Microscopic evaluation of the vasal fluid for sperm at the time of vasectomy reversal: Do we really need to check?

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Abstract

Introduction: During vasectomy reversal, intraoperative microscopic evaluation of the vasal fluid for sperm presence/quality can inform of the possibility of epididymal obstruction and need for a vasoepididymostomy (VE). In an effort to validate the utility of microscopic vasal fluid evaluation, the current initiative correlates gross vasal fluid characteristics with sperm presence and quality in a large series of VRs.

Methods: A total of 1267 vasectomy reversals yielded a total of 2522 vasal-units (right/left sides) for analysis. During vasectomy reversal, vasal fluid was sampled from the testicular-end vas and the fluid was characterized (thick-paste/opaque/translucent/clear). Each aspirate underwent microscopic evaluation for sperm quality and was categorized as: motile sperm/intact-non-motile sperm/sperm parts/no sperm. The predictive utility of the gross vasal fluid characteristics with respect to microscopic sperm presence and quality was analyzed.

Results: Among the 2522 vasal units analyzed, the side-to-side (left-right) concordance of vasal fluid quality and microscopic vasal sperm quality was 72% and 52%, respectively. When thick-pasty fluid was observed, no sperm were seen in the samples in 53% of cases, and if present, only non-motile sperm were observed. Even in the setting of more favorable vasal fluid characteristics (clear, translucent, and opaque fluid), no sperm were seen in 6–11% of cases, suggesting the possibility of epididymal obstruction and the need for VE.

Conclusions: Intraoperative microscopic evaluation of the vasal fluid for sperm is a necessary practice during vasectomy reversal to optimize surgical outcomes. Reliance on gross vasal fluid characteristics in isolation may lead to unrecognized epididymal obstruction, and the need for a VE, in approximately 11% of cases.

Introduction

Vasectomy reversal is performed in approximately 5% of men who have previously elected for vasectomy.[1] At the time of vasectomy reversal, each surgeon makes a determination as to the most appropriate method of anastomostic reconstruction — vasovasostomy (VV), or if epididymal obstruction is suspected, vasoepididymostomy (VE).[2] It is well-accepted that the occlusive nature of the vasectomy can cause back pressure on the epididymis and may lead to a secondary epididymal obstruction or epididymal dysfunction.[3] Appreciating that the incidence of secondary epididymal obstruction following a vasectomy increases with longer vasal occlusion intervals (length of time from the vasectomy to vasectomy reversal), the vasal occlusion interval alone is not diagnostic of epididymal obstruction in any particular patient.[1,4] During vasectomy reversal, intraoperative, microscopic evaluation of the vasal fluid for sperm presence and quality can inform as to the likelihood of epididymal obstruction and need for a vasoepididymostomy.[4,5]

Thick, pasty, or minimal vasal fluid that is devoid of sperm are features suggestive of epididymal obstruction and should prompt a surgeon to consider vasoepididymostomy.[4,5] Moreover, both patency (sperm presence in the semen) and pregnancy rates following vasectomy reversal are influenced by the quality of sperm in the vasal fluid at the time of reversal.[1,6] Despite its potential utility, the practice of intraoperative, microscopic vas fluid evaluation is not universal among "reproductive" surgeons. Some centers may not have intraoperative bench microscopy available. Some surgeons may only offer patients a VV (not VE) and therefore are not influenced by vasal fluid characteristics or alternatively feel that the gross vasal fluid quality alone can predict epididymal obstruction and the need for a vasoepididymostomy.[4]

In an effort to validate the utility of intraoperative microscopic vasal fluid evaluation, the current initiative correlates the predictive validity of vasal fluid characteristics with sperm presence and quality in a large, contemporary series of vasectomy reversals.

Methods

This study received research ethics board approval for infertility research at Mount Sinai & Women's College Hospital at the University of Toronto. A prospective patient data series of vasectomy reversal surgeries performed by a single surgeon

(EG) from 2007–2017 was analyzed. During this time period, 1255 bilateral and 12 unilateral vasectomy reversals were identified and yielded a total of 2522 vasal units (right and/or left sides) for analysis.

The approach to vasectomy reversal and surgical technique has been described previously.[7] During vasectomy reversal, vasal fluid was manually expressed and sampled from the freshly transected testicular-end vas and the vasal fluid quality was characterized (thick-paste/opaque/translucent/clear). The vasal fluid volume was documented as copious/minimal. Immediately following vasal fluid aspiration, each sample underwent intraoperative bench microscopic evaluation at 200 power to determine sperm presence (yes/no) and vasal sperm quality — categorized as motile sperm/intact non-motile sperm/sperm parts (sperm heads or tails)/no sperm (American Society for Reproductive Medicine [ASRM] guidelines).[4] In all cases, vasal fluid quality and microscopic sperm characteristics were determined by an experienced, fellowship-trained male reproductive surgeon (EG). The predictive utility of the gross vasal fluid characteristics in relation to microscopic sperm presence and sperm quality represented the primary analysis of this study.

Results

Among the 2522 vasal units analyzed, VV and VE was performed in 87% and 13% of cases, respectively. Mean patient age was 40 years (range 24–70 years) and mean vasal occlusive interval 7.9 years (range 3 months–33 years). The side-to-side (right-left) concordance of the gross vasal fluid quality was 72%. The side-to-side (right-left) concordance of the microscopic vasal sperm characteristics was 52%. Collectively, such discordance highlights the importance of independent interpretation of the gross and microscopic vasal fluid characteristics of each side or vasal unit.

Table 1 summarizes the relationship between the gross vasal fluid quality and the microscopic presence of sperm and vasal sperm quality within the vas fluid among 2522 vasal units analyzed.

In summary, when thick-paste like vasal fluid was observed, no sperm were seen in these samples in 53% of cases, and if sperm were present, only non-motile sperm were observed, signaling the possibility of epididymal obstruction/dysfunction. Importantly, even in the setting of more favorable vasal fluid quality (clear, translucent, and opaque, non-pasty fluid), no sperm were seen in 7–11% of cases, suggesting the possibility of epididymal obstruction and the consideration for a vasoepididymostomy.

Among the entire series, the postoperative patency rate (motile sperm in ejaculate) was 94% and the mean total motile sperm count (TMC) was 23.4 million sperm.

Table 1. Intraoperative microscopic sperm presence and vasal sperm quality stratified by gross vasal fluid quality

	No sperm	Sperm parts	Non-motile intact sperm	Motile sperm
Thick-paste	53% (62)	39% (57)	8% (31)	0%
Opaque	11% (90)	60% (368)	23% (166)	6% (63)
Translucent	6% (75)	32% (239)	42% (329)	20% (180)
Clear	7% (84)	21% (178)	50% (415)	22% (185)

(#) represents the number of vasal units in each category.

Discussion

The current study was initiated to validate the utility of intraoperative microscopic vasal fluid analysis during vasectomy reversal. Specifically, investigators sought to correlate the predictive nature of the gross vasal fluid characteristics with microscopic sperm presence and sperm quality within a large series of vasectomy reversals.

We found that examination of the gross vasal fluid quality in isolation does not reliably predict sperm presence and sperm quality upon intraoperative microscopic evaluation of the vasal fluid. Consequently, reliance on the gross vasal fluid characteristics in isolation limits the surgeon's ability to identify the presence of epididymal obstruction and the possible need for vasoepididymostomy.

With reference to intraoperative microscopic vasal fluid analysis at the time of vasectomy reversal, contemporary guidelines (ASRM) generally recommend that a VE be performed if no sperm are identified in the aspirate within the vasal fluid from the testicular end,[4] with a noted exception being the absence of sperm within clear and copious vasal fluid. Thick, pasty-like fluid is generally consistent with epididymal obstruction.[1,4] Application of the ASRM guidelines to the data from the current analysis would suggests that in up to 11% of cases, a surgeon would misidentify epididymal obstruction and the need for a VE if relying solely on more favorable (clear, translucent, opaque) gross vasal fluid characteristics alone to determine the need for VV or VE. Conversely, in cases where thick, paste-like vasal fluid was documented, elements of sperm (sperm parts or intact non-motile sperm) were identified in 47% of cases, justifying the consideration of a VV.

Collectively, these results highlight the fact that optimal surgical decision-making and the standard of care is best achieved when both the gross vasal fluid characteristic and the microscopic vasal fluid evaluation for sperm presence and quality are used together to determine the need for VV or VE during vasectomy reversal.[8]

Consistent with the findings of the current analysis, Chawla et al reported that approximately 48% of vasectomy reversal failures could be attributed to unrecognized epididymal obstruction during the original vasectomy reversal surgery.[9] Consequently, study investigators recommend that all surgeons offering vasectomy reversals be able to offer VE if

required based on intraoperative findings to serve the patient optimally, as well as his partner and their future fertility.[9]

With respect to limitations of the current study, the authors acknowledge that variability exists among surgeons with respect to interpretation of both gross and microscopic vasal fluid characteristics and technical proficiency and confidence in performing VV or VE. Additionally, while published guidelines are available, absolute categorization of vasal fluid and sperm quality lacks universal standardization and it is acknowledged that vasal fluid and sperm quality are not absolutely diagnostic of epididymal patency or obstruction.[4] The current investigation was based on the interpretations of a single, high-volume reproductive microsurgeon who adopted generally accepted, published standards for vasal fluid interpretation during vasectomy reversal as a basis for suspecting epididymal obstruction.[4] Finally, despite the large number of vasal units analyzed as part of this investigation, side-to-side discordance makes it challenging to isolate the impact of vasal fluid and microscopic sperm quality on postoperative outcomes (patency, semen quality).

Conclusions

Intraoperative microscopic evaluation of the vasal fluid for sperm is a necessary practice during vasectomy reversal to optimize surgical outcomes. The gross characteristics of the vasal fluid alone does not universally predict sperm presence and sperm quality. Reliance on gross vasal fluid characteristics in isolation, without intraoperative microscopic sperm analysis, may lead to unrecognized epididymal obstruction and the possible need for a VE in approximately 10% of cases of vasectomy reversal.

Competing interests: Dr. Grober has received research and educational support from Boston Scientific; is an investor in MHB Labs; and has been a speaker and consultant for Paladin Labs. Dr. Tobe does not report any competing personal or financial interests related to this work.

This paper has been peer-reviewed.

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