and had a recent diagnosis of breast cancer, planning for immediate chemotherapy. They felt that the health risks of any hormonal based contraception were unacceptable. Condoms and other barrier methods were not acceptable options, due to what the couple felt were unacceptably high failure rates. She had tried a non-hormonal intrauterine device, but due to intractable cramping and bleeding, she had it removed. The couple were interested in having another child a few years from the time they were seen, depending upon her recovery from the breast cancer. They brought up the option of a vasectomy with a planned reversal as a means of highly effective and non-hormonal temporary contraception.

The current guidelines consistently state that we should only consider a vasectomy as a permanent form of birth control. This couple's question prompted us to consider whether there are circumstances in which we should discuss the potential use of a vasectomy as a temporary form of birth control.

A discussion about using vasectomy as a temporary form of birth control is difficult for a clinician under

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any circumstances, since the guidelines from large urological groups such as the American Urological Association (AUA),[1] European Urology Association (EAU),[2] and Canadian Urological Association (CUA),[3] to name a few, state unequivocally that vasectomy should be considered a permanent contraceptive. In addition, we are unaware of any articles discussing vasectomy as a temporary form of birth control. The goal of this article was to review the literature to determine if there are situations in which a discussion about using vasectomy as a temporary contraceptive is acceptable. In addition, this article aims to give clinicians the information necessary to identify patients who may be candidates for a discussion about the use of vasectomy as a temporary form of contraception. Finally, we aim to provide clinicians with the necessary information to allow for an informed discussion with patients about the risks and benefits of a vasectomy planned as a temporary form of contraceptive.

Materials and methods

A systematic review of the literature was conducted using the US National Library of Medicine PubMed database using the terms "contraceptive options", "contraceptive risks", "contraceptive failure", "vasectomy success", "vasectomy reversal success", vasectomy reversal scarring", "vasectomy practice guidelines", and "male contraception". Publications from the past 10 years were preferred, although landmark and highly regarded older publications were included where deemed appropriate. Systematic reviews were also included because they provided a more extensive overview. Pertinent, current websites were identified where appropriate.

An analysis of these studies was then performed. Fifteen articles were selected for review on current contraceptive options, including risks, failure rates and special considerations. Eleven articles were selected for review on vasectomy and vasectomy reversal, including risks and success rates. Four articles were selected for review on currently established practice guidelines for vasectomy.

Results

What are the available reversible forms of contraception and contraindications to their use?

Most reversible contraceptives are directed at women and include a variety of oral, transdermal, transvaginal, intrauterine or injectable hormonal methods. One study showed that within 3 months of initiating a reversible contraceptive, 4.2% of all women experienced a failure, at 6 months 7.3% experienced a failure, and at 12 months 12.4% experienced a failure.[4]

The combination hormonal oral contraceptive pill is the most widely utilized form of reversible hormonal contraception,[4] although, combined hormonal therapy is also available through other routes including transdermal patches and intravaginal rings. Failure rates of oral contraceptive pills vary from 0.3% with perfect use to 8% pregnancy rates/year with typical use.[4] While complication rates of combined oral contraceptive pills are low, they have long been associated with the risk of deep vein thrombosis, pulmonary embolism, arterial thrombosis, thrombotic stroke and myocardial infarction.[5] Large studies suggest that there is a 1.4-2.2 fold relative risk of thrombotic stroke and a 2-5 fold relative risk of myocardial infarction among current users of oral contraceptives.[5]

In 2012 the CDC published guidelines on the medical eligibility for contraceptive use to augment the existing 2006 American College of Obstetricians and Gynecologists guidelines.[6] Based on these guidelines, the following groups of women have been deemed "risk unacceptable" for estrogen-based hormonal contraceptives. Combination hormonal contraception are contraindicated in women with the following conditions:

1) Hypertension
   - Combination oral contraceptive users with a history of hypertension have been shown to have an increased risk of developing myocardial infarction and stroke, with odds ratios of 10.7 and 68.1, respectively.[7]
2) Smokers over 35 years of age
   - "Large increases (ranging from 7x to > 100x) have been observed in the relative risks of myocardial infarction and ischemic stroke among users of oral contraceptives who smoke or have hypertension".[8]
   - Oral contraceptive use combined with smoking has been associated with an odds ratio of 13.6 for myocardial infarction, almost twice as high as for smoking alone.[9]
3) Migraine headaches with focal neurological symptoms
   - Women with migraine with visual aura and who are smokers have a 7x higher odds of having a stroke, compared with non-smoking, non-oral contraceptive users using women with migraine with visual aura.[10]
   - Women having a stroke on hormonal contraception were more likely to report a history of migraine compared with controls.[11]

4) History of venous thromboembolism
   - The use of combination oral contraceptives formulated with the progestin desogestrel have been associated with a venous thromboembolism risk 1.7–19x higher than that of other progestins.[8]
   - Women with a history of unexplained venous thromboembolism or venous thromboembolism associated with pregnancy or exogenous estrogen use should not use combination hormonal contraceptives unless they are taking anticoagulants.[8]
5) Known personal history of hypercoaguable state
   - Personal or family history of hypercoaguable state portends an increased risk of venous thromboembolism with oral contraceptive use, estimated at an odds ratio of 10.[12]
6) Personal history of breast cancer
   - For women with breast cancer, exogenous estrogen and progestins are not recommended due to concerns that they may affect tumor growth and prognosis depending on the estrogen and progestin receptor status.[6]
7) Hepatic tumors or decompensated cirrhosis
   - Estrogen receptors are present in normal liver tissue and a variety of liver tumors. Therefore, estrogen containing contraceptive methods are contraindicated in patients with acute liver disease and many hepatic tumors.[13]
8) Systemic lupus erythematosus
   - Women with lupus on combined hormonal oral contraceptives have higher rates of hospitalization, thrombotic events, and death.[6]
9) Undiagnosed genital bleeding
   - While the etiology of genital bleeding is unknown, exogenous hormones may be unsafe as combination oral contraceptive use may increase the risk of cervical cancer in women positive for human papillomavirus.[6]

In general, these contraindications are similar for all combined hormonal contraceptives, including patches and intravaginal rings. Most of these complications are secondary to the estrogen component. In addition to these medical contraindications to combined hormonal contraceptive, women may also opt for non-hormonal contraceptive methods due to unwanted side effects such as irregular bleeding, breast tenderness, weight gain, nausea and mood changes.

Alternative hormone therapies for birth control include progestin-only options including the progestin-only oral contraceptive pill, depot medroxyprogesterone acetate and the levonorgestrel-releasing intrauterine system. The levonorgestrel-releasing intrauterine system offers a relatively low failure rate but has some added risks, including uterine perforation with insertion, ovarian cyst formation, pain and device expulsion.[14] Relative to other combination oral contraceptives, the progestin-only oral contraceptive pill has a relatively high failure rate at 5%-10%.[14] Progestin-only contraceptives may be an option for women with specific contraindications to estrogen, although there are still contraindications to the use of progestins. These include:

1) Unexplained vaginal bleeding
   - While the etiology of bleeding is unknown, administering exogenous hormones may be unsafe.[6]
2) Current diagnosis of breast cancer
   - For women with breast cancer, exogenous estrogen and progestins are not recommended due to concerns that they may affect tumor growth and prognosis depending on the estrogen and progestin receptor status.[6]

There are also side effects from progestin only medications, including many of the same symptoms as with combined hormonal contraception as well as a delayed return to fertility, acne, decreased libido and a variable decrease in bone mineral density.[15]

Potentially good, non-hormonal contraceptive options do exist, including the non-hormonal copper intrauterine device, condoms, cervical caps, diaphragms, spermatocidal agents, fertility-awareness based methods (timed intercourse) and coitus interruptus. These all have limitations with both compliance and efficacy. The copper intrauterine device has the same device related risks as the levonorgestrel-releasing intrauterine system, and an unwanted pregnancy rate of approximately 0.8%-1.43%.[16] Contraindications to its use include current or recent pelvic inflammatory disease or sexually transmitted infection, cervical or endometrial cancer, malignant trophoblastic disease, distorted uterine cavity, undiagnosed vaginal bleeding, allergy to copper, and puerperal or post-abortion sepsis.[16] Male condoms suffer from issues with slippage and breakage, having to pause during foreplay for putting them on, and concerns that they decrease penile sensation. The 12 month probability of failure with male condoms is 17%.[4] Cervical caps are limited by having to pause during foreplay for insertion, manual challenges with insertion and removal, discomfort during intercourse by both male and female partners, and a relatively high failure rate, with pregnancy rates of 15% per year.[17] Spermicide increases the effectiveness of the diaphragm, and when used with spermicidal agents, pregnancy rates are 10% per year.[6] The diaphragm is contraindicated in women with a latex allergy, and is associated with an increased risk of urinary tract infection and the risk of developing

toxic shock syndrome.[18] Coitus interruptus may be difficult for some couples to use, and its efficacy is highly dependent on consistent and proper use. Overall, the 12 month probability of failure is 25%.[7] Vasectomy is the birth control method with the lowest failure rate of any form of contraception, but is currently reserved for those interested in a permanent form of contraception.

There are no currently available options for reversible contraception for men. There are studies looking into reversible contraceptive options for men, however, at present none of these are approved for use in humans. Male hormonal contraceptives are typically testosterone based, and work by inhibiting spermatogenesis by inhibiting the release of luteinizing hormone and follicle-stimulating hormone, thereby decreasing intratesticular testosterone levels and subsequently spermatogenesis. This suppressive effect on spermatogenesis can be augmented by the addition of progesterone analogues and gonadotropin releasing hormone antagonists. Currently, male hormonal contraceptives are plagued by administration issues (orally administered agents have poor bioavailability or hepatic toxicity),[19] as well as a substantial failure rate of 2% of men failing to achieve oligospermia < 3 million sperm/mL, resulting in a pregnancy rate of 8.1 per 100 person-years.[20,21] In addition, men of East-Asian ethnic decent have higher sterilization rates using male hormonal contraceptives than men of other races, leading to concerns about its efficacy in these groups.[22] Other adverse effects reported using male hormonal contraceptives include a loss of testicular volume,[23] mood alterations,[24] acne, night sweats,[25] concerns about prostate enlargement and prostate cancer,[26] as well as conflicting evidence on the effects of testosterone on cardiovascular heath.[26]

Other medical options being explored for male contraception are currently investigative, and are generally limited by side effects, reversibility issues, and efficacy issues. These include lonidamine derivatives,[27] vaccines against sperm,[28] and retinoic acid inhibitors.[29] In addition, vasal occlusion devices are currently being explored. A Chinese group developed a urethrane device filled with nylon thread that blocks sperm but allows the passage of seminal fluid, that is inserted through a small incision similar to a vasectomy.[30] Another group developed a technique in which dissolved styrene maleic anhydride is injected into the vas under direct visualization through a small incision similar to a vasectomy, which disrupts the sperm cell membranes as they traverse the vas, producing sperm incapable of fertilization.[31] Both of these devices have only been preliminarily tested in humans, and neither has been demonstrated to be reversible. Significant evaluation remains to be done before either is deemed an acceptable, and truly reversible form of male contraceptive.

How often are currently available forms of temporary contraception considered unacceptable?

With a plethora of reversible forms of birth control, it would seem that every couple should have an available and acceptable option for reversible contraceptive. However, in a British study on vasectomies, 5.5% of patients reported a female medical problem precluding the use of other contraceptives, and 9.5% expressed dissatisfaction with currently available contraceptive methods; these couples proceeded with vasectomy knowing that there were other reversible options for contraception available, but dissatisfied with these.[32] This study would suggest that vasectomy is being chosen as a form of birth control for couples who have a medical contraindication to the other presently available forms of birth control or who are dissatisfied with the other contraceptive options. While the true frequency of couples with medical contraindications to the use of reversible contraceptives or who are dissatisfied with the presently available forms of reversible birth control is unknown, this group does exist.

How do you treat couples interested in reversible contraception when the presently available forms of temporary birth control are risky or unacceptable?

For this highly selected group of patients, novel means of reversible birth control should be considered. There is a need for a safe form of highly effective contraception for some couples that are unable or unwilling to use the presently available forms of birth control. For these highly selected couples who have no other acceptable forms of contraception and who insist on a highly effective form of birth control, we believe that a discussion about the use of a vasectomy with a planned vasectomy reversal as one contraceptive option is reasonable.

However, currently, all available practice guidelines indicate that vasectomy be performed with the intention of being a permanent form of contraception. If there is the concern that future fertility may be desired then sperm banking prior to vasectomy may be performed. Both the 2012 AUA Vasectomy Practice Guidelines and EAU Guidelines on Vasectomy state "Vasectomy is intended to be a permanent form of contraception".[1,2] The American Academy of Family Physicians guidelines for vasectomy state that "Physicians should counsel men about the permanence of vasectomy".[33] The CUA guidelines state that "The potential reversibility of the procedure (vasectomy

reversal) should also be discussed".[3] These guidelines essentially prohibit clinicians from discussing the use of vasectomy as a form of reversible birth control. We suggest that there is a select group of couples for which a vasectomy should be considered an option as a temporary form of birth control.

Risks of vasectomy and reversal

In general, the complication rate after vasectomy is quoted as approximately 1%-8%.[2] The risks associated with vasectomy include: hematoma (0.04%-18%), epididymitis (0.4%-6.1%), abscess (0%-5.6%), infection (0%-6%), hydrocele (0%-4%), spontaneous vasal recanalization (0%-6%), and post-vasectomy pain syndrome (3%-8%).[34] The risk of morbidity after vasectomy depends primarily on the surgeons experience.[34]

The risk of serious complications from vasectomy reversal is low, ranging from 0%-3.7%.[35,36] Risks include superficial hematoma treated conservatively (0%-2.2%), deep hematoma requiring evacuation (0%-1.48%), infection (0%-0.8%), sexual dysfunction and testicular damage (both isolated reports). Using the mini-incision technique for vasectomy reversal with no scalpel principles, patients have less pain and quicker functional recovery, with no compromise of post-reversal semen parameters.[35]

What is the reversibility of vasectomy?

The Vasovasostomy Study Group reported an overall patency rate of 86% and pregnancy in 52% of patients in their series of 1469 microsurgical vasectomy reversals.[36] Hinz et al reviewed 212 vasectomy reversals performed by a single surgeon and reported an overall patency rate of 93% and a pregnancy rate of 72%.[37]

While the overall pregnancy rates in these large series varied between 52%-72%, one of the most important factors affecting the overall pregnancy rates was vasal obstructive interval. The Vasovasostomy Study Group reported that for reversals performed less than 3 years following vasectomy, patency rates were 97% with overall pregnancy rates of 76%.[36] If the reversal is performed relatively quickly following the vasectomy, patency and pregnancy rates are very high.

Following a successful vasectomy reversal, there is the risk of anastomotic scarring leading to recurrent azoospermia. The incidence of this varies in the literature. Belker et al in the Vasovasostomy Study Group[38] found that of 892 patients who underwent microsurgical vasovasostomy and developed fertile sperm concentrations post-reversal, 28 (3.13%) later developed azoospermia or severe oligospermia. The wives of 5 of the 28 men with such transient post-reversal fertility became pregnant before the patients became azoospermic or severely oligospermic again. In his single surgeon experience, Schwarzer[39] found that of 823 men who initially demonstrated patency after vasectomy reversal, 8 (1%) experienced repeated occlusion. In a series of 100 vasoepididymostomies and 100 vasovasostomies from Cornell,[40] patency and pregnancy rates following vasoepididymostomy and vasovasostomy were 65% and 40%, and 99% and 53%, respectively. Late failure rates were 21% for vasoepididymostomy and 12% for vasovasostomy. These studies indicate that a vasectomy reversal may be performed with a high degree of success, particularly when performed with a relatively short period of time following the vasectomy, optimally < 3 years, resulting in a low risk of vasal anastomotic scarring.

The success of vasectomy reversal has been shown to be highly dependent on surgeon skill and experience, and should only be offered by male fertility specialists with microsurgical training. Large vasectomy reversal series on post-procedural patency and pregnancy rates demonstrate the superiority of a microsurgical technique.[41] In addition, surgeon experience is important, and all surgeons offering vasectomy reversals should have the microscopic surgical skills and equipment necessary to perform a vasoepidymostomy if required based on intraoperative findings.[42] However, there is wide availability of experienced fertility microsurgeons in North America and Europe, which will provide patients with access to physicians trained in performing these operations, and a high likelihood of excellent results for most patients interested in obtaining a vasectomy reversal.

Is vasectomy reversal a cost effective option?

In North America, vasectomy reversal costs approximately $6500-$7500, based on internet quotes.[43] While the annualized cost would be $1500/year for those having a vasectomy reversal 5 years following the vasectomy, which may not be onerous for many couples in North America, this is certainly a higher cost than most alternative forms of reversible birth control.

Discussion

In general, a vasectomy should be considered a permanent form of birth control. Even with the best microsurgery, only ¾ of the couples achieve a spontaneous pregnancy following vasectomy reversal. However, there are situations in which couples have contraindications to, or are unwilling to use the presently available forms of reversible birth control. For example, a woman with breast cancer about to undergo

chemotherapy has a contraindication to the use of any of the hormonally based contraceptive devices and who also is unable to tolerate an intrauterine device, only has barrier methods remaining. The couple may not be willing to use the barrier methods (for social reasons or due to unacceptably high failure rates). While abstinence may make the heart grow fonder, this is not a reasonable solution for most couples.

We are suggesting this be an option for highly select couples who are unable or unwilling to use any of the other available forms of effective birth control. In these unique situations, we believe that it is reasonable to discuss a vasectomy as a form of temporary contraception. If the couple is well informed about the risks of the vasectomy, the potential reversibility of the vasectomy, as well as the risks of the reversal, then, we believe that a vasectomy may be offered to the couple as a temporary form of birth control.

Conclusions

The statements provided in the AUA and EUA guidelines that "Vasectomy is intended to be a permanent form of contraception" applies to the vast majority of couples, but we believe that there are select couples who are unable or unwilling to use other forms of birth control, who would benefit from an informed discussion about using a vasectomy as a potentially reversible form of contraception. □

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