

Determining the success of vasectomy

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OBJECTIVES

To examine patient compliance, significance of rare nonmotile sperm (RNMS) and to determine the timing and number of semen analyses required to confirm sterility.

PATIENTS AND METHODS

From November 2001 to November 2004, 436 consecutive primary vasectomies were performed by one surgeon. All patients were instructed to submit two initial semen specimens for analysis (2 and 3 months after vasectomy) and additional samples (at 1-month intervals) if sperm were identified on the initial and subsequent analyses.

RESULTS

A quarter of the patients submitted no semen specimens and only 21% followed the full

instructions to provide two consecutive negative semen analyses. Three-quarters of the patients provided a semen specimen at 8 weeks after vasectomy; of these, 75% were azoospermic and 25% contained sperm. At 12 weeks after vasectomy half the patients provided a semen specimen; of these, 91% were azoospermic and 9% contained sperm. Of the 83 patients with semen containing sperm at 8 weeks, 80 had RNMS and three had rare motile sperm (one of whom subsequently proved to have vasectomy failure). Of the 80 patients with RNMS, at 3, 4, 5, 6, 8, 10 and 11 months, 65, four, three, four, two, one and one, respectively were azoospermic.

CONCLUSIONS

The present results indicate that many patients are not compliant with the protocol after vasectomy. Provided patients have been

adequately counselled, we think that one negative semen analysis at 3 months or one with RNMS at 2 months may be adequate to determine the success of vasectomy. This should reduce the number of semen analyses, including reducing the number of men who must undergo repeat testing, without sacrificing the accuracy of determining paternity. Simplifying the follow-up after vasectomy is important; not only would it be cost-effective but it may also improve patient compliance.

KEYWORDS

vasectomy, semen analysis, azoospermia

INTRODUCTION

Vasectomy is one of the most common forms of permanent sterilization methods currently in use, and has a failure rate of <1% in most reported series [1]. As failure of vasectomy may result in pregnancy, adequate counselling is essential. Couples are advised that an analysis of a semen specimen after vasectomy (SSAV) is required to confirm success before the use of alternative contraception is abandoned.

The timing and the number of specimens required to confirm success remains controversial because of variable clearance times of residual sperm from the ampulla of the vas deferens and seminal vesicles. There are also no standardized guidelines on the follow-up of these patients to assess the efficacy of the vasectomy [2].

Classically, the absence of sperm in the SSAV was required to establish the success of the vasectomy. We have traditionally recommended the use of an alternative form

of contraception until a patient has two consecutive azoospermic SSAVs. However, other investigators have suggested that achieving azoospermia after vasectomy is not an absolute requirement [3]. It was proposed that a man can be considered infertile as long as the spermatozoa present in the SSAVs are not motile [4].

Clarifying the timing and the number of specimens required to confirm vasectomy success, and the significance of rare nonmotile sperm (RNMS) would allow for a more feasible follow-up protocol after vasectomy. Simplifying the follow-up, in addition to being cost-effective, might improve compliance rates. Thus we examined patient compliance, the significance of RNMS, and determined the timing and number of SSAVs required to confirm sterility

PATIENTS AND METHODS

We reviewed the records of 436 consecutive men who had had a percutaneous no-scalpel

vasectomy by one surgeon (J.S.J.) at our institution between November 2000 and November 2004. All patients were carefully instructed at both the preoperative assessment and at the time of vasectomy to submit two semen samples for analyses at 2 and 3 months after vasectomy.

Percutaneous no-scalpel bilateral vasectomy was performed in the office setting, with local infiltration of 1% lidocaine, using the procedure previously published [5]. The sharp no-scalpel haemostat punctures the skin and the vas is then grasped with the ringed instrument. The exposed aspect of the vasal sheath is incised with a scalpel longitudinally, allowing the sheath to fall away and expose a 1–3-cm mobile section of the vas. The vas deferens was then doubly ligated with titanium clips, the intervening segment of vas deferens (\approx 1 cm) between the clips excised and the lumen then cauterized. The specimen is not submitted for pathological examination.

The semen samples were produced at home and all samples were examined within 12 h. The surgeon who performed the vasectomy also analysed all SSAVs in the office, using standard light microscopy; 40 fields of uncentrifuged semen samples were investigated at $\times 200$. An azoospermic semen analysis is one in which sperm are absent. The remaining semen analyses are defined as either RNMS (fewer than five nonmotile sperm per slide) or positive (more than five nonmotile sperm per slide and/or motile sperm). There was no charge for the semen analysis, no matter how many were required to establish the success of vasectomy. The patient is informed of the semen analysis results by telephone or in writing, and further instructions and counselling are given at that time. Once the patient has achieved two consecutive negative semen analyses 1 month apart, he is informed that the vasectomy was successful in achieving sterility.

RESULTS

Semen analysis was requested at 2 and 3 months after vasectomy in all 436 patients; 75% provided a semen specimen at 2 months, of which 75% were azoospermic and 25% had semen containing sperm (Fig. 1). Only 42% of patients with initial azoospermia returned a second semen specimen. At 3 months after vasectomy, 50% of patients provided a semen specimen, of which 91% were azoospermic and 9% had semen containing sperm (Fig. 1). In all, three patients with initial azoospermia at 2 months had evidence of RNMS at 3 months; all three were azoospermic on both their 4- and 5-month SSAV.

Of the 83 patients with semen containing sperm at 8 weeks after vasectomy, 80 had RNMS and three had rare motile sperm. Of the three men with motile sperm, two eventually became azoospermic at 6 months and in one the vasectomy failed, with persistence of motile sperm 7 months after vasectomy. Of the 80 patients with RNMS, at 3, 4, 5, 6, 8, 10 and 11 months, 65, four, three, four, two, one and one, respectively were azoospermic (Fig. 2).

In all, 21% of patients complied with instructions to provide two consecutive azoospermic SSAVs. Of the 436 patients, 58% only submitted one SSAV, of which all were

FIG. 1. Rates of semen sample return from 436 men.

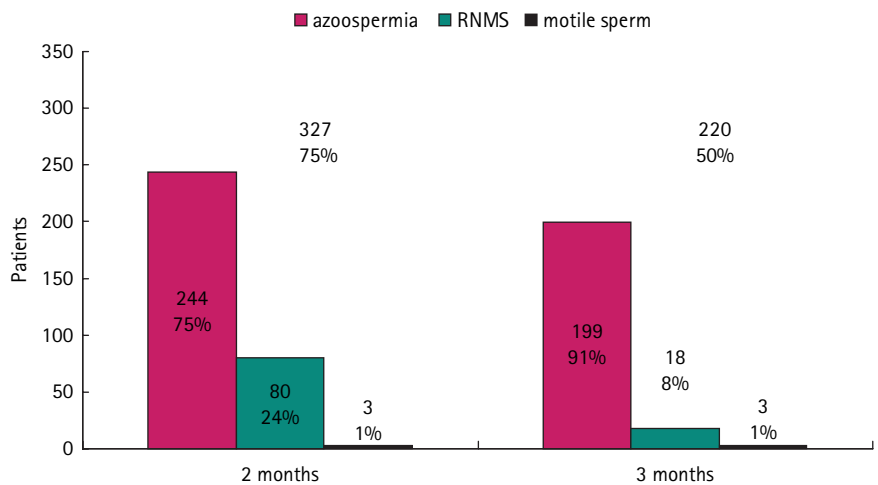
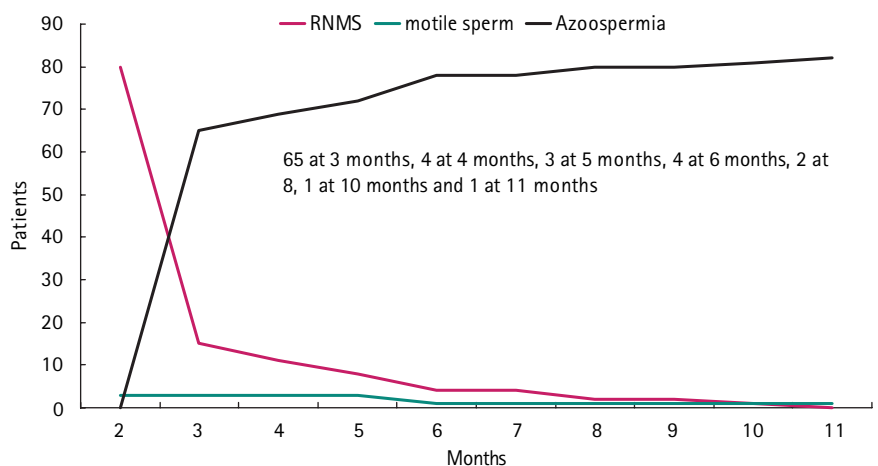


FIG. 2. The follow-up of patients with evidence of sperm in the SSAV at 8 weeks.



azoospermic. The true failure rate in these patients was difficult to assess because no additional samples were submitted and no follow-up visit was attended, despite careful counselling.

Partners of two of the 436 men reported pregnancy during the mean (range) follow-up of 28 (6–51) months. One nonmotile sperm was identified on a centrifuged semen analysis 4 months after vasectomy in one of these patients, which was his first check and was done only after his wife became pregnant. The spouse had a spontaneous miscarriage before a re-assessment a month later, when azoospermia was confirmed, and this was also repeated a month later. A second man's sexual partner became pregnant almost a year after vasectomy. He had azoospermia

on two SSAVs at 8 and 12 weeks after vasectomy. She acknowledged coitus with several partners, and his sterility was confirmed with a repeat semen analysis in response to her pregnancy.

As noted, one man who had rare motile sperm on his initial semen analysis had re-canalization, as shown by innumerable motile sperm in his 12-week SSAV. He had a repeat percutaneous vasectomy and sterility was confirmed by azoospermia on both his 8 and 12-week SSAV afterward. He had been adequately counselled about his continued fertility potential when the sperm were identified on the initial SSAV, and had continued to use alternative contraception until sterility was confirmed, avoiding an undesired pregnancy.

DISCUSSION

At our institution, we traditionally require two consecutive azoospermic SSAVs 1 month apart before advising men that the vasectomy was successful. Studies show that up to 90% of urologists require two semen samples routinely and that up to 95% request further semen samples if nonmotile sperm are present [2]. However, there is no evidence-based consensus to suggest that insisting on two consecutive azoospermic SSAVs, rather than one, reduces the risk of subsequent pregnancy. An azoospermic SSAV serves only to confirm division of both vas deferens and does not guarantee that the patient will not develop subsequent re-canalization of the vas deferens. Two consecutive azoospermic SSAVs do not guarantee sterility [6,7]. Studies from other centres show that the incidence of the transient re-appearance of sperm after vasectomy is 0.8–2.4% [8–10].

In addition, insisting on two consecutive azoospermic semen analyses presents barriers to patient compliance. The present initial non-compliance rate (those returning no samples) of 25% is similar to rates of 24–40% reported previously [11–13]. However, non-compliance rates increased to 79% when based on failure to produce two consecutive azoospermic SSAVs. Similarly, Maatman *et al.* [14] reported a non-compliance rate of 73% when based on failure to produce two consecutive azoospermic SSAVs 1 month apart.

Of importance are the 25% who provided no SSAV; historically, published data show that up to 40% of patients never return for one follow-up semen analysis [12,14]. The reasons for the poor compliance are unknown and therefore adequate counselling before vasectomy is essential [14].

The persistence of nonmotile sperm after vasectomy is well known [3,15]; in the present study there were 80 patients with RNMS in the semen (in one or both of the SSAVs). At 6–11 months after vasectomy, and after submitting a further one to eight samples, all of these men had azoospermia. De Kniff *et al.* [3] reported that 96% of men with RNMS eventually became azoospermic, with a mean (range) follow-up of 6 (3–21) months, and concluded that it was safe to give clearance to patients with RNMS. However, they performed a second vasectomy in the remaining 4% of men with RNMS.

The true failure rate and the recommended follow-up for patients with RNMS has not been established, largely because significantly many of these men are lost to follow-up. The observed failure rate associated with RNMS is reportedly low, and some authors have suggested that the finding of RNMS is not an indication for additional testing [2,4,15]. Davies *et al.* [4] reported no pregnancies when clearance was given to their 151 patients with RNMS in the SSAV. Chawla *et al.* [15] reported a 1% failure rate associated with RNMS, which is not significantly greater than the reported 1 in 2000 late failure rates [16].

Three patients with initial azoospermia at 2 months had evidence of RNMS at 3 months. De Kniff *et al.* [3] hypothesized that the reappearance of nonmotile sperm after vasectomy is caused by the release of nonviable residual sperm in the seminal vesicles and the abdominal portion of the vas deferens.

The present study indicates that significantly many men are not compliant and therefore timing is also very important. We think that if the urologist chooses RNMS as a surrogate for azoospermia, then waiting 3 months adds nothing, whereas if the urologist insists on true azoospermia then they should wait 3 months to avoid substantial repeat testing. As shown in Fig. 2, 65 patients would require re-sampling, whereas only 15 would require re-sampling at 3 months.

We do not use centrifugation as a means to confirm azoospermia (except in one man whose paternity was in question). Despite the possibility that this would identify sperm that are not found in uncentrifuged concurrent semen analyses, we failed to identify one case where it did so in over 50 patients (unpublished). Thus, we abandoned this practice well before the period of the present study. In addition, examining uncentrifuged semen is the approach used by most urologists.

In conclusion, the present results indicate that a significant proportion of men are not compliant with protocols for SSAVs. We think that provided patients have been adequately counselled, one negative semen analysis at 3 months or one with evidence of RNMS at 2 months is adequate to determine that the patient is sterile. This will reduce the number of semen analyses, and the number of men

who must undergo repeat testing, without sacrificing the accuracy of determining paternity. Simplifying the follow-up after vasectomy is important; not only would it be cost-effective but it might also improve patient compliance rates.

CONFLICT OF INTEREST

None declared.

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Abbreviations: SSAV, semen sample after vasectomy; RNMS, rare nonmotile sperm.