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Vasectomy: Efficacy of Placing the Cut Vas in Different Fascial Planes

DONALD B. RHODES, M.D., STEPHEN D. MUMFORD, DR.P.H., AND MICHAEL J. FREE, PH.D.
VAECTOMY: EFFICACY OF PLACING THE CUT VAS IN DIFFERENT FASCIAL PLANES*

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The inadvertent failure to achieve sterility in 8 of 40 vasectomy procedures afforded a rare opportunity to study the efficacy of placing the two cut ends of the vas in different fascial planes. Interposition of the fascia was performed in 12 patients and was not performed in 28 others, with no significant difference in the failure rates of the two groups. Histologic examination of vasal tissue from one patient in each group revealed that a sperm granuloma can erode fascia and the wall of the vas.

Fertil Steril 33:433, 1980

For many years, interposing a fascial plane between the two cut ends of the vas deferens has been advocated as a useful adjunctive procedure to help prevent recanalization after vasectomy. In 1924, based on a study of 30 dogs, Rolnick¹ concluded that the sheath of the vas deferens aided recanalization after vasectomy by acting as a splint promoting and directing the path for epithelization. Thus, it could reasonably be assumed that recanalization could not occur if the sheath of the vas were sealed over one end of the severed vas. For this reason, and because it can be performed with any method of vasal occlusion that includes transection of the vas, this adjunct procedure has been widely adopted.²⁻¹¹

After the ends of the vas are ligated, clipped and/or coagulated, and withdrawn into the sheath of the vas, a fascial plane is interposed between them by suturing the spermatic fascia over one end (usually the distal end), most often with a single suture. Advocates of this procedure claim that it creates an impenetrable wall of fascia, thus preventing spontaneous anastomosis, and that with the sheath blocked regeneration cannot occur.

In a recent article,¹² the experience of several surgeons who routinely interpose the fascia was surveyed. Each had first performed a large number of ligation procedures without interposition of fascia and all had a few recanalizations. Then each surgeon switched to a technique of fulguration and fascial interposition and had no failures in large series. The authors concluded: "Fulguration of the lumen of the cut vas ends was used but was not the significant factor in this zero recanalization rate."

However, there are methodologic defects in this study that prohibit reaching this conclusion. No evidence is cited for concluding that fulguration is not the significant factor. When two changes in technique are made simultaneously, the improvement in the recanalization rate cannot entirely be attributed to one of the changes without justification. Another consideration is that the two groups were not operated upon during the same time interval. The surgeons first performed their vasectomies by ligation without fascial interposition, and their few failures occurred while they gained considerable experience at performing vasectomy.
unsuccessful vas occlusion. It is probable that a proportion of azoospermic men were, in fact, made sterile by spontaneous fibrotic occlusion rather than by surgical occlusion. Interposition of the fascia was performed in 12 of the men but not in the other 28.

RESULTS

Failures occurred in 6 (21.4%) of the 28 patients in whom fascia was not interposed between the two cut ends of the vas. Of these, 4 men had 98 or more sperm/high-power field (HPF) after 35 to 54 ejaculations. The 5th man had 30 sperm/HPF after 73 ejaculations, and the 6th had 55 sperm/HPF after 33 ejaculations.

Among the 12 patients in whom fascia was interposed, there were two (16.7%) failures. In 1 of these, there were 98 or more sperm/HPF after 38 ejaculations, and in the other case, there were 98 or more sperm/HPF after 50 ejaculations. Another patient in this group was lost to follow-up and is

MATERIALS AND METHODS

In all 40 patients in this series, vasectomy was performed through double vertical scrotal incisions. The vasa were separated from their sheaths and transected, but no segment of the vas was removed. The occlusion procedures were identical in all respects for all patients, but it was later discovered that vasal occlusion had not been achieved in at least eight vasa. (Since sperm counts were the only end-point in this study, it was not possible to determine the actual incidence of

FIG. 1. Patient 1. Left vas, 1.5 mm proximal to transection. The vas is relatively normal at this level ( x 175).

FIG. 2. Patient 1. Left vas, 0.2 mm proximal to transection, showing the site of granuloma and epithelium-lined channels external to the muscularis ( x 325).
Patient 1

Patient 1, who did not have fascia interposed during his initial vasectomy, had a repeat vasectomy 23 weeks after the first procedure. Subsequent histologic examination revealed that the initial vasectomy had failed on the left side only. On this side, from the epididymal end toward the ampullary end of the vas, the following sequence was noted (approximate distances proximal or distal to the site of transection are given for each histologic section discussed):

Proximal 4 mm. The transition from normal to abnormal vas occurred abruptly over the space of 0.5 mm. Epithelial lining cells were absent from the original and two cavities appeared in the musculature, one contiguous with the original lumen and one deep in the longitudinal muscle layer. Scarring was evident in the musculature at this level.

The muscle layer was fragmented into separate

considered a potential failure because he had 98 or more sperm/HPF after 6 ejaculations.

If it is assumed that the proportion of nonoccluded vasa was similar in each group, then application of the Fisher's exact probability test indicates no significant difference in the failure rates of the two procedures ($P = 0.5485$). Thus, placing the two cut ends of the vasa in different fascial planes as an integral part of the vasectomy procedure did not reduce the incidence of failure. Even if parity of unoccluded vasa between the two groups was not assumed, it is apparent that fascial separation was no guarantee against failure of vasectomies.

**CASE REPORTS**

To ascertain the fate of the fascial barrier, we made a histologic examination of vasa tissues excised at the time of repeat vasectomy from two patients, one of whom had fascia interposed between the cut ends of the vasa as an adjunct to the vasectomy.

![Figure 3](image1.jpg)

**Fig. 3.** Patient 1. Left vas, 0.2 mm proximal to transection, showing the site of inflammation and epithelium-lined channels in the lamina propria ($\times 325$).

![Figure 4](image2.jpg)

**Fig. 4.** Patient 1. Left vas, 0.2 mm distal to transection. The original lumen has divided into several very small lumina, each surrounded by a single layer of atypical epithelial cells ($\times 175$).
Distal 1.2 mm. A normal lumen appeared again at this level, while the external granuloma became more extensive (Fig. 5).

The external granuloma extended for 14 mm toward the ampulla while becoming progressively less severe. The vas lumen remained normal throughout.

The proximal damage was probably due to handling during excision of the tissue. Since there was no fascial separation between distal and proximal vas segments, the cut ends were probably lying in apposition. New lumina, which had formed through the inflamed areas within the lamina propria, were probably sufficient to connect the proximal and distal lumina of the vas, although additional epithelium-lined lumina were present in the granulomatous tissue outside of the muscular layer.

Patient 2

Patient 2, who had fascia interposed between the cut ends of the vasa during initial vasectomy,

Proximal 1.5 mm. As it progressed farther toward the site of transection, the vas became relatively normal (Fig. 1). No sperm were evident in the lumen.

Proximal 0.7 mm. The vas remained relatively normal, but some sperm nuclei appeared in the muscle layers and whole spermatozoa and mononuclear inflammatory cells were evident in the connective tissue external to the muscle.

Proximal 0.2 mm. The lumen was intact. Sperm granulomas with epithelium-lined channels appeared in the connective tissue external to the muscle layers (Fig. 2), and there was a focus of mononuclear inflammatory cells with epithelium-lined channels in the lamina propria (Fig. 3).

Distal 0.2 mm. The original lumen appeared to divide into approximately 10 very small lumina, each surrounded by a single layer of atypical epithelial cells (Fig. 4). The granulomas were more extensive.

Fig. 5. Patient 1. Left vas, 1.2 mm distal to transection. The normal lumen appeared again at this level while the external granuloma became more extensive (× 70).

Fig. 6. Patient 2. Right vas, 0.8 to 1.0 mm proximal to transection, showing the lumen with hyperplastic epithelium. Foci of granulomatous reaction are present in the junction of the longitudinal and circular muscle (× 175).
and circular muscle. The epithelial lining cells became atypical and hyperplastic (Fig. 6).

**Proximal 0.5 mm.** The lumen diminished in size, the musculature was nearly obliterated by granuloma formation and scar tissue, and some epithelium-lined channels were present (Fig. 7) at first, followed by a large channel that appeared to run to the end of the proximal vas.

The region between the cut vas ends was made up entirely of granulomatous inflammatory cells, although numerous epithelium-lined channels containing sperm were present (Fig. 8).

**Distal 2 mm.** The external granuloma diminished rapidly along the distal vas, but the central granuloma persisted with sperm, lymphocytes, macrophages, and numerous epithelium-lined channels in evidence (Fig. 9). This central reaction diminished generally over the next 2 mm, progressing toward a normal vas. There appeared to be a lumen throughout the distal vas.

The interposed fascia had apparently been eroded away by the granulomatous reaction. Although the cut ends of the vas were much farther apart than those not separated by fascia,

had a repeat vasectomy 16 weeks after the first procedure. Subsequent histologic examination revealed that the initial vasectomy had failed on the right side only. On this side, from the epididymal end toward the ampullary end of the vas, the following sequence was noted:

The transition from normal to abnormal vas was characterized by the appearance and increase in the number of sperm and inflammatory cells in the connective tissue exterior to the muscle layer.

**Proximal 5.5 mm.** A second channel became evident adjacent to the lumen. The inflammatory reaction subsided in the external connective tissue, and the vas became essentially normal with a few spermatozoa in the lumen.

**Proximal 0.8 to 1.0 mm.** Inflammatory reactions reappeared in the external connective tissue, characterized initially by the presence of sperm and mononuclear inflammatory cells and eventually by macrophages and foreign body giant cells. They gradually eroded the outer longitudinal muscle, and foci of granulomatous reaction appeared in the lamina propria and junction of the longitudinal

![Fig. 7. Patient 2. Right vas, 0.5 mm proximal to transection. The lumen has diminished in size and some epithelium-lined channels are present. The musculature is nearly obliterated by granuloma formation and scar tissue; x 70.](image)

![Fig. 8. Patient 2. Right vas at the site of transection. Epithelium-lined channels run through the granuloma; x 350.](image)
there were large channels in the interposing granuloma through which sperm apparently passed.

CONCLUSIONS

A sperm granuloma is apparently capable of eroding fascia and (from the outside in) the muscle wall of the intact vas. Interposing fascia between the cut ends of the vas as an adjunct to vasectomy does not guarantee that vasectomy will not fail and may not improve its chances for success. Furthermore, any circumstance or technique that results in an unoccluded proximal vas (thereby permitting extensive granulomas to form) seems likely to have a higher risk of failure, even if a fascial barrier is interposed or the distal vas end is occluded.

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