Outcomes of Microsurgical Vasovasostomy for Vasectomy Reversal: A Meta-analysis and Systematic Review

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OBJECTIVE To perform a systematic review and meta-analysis of the published literature evaluating vasovasostomy for vasectomy reversal outcomes.

METHODS We conducted a review of English language articles describing results of microscopic vasovasostomy for vasectomy reversal. Two reviewers independently examined the studies for eligibility and evaluated data from each study. Meta-analysis was performed using a random effects model.

RESULTS Thirty-one studies with 6633 patients met inclusion criteria. Mean patient age at time of vasectomy reversal was 38.9 years with a mean obstructive interval of 7.2 years. The mean postprocedure patency and pregnancy rates weighted by sample size were 89.4% and 73.0%, respectively. A meta-analysis comparing an obstructive interval (OI) of <10 years to an OI of at least 10 years duration produced a pooled incidence ratios (IR; meta-IR) of 1.17 (95% confidence interval [CI], 1.09-1.25) for patency and 1.24 (95% CI, 1.12-1.38) for pregnancy. Incidence of patency for modified 1-layer technique was similar to that after a 2-layer procedure with a meta-IR of 1.04 (95% CI, 1.00-1.08). Because of a small number of relevant studies, a meta-analysis for other predictors of success such as sperm granuloma, quality of vasal fluid, and female factors was not feasible.

CONCLUSION We found no statistically significant difference in vasovasostomy outcomes when comparing the impact of single vs multilayer anastomoses. Patients with an OI <10 years showed higher patency and pregnancy rates compared with those with an OI ≥10 years. Uniform definitions of patency are necessary to characterize success and standardize outcome reporting. UROLOGY 85: 819–825, 2015. © 2015 Elsevier Inc.

It is estimated that 175,000-354,000 vasectomies are performed in the United States each year,[1] but up to 6% of patients who undergo vasectomy ultimately request a reversal procedure for a variety of reasons.[2] Silber and Owen concurrently introduced the microsurgical vasovasostomy in 1977 and initiated the era of microsurgical vasectomy reversal.[3,4]

The most comprehensive study on vasectomy reversal was published in 1991 by the Vasovasostomy Study Group (VVSG), which aimed to define outcomes of the procedure based on a multisurgeon multicenter experience.[5] The VVSG study found a decreased likelihood of patency with increasing obstructive interval (OI). No difference in patency was found comparing modified 1 vs 2 layers of the anastomosis.[5] Another factor that appeared to influence pregnancy rates was the character of the vasal fluid present at the time of reversal. Even today, most reproductive surgeons quote success rates based on data from this 1991 landmark study.

Since 1991, numerous additional studies have been conducted. These more recent studies examined varying techniques, operative approaches, and used different definitions of success. It is widely believed that recent technical advancements have improved outcomes of vasectomy reversal; however, current data have not been reviewed systematically. Notably, studies evaluating more modern approaches generally tended to be small, retrospective, and based on data from a single-institution.

In the era of improving in vitro fertility (IVF) with intracytoplasmic sperm injection (ICSI) outcomes, it is increasingly important that we critically evaluate vasectomy reversal results so that patients can be appropriately counseled regarding their reproductive care choices (vasectomy reversal vs sperm retrieval with IVF-ICSI). Although the decision to undergo treatment is based on a variety of factors including the number of children desired, maternal age, reproductive history, and cost, it is

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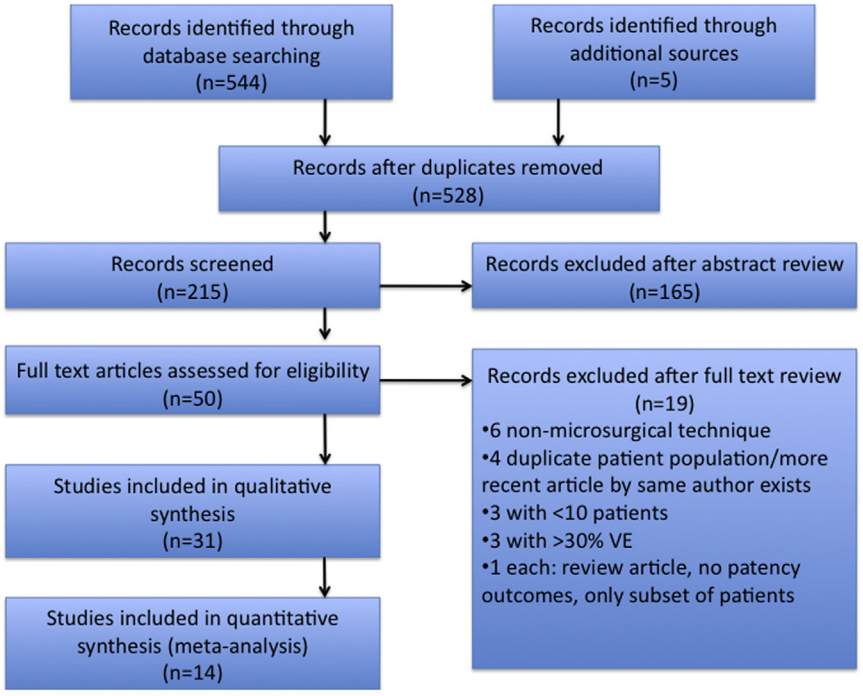

Figure 1. Flowchart of included studies. VE, vasoepididymostomy. (Color version available online.)

also influenced by the chance of patency and pregnancy after vasectomy reversal.

Given the lack of a single modern definitive study, the purpose of the current communication is to systematically review the current literature on vasovasostomy for vasectomy reversal. We performed a systematic review and meta-analysis of the published literature to describe frequency and predictors of patency and pregnancy after vasovasostomy in an effort to provide up-to-date information.

METHODS

Search Strategy

A review of English language articles reporting the outcomes of microscopic vasovasostomy for vasectomy reversal was conducted using PubMed and Web of Science electronic databases. The search terms included "vasectomy reversal" and "vasovasostomy." Exclusionary terms included "vasoepididymostomy," "orchitis," and "orchalgia." The study was limited to human studies only. Reference lists of articles identified via the electronic search were checked for any additional relevant studies. Once studies were selected based on abstract information, the full-text articles were retrieved. The search was conducted through May 2014.

Inclusion and Exclusion Criteria

Studies were considered eligible for inclusion if they described outcomes of microscopic vasectomy reversal and had >10 study participants. We limited our analysis to studies of vasovasostomy performed for vasectomy reversal. Studies of patients who underwent vasoepididymostomy (VE) or vasovasostomy for other reasons such as history of epididymitis, history of trauma, history of hernia repair, or idiopathic obstruction were excluded. When multiple overlapping publications on the same patients from the same institution were found, only the latest study was included. Studies with >30% of patients receiving a VE were excluded. We chose to eliminate studies with a large portion of VE in an effort to homogenize in preparation for meta-analysis. A flowchart depicting record acquisition, inclusions, and exclusions is shown in Figure 1.

Data Extraction

Two reviewers independently examined the studies for eligibility and performed data extraction. Any disagreements between the 2 reviewers were discussed and resolved by consensus. The study parameters summarized for the purposes of the present review included sample size, patient demographic characteristics, interval to reversal, mean follow-up duration, vasovasostomy technique (number of anastomotic layers), percent of patency, definition of patency, percent pregnancy, and presence of sperm granuloma. A modified 1-layer technique was considered as a 1-layer anastomosis.

Meta-analysis

Whenever possible, meta-analysis was performed to calculate a pooled or metaincidence ratios (meta-IR), which provides an overall estimated effect size for the combined studies, and the corresponding 95% confidence intervals (CIs) using random effects models. Heterogeneity of study results was assessed by calculating an I^2 statistic and by performing a Q test.[6] Statistical significance was defined as 2-sided alpha error <.05. All analyses were performed using OpenEpi.com,[7] Episheet,[8] Stata (StataCorp LP, College Station, TX), or MIX 2.0 Pro (BiostatXL).[9]

RESULTS

Overview of Studies

Thirty-one studies (sample size range, 12-3904) met the criteria for inclusion in the systematic review (Table 1). Years of publication spanned a 35-year