

Fertility Restoration After Vasectomy: AUA Guideline (2026) Part II

Peter N. Schlegel¹, Joseph Y. Clark,² R. Matthew Coward,³ Steven J. Hirshberg,⁴ Stanton Honig,⁵ Wayland Hsiao,⁶ Erin Kirkby,⁷ Michel Labrecque,⁸ Richard Lee,⁹ Jonathan Stack,¹⁰ Cigdem Tanrikut,¹¹ Peter Tiffany,¹² Jonathan R. Treadwell,¹³ Sarah C. Vij,¹⁴ and Akanksha Mehta¹⁵

¹New York Mens Health Medical, PLLC, New York, New York

²Department of Urology, Penn State Health Milton S. Hershey Medical Center, Hershey, Pennsylvania

³Atlantic Fertility, Raleigh, North Carolina

⁴MidLantic Urology, Abington, Pennsylvania

⁵Department of Urology, Yale School of Medicine, New Haven, Connecticut

⁶Department of Urology, The Permanente Medical Group, Oakland, California

⁷American Urological Association, Guidelines, Linthicum, Maryland

⁸Family Medicine and Emergency Medicine, Laval University, Quebec City, Quebec, Canada

⁹Department of Urology, Weill Cornell Medicine, New York, New York

¹⁰World Vasectomy Day, New York, New York

¹¹Shady Grove Fertility, Georgetown University School of Medicine, Washington, District of Columbia

¹²Lahey Clinic, Burlington, Massachusetts

¹³ECRI—Penn Evidence-based Practice Center, ECRI, Willow Grove, Pennsylvania

¹⁴Surgery and Perioperative Care, University of Texas at Austin Dell Medical School, Austin, Texas

¹⁵Department of Urology, Emory University School of Medicine, Atlanta, Georgia

Abbreviations and Acronyms

ICSI = intracytoplasmic sperm
injection

IVF = in vitro fertilization

Purpose: This Guideline aims to provide a contemporary overview of options for future fertility following vasectomy. See Part I of this series for information on indications for vasectomy, pre-operative counseling and preparation, peri-operative considerations, procedural techniques, potential risks and complications, and post-operative care.

Materials and Methods: A comprehensive search of the literature was performed and covered articles published between January 1, 1990 and January 30, 2024. Relevant study designs included randomized controlled trials, controlled clinical trials, and observational studies (cohort with and without comparison group, case-control). Systematic reviews were searched for as an additional resource to identify any relevant studies with the designs noted above that may not have been captured in the literature search.

Results: The Panel developed evidence- and consensus-based statements based on a comprehensive systematic review of the literature. Recommendations for restoration of fertility following vasectomy are detailed herein.

Conclusions: While this Guideline provides a summary of the current evidence related to vasectomy reversal and other fertility options after vasectomy, future review will be required as knowledge in this space continues to evolve. The unabridged version of this Guideline is available at auanet.org.

Key Words: vasectomy, sterilization, reproductive, vasovasostomy, guideline

Vasectomy is considered a permanent form of contraception. However, it is understood that some men who

have had a vasectomy will request vasectomy reversal. In addition to requests for vasectomy reversal, it is

well recognized that many men will also undergo procedures for sperm retrieval for use in assisted reproduction. The total proportion of men who have had a vasectomy that will want to have fertility restored is not reliably available. As part of the AUA's Vasectomy Guideline process, both the procedure of vasectomy as well as fertility restoration after vasectomy were reviewed. Herein the Panel reviews considerations for fertility after vasectomy. Although vasectomy produces obstruction of the male reproductive tract, sperm production is routinely preserved after vasectomy, so fertility potential is reliably possible. As time after vasectomy progresses, there is an increased risk of developing a second obstruction in the epididymal region of the male reproductive tract on 1 or both sides. Since surgical bypass of epididymal obstruction is technically more challenging and less successful than that from vasal obstruction alone, the development of epididymal obstruction must be considered for men interested in fertility after vasectomy. Constructed guideline statements (sequentially numbered from Part I) are provided below.

GUIDELINE STATEMENTS

Fertility Restoration After Vasectomy

21. Clinicians should inform patients who desire restoration of fertility after vasectomy that surgical reconstruction or surgical sperm retrieval with intracytoplasmic sperm injection (ICSI) are both options. Counseling should be provided to couples based on their clinical presentation to support shared decision-making regarding options for family building. (*Expert Opinion*)

Options for family building after vasectomy include vasectomy reversal and surgical sperm extraction for use with in vitro fertilization (IVF) with ICSI, as well as adoption and use of donor sperm. Since IVF for male factor requires ICSI, we will refer to this intervention as ICSI for the purpose of simplicity. The interventional options are not always successful, and they may be expensive. Given that the primary predictive factor of conception is female partner age, this, along with any other female factor pathology, number of children desired, and economic factors should be

Submitted November 13, 2025; accepted November 19, 2025; published December 9, 2025.

The complete unabridged version of the guideline is available at auanet.org/VasectomyGuideline2026

This document is being printed as submitted, independent of standard editorial or peer review by the editors of *The Journal of Urology*®.

Funding/Support: This study was supported by the American Urological Association.

Conflict of Interest Disclosures: All panel members completed COI disclosures. Disclosures listed include both topic- and non-topic related relationships. Panel members not listed below have nothing to disclose. Consultant/Advisor: Dr Honig, Endo, Coloplast, HIMS, Winfertility, Infertility, Haleon, Tolmar; Labrecque, Signati Medical, Next Life Sciences; Dr Schlegel, Theralogix, Roman Health, Posterity Health, Igxos, ReproNovo, Xenetic Biosciences; Dr Tanrikut, PSFertility; Dr Vij, Swiss Precision Diagnostics, Marius Pharmaceuticals. Scientific Study or Trial: Dr Lee, Bill and Melinda Gates Foundation. Investment Interest: Dr Honig, Fellow, Posterity Health; Dr Lee, Pfizer, Merck, Johnson and Johnson; Dr Schlegel, Doveras; Tiffany, United Medical Systems. Health Publishing: Dr Tanrikut, F&S Reviews. Leadership Position: Dr Clark, Society of Government Service Urologists; Dr Coward, Maximus; Labrecque, VasectoPro; Stack, World Vasectomy Day. Other: Labrecque, Laval University; Dr Schlegel, general medico-legal review; New York Mens Health Medical; Dr Tanrikut, New England Cryogenic Center.

Ethics Statement: In lieu of a formal ethics committee, the principles of the Helsinki Declaration were followed.

Author Contributions:

Conception and design: Mehta, Tanrikut, Kirkby, Schlegel, Coward, Hsiao.

Data analysis and interpretation: Mehta, Tanrikut, Treadwell, Clark, Labrecque, Schlegel, Coward, Hirshberg, Hsiao.

Data acquisition: Mehta, Treadwell, Hsiao.

Critical revision of the manuscript for scientific and factual content: Mehta, Tanrikut, Kirkby, Treadwell, Labrecque, Schlegel, Coward, Hsiao.

Drafting the manuscript: Mehta, Tanrikut, Clark, Schlegel, Coward, Hirshberg, Hsiao.

Supervision: Mehta, Kirkby, Treadwell, Clark, Schlegel, Coward, Hirshberg.

Statistical analysis: Treadwell, Hsiao.

Review of data: Tanrikut.

Revision of statistical analysis: Labrecque.

Disclaimer: This document was written by the Vasectomy Panel of the American Urological Association Education and Research, Inc, which was created in 2023. The PGC of the AUA selected the Panel Chair. Panel members were selected by the Panel and PGC Chair following an open application process. Membership of the Panel included specialists in urology with specific expertise on this disorder. The mission of the Panel was to develop recommendations that are analysis based or consensus based, depending on Panel processes and available data, for optimal clinical practices in vasectomy. Funding of the panel was provided by the AUA. Panel members received no remuneration for their work. Each member of the Panel provides an ongoing conflict of interest disclosure to the AUA, and the Panel Chair, with the support of AUA Guidelines staff and the PGC, reviews all disclosures and addresses any potential conflicts per AUA's Principles, Policies and Procedures for Managing Conflicts of Interest. While this guideline does not necessarily establish the standard of care, AUA seeks to recommend and to encourage compliance by practitioners with current best practices related to the condition being treated. As medical knowledge expands and technology advances, the guidelines will change. Today these evidence-based guidelines statements represent not absolute mandates but provisional proposals for treatment under the specific conditions described in each document. For all these reasons, the guidelines do not pre-empt physician judgment in individual cases. Treating physicians must take into account variations in resources, and patient tolerances, needs, and preferences. Conformance with any clinical guideline does not guarantee a successful outcome. The guideline text may include information or recommendations about certain drug uses ("off label") that are not approved by the Food and Drug Administration (FDA), or about medications or substances not subject to the FDA approval process. AUA urges strict compliance with all government regulations and protocols for prescription and use of these substances. The physician is encouraged to carefully follow all available prescribing information about indications, contraindications, precautions and warnings. These guidelines and best practice statements are not intended to provide legal advice about use and misuse of these substances. Although guidelines are intended to encourage best practices and potentially encompass available technologies with sufficient data as of close of the literature review, they are necessarily time-limited. Guidelines cannot include evaluation of all data on emerging technologies or management, including those that are FDA-approved, which may immediately come to represent accepted clinical practices. For this reason, the AUA does not regard technologies or management which are too new to be addressed by this guideline as necessarily experimental or investigational.

Corresponding Author: Peter N. Schlegel, MD, New York Mens Health Medical, PLLC, 983 Park Ave, 1C, New York, NY 10028 (nymenshealth@gmail.com).

considered when counseling patients regarding options for fertility after vasectomy. A detailed review of these options, optimization of sperm production after standard evaluation, and other considerations for post-vasectomy fertility are discussed in the Diagnosis and Treatment of Infertility in Men: AUA/ASRM Guideline.¹ This prior Infertility Guideline also addresses improving sperm production in men who are currently or were previously taking testosterone or other androgenic steroids.

Limited comparative data exist evaluating outcomes of vasectomy reversal vs other post-vasectomy fertility treatments. Valerie et al² compared results of vasectomy reversal to post-vasectomy surgical sperm retrieval and ICSI. Mean age of male patients was 35.5 years at the time of initial vasectomy, then 44.4 (± 6.7) and 45.6 (± 7.7) years at the time of the study intervention for re-anastomosis and ICSI, respectively. No statistically significant differences were found between the 2 groups in partner characteristics, such as age and parity. Overall, 99 patients underwent surgical reconstruction, and 64 couples pursued primary sperm extraction and ICSI. Among the 99 patients who underwent surgical reconstruction, 45 chose this option as the primary intervention, while 54 had vasectomy reversal and then requested ICSI (50 couples) or intrauterine insemination (4 couples, of whom 2 subsequently also proceeded to ICSI).

The cumulative delivery rates among the groups were as follows:

- Primary re-anastomosis: 40% (18/45) vs primary ICSI: 44% (28/64).
- Re-anastomosis combined with ICSI: 57% (31/54) vs primary ICSI: 44% (28/64).
- Overall re-anastomosis: 50% (49/99) vs primary ICSI: 44% (28/64).

None of these comparisons showed statistical significance, but the study may not have had sufficient statistical power to demonstrate clinically relevant differences. Time to achieve pregnancy was not evaluated in this study. In theory, ICSI may allow an earlier chance of pregnancy than vasectomy reversal. Ability to have a second child after intervention was also not assessed in this comparative study that may be more likely after vasectomy reversal.

22. Surgeons should inform patients considering vasectomy reversal that duration of the obstructive interval, patient age, and female partner age are the best preoperative predictors of post-operative reversal success. (Moderate Recommendation; Evidence Level: Grade C)

The preoperative factors that predict vasectomy reversal success include patient age, duration of obstructive interval, and female partner age.

The age of the patient undergoing vasectomy reversal is associated with surgical success rates. Older patient age, particularly over 40 years, is associated with lower chances of success, as it relates to pregnancy outcomes.³⁻⁵ Older patient age is independently associated with older age of the female partner, which, in turn, has a dramatic effect on natural pregnancy, as well as success of ICSI.^{3,5} Age-related declines in sperm quality and testicular function may also contribute to this finding. Lastly, patient age may be a proxy for obstructive interval, with longer interval adversely affecting surgical outcomes of patency and pregnancy.

The length of time since the vasectomy, known as the obstructive interval, is an important preoperative predictor of vasectomy reversal success. While there is no discrete cutoff for years of obstructive interval that adversely affects outcome, studies suggest that longer intervals between the vasectomy and the vasectomy reversal procedure are associated with reduced likelihood of success in terms of patency and pregnancy rates.⁶⁻⁸ As the duration of obstruction increases, the need for vas-epididymostomy to provide successful reconstruction also increases, resulting in a lower chance of patency and pregnancy when compared to vasovasostomy.⁶⁻⁹

Female partner age may significantly impact pregnancy success after vasectomy reversal.^{3,7,10,11} Female fertility declines with age; therefore, pregnancy rates post-reversal decrease as the partner ages. Assisted reproductive technology results are also adversely affected by female age, but this treatment may be necessary to achieve pregnancy for older female partners.^{8,11}

Other preoperative factors that have been evaluated and not found to be predictive of success are male FSH (follicle-stimulating hormone) levels,^{12,13} testicular volume,^{13,14} and the presence of preoperative antisperm antibodies.¹⁵

In summary, the best predictors of success for vasectomy reversal are the duration of obstruction, the age of the patient, and the age of the partner, with longer obstructive intervals and older age being associated with decreased success rates. Despite these trends, there is no absolute time frame or age cutoff that precludes success. Individual patients should be counseled regarding the success rates of both vasectomy reversal and assisted reproduction.

23. Surgeons should evaluate vasal fluid microscopically at the time of vasectomy reversal as the presence of sperm at the site of planned reconstruction is the best intraoperative predictor of patency after vasectomy reversal. (Strong Recommendation; Evidence Level: Grade B)

Intraoperative gross and microscopic vasal fluid evaluation is useful in aiding decision-making during

attempted vasectomy reversal regarding whether to perform vasovasostomy or vasoepididymostomy.

The use of a bench microscope to microscopically evaluate the presence of sperm in the vasal fluid from the testicular end of that vas deferens is highly recommended during vasectomy reversal. The presence of sperm in the vasal fluid is the best intraoperative predictor of vasectomy reversal success.^{6,8,16} If sperm are not seen initially on microscopic examination, additional samples from the vas deferens should be evaluated looking for sperm or sperm parts. The presence of clear copious fluid from the testicular end of the vas deferens should also prompt the surgeon to perform a vasovasostomy, even if no sperm are seen.

If no sperm are found in the vasal fluid, and there is lack of clear copious fluid emanating from the testicular end of the vas deferens, then the surgeon should perform vasoepididymostomy.

Gross vasal fluid appearance^{9,11,12,17}; gross epididymal fluid volume, color and consistency¹⁸; location of prior vasectomy⁵; and type of anesthesia⁹ used during the procedure are not predictive of patency or pregnancy outcomes, though studies are limited. Vasoepididymostomy should be performed at a level of the epididymis with intraluminal sperm present.

24. Surgeons should perform a microsurgical vasovasostomy using a modified one-layer or a two-layer anastomosis based on surgeon preference. (Moderate Recommendation; Evidence Level: Grade C)

Several techniques for vasovasostomy have been described. These include 2-layer and modified 1-layer microsurgical approaches, 2-layer and 1-layer macro-surgical or loupe-assisted approaches, and robotic-assisted approaches. The 1-layer approach involves using multiple interrupted permanent sutures full-thickness through the adventitial, muscular and mucosal layers of the vas deferens in an evenly distributed circumferential manner. The modified 1-layer approach involves the same steps described for the 1-layer approach with the addition of multiple adventitial interrupted sutures in the gaps between the full-thickness sutures. The 2-layer approach involves the placement of evenly distributed mucosal sutures followed by muscular circumferential sutures in 2 separate layers. These approaches can be performed with the assistance of the surgical microscope, surgical loupes, or robotic surgical systems.

When comparing surgical approaches for vasovasostomy, effectiveness can be defined by patency and/or pregnancy rates. The largest study to date demonstrating patency and pregnancy rates using the microsurgical approach was published in 1992.⁹ The authors demonstrated high patency and pregnancy rates for microsurgical vasectomy reversal (Table). Studies comparing surgical technique and

magnification are limited by small comparative populations and biases.¹⁹⁻²⁴ Despite these limitations, published data do not prove that the surgical technique and the use of microscopic assistance affect patency or pregnancy rate. The Panel favors the microsurgical approach given that there are more substantial data supporting successful vasectomy reversal with this approach.

25. Surgeons offering vasectomy reversal should have microsurgical expertise to provide vasoepididymostomy as well as vasovasostomy. (Expert Opinion)

Vasectomy reversal mandates an intra-operative decision regarding the type of reconstruction (vasovasostomy vs vasoepididymostomy) that should be based on the intra-vasal fluid appearance and microscopic examination of the fluid. It is the opinion of the Panel that surgeons offering vasectomy reversal should have the microsurgical skillset to perform either vasovasostomy or vasoepididymostomy since the decision as to which procedure is needed is made intra-operatively. The diminutive size of the epididymal tubules requires microscopic magnification to perform an effective vasoepididymostomy.

26. Surgeons may perform vasoepididymostomy using longitudinal intussusception, triangulation intussusception, end-to-end anastomosis, or end-to-side anastomosis. (Conditional Recommendation; Evidence Level: Grade C)

Vasoepididymostomy is regarded as the most technically challenging operation in reproductive urology. Several techniques have been described for vasoepididymostomy. Longitudinal intussusception involves the pre-placement of 2 double-armed microsurgical sutures longitudinally through the epididymal tubule. The epididymal tubule is then

Table. Obstructive Interval vs Postoperative Result for First Reversals

Obstructive interval (y) ^a	No. of patients with sperm in semen/total number in group (%)	No. of achieving pregnancy/total number in group (%)
<2	38/39 (97)	23/31 (74)
2	48/50 (96)	33/43 (77)
3	63/74 (85)	31/56 (55)
4	103/112 (92)	49/86 (57)
5	97/112 (87)	44/89 (49)
6	83/95 (87)	40/74 (54)
7	88/100 (88)	44/87 (51)
8	91/107 (85)	45/86 (52)
9	46/60 (77)	20/46 (43)
10	65/85 (76)	30/70 (43)
11	39/51 (76)	16/40 (40)
12	29/34 (85)	7/25 (28)
13	15/17 (88)	14/19 (74)
14	11/14 (79)	5/9 (55)
≥15	32/45 (71)	11/37 (30)

^a Obstructive interval equals nearest completed year from vasectomy to reversal. Reproduced with permission from *J Urol*. Belker et al, Table 3.⁹

punctured between the suture needles, and the fluid is examined for sperm or sperm parts. The microsurgical sutures are then passed through the vasal mucosa and muscular layers in an “inside-out” fashion, distributed equally around the circumference of the vas. This maneuver leads to intussusception of the epididymal tubule into the lumen of the vas deferens. The triangulation intussusception technique is similar except that 3 double-armed microsurgical sutures are placed in a triangular fashion through the epididymal tubule and then intussuscepted into the lumen of the vas. The end-to-side anastomosis is performed by approximating the vasal lumen to an identified opening in the epididymal tubule, whereas end-to-end anastomosis requires the division of the epididymis to create and identify a cross-sectioned epididymal tubule effluxing fluid through which interrupted microsurgical sutures are placed circumferentially. A single non-randomized cohort study has compared the effectiveness of these techniques; however, the small sample sizes limited the ability to determine any differences in outcome amongst the techniques.²⁵

FUTURE DIRECTIONS

Although this Guideline demonstrates substantial progress since the initial publication of the 2012 AUA Vasectomy Guideline, there are many areas where gaps of knowledge persist.

Patient requests for vasectomy are occurring at an earlier age, and data on patient choice for permanent contraception are limited. The consequences of early vasectomy choice have also not been well studied. Regret regarding vasectomy choice is an area where data are lacking. Regret can be based on post-operative pain, need for reversal, or general regret. Relevant factors may include age less than 30 at the time of vasectomy, lack of information about reversibility, high impulsivity score, lower education level, involvement with a responsible partner, and child status.²⁶ Earlier and more common performance of vasectomy could lead to greater need for and requests of fertility after vasectomy.

This Guideline addresses restoration of fertility after vasectomy for the first time. A review of the

pertinent literature on this topic identified some important issues that will need to be delineated in the future. There are no published data regarding what microsurgical expertise is necessary to provide vasectomy reversal surgical care, hence the expert opinion provided in this Guideline. With this gap in knowledge, success rates of vasoepididymostomy are based mostly on single series with non-randomized data to evaluate results. Many practitioners who perform only vasovasostomies might report their data of outcomes with vasovasostomy alone despite the presence of standard indications for vasoepididymostomy, such as increased obstructive interval, no sperm seen with vasal fluid sampling, inspissated vasal fluid at time of reversal, and epididymal induration. In the absence of sperm reaching the vas deferens, the chance of successful vasovasostomy for vasectomy reversal is limited.

A single surgeon randomized trial of different microsurgical techniques would be valuable to determine if 1 technique is better than the others. Although expertise in vasoepididymostomy is recommended for the surgeon offering vasectomy reversal, the number of urologists with such expertise in the United States is limited. Some urologists offering vasectomy reversal today do not have training or experience in performance of vasoepididymostomy despite the value of this procedure for a substantial number of men undergoing attempted vasectomy reversal.

What is the best option for fertility after vasectomy? There are limited data in comparative trials to assess different interventions, and assisted reproduction as well as microsurgical reconstructive results can vary greatly at different centers. Further, a randomized trial may be difficult to accrue. However, a randomized trial comparing vasectomy reversal vs sperm retrieval and ICSI would provide very valuable data. This would need to be performed in a health system that offers both options without cost limitations and control for patient and partner age/type of anastomosis (vasovasostomy vs vasoepididymostomy) and delay of cross-over treatment for periods of time that may limit patient acceptance.

REFERENCES

1. Brannigan RE, Hermanson L, Kaczmarek J, Kim SK, Kirkby E, Tanrikut C. Updates to male infertility: AUA/ASRM guideline (2024). *J Urol*. 2024;212(6):789-799. doi:10.1097/JU.0000000000004180
2. Valerie U, De Brucker S, De Brucker M, et al. Pregnancy after vasectomy: surgical reversal or assisted reproduction?. *Hum Reprod*. 2018;33(7):1218-1227. doi:10.1093/humrep/dey101
3. Ren LJ, Xue RZ, Wu ZQ, et al. Vasectomy reversal in China during the recent decade: insights from a multicenter retrospective investigation. *Asian J Androl*. 2023;25(3):416-420. doi:10.4103/aja202244
4. Holman CD, Wisniewski ZS, Semmens JB, Rouse IL, Bass AJ. Population-based outcomes after 28,246 in-hospital vasectomies and 1,902 vasovasostomies in Western Australia. *BJU Int*. 2000;86(9):1043-1049. doi:10.1046/j.1464-410x.2000.00977.x
5. Ghaed MA, Mahmoodi F, Alizadeh HR. Prognostic factors associated with bilateral, microsurgical vasovasostomy success. *Middle East Fertil Soc J*.

- 2018;23(4):373-376. doi:10.1016/j.mefs.2018.05.006
6. Farber NJ, Flannigan R, Srivastava A, Wang H, Goldstein M. Vasovasostomy: kinetics and predictors of patency. *Fertil Steril*. 2020;113(4):774-780.e3. doi:10.1016/j.fertnstert.2019.11.032
 7. Davis NF, Gnanappiragasam S, Nolan WJ, Thornhill JA. Predictors of live birth after vasectomy reversal in a specialist fertility centre. *Ir Med J*. 2017;110(1):495.
 8. Gerrard ER Jr, Sandlow JL, Oster RA, Burns JR, Box LC, Kolettis PN. Effect of female partner age on pregnancy rates after vasectomy reversal. *Fertil Steril*. 2007;87(6):1340-1344. doi:10.1016/j.fertnstert.2006.11.038
 9. Belker AM, Thomas A Jr, Fuchs EF, Konnak JW, Sharlip ID. Results of 1,469 microsurgical vasectomy reversals by the Vasovasostomy Study Group. *J Urol Nurs*. 1992;11(2):93-111.
 10. Hinz S, Rais-Bahrami S, Kempkensteffen C, Weiske WH, Schrader M, Magheli A. Fertility rates following vasectomy reversal: importance of age of the female partner. *Urol Int*. 2008;81(4):416-420. doi:10.1159/000167839
 11. Ostrowski KA, Polackwich AS, Conlin MJ, Hedges JC, Fuchs EF. Impact on pregnancy of gross and microscopic vasal fluid during vasectomy reversal. *J Urol*. 2015;194(1):156-159. doi:10.1016/j.juro.2015.01.009
 12. Hsiao W, Goldstein M, Rosoff JS, et al. Nomograms to predict patency after microsurgical vasectomy reversal. *J Urol*. 2012;187(2):607-612. doi:10.1016/j.juro.2011.10.044
 13. Hsiao W, Sultan R, Lee R, Goldstein M. Increased follicle-stimulating hormone is associated with higher assisted reproduction use after vasectomy reversal. *J Urol*. 2011;185(6):2266-2271. doi:10.1016/j.juro.2011.02.011
 14. Cosentino M, Peraza MF, Vives A, et al. Factors predicting success after microsurgical vasovasostomy. *Int Urol Nephrol*. 2018;50(4):625-632. doi:10.1007/s11255-018-1810-4
 15. Vrijhof HJ, Delaere KP. Vasovasostomy results in 66 patients related to obstructive intervals and serum agglutinin titres. *Urol Int*. 1994;53(3):143-146. doi:10.1159/000282656
 16. Bolduc S, Fischer MA, Deceuninck G, Thabet M. Factors predicting overall success: a review of 747 microsurgical vasovasostomies. *Can Urol Assoc J*. 2007;1(4):388-394. doi:10.5489/cuaj.454
 17. Ramasamy R, Mata DA, Jain L, Perkins AR, Marks SH, Lipshultz LI. Microscopic visualization of intravasal spermatozoa is positively associated with patency after bilateral microsurgical vasovasostomy. *Andrology*. 2015;3:532-535. doi:10.1111/andr.12033
 18. Ory J, Nackeeran S, Blankstein U, et al. Predictors of success after bilateral epididymovasostomy performed during vasectomy reversal: a multi-institutional analysis. *Can Urol Assoc J*. 2022;16(3):E132-E136. doi:10.5489/cuaj.7441
 19. Safarinejad MR, Lashkari MH, Asgari SA, Farshi A, Babaei AR. Comparison of macroscopic one-layer over number 1 nylon suture vasovasostomy with the standard two-layer microsurgical procedure. *Hum Fertil (Camb)*. 2013;16(3):194-199. doi:10.3109/14647273.2013.805256
 20. Amjadi M, Jahantabi E, Nouri H, Nourizadeh D, AsrBadr YA, Salehi-Pourmehr H. One-layer macroscopic versus two-layer microscopic vasovasostomy: our experience in two referral hospitals. *Urologia*. 2023;90(2):322-328. doi:10.1177/03915603221137955
 21. Wang B, Liu Z, Jiang H. Comparison of low-power magnification one-layer vasovasostomy with stent and microscopic two-layer vasovasostomy for vasectomy reversal. *Int J Impot Res*. 2020;32(6):617-622. doi:10.1038/s41443-019-0216-x
 22. Fischer MA, Grantmyre JE. Comparison of modified one- and two-layer microsurgical vasovasostomy. *BJU Int*. 2000;85(9):1085-1088. doi:10.1046/j.1464-410x.2000.00668.x
 23. Nyame YA, Babbar P, Almassi N, Polackwich AS, Sabanegh E. Comparative cost-effectiveness analysis of modified 1-layer versus formal 2-layer vasovasostomy technique. *J Urol*. 2016;195(2):434-438. doi:10.1016/j.juro.2015.08.102
 24. Parekattil SJ, Gudeloglu A, Brahmabhatt J, Wharton J, Priola KB. Robotic assisted versus pure microsurgical vasectomy reversal: technique and prospective database control trial. *J Reconstr Microsurg*. 2012;28(7):435-444. doi:10.1055/s-0032-1315788
 25. Schiff J, Chan P, Li PS, Finkelberg S, Goldstein M. Outcome and late failures compared in 4 techniques of microsurgical vasoepididymostomy in 153 consecutive men. *J Urol*. 2005;174(2):651-801. doi:10.1097/01.ju.0000165573.53109.92
 26. Degraeve A, Tosco L, Tombal B, et al. Definition of a European pre-vasectomy scoring system to identify patients at risk of vasectomy regret. *Sex Med*. 2024;12(6):qfae094. doi:10.1093/sexmed/qfae094