Vasectomy and Vasovasostomy (Reversal Surgery)

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What Is Vasectomy?

In the United States, vasectomy emerged as a popular method of permanent contraception during the 1960s. Within a decade, 750,000 men were undergoing vasectomies each year. Vasectomy rates markedly declined in the 1990s and have now plateaued at about 500,000 a year. Worldwide, an estimated 42 million couples use vasectomy as a method of birth control.

The procedure works by surgically interrupting the route that the sperm take from the testicles (where they are produced) to the penis. [*See Box* The Male Reproductive Tract.] After vasectomy, the testicles still continue to generate sperm, but their movement is blocked at the site of the vasectomy. Eventually the sperm die and the patient's body absorbs them. During sex, semen is produced in the same amount as before vasectomy, but this fluid does not contain sperm.

Vasectomy should not be confused with castration. It has no noticeable impact on a man's ability to perform sexually, or on his sensation of orgasm and pleasure. It does not affect the balance of male hormones, male sex characteristics, or sex drive. Testosterone continues to be produced in the testes and delivered into the blood stream. Sperm form a very small portion of semen, so patients notice no difference in the amount of semen produced during orgasm.

The Male Reproductive Tract

The male reproductive tract performs three functions:

1. It enables a man to produce offspring.
2. It provides him with a supply of male hormones.
3. It enables him to experience sexual pleasure.

The Traveling Sperm

· Sperm are produced in the testes (the testicles) at a rate of 50,000 an hour within tiny ducts called ***seminiferous tubules.***

· Sperm do not mature in the testes. They must first pass into the ***epididymis***, a C-shaped storage chamber adjoining the testes composed of a 20-foot coiled tube. The sperms' journey through the epididymis takes about two to three weeks. They are held here until sexual activity forces them to move on.

· When a man experiences sexual excitement, nerves stimulate the muscles in the epididymis to contract. This forces the sperm to pass into one of two rigid and wire-like muscular channels, called the ***vasa deferentia.*** (A single channel is called a ***vas deferens***. It is the vas deferens that is cut during vasectomy.)

· Muscle contractions in the vas deferens from sexual activity propel the sperm along past the seminal vesicles, which are clusters of tissue that contribute fluid, called seminal fluid, to the sperm. The vas deferens also collects fluid from the nearby ***prostate gland***. This mixture of various fluids and sperm is the semen.

· Each vas deferens then joins together to form the ***ejaculatory duct.*** This duct, which now contains the sperm-containing semen, passes down through the ***urethra***. (The urethra is the same channel in the penis through which a man urinates, but during orgasm, the prostate closes off the bladder so urine cannot enter the urethra.)

· The semen is forced through the urethra during ***ejaculation***, the final stage of orgasm when the sperm is literally thrown out of the penis.

What Factors Should Be considered before A Vasectomy?

Having a vasectomy is a serious decision. The surgery is intended to be permanent. A reversal procedure called vasovasostomy is available, but it is a major operation that provides no guarantee of restored fertility.

In a 2000 Australian study of procedures between 1980 and 1996, vasectomy rates had leveled off but vasovasostomy rates had increased in men by nearly 70% in the most recent five period compared to the earliest five year period. Studies indicate that between 5% and 11% of men who have vasectomies regret the decision. Those at highest risk for seeking reversal surgeries are the following:

· Men who have vasectomies in their 20s.

· Men who have a working wife.

· Men who are single (including those divorced or separated) at the time of vasectomy.

The optimal decision is made within a stable relationship when both partners have considered all options carefully before proceeding. The great majority of men who seek a vasectomy have been married for ten years or more. The best candidates for vasectomy are the following:

· Men who are part of a couple that considers their family complete and permanent birth control as one method of maintaining the family's stability.

Both the woman and the man should completely agree that they no longer want to have children. After deciding that permanent birth control is the best solution, a couple still has the option of either vasectomy for the male, or tubal ligation [*see below*] for the female.

Good and Poor Candidates for Vasectomy

Vasectomies may be right for the following:

· Men in couples in which both partners agree they have all the children they want and both do not want to use or are unable to use other methods of contraception.

· Men in couples whose partners have health problems that make pregnancy unsafe.

· Men in couples in which one or both have genetic disorders that they do not want to transmit.

Vasectomies may ***not*** *be right for the following:*

· Men in couples in which one partner is unsure about his or her desire to have children in the future.

· Men whose current relationships are unstable or going through a stressful phase.

· Men who are considering the operation just to please their partners.

· Men who are counting on having children later by storing sperm or by surgical reversal of the vasectomy.

· Young men who still have many life changes ahead.

· Men who are having the operation primarily for the sake of their partners and not wholly for their own reasons.

· Men or couples whose only motive is freedom from distraction imposed by other contraceptive methods during sexual activity.

The Influence of Short-Term Stress

Vasectomy should not be undertaken in response to temporary stressful situations that might block the desire for children. Such conditions may include illness, temporary financial crisis, death in the family, or birth of a child. Couples should wait through such short-term stresses or seek counseling or psychotherapy to be sure that they are not making a decision they will later regret.

All Future Scenarios. Before deciding on a vasectomy, the couple should consider all future scenarios for their life together, such as the following examples:

· If a couple already has children, how would they feel about a vasectomy if one of their children died?

· If financial stress is triggering the decision for a vasectomy, would improved affluence increase their desire for children?

· How would the man consider the vasectomy if his current relationship ended, either by divorce or the woman's death?

Emotional Implications for the Man and Woman

The word "sterilization" has a deep emotional connotation for many people. Even though a couple may rationally accept the idea of a vasectomy, it is extremely important for each partner to be as open as possible about any negative feelings they might associate with the procedure. Such feelings on the part of either partner can have devastating consequences on a relationship if they surface only after the procedure has been performed. Openness with each other is imperative in order to make a decision that is clear of any hidden apprehensions. Neither partner should be too embarrassed to request counseling if the emotional aspects involved in making the decision are too difficult to solve between themselves.

What the man may be feeling:

· A man may have a poor self image, including concerns for his own physical health or sexual ability. Such men are likely to have a difficult time adjusting psychologically to vasectomy.

· A man may not actually really want the procedure but may not want to confront a partner he loves who wants him to have it.

What the woman may be feeling:

· A woman might believe, incorrectly, that a vasectomy is emasculating, but she might not want to express this idea to her partner.

· On the other hand, some women fear that vasectomy may make their partner *more* attractive and encourage outside affairs. (Research from the 1970s indicates that married men who have a vasectomy are no more likely to indulge in extramarital sex than fertile men.)

Stability of the Relationship

Ideally, the couple should view the operation as a mutual commitment to an already successful marriage or relationship. Vasectomy generally is not a good idea if the couple's relationship is under great stress; it is not a cure for emotional or sexual problems between a man and woman.

Sperm Banking

Storing frozen sperm in a sperm bank before vasectomy might enable the patient to have children later. Before the vasectomy, the patient collects sperm, which are frozen and stored until he wants to have a child. In one study, 1.5% of men who had stored sperm later used it for conception and most were successful. Other studies have shown a lower success rate, however, and it is a very expensive process. Experts believe that a patient who wants to bank sperm should probably reconsider his decision to have a vasectomy because such a concern may indicate doubts about giving up his ability to father a child.

What Other Forms of Male Contraception Are Available?

As many as 40% of couples seeking vasectomy have experienced a failure with their previous method of nonpermanent birth control. Such failures can occur from misplacement of a diaphragm, an incorrectly implanted IUD, or noncompliance with an oral contraception regimen. Couples who are unsure about permanent sterility should still consider other methods and improving their use. [For more information see the *Well-Connected* Report #91, *Female Contraception*.]

Withdrawal

Withdrawal before ejaculation is a form of natural contraception, but it is extremely risky and most people find it unsatisfactory.

Condoms

The only other form of male contraception currently available is the condom. However, the average rate of pregnancy for couples who rely only on condoms for protection is still 12%. And in adolescents the risk with condoms is even higher, 18%. Even for those who use a good-quality condom correctly, the annual risk for pregnancy is 3%. The condom should be put on before intercourse when the penis is erect, long before ejaculation, since the male can discharge sufficient semen to cause pregnancy before ejaculation occurs. (Even after a vasectomy, men who are not in a monogamous relationship with an HIV-negative partner should always wear a condom during sex for protection against sexually transmitted diseases. Vasectomy is not protective.)

Condom Materials.

Latex. Condoms made of latex rubber are the most common types. When they are contoured for better fit and contain a spermicide they can provide fairly effective protection. Some people are allergic to latex, however, and in some cases the reaction can be very dangerous. The latex smell may also be unpleasant for some people.

Polyurethane. Polyurethane condoms (Avanti, eZ-on) are now available. It is hoped that eventually they will prove to be superior to latex in a number of ways, including strength, sensitivity, and durability. At this point, they have good acceptance by couples but have a higher breakage rate (6% to 7.2%) compared to the latex condom (1.1% to 2%). Other synthetic materials are under investigation.

Animal Membranes. Condoms made from animal membrane can prevent pregnancy, but sexually transmitted infections can permeate them.

Lubricants and Spermicides. Lubricants can be used to prevent tearing. Petroleum-based products (such as Vaseline and baby oil) and vegetable oils should not be used because they can corrode the condom. When the condom is used with spermicidal lubricants, either foams, creams, or jellies, protection is increased. Spermicidal lubricants also prevent tearing. Spermicides are sperm killing substances. The active ingredient is nonoxynol-9, which attacks the surface of the sperm cell. Side effects are not a major worry, though spermicides can irritate the vagina or penis, particularly if used often or in large amounts. Spermicide use may promote yeast infections. The major drawback of spermicides is their high failure rate when used alone without a barrier method. And although spermicides may provide some protection against the sexually transmitted organisms *chlamydia* and *gonorrhea*, there is no proof that they work against HIV or other sexually transmitted viruses. In fact, there is strong evidence that the use of nonoxynol-9 actually increases the risk for HIV (and so possibly other sexually transmitted diseases).

Oral Contraceptives for Men

Hormone-Derived Oral Contraceptives. Researchers are currently at work on hormonal contraceptives that reduce levels of sperm. Some examples include the following:

· In a very small study of eight men, the oral steroids cyproterone acetate and testosterone undecanoate significantly suppressed sperm production without any major side effects. The sperm reduction was still not sufficient to completely prevent pregnancy, but adjusting the dosage may improve results. Sexual behavior was not affected.

· The hormone desogestrel is being tested. Desogestrel is a progestin, a hormone used in female contraceptives. In one study, men took this drug and were also given testosterone implants to maintain male hormones. The regimen was successful in suppressing sperm production while maintaining normal male hormone levels. Sperm production returned to normal when the men stopped taking the drug.

Hormonal contraception for men is more complicated than for women, however, since it requires add-back therapies of male hormones. There is also a typical delay of two to three months before infertility is achieved.

Gossypol. Gossypol is a chemical extracted from cotton roots. It has been used in China as a male contraceptive, and cotton root was used as folk medicine in the American South to treat menstrual pain and to induce abortions. The chemical destroys the lining of tubules in the testicles where sperm are produced, thereby inhibiting their formation. A 2000 Brazilian study reported that a male oral contraceptive derived from gossypol suppressed sperm production within up to 16 weeks. In men who were taking lower doses, sperm production returned in most of them within a year after they stopped taking the contraceptive. In the high dose group, sperm count reversed in less than half. Gossypol did not appear to reduce sexual desire or frequency of intercourse. It also may not be very effective, since even if small numbers of sperm survive, they may get through to penetrate the egg. Researchers are investigating gossypol-derived compounds that may have less toxicity. (No one should take any so-called natural gossypol product without consultation with a physician. [*See* Warning Box.])

Warnings for All Alternative and So-Called Natural Remedies

It should be strongly noted that alternative or natural remedies are not regulated and their quality is not controlled by government authorities. In addition, any substance that can affect the body's chemistry can, like any drug, produce side effects that may be harmful. There have been a number of reported cases of serious and even lethal side effects from herbal products. In addition, some so-called natural remedies were found to contain standard prescription medication. Most problems reported occur in herbal remedies imported from Asia. Even if studies report positive benefits, most, to date, are very small. In addition, the substances used in such studies are, in most cases, not what is being marketed to the public. The following website is an excellent source for objective information on herbal products. http://www.naturaldatabase.com/

Vas Occlusion

Some attempts have been made to develop reversible procedures that interfere with sperm flow in the vas deferens using various drugs or materials. To date, none have been totally effective as a male contraceptive. A promising method uses a substance called styrene malic anhydride (SMA). This substances is injected in the vas deferens. It coats the walls and blocks the tube. It is removed by flushing the vas deferens with a solvent. It is mostly being investigated overseas.

What Are Some Female Contraceptives that Offer Effective Defense Against Pregnancy?

There are many contraceptive options for women. The methods that offer the lowest risk for pregnancy are, beginning with the most complete protection:

· Tubal ligation (female surgical sterilization).

· Hormonal Contraceptives (oral contraceptives, implants, and injections).

· The intrauterine device (IUD).

Other methods offer protection against sexually transmitted diseases but carry a higher risk for pregnancy: the diaphragm, the cervical cap, and spermicidal foam used with a condom.

A 1995 survey of several thousand US women found that the most popular contraceptives (female or male) were female surgical sterilization (28% usage) and oral contraceptives (27%). None of the other female contraceptives had secured the allegiance of more than 3% of users. These included the long-acting and reversible IUDs, implants, or injectable contraceptives. Worldwide, however, the IUD is the most popular reversible contraceptive. When American women were asked why they did not use long-acting contraceptives, they responded with three main reasons:

· Lack of knowledge about them.

· Fear of side effects or health hazards.

· Satisfaction with current methods.

Experts believe that with proper education women would be more open to other contraceptive options.

[For more information see the *Well-Connected* Report #91, *Female Contraception*.]

Common Female Contraceptives

Contraceptive	First Year Failure Rate (Typical)	First Year Failure Rate (Perfect)	Protection against Sexually Transmitted Diseases
Female Surgical Sterilization	One study reported failure rate of 0.7 to 5.4% over 10 years	Failure less than 1%	None
Oral Contraceptives-combined	5%	0.1%	None
Oral Contraceptives-progestin-only pill	5%	0.5%	None
IUD-Copper T	One study reported 5% failure rates over 10 years with IUDs in general	Less than 1% per year	None, increases risk
IUD-Progesterone T	See above	2%	None, increases risk
Levonorgestrel implants (Norplant)	NA	NA(failure less than 1%)	None
Injected Progestins (Depo-Provera, Noristerat)	0.3%	0.3%	None
Injected progestin and estrogen (Lunelle)	Less than 1%	Less than 1%	None
Diaphragm	20% (with spermicide)	6% (with spermicide)	Some protection for certain STDs (gonorrhea and Chlamydia); results uncertain for HIV or cervical cancer. May increase risk for urinary tract infections.
Cervical cap	20% (with spermicide; no previous births); 40% (with spermicide; previous births)	9% (with spermicide; no previous births); 26% (with spermicide; previous births)	Some protection
Female Condom	12.4% to 22%	5%	Possibly protective against HIV and STDs. More research is needed.
Natural Family Planning	Up to 25%	6% to 15%	None

Note: The average rate of pregnancy for couples who rely only on male condoms for protection is about 12%. Even for those who use a good-quality condom correctly, the annual risk for pregnancy is 3%.

How Is Vasectomy Performed?

Standard Vasectomy

Vasectomy is a minor operation that takes about 30 minutes and is usually performed in a doctor's office or a family planning clinic. If the operation is performed under local anesthesia, the cost ranges from about $150 to $1,200. Most insurance policies will cover vasectomies performed as a minor outpatient procedure but will not cover vasectomies performed as major surgery in an operating room.

The Procedure

· Before the operation, the patient's scrotum is shaved and cleaned, and a local anesthetic is injected into it.

· The surgeon makes a tiny incision on one side of the scrotum and locates one vas deferens. The vas deferens is isolated, drawn through the incision, and clamped at two sites close to each other.

· The segment between the clamps (which should be more than 15 mm) is then removed.

· The surgeon then seals off (ligates) the tube with either surgical clips, sutures, cauterization using an electric needle, or some combination. Clips are an important aid in this process in order to prevent destruction of tissue, which then deteriorates and sloughs off the ends. One study indicated that a combination of cauterization and surgical clips may cause more postoperative complications than the use of clips alone, but it also may have a lower failure rate.

· The surgeon may chose to close off either one (called an open-ended procedure) or two ends (closed-ended) of the vas. In the open-ended procedure, the vas section connected to the testis is left open and the one leading to the prostate is sealed; in the closed-end both are sealed. Many surgeons now prefer the open-ended version because it is proving to have lower complication and failure rates than the closed-ended, and it results in fewer cases of chronic pain.

· After closing off the tube, the vas deferens is gently placed back into the scrotum.

· The procedure is then repeated on the other side.

· After a short rest, usually about half an hour, the patient can leave the doctor's office or clinic. Arrangements should be made ahead of time for someone else to drive the patient home.

No-Scalpel Vasectomy

A method of vasectomy that does not require the use of a scalpel was developed in China in 1974 and introduced in the United States in 1985. This procedure is now used in at least one-third of vasectomies. It is just as effective as conventional vasectomy, with a less than one-percent chance that a man's partner will become pregnant.

The Procedure.

· The technique takes about 10 minutes and is performed in a doctor's office or a family planning clinic. An improved method of anesthesia that allows an injection under the skin instead of into the testicle also helps make the procedure less painful.

· The no-scalpel vasectomy (NSV) differs from a conventional vasectomy in the method of accessing the vas deferentia. In this operation, the doctor feels for the vas deferens under the skin and holds them in place with a small clamp.

· Instead of making two incisions, the doctor makes one tiny puncture with a special instrument, which is then used to gently stretch the opening until the vas deferens can be pulled through it.

· The vas is then blocked using the same methods as conventional vasectomy. As with standard vasectomy, the closures can be open- or closed-ended.

· There is very little bleeding with the no-scalpel vasectomy. No stitches are needed to close the tiny opening, which heals quickly and leaves no scar.

Standard vs. No-Scalpel

It is commonly believed that the discomfort with no-scalpel vasectomy is generally less than with standard vasectomy because there is less injury to tissues and no stitches. Research comparing the advantages of the two approaches has been conflicting, possibly because of differences in surgical experience.

· Two studies reported that there is little difference in complications, including rates of postoperative infection, bleeding at the incision, or bruising.

· In one study there was no difference in pain during surgery or in the first week. However, after that, men who had no-scalpel surgery had less pain, fewer infections, and less need to revisit the physician. Other 1999 and 2000 studies have reported that no-scalpel surgery reduced operating time, complications, and pain compared to the standard approach. Patients who had the no-scalpel procedure resumed intercourse sooner, probably because their pain was less.

What Is the Postoperative Care and Short-Term Complications after Vasectomy?

Vasectomy is a low-risk procedure and the complications, which occur in about 10% of patients, are usually easy to control. One study of no-scalpel vasectomy, for example, reported only seven complications out of 4,255 procedures and they were mostly minor. No deaths resulting from vasectomy have been reported in the United States.

Postoperative Care

Nearly all men recover completely in a few days. The following are some guidelines after the operation to help recovery:

- An hour or two after the procedure the effects of the local anesthetic wear off, and most patients then experience a dull ache in the testicles and groin. The doctor may prescribe a painkiller for the first few days, continuing with mild over-the-counter pain relievers if discomfort persists. Acetaminophen (Tylenol) with or without codeine is the primary choice for postoperative pain. Aspirin, ibuprofen (Advil, Medipren, Motrin, Nuprin), naproxen (Aleve), or other so-called NSAIDs can cause bleeding and should be avoided.
- The patient should stay in bed on his back for at least one day and apply ice packs for 8 hours. The doctor may suggest that the patient wear an athletic supporter.
- Some oozing of blood onto the gauze pads is normal during the first day or two after the operation.
- The patient should not perform any heavy physical labor for at least two days. Sports and heavy lifting may be resumed two to three weeks after surgery.
- A semen analysis is done about six to twelve weeks after the surgery to ensure that no live sperm remain in the semen. The semen is usually collected at home in a small jar and delivered to the doctor's office where it is examined under a microscope. A second semen analysis is sometimes performed again about four months after the vasectomy, although many experts now believe that a second sample is unnecessary unless sperm found the first time were motile (still able to move).

Postoperative Pain

All men experience some acute pain in the scrotum after the operation. This pain generally disappears within two days, although the patient may feel sore for a few more days. In rare cases, pain can be persistent, which is known as post-vasectomy pain syndrome. The cause of this is unclear. [See What Are the Long-term Effects of Vasectomy?]

Itching and Hives

A few men may have an allergic reaction to the local anesthesia and develop itching and hives.

Bleeding

Frequently, blood may seep under the skin, so that the scrotum and penis appear to be bruised. If there is no dangerous swelling, this painless problem usually disappears without treatment within a week or two. If the patient bleeds excessively in the days after the operation and requires more than two or three gauze changes per day, he should call his doctor.

Hematoma

In about 2% of cases, bleeding inside the scrotum can cause a painful swelling known as a hematoma. In these cases, the scrotum swells up shortly after vasectomy. The doctor should be called immediately. Risk for hematoma is less in no-scalpel vasectomy.

Infection

Infections occur in about 4% of men after standard vasectomy. The risk for infection is reduced with no-scalpel vasectomy. The incision site may become infected, causing a redness and swelling around the incision. Antibiotics, antimicrobial creams or ointments, or both, along with hot baths several times a day will usually clear the infection in a few days. There have been a few cases of infections in the lining of the heart (endocarditis) and severe gangrene of the scrotum, but they are extremely rare.

When Can Sexual Activity Resume and What Are the Chances for Pregnancy Afterward?

Resuming Sexual Activity

Once the patient feels comfortable, he can resume sexual activity, usually in about a week. During ejaculation, the patient may experience some discomfort in the groin and testicles at first due to the contraction of the vas deferens. This almost always diminishes as the tissues heal. The couple must, however, continue to use conventional birth control methods temporarily. Live sperm still exist in the ejaculatory ducts, and pregnancy remains a risk for as long as a few months in some men. (In rare cases, the vas deferens reconnects, called recanalization, within a couple of years, but the incidence is too low to be of any real concern. *See below*.)

Residual Live Sperm

After the operation there are always some active sperm left in the semen for several months, so it is essential that the patient and his partner continue to use another method of birth control until his sperm count is zero. Fifteen to 20 ejaculations are required to clear the viable sperm from the reproductive system; usually it takes a few months before sterility is complete. The patient is considered sterile only when there are no live or moving (*motile*) sperm in his semen.

In one British study, 5% of vasectomies had to be repeated, mostly because live sperm persisted in the semen. The risk for sperm surviving indefinitely is very low, however. One study indicated that about 10% of men were still producing functional sperm at six months, but all these men were sterile by eight months. About a third of men experience a recurrence or persistence of sperm that have no ability to move (*immotile*) 12 weeks after surgery and, in one study, about 7% had persistently immotile sperm. Immotile sperm, however, cannot swim up the vaginal canal and pose no danger for fertility.

Recanalization and Vasectomy Failure

Failure rates after a vasectomy are estimated to be less than 1%. The primary reason for vasectomy failure is *recanalization*. This occurs when the cut ends of the vas deferens spontaneously reconnect. Causes of recanalization may be sperm granuloma, tiny balls of debris that form from sperm, scar tissue, and white blood cells at the incision site. Cells lining the inside of the vas deferens grow through the scar tissue and form a new channel through which the sperm can now move. In general, surgeons can prevent this by leaving a gap between the two cut ends. [*See* Sperm Granuloma *under* What Are the Long-Term Complications after Vasectomy?]

This natural vasectomy reversal can occur after any vasectomy surgical procedure, but it is a very rare event. It develops in only about .025% or one in 4,000 vasectomies. Recanalization has been known to occur as soon as a man has achieved a zero sperm count and as late as 17 months after vasectomy. Men should have a follow-up examination a year after the procedure to be sure that there are no residual or new sperm. Although physicians urge men to return for such follow-up testing, in one study only 3% did so.

What Are the Long-Term Effects and Complications of Vasectomy?

Problems at the Vasectomy Site

Sperm Granulomas. After vasectomy, sperm often leak from the vasectomy site or from a rupture in the epididymis, the tightly coiled, thin tube that connects the testicle to the vas deferens. Sperm have very strong antigenic qualities: the immune system views sperm as foreign agents and attacks them. Sperm leakage provokes an inflammatory reaction. The body forms pockets to trap the sperm in scar tissue and inflammatory cells. Firm balls of tissue about one-half inch in diameter then form; these are known as sperm granulomas. They occur in about 60% of vasectomy patients.

Although they rarely cause problems, one study reported that sperm granulomas were troublesome in 15% of patients. In about 3% to 5% of cases, sperm granulomas obstruct the already blocked ends of the vas deferens and generate pressure build-up in the epididymis. This can cause a rupture from the pressure of the fluid. In such cases, the testicles may become enlarged and painful. A damaged epididymis can be repaired, but if the patient later wishes a reversal of the vasectomy, disruption of this tiny tube makes success much less likely. [*See* Can Vasectomy Be Reversed?, *below*.]

Epididymitis. Epididymitis occurs when an inflammation at the site of the vasectomy causes swelling of the epididymis. This condition may occur within the first year and can be treated with heat and anti-inflammatory medications. It usually clears up within a week.

Long-Term Psychologic Reactions

Positive Effects. Most men who have vasectomies feel relieved that the worry about pregnancy is over, and most couples respond well to their new-found contraceptive freedom. About 30% of couples report that they have sex more often following vasectomy, enjoy it more, consider their marriages stronger, feel healthier and more relaxed, and have no regrets about the operation. Surveys indicate that about 90% of men are satisfied with the operation and that the feeling persists. One study reported even higher satisfaction in the partners, with more than 95% of wives reporting satisfaction with the procedure. Younger and older couples, with or without children, were all equally likely to have favorable reactions to vasectomies.

Negative Effects. Some men go through a brief period of self-consciousness, wondering whether others notice some difference in their masculinity. About half of vasectomy patients keep their operations a secret. They may believe that the operation is tainted by the stigma of emasculation and that knowledge of it would degrade them in the eyes of their friends and family. For most men, this tentativeness passes quickly.

In a few men, however, problems of poor self-image persist and require counseling. Some may experience depressed and angry emotions. They may actually require a mourning period over the loss of their reproductive ability (similar to what some women go after during menopause). These negative feelings usually resolve over time as the patient moves on to the next stage of his life.

A small percentage of couples experience serious difficulties with the adjustment. Their emotional distress most often manifests itself in sexual dysfunction, such as impotence, premature ejaculation, or painful intercourse. In such cases, however, the vasectomy is probably the catalyst but not the cause of such extreme reactions. Studies have indicated that men who

experience impotence after vasectomy are more likely to have female partners who are unable to accept the operation.

Chronic Pain

Research has indicated, however, that up to a third of men have some pain in or around the testes that lasts longer than three months. In a study of 700,000 vasectomized patients in the Netherlands, up to 10% reported long-term chronic pain around the testicles. In one survey, 19% of subjects reported chronic pain that was simply a nuisance and 12% reported more severe pain. Another study that followed men for an average of 19 months reported that 27% had some pain in the testicles, although in the great majority, the pain was brief.

Causes of Chronic Pain. The source of the pain is not fully known, although some cases may be caused by the following conditions:

· Scarring from the surgery.

· Obstruction of part of the epididymis that causes swelling in another section.

· Pinched nerves.

· In about one percent of all vasectomies, the epididymis becomes so congested with dead sperm and fluid that the patient feels a dull ache in his testicles. This condition, called ***chronic orchialgia***, usually disappears within six months.

· Some experts believe that granulomas may cause more chronic pain than generally believed, but others point out that open-ended procedures, which actually stimulate granuloma production, result in less pain than closed-ended techniques. No-scalpel techniques may reduce the rate of this complication, but this is not yet clear.

Treatments for Chronic Pain. Surgery may be required if more conservative measures fail to relieve pain. Procedures may include the following:

· Removal of the epididymis and surrounding tissue tends to be effective if the pain is in the scrotum (the sac that contains the testes) and if abnormalities in the epididymis can be seen by ultrasound.

· A surgical procedure that blocks nerves in the sperm cord can bring relief in severe cases.

· Surgery to reverse vasectomy also may relieve pain in men who have the procedure for this purpose.

Prostate Cancer

Prostate cancer is the second most common cause of cancer death among American men, and 30% of all American men over 50 show some evidence of prostate cancer cells. Long-term high-normal levels of testosterone are associated with an increased risk for prostate cancer. Because testosterone levels remain higher for a longer period in men who had vasectomy, experts have been concerned that such men have a greater chance for developing the cancer. (There is no association between vasectomy and testicular cancer.)

Studies investigating the relationship between vasectomy and prostate cancer have been conflicting:

· A number of studies have reported some association between vasectomy and a higher incidence of prostate cancer. Two of the most recent ones were Canadian studies in 2000 and 2001. The 2001 study reported a higher risk beginning 10 years following the procedure.

· A 1999 study that specifically investigated a possible association between vasectomy and prostate cancer found no link. In fact, men with vasectomy who did have prostate cancer were more likely to be diagnosed at an earlier stage and with a less aggressive prostate tumor.

None of the studies reporting higher rates of prostate cancer in men with vasectomies can exclude the possibility that they may simply be due to earlier prostate screening in men who have had vasectomies. Indeed one study reported that about 25% of physicians screened men with vasectomies earlier for prostate cancer than those without the operation. Research on the relationship with prostate cancer is continuing, although if any link is found, it is likely to be very weak. Some experts estimate that any increased risk would amount to 27 cases of prostate cancer out of 13,000 vasectomies over a 13-year period.

An expert panel has recommended that vasectomy reversal is not warranted to prevent prostate cancer and that screening criteria for prostate cancer should be the same for men with and without vasectomies. Men with a family history of prostate cancer should discuss the risks and benefits of vasectomy with their physicians. [For more information see the *Well-Connected* Report #33, *Prostate Cancer*.]

Immune System Changes

Vasectomy is known to provoke immune system changes.

Antisperm Antibodies. Sperm continue to be produced after vasectomy but disposed of in the body. In some men the immune system mistakes these sperm as foreign proteins (antigens) and produces antisperm antibodies that are designed to target and interfere with sperm's motility (ability to move). Up to two thirds of vasectomized men develop such antisperm antibodies. Infections in the genital tract, such as orchitis or sexually transmitted diseases, increase the

risk for antisperm antibodies. The antisperm response itself appears to be a problem only if a man wishes to reverse the vasectomy. [*See* Can Vasectomy be Reversed?, *below*.]

Other Immune Changes. Experts are concerned that, theoretically, changes in the immune system might also cause damage in other parts of the body, including contributing to the heart disease. Animal research, in fact, has suggested that heart disease accelerates after vasectomy, but one study on men who had vasectomies found no significant increase in risk for angina, even over the long term. Two major studies, however, found no significant risk to a man's overall health. In fact, both studies found that men who had vasectomies actually experienced a slightly lower risk for coronary artery disease, and one study also found lower risks for stroke, high blood pressure, and chest pain. One of the studies even found that men who had vasectomies had a longer lifespan than those without the procedure. (In both studies, however, these benefits were not considered significant.)

Kidney Stones

Studies are indicating that men younger than their mid-forties who have vasectomies have twice the risk for kidney stones as their peers who have not had vasectomies. The increased risk persists for up to 14 years after the operation. Kidney stones are not life threatening but they can be extremely painful, and just to be on the safe side, men who have had vasectomies should drink plenty of fluids to help prevent them.

Osteoporosis

There has been some concern that vasectomies increase the risk for osteoporosis in men. One study, however, found no higher incidence of bone loss in vasectomized men.

What is Reversal Surgery Vasovasostomy) to Restore Fertility?

Although men should consider vasectomy a permanent decision, there is a surgical procedure, known as a vasovasostomy, that may restore fertility. One study reported that up to 6% of men who have vasectomy wish to reverse the procedure later. The main reasons for requesting a reversal are remarriage, the death of a child, or an improvement in finances. Reversal may also be performed to relieve postvasectomy pain, which occurs in a small percentage of men. Fewer than 10% of patients who request reversals do so because of physical or psychological problems following vasectomy.

Vasovasostomy (Reversal Surgery) Procedures

Standard Procedure. Vasovasostomy reconnects the severed ends of the vas deferens to reestablish the flow of sperm. The procedure is difficult:

· It involves sewing together the two tiny ends of both tubes, each with pinhead-sized openings.

· If the vas deferens is blocked, the surgeon may try to connect the *epididymis* to an area in the vas deferens that bypasses the blockage.

Vasovasostomy can usually be done on an outpatient basis and patients can usually return to work within one to two weeks. It is far more difficult and expensive than vasectomy itself, however, and is even costlier if the procedure involves connecting the vas to the epididymis, which takes about three hours. It should be noted that reversal surgery is usually not reimbursed by insurance companies, and that the results may not be known for some time.

Microscopic versus Magnification Techniques. The surgeon may view the surgical site using either magnification instruments (called ***macroscopic*** vasovasostomy) or microscopic techniques. Advanced microscopic techniques are proving to increase the chances of a reversal's success, but rates vary. In one small study, 89% of the procedures successfully re-opened the tubes and the pregnancy rate was 44%. Macroscopic vasovasostomy has a slightly lower success rate, but it is less expensive and has a shorter operating time.

Laser Techniques. Laser surgery is being investigated and may prove to require lesser skills, reduce operating time, and result in fewer complications. At this time, however, results vary widely.

Obtaining Sperm During Vasovasostomy

If the patient did not contribute sperm for freezing and banking before vasectomy, some physicians suggest freezing sperm obtained during vasovasostomy as insurance against failure. Such sperm can be used in assisted reproductive methods later on if natural intercourse fails to achieve pregnancy. One study reported, however, that so many sperm were non-motile at the time of the reversal surgery that freezing sperm obtained during the procedure provided little benefit. Nevertheless, other studies have reported some successful pregnancies with frozen sperm. Men should discuss these options with their physician.

Pregnancy Rates after Vasovasostomy

Pregnancy rates of over 50% have been reported after a vasovasostomy. One study reported that when successful conception occurs, it does at an average of one year after the surgery.

A successful reversal is more likely if the following conditions are present:

· The section removed during vasectomy was not long.

· The original procedure was performed on straight sections of the vas deferens.

· The pieces joined during the vasovasostomy are of equal size.

The closer in time the vasovasostomy is to the original vasectomy the better. (In one large study, the pregnancy rates were 76% for those who had vasectomy less than three years before reversal surgery decreasing to 30% for those with vasectomy more than 15 years prior. The lower rates as time goes by are probably due to increasing chance for obstruction of the epididymis and the development of antisperm antibodies.)

Causes of Vasovasostomy Failure

Even though tubes are open and sperm is restored in as many as 85% of men, pregnancy is not guaranteed. A number of factors may play a rule in the failure of reversal surgery.

Epididymis Obstruction. If the sperm count does not recover within a reasonable period after vasovasostomy, it may be due to blockage that has occurred in the epididymis, which may be corrected with a second procedure. One study reported that the physician may be able to detect obstruction *before* the vasovasostomy by pressing and manipulating (palpating) the epididymis. If any part seems swollen or larger than other parts the obstruction is very likely to be present and the patient is likely to need a *vasoepididymostomy*, which creates a bypass around the obstruction. [*See* Reoperations after a Failed Vasovasostomy *below*.]

Autoantibodies. In the majority of cases, the reversal procedure reopens the epididymis, but fertility is impaired because of ***autoimmunity***. Autoimmunity is a condition in which important immune factors, the ***antibodies***, attack the body's own cells, mistaking them for ***antigens*** (any foreign microinvader that the immune system perceives as a threat). Such antibodies in this abnormal process are known as ***autoantibodies***. In the case of autoimmunity after vasectomy, the autoantibodies attack the sperm.

After vasectomy, sperm continue to be produced but, instead of being confined to the reproductive passages, they leak out into the body. Once out of their natural habitat, the immune system perceives them as foreign invaders and develops antibodies to attack them.

The autoantibodies bind to specific parts of the sperm (eg, the head or tail) and cause problems depending on the site of attachment. Sperm may stick together (agglutinate), fail to interact with cervical mucous, or fail to penetrate the egg. Even after vasovasostomy, such antibodies often persist.

Oxidation. The important immune factors that trigger the autoimmune process are called leukocytes. These inflammatory agents may also have harmful effects, particularly triggering the release of particles called oxygen-free radicals, a process called ***oxidation***, which can do considerable damage to cells and genetic material. When free radicals are produced after a vasectomy, they may theoretically be injurious to sperm DNA.

Other Lower Fertility Factors. Vasectomy may also change other factors that affect fertility and may result in vasovasostomy failure.

· Some studies are reporting that after vasectomy, the sperm have lower than normal amounts of a protein called P34H. This protein lies on the surface of the head of the sperm and is important in enhancing fertility. The longer the duration of time between vasectomy and vasovasostomy the lower the levels of this protein. The effect appears to suggest that vasectomy can cause genetic damage in the epididymis where this protein is added and modified.

· Another reported more sperm with abnormal heads after vasectomy, which can affect fertility.

Reoperations after a Failed Vasovasostomy

Repeat Vasovasostomy. If pregnancy fails, in some cases a repeat vasovasostomy may be effective. Success rates depend on several factors:

· the doctor's skill,

· complications from the original operation,

· the effects of antisperm antibodies,

· the time elapsed since vasectomy (the shorter the better), and

· history of previous children. (In one study conception rates after reoperations were highest (80%) in couples who had had previous children. The pregnancy rate was only 17% when men had remarried.)

Vasoepididymostomy. Damage to the epididymis occurs in about 75% of men who request a repeat operation after vasovasostomy failure. This requires an operation called vasoepididymostomy, which creates a bypass around the obstruction. To appreciate the difficulty, one should realize that the epididymis is 1/300 of an inch wide with a wall thickness of 1/1000 of an inch. Microscopic techniques are critical for the success of this procedure and require a surgeon who specializes in them. A modified vasoepididymostomy procedure that employs new techniques is showing promising results, resulting in opened tubes in 77% to over 85% of cases.

Success rates are higher for repairing obstructions closer to the testicles because the epididymis is wider in this area. In general, pregnancy rates are around 20%, but higher rates have been reported. Damage in other ducts and small tubes are a major reason for vasoepididymostomy failure. Ultrasound before the operation may be valuable to determine if these abnormalities exist, which would make it unlikely that the procedure would be successful.

If an initial vasoepididymostomy fails, but conditions are favorable, a repeat procedure may still succeed. In a 1999 study, two-thirds of men who had repeat vasoepididymostomy had sperm in their semen, and natural conception occurred in 25% of patients (3 out of 12) within 18 months.

What Are the Alternative Male Fertility Treatments?

Assisted reproductive technologies (ART) or intrauterine insemination are available for men who want to conceive children after a vasectomy. One very effective fertilization technique for men who have had vasectomies or failed reversal surgery is called intracytoplasmic sperm injection (ICSI). In this procedure, sperm are usually taken from the epididymis using a technique called epididymal sperm aspiration (MESA). The procedure injects a single sperm into an egg with the aid of powerful microscopic and robotic instruments. The fertilized egg is then implanted in the woman.

It should be noted, however, that vasovasostomy still has a higher rate for pregnancy. In one study the pregnancy rate for vasovasostomy was 52% while success after an ICSI technique was under 25%. In addition, a vasovasostomy does not pose a risk for multiple births. A 2000 study concluded that vasovasostomy was even a more cost-effective way to achieve fertility in men with partners older than 37 years. Even for men who have failed vasovasostomy, a repeat procedure appears to be less expensive than embarking on fertility treatments at that time.

Nevertheless, assisted reproductive technologies may be the best approach at this time for men with evidence of antisperm autoantibodies due to vasectomy.

High doses of corticosteroids may be useful in conjunction with intrauterine insemination for infertile men who show antibodies to their own sperm, although their effectiveness is not proven. It should be noted that these drugs have potentially serious side effects with prolonged use.

Interesting research is testing a factor called fertilization antigen (FA-1), which may be able to remove autoantibodies from the sperm surface. Some experts believe that in most cases the presence of these antibodies will not prevent conception unless a large percentage of sperm (70% of more for the most common antibody) are affected. [For a description of ICSI and other fertility treatments, see the *Well-Connected* Report #67, *Infertility in Men*.]

Where Else Can Help Be Obtained for Vasectomy?

Access to Voluntary and Safe Contraception (AVSC) International, 440 Ninth Ave., New York, NY 10001. Call (212-561-8000) or on the Internet (http://www.avsc.org/)
The association is one of the best sources for information on vasectomy. AVSC publishes booklets answering questions about vasectomy, no-scalpel vasectomy, and sterilization reversal as well as a monthly newsletter for members. They will also provide names of local physicians who perform no-scalpel vasectomies. Those requesting information in writing should include a self-addressed envelope. An e-mail request should include mailing address.

National Institute of Child Health and Human Development, Public Information and Communication Branch, 31 Center Drive, Rm. 2A32, Bethesda, MD 20892-2425. Call (800) 370-2943 or on the Internet (http://www.nichd.nih.gov/)

Planned Parenthood, 810 Seventh Avenue, New York, NY 10019. Call (800-230-PLAN) or (212-541-7800) or on the Internet (http://www.plannedparenthood.org/)
This organization offers a brochure #1537 *All About Vasectomy*. Write to request information about this report and other family planning brochures.

American Foundation for Urologic Disease, 1128 North Charles Street, Baltimore, MD 21201. Call (800-242-2383) or (410 468-1800) or on the Internet (http://www.afud.org/)

Also on the Internet
Description of vasectomy
(http://yoursurgery.com/data/Procedures/vasectomy/p_vasectomy.htm)
http://www.mediconsult.com/contraception
http://www.vasectomy.com/

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