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Complications of Vasectomy: Review of 16,000 Patients

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Summary—Sixteen thousand, seven hundred and ninety-six men underwent vasectomy between 1970 and December 1983 and have been reviewed. Post-operative side effects were few and significant complications were reported in 0.9%. Failure to achieve sterility occurred in 72 men, 69 of whom have been analysed. The early recanalisation rate was 0.36%. This rate was not influenced by the operative technique used, but varied markedly between individual surgeons. Experience and care with technique should result in a failure rate of 0.2% or better. There were six cases of late recanalisation in men previously thought sterile by two consecutive azoospermic analyses 4 months after vasectomy.

A recent review has estimated that 33 million couples worldwide now rely on vasectomy for birth control, a figure which supports the often expressed surgical view that vasectomy is a simple, safe and effective procedure with few complications or failures (Population Reports, 1983). Blandy (1979), however, cautioned against regarding this operation lightly, and this review of one clinic's overall experience was stimulated by the recognition of late recanalisation in six men previously thought to be sterile after two azoospermic analyses after vasectomy.

Patients and Methods

Patients were referred to the Elliot Smith Clinic by their GPs and vasectomy performed under local anaesthesia by surgeons trained in a standard clinic technique. Before 1974 all vasectomies were performed by ligation, but after the success claimed by Schmidt (1973), most vasectomies were carried out using intraluminal diathermy, but without fascial interposition. Vasa were not routinely examined histologically.

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Patients were advised to rest for 24 h post-operatively and asked to submit two semen samples for analysis 4 and 4½ months later. The standard criteria for sterility were two consecutive completely azoospermic analyses at least 4 months after vasectomy, and further samples were requested as necessary. Men with persistent sperms were offered a "special clearance" if three criteria were fulfilled: firstly, there were two consecutive counts of less than 10,000 sperm/ml; secondly, no motile sperm were seen and thirdly, if there had been a minimum of 7 months' follow-up after vasectomy.

Assessments of post-operative complications were attempted in 1975 and 1983 by asking consecutive groups of men to return questionnaires 2 weeks after surgery.

Results

Between 1970 and December 1983 the clinic performed 16,796 vasectomies, approximately 4500 by ligation and 12,300 by diathermy. There was only one unilateral duplicated vas, recognised at the time of the vasectomy. In a series of 2000 patients, operated upon by two surgeons, five men (0.25%) had an absent vas on one side, with normal testes; 757 men (4.5%) defaulted from providing

requested semen specimens at various stages post-operatively, leaving 16,039 cases for analysis.

Post-operative complications

In 1983, 800 men were asked to return questionnaires, but only 534 replied (67%). Of those that responded 7.7% sought medical advice for post-operative pain and 3.6% for bleeding. In seven men there was a discharge from the wound (1.3%), five men developed scrotal haematomas (0.9%), and of these one man was admitted to hospital for attempted drainage; 80% returned to work within 3 days, 96% within a week.

The results of the 1975 survey were similar but also sought to assess differences in outcome between groups sterilised by ligation or diathermy. No differences could be demonstrated, though the surgeons reported that vasectomy performed by diathermy was quicker and appeared less traumatic.

Failures of vasectomy

One hundred and fifteen re-operations have been performed. However, 48 re-explorations undertaken before 1975 were in men with scanty non-motile sperms, within the criteria set after that date for "special clearance". Three men were re-explored twice and two on three occasions. Counts of less than 10,000 non-motile sperms persisted in the ejaculates of all five following their last operation. Since that date, 310 men have been given a special clearance, 2.2% overall. All were asked to contact the clinic should any problems arise, but to date no subsequent failure in this group has been reported. Seventy-two early failures have occurred, but 3 were among the 757 men who defaulted from supplying follow-up sperm counts, leaving 69 in 16,039 cases, an overall incidence of 0.43%. The sperm counts of these 69 are given in Table 1. As excised vasa were not routinely examined histologically, the frequency of failure to identify the vas as the cause of continued fertility is not known. However, at re-exploration 12 vasa appeared pristine. The initial sperm counts were high and therefore it is probable that in these cases the vas was not interrupted at surgery. In 17, the initial post-vasectomy counts were less than 5 million/ml and subsequently rose. It is likely that these are all recanalisations. The remaining 40 all had high counts, but scarring around the vas often with vasal nodules was found at re-operation. Although it is likely these men had recanalised, it is possible that some of these may have failed because of missed vasa. Excluding the 12 cases where the vas was probably missed, this leaves 57 early recanalisations (0.36%), 23 following ligation (0.51%) and 34 following diathermy (0.28%).

Table 2 shows the individual failure rates for 19 of the surgeons who have worked at the clinic. This list is not comprehensive but covers each surgeon's experience up to the end of 1983. It shows that of the 4 surgeons with personal experience of 900 vasectomies or more, 3 achieved failure rates of 0.2% or better. There follows a group of six surgeons with 300+ vasectomies who achieved failure rates of less than 1%. Of the remaining eight surgeons with rates of 1.3% or worse, five had performed less than 200 vasectomies. One surgeon who continued to use a ligation technique had 13 failures in an experience of over 800 vasectomies (1.57%).

Late recanalisation, defined as a return of fertility with positive sperm counts after 2 consecu-

Table 1 69 Failures: Sperm Counts at 4 Months

Less than 1 M/ml	*1-5 M/ml*	*More than 5 M/ml or "numerous"*
12	5	52 Of these, vasa appeared intact at re-op 12

Table 2 Individual Recanalisation Rates

Surgeon	*Failures (missed vasa)*	*Total vasectomies*	*Rate %*
A	2	1442	0.14
B	2	1181	0.17
C	3	1703	0.18
D	2 (1)	974	0.21
E	1	384	0.26
F	1	331	0.30
G	7	1722	0.41
H	2	388	0.52
I	4	686	0.58
J	3	367	0.82
K	4 (1)	443	0.90
L	3	235	1.28
M	5	378	1.32
N	2	150	1.33
O	1	77	1.40
P	13 (1)	826	1.57
Q	3	190	1.58
R	7 (5)	15	46.67
S	2 (1)	3	66.67

tive aspermic counts performed at least 4 months after vasectomy, has occurred in six men. All were recognised after their wives became pregnant. Each had been sterilised by a different surgeon using intraluminal diathermy. All cleared without difficulty, their wives then becoming pregnant between 16 months and 3 years after vasectomy. Five were re-explored and unilateral recanalisation was shown histologically or radiologically. Details of these cases have already been reported (Philp *et al.*, 1984).

Discussion

The 13-year experience of the Elliot Smith Clinic supports the view that vasectomy is a simple, safe and effective procedure for birth control. Side effects are few. Our figures suggest that about 10% of men may need to seek medical advice afterwards, but the impression gained from unsolicited comments made by patients was that many consultations were for reassurance and might have been prevented by more careful pre-operative counselling. The most serious side effect revealed from our questionnaire was scrotal haematoma, with an incidence of 0.9%, but only one man in 534 needed admission to hospital as a result. This is comparable to other series (Population Reports, 1983). Randall *et al.* (1983) reported a 32.9% wound infection rate in men who had undergone vasectomy, four of which were severe (4.3%). We cannot comment on minor infections, but only 1.3% of men we surveyed complained of wound discharge post-operatively, none severe. Assuming this to be infective, this incidence is similar to that of most other reports (Population Reports, 1983).

Despite careful counselling and postal follow-up, 4.5% of our patients defaulted from providing semen specimens post-operatively. This system has, however, resulted in fewer defaulters than any of the other series in which figures have been given (Barnes *et al.*, 1973; Rees, 1973; Esho and Cass, 1978).

Our overall failure rate of 0.43%, with 0.36% early recanalisation, is in line with other reported British series, the Margaret Pyke Centre quoting 0.6% (7.1% defaulters) (Barnes *et al.*, 1973) and Cardiff 0.4% (16.5% defaulters) (Rees, 1973). Interestingly, there has been no improvement over the last 10 years, despite a change in technique, for although it appears here that the recanalisation rate following ligation (0.51%) is worse than that after diathermy (0.28%), the one surgeon operating at the clinic over 13 years who still uses the ligation technique has suffered 13 failures of the 23 in that group. If his personal series is removed, the rate for the ligation group falls to 0.27%, and no difference between the two methods can be demonstrated. American series quote recanalisation rates between 0 and 3% with most less than 1% (Esho and Cass, 1978), but in only one of these are adequate details of follow-up or defaulters given.

Only one other study has analysed failures by individual surgeons (Kaplan and Huether, 1975) and their findings that individual rates varied between 0.2 and 5.3% is much in accord with ours. All vasectomies at their clinic had been performed by ligation and the only significant variable that they had found was in the length of vas removed; fewer failures resulted if more than 14 mm were excised. The Elliot Smith Clinic surgeons (with one exception noted above) perform a standard technique, and the effect of minor individual variations has not been examined. However, our figures suggest there may be a "learning phase" to vasectomy, most failures tending to occur early in the surgeon's experience.

Discussion in the literature on how to minimise the incidence of recanalisation has tended to focus on the operative method. Fascial interposition has been advocated as the manoeuvre that will result in no failures (Esho and Cass, 1978; Schmidt and Free, 1978), but evidence to support this contention has relied on data from sequential series of patients. Our evidence suggests that conclusions based on data collected in this way will be distorted by the surgeon's technique improving with experience. Burial of one end has not been part of the clinic technique, but some circumstantial evidence suggests fascial interposition may not prevent failures (Chaset, 1962; Rhodes *et al.*, 1980).

It is concluded that with experience and attention to individual technique, regardless of the actual method employed, a failure rate of 0.2% or better should be attainable.

The policy of ignoring the presence of a few non-motile sperms for establishing clearance post-vasectomy was adopted by the Elliot Smith Clinic in 1975. Our experience of no known pregnancies caused by men in this group bears out the view of Blandy (1979). Unlike Edwards and Farlow (1979), we would advise follow-up for at least 7 months as there have been some cases where initial analyses like these were soon followed by much higher counts and motility.

Late recanalisation has been reported previously (Philp *et al.*, 1984). In summary, there appear to be no distinct aetiological factors in these cases, nor

can the operative method or the individual surgeon be implicated. Until more evidence accrues, this must be assumed to be a rare possibility at any time post-operatively. The incidence of this complication appears to be approximately 1 in 2000 to 7000. The practical conclusions drawn from these cases is that, firstly, pre-operative counselling must take account of this rare possibility, though abstinence remains the only method of birth control more effective than a successful vasectomy; secondly, vasectomised men whose partners become pregnant should have a semen analysis performed before it is assumed the fertile sperm came from another source.

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