Vasectomy can be one of the simplest, cheapest, safest, and most satisfactory methods of fertility control. Both simpler and safer than female sterilization, it can be performed without difficulty in a doctor's office, a railway station clinic, or a rural vasectomy camp (see Fig. 1). As the IPPF Panel of Experts on Male and Female Sterilization pointed out in their 1973 report:

No significant long-term clinical side-effects of male sterilization have been demonstrated although many millions of operations have now been performed in both developed and developing countries (132).

Surgical intervention to occlude the vas deferens and thus prevent the ejaculation of spermatozoa has been practiced for nearly a century. At first, it was used to reduce complications from prostate operations and then, quite mistakenly, to promote sexual rejuvenation. More recently, and with better justification, vasectomy has become a popular and widely available fertility control method for those couples whose family is complete.

The techniques used today for vasectomy—either alone or in combination—include removing a portion of the vas and tying the ends; fulgurating the ends by electrocautery; applying two or more clips or staples; or inserting valves or other obstructive devices within the vas. These different methods are described in detail in "Vasectomy—Old and New Techniques," Population Report D-1, October 1973.

Whatever the method employed, the complication rates for vasectomy are very low compared with other contraceptive methods—about 2 to 4 percent in large US studies. Moreover, most of the complaints that have been noted are short-term and minor (see Table 1 and Fig. 2).

The most common side effects are local problems like skin discoloration, bruising, swelling, and discomfort. These normally disappear a week or two after the operation. Sometimes more serious conditions develop such as hematoma, granuloma, infection, or epididymitis, but these can usually be handled without surgical intervention. Sometimes sperm antibodies may develop within the body as a result of spermatozoa that slip out of the reproductive tract into surrounding tissues, but these antibodies seem to have no effect on overall health. Even psychological problems resulting from conscious or unconscious fears about the operation can usually be reduced by careful and sympathetic counseling. This Population Report will discuss in detail the complications that may arise after vasectomy and how they can be prevented or minimized.

On the whole, male sterilization has proved unexpectedly popular. Not only in the USA where the potential hazards of female oriented methods have been widely publicized but also in India where women are reluctant to go to male doctors or to initiate contraception on their own, vasectomy has proved a reasonable and acceptable alternative to other methods of fertility control. As international experience with the procedure increases, even fewer complications, both physical and psychological, can be expected.

### CONTENTS

- Physical Contraindications ........................................... D-26
- Discoloration, Swelling, and Pain .............................. D-26
- Hematoma .................................................................. D-27
- Infection ..................................................................... D-27
- Sperm Granuloma .......................................................... D-29
- Epididymitis .................................................................. D-30
- Systemic Effects ............................................................. D-30
- Testicular Function and Male Hormones ........................ D-30
- Sperm Antibodies ............................................................ D-31
- Failure .......................................................................... D-32
- Psychological Effects ...................................................... D-33
- Bibliography .................................................................. D-37
The most frequent and least serious side-effects of vasectomy are skin discoloration, swelling and pain. These reactions which may occur in up to 50 percent of men postoperatively are common to all surgery. They are difficult to measure quantitatively and are frequently combined in clinical reports.

**Skin Discoloration**

The reported incidence of skin discoloration or bruising (ecchymosis) ranges from 2 percent (37) to 65 percent (161). This variation probably represents differences of assessment rather than actual results. Most physicians warn men to expect some discoloration of the scrotal area following vasectomy.

Discoloration is caused by the seepage of blood under the skin which often occurs when small subcutaneous blood vessels are punctured by the anesthetic needle. The discoloration is usually concentrated in the scrotum although it may spread to the skin of the penis (214) or, less frequently, to the groin, inner thighs, or lower abdomen (133, 185). It is harmless, requires no treatment, and subsides within a few weeks (61, 133).

**Swelling**

Postoperative swelling occurs as often as bruising—in about 0.8 percent (159) to 67 percent (161) of men. A low reported incidence may simply mean that the men were not sufficiently troubled to report it to the physician.

**Pain**

Pain is a subjective reaction, even more difficult to quantify than bruising or swelling. Edey calls it the most frequent “anticipatory anxiety” of vasectomy (70). Most doctors and counselors warn vasectomy candidates that some discomfort is normal (26, 135).

Although seldom severe, pain or discomfort may occur at several specific junctures in the procedure—when the local anesthetic is injected, when traction is put on the vas to bring it into view, and when the procedure is over. The sensations are quite different in each case. In the first instance, if the anesthetic needle touches the spermatic nerve, the patient will feel a sharp pain. Eighteen percent of the 1,875 Korean men in Lee’s study reported pain at this juncture (149). In the second instance, when traction is put on the vas to bring it into view a few men are likely to report discomfort (159). Only 1.2 percent of 1,000 patients at the Margaret Pyke Center felt “excessive pain” during the procedure and may have needed more anesthetic (157). Thirdly, many men report mild pressure or a sensation of heaviness in the scrotum when the local anesthetic wears off (39, 221). Postoperative discomfort is usually caused by surgical manipulation and subsequent swelling (81). Depending on the individual’s pain threshold, the skill of the surgeon, and the extent of the procedure (e.g., the amount of vas resected and treatment of the dart ends), most men describe the immediate postoperative pain as slight (39, 44, 134, 135, 116, 187, 221, 252).

Not only individual differences but also cultural differences influence a man’s interpretation of pain. Americans and Europeans, for example, report only localized pain at or near the operative site; Indians, on the other hand, often report pain extending to the legs, abdomen, back or over the entire body (212, 250).

Pain sometimes occurs during the first intercourse following vasectomy (81) and even months after the procedure during erection or ejaculation (81, 103). This may be due to paraskiasis in the proximal vas which is distended with sperm (103). Also, the incidence and duration of postoperative pain may be related to preoperative apprehension. In an Indian study of 913 industrial workers, 43 percent of those who were apprehensive before the procedure reported that the pain lasted more than three days afterwards as compared with only 12.8 percent of those who were confident before the procedure (238).

**Prevention and Treatment of Swelling and Pain**

In an attempt to reduce postoperative pain and swelling, several investigators have used drugs in combination with local anesthesia. Gould, for example, reduced postoperative pain and swelling by adding the steroid, methylprednisolone acetate (Depo-Medrol) to the local anesthetic (1 per cent Xylocaine). Among 100 patients, only two felt moderate to severe pain postoperatively as compared with 54
percent of those in whom the drug was not used. Seventy-five percent of the steroid group felt no postoperative pain at all (95, 96, 97) and moderate to severe swelling occurred in only 8 percent compared with 63 percent in the nonsteroid group. De N'Yeurt found that among 25 patients given an oral enzyme, Chymoral* (trypsinchymotrypsin), there was only minimal bruising and edema and a lower incidence of hematomas and postoperative disability than among 28 control patients. Y. F. Din, District Surgical Officer in Gujrat, Pakistan reported that adding alpha-chymotrypsin to the local anesthetic reduced the incidence of hematoma, inflammation, and edema and shortened healing time (65).

The techniques used for occluding the vas and closing the scrotal incision may also influence the amount of swelling and pain. After trying various techniques, Altman in Great Britain found that fulgurating the vas ends and enclosing the proximal end with sheath by a single suture caused least pain (15). Two other investigators observed that an absorbable catgut suture for closure of the incision combined with a pressure bandage reduced swelling and discomfort more than nonabsorbable silk sutures with no pressure bandage (67, 171).

Following the operation, Joseph Davis of New York Medical College requires his patients to use ice packs every 20 to 30 minutes for several hours and to refrain from strenuous exercise for one or two days (55, 184). A scrotal support and analgesics such as aspirin are usually sufficient to relieve postoperative discomfort. For severe pain, anti-inflammatory therapy may be given (81, 240).

HEMATOMA

Hematoma—the formation of a mass of clotted blood from injured blood vessels which bleed into the loose connective tissue layers of the scrotum (25, 26, 55, 117, 132)—occurs in less than 4 percent of all vasectomy operations and usually in less than 1 percent (see Table 1). Prompt diagnosis and treatment are important because in addition to discomfort, infection may develop (26, 108).

Prevention

The best way to prevent hematomas is by meticulous attention to hemostasis during the procedure (25, 26, 103, 222). Bleeding from large blood vessels can be stopped by fulgurating or tying off the bleeding vessels. Bleeding from small vessels may not be noticed, however, and, in fact, may not occur until the effect of the local anesthetic has worn off (123).

Hematomas are more likely to occur if the scrotal area is strained too soon after vasectomy. Since strenuous activity interrupts the healing process, most men are advised to rest for the first few hours after the operation (107, 108, 133, 161, 248) and to refrain from heavy labor for several days (133).

Treatment

If a small hematoma does not reabsorb spontaneously, ice packs can be applied to halt the bleeding (146). Larger masses, which occur in less than 1 percent of the cases, may not respond to ice packs. Then, it becomes necessary to reopen the scrotum, drain it of blood, and tie off the bleeding vessel (37, 73, 131, 145, 146, 157, 240). Only if the vessel is difficult to locate and ligate is hospitalization and a general anesthetic required (108, 145, 146).

INFECTION

Infection following vasectomy is infrequent, ranging from less than 1 percent of vasectomy procedures (127, 145, 152, 154, 212, 231, 240), to between 1 and 4 percent (39, 73, 103, 112, 126, 146, 151, 153, 157, 167, 229) to about 7 percent in one study (250) (see Table 1). This range probably reflects differences in criteria since some investigators report all infections, including minor skin eruptions, while others report only abscesses requiring incision and drainage.

Infection may occur at any of a variety of sites—incision, vas, epididymis and testes (63). Superficial skin infection usually appears three to four days after the operation, and may be caused by tissue irritation from the skin sutures, lack of asepsis during the procedure, or lack of cleanliness on the part of the man (151, 185). Sometimes a more severe and painful cellulitis (often accompanied by fever and chills) will develop under the skin but it usually responds well to antibiotics (153). Before treatment it may be prudent to do a culture of the discharge to determine the causative organism and the most appropriate antibiotic (133, 143, 145). If an abscess develops and does not drain freely, surgical incision may be necessary.

Deep infections which involve internal tissues are most likely to occur in the vas or in the epididymis. These may occur right after surgery or as late as two months postoperatively (153). Livingstone found that silk ligatures used on the vas are likely to promote deep infections. After switching to nylon, he encountered no infections in 2,000 men (153). In a comparison of fulguration and ligation methods, Esho et al reported wound infections in 7.4 percent of the 338 patients whose vasa were fulgurated.

Fig. 1. These men are among the nearly 63,000 who sought vasectomy at the Ernakulam District Family Planning Festival, Kerala State, India. Wives who accompanied their husbands can be seen in the back.
and the ends separated by a fascial barrier; he reported wound infections in 4.9 percent of the 55,1 patients whose vasa were ligated with chromic catgut (75). Axelrad et al encountered 18 abscesses after 2,200 cotton ligations and, as a result, began using hemostatic clips (2, 145).

There have been one or two reports of gangrene, probably caused by infection entering the scrotal incision. One patient, 13 days after vasectomy, developed fever, headache and chills. The scrotum was swollen and red; the skin was ulcerated and eventually became gangrenous. Pus cells and lactose-fermenting organisms were present. Infection subsided (183). Five deaths due to tetanus infection of the vasectomy site were reported among the 62,000 men who had vasectomies at a Family Welfare Festival in India during 1971 (3, 203). The cause of the infections has not been established definitively. It is known that tetanus was prevalent at that time in the Gorakhpur District of Uttar Pradesh where the deaths occurred. Perhaps the men did not take the sulfa drugs provided them. Perhaps the men applied cow dung to their wounds, believing it possessed healing properties even though it often carries the tetanus virus. Still another possibility was cited in a Government report which suggested that contaminated powder was used on the surgeon’s gloves (203). Although gloves were used, they are not necessary. If instruments are carefully sterilized and a “no touch” surgical technique is used, bacteria from the hands cannot enter a vasectomy incision. Even if tetanus is prevalent in an area where vasectomies are being performed, the risk will not be reduced by the administration of tetanus toxoid because the toxoid could not act fast enough to prevent infection (132).

The best defenses against infection are:

- examination of the patient before vasectomy so that any superficial or deep infection can be treated in advance;
- sterilization of operative equipment and draping materials;
- maintenance of asepsis during preoperative preparation and operative procedure;
- instruction to the patient on the importance of keeping the scrotal incision clean postoperatively;

Table 1—Major Complications of Vasectomy in Selected Studies, 1969-1974

<table>
<thead>
<tr>
<th>Author and Date</th>
<th>Country</th>
<th>Reference Number</th>
<th>Number of Patients</th>
<th>Hematomas</th>
<th>Infected</th>
<th>Cellulitis</th>
<th>Granulomas</th>
<th>Incidence of Local Complications per 100 procedures</th>
<th>Failures</th>
<th>Procedure Used to Close Skin incision</th>
<th>Procedure Used to Close Skin incision</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burke 1973</td>
<td>USA</td>
<td>10 688</td>
<td>18.2</td>
<td>8.1</td>
<td>3.3</td>
<td>1.6</td>
<td>0.5</td>
<td>3.5</td>
<td>1.9</td>
<td>1.9</td>
<td>0.2</td>
</tr>
<tr>
<td>Int. 1018</td>
<td>USA</td>
<td>10 688</td>
<td>18.2</td>
<td>8.1</td>
<td>3.3</td>
<td>1.6</td>
<td>0.5</td>
<td>3.5</td>
<td>1.9</td>
<td>1.9</td>
<td>0.2</td>
</tr>
<tr>
<td>Callejas 1974</td>
<td>USA</td>
<td>10 688</td>
<td>18.2</td>
<td>8.1</td>
<td>3.3</td>
<td>1.6</td>
<td>0.5</td>
<td>3.5</td>
<td>1.9</td>
<td>1.9</td>
<td>0.2</td>
</tr>
<tr>
<td>Int. 1018</td>
<td>USA</td>
<td>10 688</td>
<td>18.2</td>
<td>8.1</td>
<td>3.3</td>
<td>1.6</td>
<td>0.5</td>
<td>3.5</td>
<td>1.9</td>
<td>1.9</td>
<td>0.2</td>
</tr>
<tr>
<td>Van Dorn 1973</td>
<td>USA</td>
<td>10 688</td>
<td>18.2</td>
<td>8.1</td>
<td>3.3</td>
<td>1.6</td>
<td>0.5</td>
<td>3.5</td>
<td>1.9</td>
<td>1.9</td>
<td>0.2</td>
</tr>
<tr>
<td>Int. 1018</td>
<td>USA</td>
<td>10 688</td>
<td>18.2</td>
<td>8.1</td>
<td>3.3</td>
<td>1.6</td>
<td>0.5</td>
<td>3.5</td>
<td>1.9</td>
<td>1.9</td>
<td>0.2</td>
</tr>
</tbody>
</table>

a. Infection includes: skin infections, ligature abscess, vasitis, and/or cellulitis. The diagnosis of major and minor infections is based on each physician’s subjective appraisal.

b. Possible or assumed complications.

c. Approximate numbers of patients with listed complication.

d. Diagnosis of hematomas included all palpable masses larger than 0.5 cm in region of vas. Major hematomas are those which required treatment.

Percentage of each complication:

- Hematomas: 0.30
- Infected: 1.47
- Cellulitis: 1.27
- Granulomas: 0.05
follow-up care by medical personnel if there is doubt that the patient will keep the incision clean (132, 222).

If normal aseptic precautions are followed during vasectomy, antibiotics should not be needed and should be reserved for proven cases of infection. In developing countries, however, vasectomies are sometimes carried out under less than optimal conditions and there is little opportunity for follow-up. Thus, for example, in Indian vasectomy camps, antibiotics are often used prophylactically. They may be injected, taken orally or applied at the incision site (180). The IPPF Panel of Experts, however, advised against using large doses of penicillin because of wide-spread sensitivity to the antibiotic (132).

Rare Complications

Some vasectomy complications occur only rarely such as vasocutaneous adhesions, hydrocele, and orchitis. Abnormal adhesions, sometimes caused by infection, form occasionally between the vas and the skin surface following vasectomy. Leader et al reported that 20 of the 2,711 men whose vasa were occluded by ligatures or clips developed adhesions and that, in some cases, surgical lysis was required (146).

Hydrocele—a collection of fluid around the testicle, epididymis or vas—although not technically caused by infection, can be caused by surgical trauma. Leader and Axelrad found only two cases of hydrocele in 2,711 vasectomy patients (146).

According to the IPPF medical handbook on vasectomy, there is apparently a relationship between orchitis (inflammation of the testes) following vasectomy and a previous history of prostatitis, epididymitis or venereal disease. Testicular pain is the usual symptom (133).

Sperm granulomas are an inflammatory response to the leakage of sperm from the vas or epididymis into surrounding tissues. They have been reported in 0.1 to 3.0 percent of vasectomy cases (see Table 1). Most granulomas are small and harmless, however, and would go unnoticed except in cases of later surgery. Thus, it is estimated that their true incidence may be as high as 20 percent for granulomas in the vas and 15 percent in the epididymis. Some have been discovered only a few weeks after the procedure; others as long as 25 years later (93, 152, 156, 157, 213, 216).

Although generally asymptomatic, sperm granulomas can be troublesome if they become infected (55, 123), if they create vasocutaneous fistulae (214, 215), if they cause recanalization of the vas through ducts formed within the granuloma (55, 98, 121, 173), or if they prevent later surgical reanastamosis (123, 219). In theory at least, granulomas may also initiate an immune response by absorption of sperm from the granuloma (140, 217). Schmidt has noticed that "the combined incidences of symptomatic and asymptomatic granulomas approximate the incidence of postvasectomy immunity cited by Ansbacher, Keung-Yeung and Wurster" (219).

Cause

The leakage of sperm from the reproductive tract which gives rise to granulomas may be caused by:

- absorption of ligatures before scar tissue has formed (155);
- inadequate occlusion of the vasa during the operation (140);
- tight ligatures which cut through the vasa (171);
- a buildup of pressure behind the cut end of the vas, either because of the normal intraluminal pressure of accumulated sperm or because of ejaculatory peristalsis which forces the vas end to open (55, 93, 98, 215);
- infection and subsequent inflammation of the vas, causing tissue necrosis (102).

Diagnosis

Variations in the reported incidence of granulomas reflect different diagnostic criteria. To some doctors, any tender nodule appearing at the operative site is a granuloma (93, 98, 152, 215). To others, only an extensive inflammatory tissue reaction is a granuloma (146, 184).

A diagnosis of sperm granuloma should be considered if the man complains of pain and swelling at the site of vasectomy after one or two weeks (93, 98, 103). Especially if the patient has been asymptomatic for some time after the operation, the sudden onset of pain suggests a granuloma (57), but because the symptoms are similar, cancer, tuberculosis, and neoplasms should first be ruled out (102, 219).
On gross examination, the granuloma begins as an inflammation around creamy white, thick seminal fluid. The initial lesion is usually pea-sized. As it matures, a thick grayish-red wall forms around gray puttylike contents. If the lesion becomes large and cystic, its contents may become tinged with blood. As the inflammation subsides, the lesion becomes yellowish-brown, and the walls, fibrous and sometimes calcified (214, 217).

Through a microscope early granulomas appear as a mass of sperm, often without tails, surrounded by histiocytes and round cells. Later, there is an influx of polymorphonuclear neutrophils and active phagocytosis by histiocytes. The central area containing a sterile pus of sperm, phagocytes, giant cells, and amorphous cellular debris is surrounded by epithelioid cells and an outer layer of lymphocytes. As the lesion progresses, fibrosis takes place (88, 103, 131, 140, 217, 219).

Prevention and Treatment

According to some investigators, fulguration substantially decreases the incidence of sperm granulomas because it causes formation of a hard scar (123, 152, 214). William McRoberts of the University of Kentucky School of Medicine (USA) found that granulomas occurred in 10 percent of the cases in which the vas ends were ligated, but in no cases where the ends were fulgurated (123). Because 7 percent of Schmidt’s patients developed granulomas when cotton sutures were used, he now uses fulguration exclusively and has observed no serious granulomas in the last 1,200 cases (216). Schmidt recommends, however, that fulguration be used only to destroy the mucosa and not the muscular wall because excessive fulguration may stimulate the formation of granulomas (214).

Studies dealing with prevention and reversal of existing granulomas are now being conducted by Freeman and Coffey at The Johns Hopkins University (Baltimore, Maryland, USA). By implanting silastic capsules of testosterone subcutaneously in rats, they decreased both sperm production and granuloma formation (80).

Many granulomas subside spontaneously. Those which persist can be treated conservatively with ice bags, bed rest and anti-inflammatory medication (184). If a granuloma becomes large and painful, it must be removed (146, 214, 240). Unfortunately, excision of one granuloma does not preclude the development of another (217).

EPIDIDYMITIS

Epididymitis, or swelling and tenderness near the testes, occurs in less than 1 percent of all vasectomies (56, 73, 131, 145, 146, 152, 157, 229, 231, 242). It is usually caused by the engorgement of the epididymal tubules with sperm rather than by bacteria and may occur as late as several months after the procedure. If a back-up or engorgement of sperm at the site of the vasectomy causes the walls of the epididymal tubules to stretch until they burst, an epididymal granuloma is likely to form (112, 152, 157, 216, 218). While epididymitis caused by bacteria usually obstructs the epididymis, epididymitis caused by congestion may leave the tubules patent (216).

Epididymitis is usually treated conservatively by the application of heat and the wearing of a suspensory (214, 216, 218). Symptoms normally subside within a week. Epididymo-orchitis, a painful and enlarged testicle often associated with acute epididymitis, is usually treated by antibiotics and bed rest (146).

SYSTEMIC EFFECTS

In controlled studies, that is, including both preoperative and postoperative testing, local obstruction of the vas showed no significant systemic effects. Where changes occurred, they were usually within normal limits and were not harmful. For example, a 1973 study of 32 men one year after vasectomy reported no changes in the blood levels of sodium, potassium, chlorides, carbon dioxide, albumin, calcium, cholesterol, alkaline phosphatase, glucose, creatinine and bilirubin, and no significant change in uric acid (23).

Seminal Plasma

The functions of the prostate, seminal vesicles, and urethral glands do not change as a result of vasectomy since they are determined by the level of circulating androgens which is unaltered (180). Studies of seminal plasma conducted by Greig and Moran (1971 and 1972) found no significant change in either protein, fructose, lactic dehydrogenase or glucose-phosphate isomerase. In addition, little variation occurred in two enzymes necessary for biologic oxidation— isocitric dehydrogenase (ICD) and leucine aminopeptidase (LAP) (99, 100).

Nun et al found that the level of acid phosphatase in seminal plasma in 20 men rose from a mean of 66.2 preoperatively to 126.2 nine months after the operation, thus exhibiting an inverse correlation between acid phosphatase values and sperm concentration (170). In tests conducted 12 and 16 weeks following vasectomy, Brum-mer found the levels of the prostaglandins PGE and PGA in the seminal fluid of 10 men elevated (40). The significance of both findings is unknown.

TESTICULAR FUNCTION AND MALE HORMONES

Investigation of the effects of vasectomy on testicular function, that is, the production of viable sperm, began in the 19th century with the work of Sir Astley Cooper. In 1830, Cooper studied the effects of ligating the vas deferens in dogs and observed that occlusion of the vas deferens did not affect the germinal portion of the testes and that spermatogenesis continued as before (50). In 1947, Gosselin in France and in 1921 Simmons in Germany, confirmed Cooper’s findings in humans (122). No permanent changes in testicular function have been attributed to vasectomy.

Although spermatogenesis continues unchanged immediately after vasectomy, studies conducted at the George Washington University Medical Center suggest that as sperm accumulate in the tubules, there is a temporary suppression of spermatogenesis and an arrest of sperm maturation. However, normal spermatogenesis soon resumes (64).
No significant short-term changes have been found in pituitary gonadotropins (FSH-LH) or testosterone (23, 230, 234). Some men who exhibited normal levels of FSH, LH and testosterone before vasectomy showed higher levels postoperatively, but these were usually within the normal range. Others who had elevated gonadotropin levels prior to the operation returned to normal after vasectomy (204).

At the Workshop on Control of Male Fertility held in June 1974, Smith of the University of Texas described tests in which blood samples were taken from 146 men on the day of vasectomy, and again at seven days, six weeks, three months, six months, and one year postoperatively to determine plasma testosterone, FSH, LH and estradiol levels. There were no significant changes in the levels of estradiol or FSH in the 146 men, and the increases in testosterone and LH which were observed were all within normal range (230, 257).

About one-half to two-thirds of vasectomized men develop antibodies to sperm, that is, an immunity is established within the body that inhibits sperm activity (19, 169, 185). Although similar antibodies have been found in normal fertile men, they are more common in infertile men and in men who have had their vasa ligated (2, 132, 133, 176, 206).

Considerable publicity and controversy have focused on the issue of sperm antibodies. One investigator has suggested that such antibodies might be associated with a higher incidence of immunological reactions which might lead to thrombophlebitis or hypoglycemia in vasectomized men (194, 195, 197, 198).

To date, however, there has been no physiological or statistical evidence that sperm antibodies are in fact related to any kind of pathological condition and no evidence that these antibodies attack anything other than sperm. In fact, sperm antibodies may have a beneficial effect by assisting the body to dispose of excess sperm in the blocked genital tract (11).

The formation of sperm antibodies may well be an individual, genetically determined response—which would account for a positive reaction in some men and a negative reaction in others. It is probably triggered by one or more different factors such as leakage of sperm from the reproductive tract into surrounding tissue (54, 82, 123, 228); local inflammation or tissue trauma (54, 82, 105, 182); phagocytosis (or cellular absorption) of excess sperm accumulated in the epididymis (54, 56), or prior urogenital infections and other pathological conditions (260).

The action of antibodies formed by an autoimmune response is not well understood. As in all immunology, two kinds of reaction are thought to be involved—humoral and cell-mediated. Humoral antibodies are those which circulate in the blood. Cell-mediated immunity is a delayed hypersensitively carried by cells in response to external stimuli. Humoral antibodies have been detected after vasectomy by tests which measure sperm agglutinating or sperm immobilizing activity in the blood serum. Cell-mediated immunity is suspected because of the presence of destroyed sperm cells after vasectomy (see Table 2).

### Humoral Immunity

With respect to humoral immunity, recent studies indicate that about 50 percent of vasectomized men develop agglutinating or immobilizing antibodies (11, 18). In some instances, these have persisted up to 10 years or longer (11). The following table summarizes the findings of Alexander at the Oregon Regional Research Center.

<table>
<thead>
<tr>
<th>Period of post-op. testing</th>
<th>No. %</th>
<th>No. %</th>
<th>No. %</th>
<th>No. %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agglutinating antibodies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-1/2 yr 1/2-2 yrs 2-5 yrs 5-10 yrs</td>
<td>12</td>
<td>17</td>
<td>16</td>
<td>56</td>
</tr>
<tr>
<td>1 2-2 yrs</td>
<td>22</td>
<td>50</td>
<td>17</td>
<td>59</td>
</tr>
<tr>
<td>5 yrs</td>
<td>6 12 35.3 Cytotoxic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cytotoxic</td>
<td>12</td>
<td>17</td>
<td>61</td>
<td>23</td>
</tr>
<tr>
<td>52</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The effect of agglutinating and immobilizing antibodies on fertility is being studied. Halim and Antoniou (1973) hypothesized that up to 3 percent of fertile men who have fathered normal children have sperm agglutinating antibodies in their sera (105). In a follow-up of 254 infertile men whose blood serum contained sperm agglutinating antibodies, Rumke found that 36 or about 15 percent later became fertile. Padhke and Padukone found that three of the six men who had antibodies after surgical reanastomosis of the vasa fathered normal children (176). Rumke concluded that fertility appears to be related to sperm quality rather than to quantity (209). Nevertheless,

### Table 2—Number and Percentage of Men with Postvasectomy Antibodies in Selected Studies, 1972-1974

<table>
<thead>
<tr>
<th>Author and Date</th>
<th>Reference Number</th>
<th>Number of Men in Study</th>
<th>Men with Prevasectomy Antibodies</th>
<th>Test Intervals After Vasectomy (in months)</th>
<th>Men with Postvasectomy Antibodies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ansbacher 1973</td>
<td>69</td>
<td>12 27.3 Agglutinating</td>
<td>6</td>
<td>39 56.5 Agglutinating</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.5</td>
<td>12</td>
<td>19 27.5 Agglutinating</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agglutinating</td>
<td>Immobilizing</td>
<td>27 61.4 Agglutinating</td>
<td></td>
</tr>
<tr>
<td>Halim 1973</td>
<td>100</td>
<td>2 27.3 Agglutinating</td>
<td>12</td>
<td>12 27.3 Agglutinating</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Agglutinating</td>
<td>12</td>
<td>6 6 Agglutinating</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 1</td>
<td>3-6</td>
<td>2 2 Cytotoxic</td>
<td></td>
</tr>
<tr>
<td>Henry 1972</td>
<td>12</td>
<td>Not Tested</td>
<td>12</td>
<td>9 75 Cytotoxic</td>
<td></td>
</tr>
<tr>
<td>Howard 1973</td>
<td>43</td>
<td>0</td>
<td>12</td>
<td>14 32.6 Agglutinating</td>
<td></td>
</tr>
<tr>
<td>Jennings 1974</td>
<td>30</td>
<td>0</td>
<td>3,6,9 or 12</td>
<td>4 13.3 Cytotoxic</td>
<td></td>
</tr>
<tr>
<td>Mumford 1974</td>
<td>34</td>
<td>8 23.5</td>
<td>6</td>
<td>12 35.3 Cytotoxic</td>
<td></td>
</tr>
<tr>
<td>Shulman 1974</td>
<td>22</td>
<td>2 9</td>
<td>6+</td>
<td>14 63.7 Agglutinating</td>
<td></td>
</tr>
</tbody>
</table>

*Only one patient had antibodies which acted against his own cells.*
Antibodies which immobilize sperm develop less frequently but may affect fertility to a greater degree than those which agglutinate sperm. Ansbacher, for example, reported that four of the eight men whose spermagglutination test was positive fathered children. However, none of those whose sperm immobilizing test was positive fathered children (20).

Humoral antibodies develop soon after vasectomy and increase gradually. Ansbacher observed the first antibody activity as early as seven to 11 days after vasectomy (see Table 3). In other antibody tests on 18 men both before and at six, 12, 18, 24, and 36 months after vasectomy, Ansbacher found that sperm-agglutinating activity peaked both in incidence and titer at 18 months and then remained almost constant through 36 months. Sperm immobilizing activity peaked at 12 months and then dropped precipitously between 12 and 18 months (see Table 4). All ejaculates were negative for sperm and sperm antibody activity when examined postoperatively.

### Cell-Mediated Immunity

Cell-mediated immunity after vasectomy may manifest itself by the creation of antibodies which attack sperm. To determine whether these antibodies also attack other cells or tissues, tests have been conducted using lymphocytes (white blood cells) from the vasectomized man and from external donors. It is rare to find a man who forms antibodies against his own lymphocytes after vasectomy (9, 74, 109, 110). Some studies show that a few men do react postoperatively against lymphocytes from external donors (9, 74, 109, 110). Jennings, for example, found a weak but positive reaction in three among 30 men tested. He hypothesized that these cell-mediated antibodies "are not regularly formed as a result of standard vasectomy procedures" (120).

Moreover, where immunity does develop, other factors besides vasectomy may be involved. Mumford et al at the Baylor College of Medicine (Texas, USA), for example, found lymphocytotoxins (cells which attack lymphocytes) in 7 of 34 men (20 percent) who had undergone vasectomy. They noted that lymphocytotoxins appear in some men who have a history of blood transfusions or recent immunoglobulin injections as well as in about 10 percent of the male population at large who have never had transfusions, injections, or vasectomies. On the other hand, in another study of 27 men with no previous history of sensitization, six (22 percent) who were negative to the antibody test before vasectomy became positive afterwards (164). Another clinician reported on a man who developed antibodies that caused the sperm heads to swell and burst. Apparently, he had not had such antibodies prior to vasectomy (105).

Two controlled tests based on preoperative and postoperative data for the same patients have been reported. After testing 43 men, Howard and James found that 10 men whose tests for sperm agglutination were positive after vasectomy were nevertheless free of autoimmune phenomena. In four other patients, an autoimmune reaction could be explained by preexisting conditions (114). Bigazzi and Rose found no antibodies to the antigens of the Leydig cells of the testes or of the adrenal cortex in the sera of 150 vasectomized men.*

Even if sperm antibodies are formed following vasectomy, no evidence has yet been found, after millions of vasectomies have been performed over many years, that links these antibodies with disease. Except for a possible negative effect on fertility if reanastomosis is attempted, sperm antibodies pose no apparent threat to health.

### Failure

Although vasectomy is not completely foolproof, it is the most effective male method of fertility control now available and it is becoming more effective as practitioners gain greater skill and experience. Studies conducted in the late 1960s reported failure rates up to four per 100 procedures performed (181). Recent studies show failure rates of less than one per 100 procedures (44, 55, 58, 97, 130, 131, 146, 163). This decline probably reflects the use of more effective and less traumatizing operative techniques as well as greater experience. Nevertheless, a vasectomy candidate should understand that a small possibility of failure exists (28, 93, 103, 158).

Failure in vasectomy may or may not result in pregnancy in the female partner. It is usually discovered when semen examinations indicate the presence of sperm more than three months after the operation or after 10 to 12 ejaculations (see Population Report, Series D, Number 1, December 1973); or when there is sperm in the semen after a

---

The most frequent cause of vasectomy failure is spontaneous recanalization (rejoining) of the cut ends of the vas (25, 157). In 1924, Rolnick at Northwestern University Medical School (USA) demonstrated that, in dogs, the vas can regenerate despite ligation, division, and resection of a segment of each vas (202). More recently, Leader et al reported that seven (0.26 percent) recanalizations occurred among 2,711 human males (146). Recanalization usually develops when the pressure of sperm builds up behind the occluded end of the vas causing leakage and the eventual development of a sperm granuloma. Within the granuloma, epithelial cell-lined channels develop through which sperm can pass.

The likelihood of recanalization may be influenced by the vasectomy technique employed. For example, crushing and tying the vas, a widely used procedure, can lead to recanalization (31, 56, 108, 151). The use of inert materials such as tantalum clips may reduce this problem (63, 66, 184). By compressing the tissues and producing ischemia, clips promote the formation of scar tissue at the vas ends. Leader, who applied four clips to each vas (one in a crushing manner on each end and one in an occluding manner next to it), encountered only one failure in 1,300 sterilizations (144).

Schmidt, a strong proponent of fulguration, pointed out that successful vasectomy depends on two factors: 1) total destruction of the mucosa in a section of vas (without destruction of the muscular wall) and its replacement with fibrous tissue, and 2) separation of the cut ends of the vas by a barrier of fascia derived from the vas sheath (215). Schmidt found that sperm leakage through the vas was most common when ligatures were used (between 7.3 and 9.3 percent) and least common when fulguration was used and the fascial sheath drawn over the distal end of vas. Schmidt recently reported no failures in more than 1,800 consecutive cases where fulguration was used (216). In a study of 1,000 cases using various methods (e.g., ligating and cutting, tying cut ends side by side, doubling cut ends back and tying, and fulguration), Klapproth and Young identified eight failures, but none of these occurred when Schmidt’s fulguration technique was used (131). Similarly, Esho et al reported six failures in 551 ligation cases but no failures among 338 fulguration cases (74).

Members of the workshop on clinical aspects of male sterilization at the 1973 Geneva conference agreed that separating the treated vas ends with a barrier of fascia is an effective means of preventing vasectomy failure (56).

Division of the Wrong Structure

An obvious cause of failure is occlusion of the wrong structure while leaving one or both vasa intact. One of the first to warn of such an error was Morson in Great Britain who in 1933 called attention to the similarity in appearance between a thickened vein and the vas (162). Misidentification now occurs in less than 0.3 percent of vasectomies (93, 97, 131, 146).

The likelihood of operative failure is reduced if the surgeon performs the procedure frequently. The importance of frequent practice was emphasized by Sobrero and Kohli (1973) of the Margaret Sanger Research Bureau, New York. They reported six failures in 236 procedures performed during the first year of the vasectomy service at the Bureau. Four of these procedures were performed by physicians-in-training and two by general surgeons with little experience in the operation (231).

Inadequate Occlusion of the Vas

Failure also results from inadequate occlusion of the vas ends. If ligatures or clips are applied too loosely, sperm continue to pass through the vas; if they are applied too tightly, they may cut through the vas wall and permit the sperm to exit (93, 108, 150).

Unprotected Coitus

Unprotected coitus in the immediate postoperative period can also lead to pregnancy (152). Sperm which remain in the distal end of the reproductive tract after the vas is closed may be released in subsequent ejaculations and impregnate the female. For this reason, it is important that other forms of contraception be continued until two consecutive negative sperm specimens have been recorded (see Population Report, Series D, Number 1, December 1973). In Indian vasectomy camps, men are given 12 condoms based upon the theory that residual sperm in the reproductive tract disappear after 12 ejaculations. Men are advised to have their semen examined when their condom supply is exhausted, although only about 20 percent comply with this suggestion (172).

Duplication of the Vas

Occasionally failure is caused by congenital duplication of a vas. Although two vasa may be occluded, if there is a third, spermatozoa can still be released (25, 152).

PSYCHOLOGICAL EFFECTS

There is no physiological basis for an adverse psychological response to vasectomy. The procedure produces only a local effect—occlusion of the vas—which should not interfere with normal psychosexual function. Although there is a paucity of reliable information on the subject, available literature suggests that a normal, sexually well-adjusted male will experience no significant psychological changes following elective sterilization if he understands what he can expect during and after the procedure and if he is given an opportunity to express his fears and have his questions answered in advance. In most cases, the obvious benefits of the operation—freedom from the emotional and/or financial burden of additional children and from the bother of other birth control methods—outweigh normal anxieties about surgical sterilization. When psychological problems do occur postoperatively, they can usually be explained by preparative attitudes and conditions.

Psychological Contraindications

For the man with serious neuroses or sexual maladjustments, vasectomy may not be advisable. If professional counseling is available, vasectomy candidates with suspected psychological problems should be interviewed and evaluated individually. Young, unmarried men especially should be screened carefully for psychological problems before the operation is performed.
Other specific conditions or situations in which vasectomy may be contraindicated for psychological reasons are:

- hypochondria in relation to other bodily functions (116, 259);
- borderline impotency, homosexuality, doubts about masculinity (103, 116, 147, 161, 259);
- a troubled marriage, including incompatibility with wife (85, 103, 129, 248);
- disagreement or coercion by spouse (72, 76, 103, 133, 147, 259, 261);
- belief by either partner that vasectomy is a temporary measure that can be easily reversed (37, 41, 211).

**Techniques for Assessment**

Assessing the psychological effects of vasectomy is difficult because the interviewing techniques used may not provide an accurate reflection of real or perceived problems. For example, in a study done in Britain, Wolfers found that among a group of men who were offered an opportunity to consult a visiting psychologist concerning marital or sexual problems following vasectomy, more sought an appointment than were willing to admit on a questionnaire that they had such problems (256).

Tests measuring psychological adjustment indicate that postoperative problems can usually be traced to preoperative ones. After administering the Maudsley Personality Inventory to 82 patients, Wig et al found that those who scored higher on the neurotic scale preoperatively suffered more adverse effects postoperatively (252). Using the Minnesota Multiphasic Personality Inventory, Ziegler et al observed that men who experienced problems after the procedure had shown hypochondria or concern about their masculinity prior to the procedure (261, 262). Lee gave the same test to Korean men and came to similar conclusions (148).

Even if personality tests attain a high degree of validity—and this is not the case today—their use in singling out men most likely to report psychological problems following vasectomy would be limited. The amount of time necessary for such testing, especially in large-scale programs, would be prohibitive.

The adjustment problems that face some vasectomy patients are usually based on various conscious or unconscious fears either of the procedure itself or its after-effects. D. N. Pai, Director of Family Planning in Bombay, who is a strong supporter of vasectomy, has analyzed psychological responses to the procedure in India where millions of vasectomies have been performed. In his keynote address to the Second International Conference on Vasectomy, he categorized the various fears a man might experience before or after vasectomy:

- fear of body injury
- fear of sex injury
- fear of family injury
- fear of moral injury
- fear of group injury (171)

**Fear of Body Injury**

The fear of body injury, that is, physical complications such as negative changes in health, or a weakened constitution, is a real one, especially for men who may not clearly understand the limited nature of the procedure. Such fears usually occur in the early phases of a vasectomy program when too few men have experienced the procedure to be available to reassure others.

Although on a world-wide basis, most men have had no change in their overall health, a surprisingly large percentage of Asian men have reported a loss of physical strength following vasectomy (see Table 5). A 1970 report on vasectomy in Bombay by the Family Planning Association of India concluded that among Indian males either the fact of having undergone this operation or the specific knowledge that this operation means cessation of fertility, is associated with the feeling of weakness or loss of strength.

“Body weakness” was reported by 23 percent of patients in that study; deterioration in health was reported by 40 percent of patients (171).

In a Malaysian study, 17 percent of the men interviewed one to four years after vasectomy claimed they felt weaker after the operation (256). Burnight et al noted that in Thailand “the most significant negative factor associated with health was fatigue.” Of 185 men, about 10 percent stated that they were more easily fatigued and could not work as well as before the operation. Age may be significantly related to fatigue because men over 40 are more likely than others to voice this complaint (44).

Table 5—Response to Vasectomy as Indicated by General Health Change in Selected Studies, 1969-1974

<table>
<thead>
<tr>
<th>Author and Date</th>
<th>Country</th>
<th>Reference Number</th>
<th>Number of Patients</th>
<th>No Change in Health</th>
<th>Health Improved</th>
<th>Health Deteriorated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apte 1970</td>
<td>India</td>
<td>22</td>
<td>168</td>
<td>118</td>
<td>70.2</td>
<td>18</td>
</tr>
<tr>
<td>Burnight 1974</td>
<td>Thailand</td>
<td>44</td>
<td>185</td>
<td>185</td>
<td>86.5</td>
<td>10.3</td>
</tr>
<tr>
<td>Goldsmith 1973</td>
<td>Colombia &amp; Costa Rica</td>
<td>104</td>
<td>250</td>
<td>145</td>
<td>58</td>
<td>31</td>
</tr>
<tr>
<td>Halder 1969</td>
<td>India</td>
<td>150</td>
<td>179</td>
<td>140</td>
<td>80</td>
<td>14</td>
</tr>
<tr>
<td>Lee 1973</td>
<td>Korea</td>
<td>212</td>
<td>175</td>
<td>212</td>
<td>84.6</td>
<td>17</td>
</tr>
<tr>
<td>Sawhney 1969</td>
<td>India</td>
<td>229</td>
<td>1012</td>
<td>895</td>
<td>88.4</td>
<td>115</td>
</tr>
<tr>
<td>Simon Pop. Trust 1969</td>
<td>Great Britain</td>
<td>238</td>
<td>912</td>
<td>72.3</td>
<td>6.1</td>
<td>21.6</td>
</tr>
</tbody>
</table>

D. 34
Other symptoms reported in many Asian studies included insomnia, nervousness, headache, bodyache, uneasiness, depression, loss of weight and "bad health" (22, 189, 221, 250). Since there is no physiological evidence to suggest that occlusion of the vas produces any of these symptoms, they would appear to be part of the psychological adjustment to the procedure. It is possible that some counselling or additional information might reduce the incidence of these effects.

In a U.S. study by Ferber et al. three of the 11 men who reported that their health had changed, either for better or worse, following vasectomy, attributed the change to the procedure. On the other hand, 13 of 22 men who reported an improvement in their wives' health postoperatively attributed the improvement to the husbands' sterilization (76).

**Fear of Sex Injuy**

There is no scientific evidence that vasectomy affects sexual capability, and in most studies a majority of the men reported no change in enjoyment or quality of sexual intercourse or in marital harmony. Table 6 summarizes studies dealing with the psychosexual responses to vasectomy.

In developed countries such as Australia, Great Britain and the United States, from 44 to 73.1 percent of the men who had vasectomies reported increased enjoyment of sex which they attributed to their new found freedom from anxiety about their partners becoming pregnant. Ferber et al. reported that following vasectomy 50 to 73 (68 percent) highly motivated men felt less inhibited sexually, and 55 (75 percent) were more satisfied with coitus (76). Even in Latin American countries, where "machismo" or the need to assert masculinity is considered strong, the operation has been popular (see Table 6).

In Asia, however, more men (20 percent or more) attribute adverse sexual effects to the procedure (22, 24, 126, 189). This higher incidence may simply reflect the larger numbers of men who have had vasectomies in Asia where the choice of other contraceptive methods is limited.

Age may be a significant factor in the sexual behavior of Asian men following the operation. Several Indian studies concluded that the majority of men who experienced decreased sexual desire and frequency of intercourse were over 40 years old, whereas those reporting increased desire were younger (24, 189).

Motivation is a key factor in determining postoperative response. If a man decides to have a vasectomy without coercion by another, he is more likely to be satisfied with the procedure. Along these lines, Deys hypothesizes that where a male dominates and makes major decisions in marriage, he is more likely to choose a male form of fertility control such as vasectomy. Because in these situations the man makes the choice, the outcome is likely to be well-accepted by both marital partners (59, 60).

Physical or psychological factors may affect postvasectomy sexual behavior. Complications such as granulomas or hematomas may cause anxiety, pain during intercourse, and/or decreased inclination to engage in sexual activity (135, 185, 250, 252). A history of hypochondria or fear of impotence preoperatively may become a self-fulfilling prophecy after the procedure (101, 115).

Rodgers and Ziegler, using data collected over a four-year period, compared the sexual behavior and psychological attitudes of 37 couples in which the husband had a vasectomy and 22 couples in which the husband had not had a vasectomy but the wife was using oral contraceptives. After two years, more couples in the vasectomy group showed a decrease in marital satisfaction than did couples in the oral contraceptive group (200). The investigators attributed this to the husbands' expectation of special recognition or gratitude from their wives for having assumed responsibility for contraception (199). Most men in

### Table 6—Sexual Response Following Vasectomy in Selected Studies, 1969-1974

<table>
<thead>
<tr>
<th>Author &amp; Date</th>
<th>Country</th>
<th>Reference Number</th>
<th>Time of Survey After Vasectomy</th>
<th>Sexual Desire</th>
<th>Frequency</th>
<th>Erection</th>
<th>Marital Harmony</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Unchanged</td>
<td>Increase</td>
<td>Decrease</td>
<td>Unchanged</td>
<td>Increase</td>
</tr>
<tr>
<td>Allen 1970</td>
<td>India</td>
<td>57</td>
<td>189-210</td>
<td>53</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Shander 1970</td>
<td>India</td>
<td>54</td>
<td>169-170</td>
<td>56</td>
<td>9</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Bruce 1971</td>
<td>America</td>
<td>39</td>
<td>109-150</td>
<td>55</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Benning 1974</td>
<td>America</td>
<td>44</td>
<td>160-170</td>
<td>55</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Freed 1975</td>
<td>USA</td>
<td>81</td>
<td>160-170</td>
<td>55</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Goldberg 1973</td>
<td>Germany</td>
<td>50</td>
<td>160-170</td>
<td>55</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Kalset 1970</td>
<td>USA</td>
<td>154</td>
<td>160-170</td>
<td>55</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Kinsley 1972</td>
<td>USA</td>
<td>410</td>
<td>160-170</td>
<td>55</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Creger 1972</td>
<td>USA</td>
<td>156</td>
<td>160-170</td>
<td>55</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Black 1972</td>
<td>USA</td>
<td>140</td>
<td>160-170</td>
<td>55</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Roddell 1972</td>
<td>USA</td>
<td>140</td>
<td>160-170</td>
<td>55</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Arkinion 1972</td>
<td>USA</td>
<td>154</td>
<td>160-170</td>
<td>55</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Snodgrass 1972</td>
<td>USA</td>
<td>154</td>
<td>160-170</td>
<td>55</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Sneed 1972</td>
<td>USA</td>
<td>154</td>
<td>160-170</td>
<td>55</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Stahl 1972</td>
<td>USA</td>
<td>154</td>
<td>160-170</td>
<td>55</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Wid 1972</td>
<td>USA</td>
<td>154</td>
<td>160-170</td>
<td>55</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Sutherland 1974</td>
<td>USA</td>
<td>154</td>
<td>160-170</td>
<td>55</td>
<td>5</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

**NOTE:** Where given percentage exceeds 100 percent, multiple answers were given by respondents; where percentage is less than 100 percent, some subjects did not respond.

a. Only 96 men responded to question regarding desire.

b. Only men who had symptoms (31 percent of total) were queried about marital harmony.
this study admitted having an increased concern about their masculinity after the operation. Frequency of intercourse increased in the vasectomy group, and some over­reached their sexual capacity in an effort to confirm their masculinity—a reaction which has also been noted in other studies (256, 291). The initial result was an increased incidence of premature ejaculation and temporary impotence (199). Four years later, however, the vasectomy group had no more problems than did the couples using contraceptives. This suggests that, after a time, most men can cope with the psychological problems associated with vasectomy (262). Rodgers and Ziegler concluded that if misconceptions were corrected in advance, vasectomy would have only minimal effect on sexual behavior (199).

Fear of Family Injury
The fear of losing children, particularly in areas of high mortality, deters some men from seeking vasectomy. Wolfers et al found that Malaysian parents who had lost children showed a high level of anxiety after the operation and, as a result, required special counseling (256). In a study done by the Simon Population Trust, two couples who had lost a child stated they later regretted the operation (229).

The IPPF Panel of Experts recommended that sterilization programs include readily available services for surgical reanastomosis of the vasa (132). The opportunity for reversal may encourage some men to seek vasectomy. Today, however, fewer than 30 percent of reanastomoses are successful (in terms of impregnating a female) (80, 257).

A few studies have assessed the reactions of wives to vasectomy. Some wives experience an adverse emotional response to their husband's sterility even though they lend support overtly. They may associate coitus so closely with conception that the sexual act has meaning only if pregnancy is possible. Such women show less interest in sex and experience less pleasure after their husband's operation (78).

The majority of women, however, show no change in sexual pleasure following their husband's vasectomy. Lee asked 1,080 Korean men to evaluate their wife's sexual satisfaction, degree of decreased inhibition, ability to reach climax and initiation of love play. For 32 percent, there was an increase in all of these areas; for 6 percent there was a decrease, and for 62 percent, there was no change (149).

Freund and Davis conducted a recent study in which husbands and wives (31 couples) were queried separately about sexual function following the husband's vasectomy. Responses for the most part revealed either an increase or no change at all. Most wives reported less anxiety during intercourse because they no longer worried about becoming pregnant (81).

Fear of Moral Injury
Conflict with religious or any other deeply rooted conviction affects a man's reaction to vasectomy.

In one Indian study, men were asked preoperatively about factors which mitigate against vasectomy. The majority placed religion above all other factors (189). In a Pakistan study, 12 of 17 women who were dissatisfied with their husband's vasectomy said it was against their religion (186).

Sometimes family members fear that vasectomy will lead to promiscuity, even though several studies indicate no increase in promiscuous behavior postoperatively (5, 200).

Fear of Group Injury
Fear of group injury, for example, extinction or diminished influence, may cause members of a religious, socioeconomic or ethnic group to avoid vasectomy. Poffenberger and Poffenberger noted that, in India, members of the Baria caste shunned vasectomy because they were afraid it would reduce their numbers and thus their political power (178).

In a study of 498 black couples in the USA, 84 percent of the men rejected sterilization. Over half of those interviewed believed that sterilization was a method of genocide. 93.3 percent stated that the survival of the black people depended on increasing the number of births (53).

Preventing Problems
It is more desirable to prevent problems than to treat them after they occur. Recommendations for minimizing adverse psychological results made by the workshop on the psychological aspects of sterilization at the Second International Conference on Sterilization, Geneva, 1973, are summarized below:

1. The words to be used [to describe sterilization] should be chosen carefully in order to avoid unfortunate associations.

2. Cultural blocks should not discourage the initiation of programs.

3. Physicians and staff should attempt to recognize their own prejudices and preferences as personal ones, and should be neither overcautious nor overenthusiastic.

4. Voluntary sterilization should not be offered as a condition for obtaining another benefit.

5. Adequate counseling should be provided to ensure good results. It should be primarily educational, and can be done by any trained person with appropriate and sympathetic personal characteristics. Individual readiness of the patient, free of pressure, and without unrealistic expectations, must also be ascertained. Staff must be available for help with any postoperative problems.

6. There are no psychiatric contraindications for voluntary sterilization because of diagnosis per se, though there may be instances in specific cases where it may be advisable to postpone the operation.

7. Routine follow-up for psychological effects is not essential.

Vasectomy is no longer experimental. Its widespread acceptance has made it a standard procedure for fertility control. However, as with any medical or surgical procedure, continued experience and research can identify those techniques and approaches which are most likely to be effective and least likely to produce even minimal complications.


<table>
<thead>
<tr>
<th>Series</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1</td>
<td>Oral Contraceptives—Fifty Million Users</td>
</tr>
<tr>
<td>B-1</td>
<td>Copper IUDs—Performance to Date</td>
</tr>
<tr>
<td>B-2</td>
<td>IUDs Reassessed—A Decade of Experience</td>
</tr>
<tr>
<td>C-1</td>
<td>Laparoscopic Sterilization—A New Technique</td>
</tr>
<tr>
<td>C-2</td>
<td>Laparoscopic Sterilization III: What Are the Problems?</td>
</tr>
<tr>
<td>C-3</td>
<td>Colpotomy—The Vaginal Approach</td>
</tr>
<tr>
<td>C-4</td>
<td>Laporoscopic Sterilization with Clips</td>
</tr>
<tr>
<td>C-5</td>
<td>Female Sterilization by Mini-Laparotomy</td>
</tr>
<tr>
<td>D-1</td>
<td>Vasectomy—Old and New Techniques</td>
</tr>
<tr>
<td>D-2</td>
<td>Vasectomy—What Are the Problems?</td>
</tr>
<tr>
<td>E-1</td>
<td>Eighteen Months of Legal Change</td>
</tr>
<tr>
<td>E-2</td>
<td>World Plan of Action and Health Strategy Approved</td>
</tr>
<tr>
<td>F-1</td>
<td>Five Largest Countries Allow Legal Abortion on Broad Grounds</td>
</tr>
<tr>
<td>F-2</td>
<td>Menstrual Regulation—What Is It?</td>
</tr>
<tr>
<td>F-3</td>
<td>Menstrual Regulation Techniques</td>
</tr>
<tr>
<td>F-4</td>
<td>Menstrual Regulation Update</td>
</tr>
<tr>
<td>G-1</td>
<td>Clinical Use of PGs in Fertility Control</td>
</tr>
<tr>
<td>G-2</td>
<td>Fertility Control Research Map and Directory</td>
</tr>
<tr>
<td>G-3</td>
<td>A Review: Modulation of Autonomic Transmission by Prostaglandins</td>
</tr>
<tr>
<td>G-4</td>
<td>&quot;Prostaglandin Impact&quot; for Menstrual Induction</td>
</tr>
<tr>
<td>G-5</td>
<td>Physiology and Pharmacology of PGs in Parturition</td>
</tr>
<tr>
<td>H-1</td>
<td>Condom—An Old Method Meets a New Social Need</td>
</tr>
<tr>
<td>H-2</td>
<td>The Modern Condom—A Quality Product for Effective Contraception</td>
</tr>
<tr>
<td>H-3</td>
<td>Vaginal Contraceptives—Reappraisal</td>
</tr>
<tr>
<td>I-1</td>
<td>Birth Control Without Contraceptives</td>
</tr>
<tr>
<td>J-1</td>
<td>Family Planning Programs and Fertility Patterns</td>
</tr>
<tr>
<td>J-2</td>
<td>World Fertility Trends, 1974</td>
</tr>
<tr>
<td>J-3</td>
<td>Advanced Training in Fertility Management</td>
</tr>
</tbody>
</table>

**Publications of the Population Information Program**
**Department of Medical and Public Affairs**
The George Washington University Medical Center
2001 S Street, N.W., Washington, D.C. 20037 U.S.A.

Additional copies are available to health personnel in developing countries. Please check items desired and indicate number of copies preferred. Cut along dash line, and mail to above address. Underline preferred language: English, Spanish, French, Portuguese.

Name ___________________________
Address ___________________________
City ___________________________
Country ___________________________

D-40