

# THE VAS AFTER VASECTOMY: COMPARISON OF CAUTERIZATION METHODS

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**ABSTRACT**—*A histologic study of the vas ends was carried out in 21 patients undergoing vasovasostomy. All had undergone prior vasectomy by the same surgeon, with a technique identical except for the type of cautery used to seal the vas ends. A superior sealing of the vas, as shown by fewer cases of vasitis nodosa and spermatic granuloma, followed use of the thermal cautery ("red-hot wire") than the electrosurgical cautery (23% vs 60.7% suboptimal sealing rate). The thermal cautery is a superior method of sealing the vas at vasectomy.*

Vasectomy is the most common operation in men. In a number of postoperative studies, the ends of the divided vas, secured at the time of vasectomy reversal, have been examined.<sup>1,2</sup> However, in all previous studies, the vasectomies were performed by many different surgeons with a variety of techniques for vasal occlusion. In the present study, we were able to examine specimens removed at vasal anastomosis in patients in whom the original vasectomy had been performed by one surgeon with a technique that differed only in the type of cautery used to seal the vas: a standard electrosurgical unit and a thermal ("red-hot wire") cautery. We then compared the degree of sealing.

Cauterization of the cut ends of the vas has been shown to be the optimal method of sealing at vasectomy.<sup>3</sup> When the vas ends are ligated, in one man in three a symptomatic spermatic granuloma of the vas will develop, and when an electrosurgical cautery is used, in one man in thirty. With a thermal cautery ("red-hot wire"), the incidence drops to less than one in one hundred.<sup>4</sup> Each cautery is used by placing the cautery tip into the lumen of the vas and then turning on the current until the mucosa becomes opaque but the muscularis remains viable.

## Material and Methods

Over a five-year period, 21 patients presented for vasectomy reversal. Each had had a vasectomy performed by one of us (SSS) from one to fourteen years previously. In each case the procedures had been identical except for the method of cauterization. During the reversal surgery, the testicular and urethral ends were excised, marked, and studied histologically by step-section. Fourteen of these 21 patients (or 28 vasa) had had the vas ends cauterized with a standard electrosurgical unit at a setting used to cauterize skin bleeders; the remaining 7 had had a thermal cautery. The presence of either vasitis nodosa or spermatic granuloma indicated a less than optimal sealing of the vasal lumen.

## Results

Of the 28 vasa cauterized with the electrosurgical cautery, 17 (in 14 men) showed either vasitis nodosa or a spermatic granuloma (or both) of the testicular end (60.7% suboptimal rate). Six of the 14 men had bilateral granulomas or vasitis nodosa, and in 4 cases both conditions coexisted in the same vas (Table I). With the thermal cautery, vasitis nodosa or a spermatic granuloma was found in only four of

TABLE I. *The vas ends at vasovasostomy in 21 men who had undergone vasectomy with electro-surgical or thermal cauterization*

	Cauterization	
	Electrosurgical	Thermal
Number of vasa	28	13
Spermatic granulomas (SG)	2	1
Vasitis nodosa (VN)	11	1
Both VN and SG coexisting on the same side	4	1
Total with satisfactory fibrosis of vas end	11	10
Total with VN, SG, or both of vas end	17	3

fourteen vasa. (In one, the granuloma arose from an inadvertent puncture into the lumen proximal to the sealed end; thus, this was excluded from the calculation, resulting in a 23% suboptimal rate.) In all other vasa, the lumen of the testicular end was filled with a solid fibrous plug, and in all patients the urethral end of the vas was similarly well sealed. Recanalization did not occur in any patient.

#### Comment

Every patient who requests a vasectomy of the senior author (SSS) is told that a reversal can be attempted if his circumstances change, but only one man in one hundred undergoes a reversal. Consequently, cases for this study have accumulated slowly. Because of its superior clinical results, the thermal cautery has been used exclusively during the past eight years. Clinical experience supports the histologic findings that granulomas are less common with the thermal cautery.

Twenty-five years ago failure of vasectomy after ligation of the vas ends with its consequent high incidence of spermatic granulomas was reported.<sup>5</sup> Ligation often leads to sloughing of the ends distal to the ligature, leaving the lumina open and permitting sperm to leak into the tissues. This results in either a granuloma or, when accompanied by mucosal regeneration, recanalization and operative failure. Most granulomas are silent; but when nerves are present in the wall of the granuloma, severe pain can result.<sup>6,7</sup>

With the demonstration that ligatures often failed to seal the vas and occasionally led to spontaneous recanalization, cauterization was tried. Just as a third-degree burn of the skin leads to scarring, destruction of the mucosa by

cautery should lead to filling and obstruction of the vasal lumen with scar tissue. As this fibrous tissue originates from the muscularis of the vas, the cauterization should be limited, leaving the muscularis viable.

Both vasitis nodosa and spermatic granulomas of the vas ends result from inadequate sealing. Each occurs only on the testicular end. After vasectomy the lumen of the epididymal tubule and vas dilates from a build up of pressure caused by a continuation of spermatogenesis in the face of obstruction to the flow of sperm. Both conditions follow a path of least resistance and thus should be prevented by a firm scarring of the cut end of the vas. A spermatic granuloma is a "blowout" from the testicular end. It has an inflammatory lining and is filled with a mixture of sperm, red and white blood cells, lymphocytes, giant cells, and epithelioid cells. It closely resembles a tuberculous granuloma. It usually occurs shortly after the vasectomy and varies from a single cystic granuloma to multiple small granulomas. Once formed, it is limited in extent by its inflammatory wall, although fistulas to the skin can be seen rarely.

Vasitis nodosa is a silent condition wherein blind channels lined with epithelium arise from the vasal lumen. It also can be found soon after vasectomy and is a predecessor to spontaneous recanalization. Either vasitis nodosa or spermatic granuloma of the vas may exist independently. Sperm is sometimes found in the channels of vasitis nodosa, and in four of the vasa after electro-surgical cauterization the channels ended in small granulomas.<sup>1,5</sup> Vasitis nodosa appears to be an attempt by the body to restore the continuity of the vas, and the channels are sometimes seen penetrating what appears to be a good fibrous plug. We are unable to say whether the channel precedes the fibrosis or if it penetrates it secondarily, but the existence of solid fibrosis in many of these cases points toward the former. The thermal cautery lessens the incidence of both granuloma and vasitis nodosa by creating a superior obstruction of the vasal lumen.

The electro-surgical cautery is a tool familiar to the surgeon, and it was natural to use it first. The intensity of its current varies with the area in contact with the tissue, and a spark jumping from the tip of a needle has a high intensity. However, when the needle tip is enclosed in tissue this same intensity is spread over a greater surface and, thus, far less current per unit of

surface is delivered. This, then, may account for its being less effective.

The loop of wire of the thermal cautery becomes red hot over its entire length and destroys the tissue it touches. In addition, it creates boiling tissue juices that destroy the remainder of the mucosal circumference.

As a practical matter the electrosurgical cautery requires a power source similar to household current, a source that might be unavailable in remote locations. The thermal cautery is battery-powered and thus can be used anywhere. Since the thermal cautery is far more effective, it should become the standard for sealing the vas.

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