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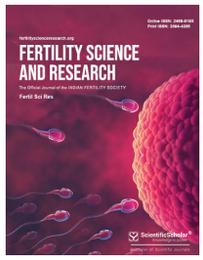

Point of View

Varicocelectomy – The Unkindest Cut of All

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Received: 07 July 2025
Accepted: 13 September 2025
Published: 24 October 2025

DOI
10.25259/FSR_39_2025

Quick Response Code:

ABSTRACT

In 2025, it is our considered opinion, based on 40 years of experience in full-time andrology and reproductive sciences, that varicocele as a cause of male infertility remains largely unproven. While some meta-analyses suggest a marginal benefit in specific patient subsets, these findings are often debated regarding their clinical significance or methodological limitations. Couples with impaired semen parameters can be effectively treated by intrauterine insemination and, if necessary, by advanced assisted reproductive technologies like intracytoplasmic sperm injection (ICSI). With unproven benefits, an invasive nature, no clear explanation for the actual mechanism of causation, an unpredictable outcome, and the availability of simpler, better alternatives like IUI and ICSI, I feel varicocelectomy is the unkindest cut of all.

Keywords: Assisted reproduction, Male infertility, Varicocelectomy

Varicocele is the price a man pays for his upright posture and scrotal testes. Animals do not develop varicocele. Varicosities also occur in ovarian veins, but fortunately, they are not visible to the naked eye and are, therefore, not implicated in any ovarian dysfunction.

In the year 1885, British surgeon Barwell opined that varicocele was a possible cause of male infertility.[1] Tulloch, in 1953, operated on a patient and showed a rise in all semen parameters following varicocelectomy.[2] Several decades later, we are still struggling to prove that varicocele is one of the causes of male infertility. This topic has given rise to many controversies. While varicocele is a routine finding in about 15% of the general male adult population, its incidence is higher in infertile men, 19%–40%.[3,4]

Various theories are being offered as mechanisms for altered semen parameters with varicocele.

Rise in scrotal temperature: It was reported that the rise in temperature occurs due to pooling of venous blood.[5] It is a widely held belief that the testes are placed in the scrotum for optimal spermatogenesis, as they need cooler temperatures than the core body temperature. It is interesting to note that only some mammals (like humans) have testes placed in the scrotum. The others, despite the abdominal location of the testes, continue to have normal spermatogenesis. Venous blood is cooler than arterial blood. Hence, pooling of venous blood in the scrotum due to varicocele should logically lead to cooler temperatures, conducive to optimal spermatogenesis. This internal contradiction within the 'temperature hypothesis' is often overlooked.

Reflux of blood from the left renal vein into the internal spermatic vein: It was postulated that refluxing venous blood from the left renal vein carried adrenocortical metabolites to the testes,

which impaired spermatogenesis.[6] This theory does not explain how static venous blood can perfuse into testicular tissue and affect spermatogenesis.

Increased spermatozoa Deoxyribo nucleic acid (DNA) fragmentation index (DFI): Varicocele is claimed to increase DFI.[7] The concept of high DFI as a cause of male infertility is highly controversial.[8] While some research groups advocate for DFI testing in specific subsets of infertile men (e.g., recurrent assisted reproductive technology (ART) failure), major guidelines like the American urology association / American society of reproductive medicine (AUA/ASRM) (2020/2024 amendment) generally do *not* recommend sperm DNA fragmentation analysis in the initial evaluation of the infertile couple, reserving it for specific circumstances like recurrent pregnancy loss.[8] At best, DFI can be considered a useful research tool and is not meant for routine assessment of male infertility.

Stress pattern of semen parameters: Varicocele has been described to cause a stress pattern of semen analysis. Abnormal semen parameters like oligozoospermia, asthenozoospermia, and teratozoospermia have been attributed to this stress pattern.[9] These definitions have often been reclassified in the last 44 years. Moreover, the semen picture is highly variable even in the same fertile male over different periods.[10] WHO has been redefining the values for Oligozoospermia[11] with the 6th edition of the WHO Manual for the Examination and Processing of Human Semen published in July 2021. Morphology assessment of the spermatozoa is highly subjective[12] and semen parameters are highly variable biological measures, as noted by the AUA/ASRM.

Thus, we wonder whether varicocele is the cause of male infertility or whether it is an associated condition. It is debatable if any of the explanations offered for varicocele causing infertility is tenable, and they do not give us a clue to the actual mechanism.

MANAGEMENT OF VARICOCELE IN MALE INFERTILITY: EVOLVING GUIDELINES AND PERSISTENT CONTROVERSY

As expected, opinions vary on the management. Some practice surgical varicocelectomy, while others do not.[13–16] The National Institute for Health and Care Excellence (NICE) guidelines in 2013 did not recommend surgical correction, as pregnancy rates had not improved following varicocelectomy.[17] While NICE's stance has largely remained consistent, more recent guidelines from major professional bodies provide nuanced recommendations that still underscore the controversy.

The AUA/ASRM Guidelines (2020; amended 2024) state:

- 'Clinicians should consider surgical varicocelectomy in males attempting to conceive who have palpable varicocele(s), infertility, and abnormal semen parameters, except for azoospermic males.' (Moderate Recommendation; Evidence Level: Grade B).[18]
- 'Clinicians should not recommend varicocelectomy for males with non-palpable varicoceles detected solely by imaging.' (Strong Recommendation; Evidence Level: Grade C).[18]
- For males with clinical varicocele and non-obstructive azoospermia, 'couples should be informed of the absence of definitive evidence supporting varicocele repair prior to ART.' (Expert Opinion).[18]

Similarly, the European Association of Urology (EAU) Guidelines (latest amendments for 2025) acknowledge varicocele as the most common correctable cause of male infertility and suggest that microsurgical varicocelectomy is the preferred method for treatment due to lower recurrence and complication rates. However, they also note that 'there is a lack of clear criteria for clinical and radiological diagnosis of varicoceles' and 'a considerable amount of controversy surrounds the management of varicoceles in infertile men worldwide.' They agree that diagnosis should primarily be based on physical examination, with ultrasonography recommended when palpation is unreliable or if semen parameters do not improve after initial repair.[19]

These updated guidelines, while sometimes recommending varicocelectomy for specific patient profiles (e.g., palpable varicocele, abnormal semen parameters, and a fertile female partner), still highlight the ongoing debate and lack of universal consensus. The rationale for improvement, when it occurs, remains theoretical (e.g., reduction of oxidative stress, improvement in the testicular microenvironment), but the fundamental mechanisms for how varicocele *causes* infertility are still not definitively explained. Surgical procedures include open varicocelectomy, laparoscopic approach, and microsurgical techniques. The nonsurgical procedure advocated is radiological embolisation. None of these can fully explain the mechanism for the expected improvement in semen parameters when it happens in a few patients. The mechanisms of causation of infertility by varicocele and the improvement in semen parameters in some patients are still unexplained.

In 2025, it is my opinion, based on 40 years of experience in full-time andrology and reproductive sciences, that varicocele as a cause of male infertility remains unproven. While some meta-analyses suggest a marginal benefit in specific subsets of patients, these findings are often debated about their clinical significance or methodological limitations. Couples with impaired semen parameters can be effectively treated by intrauterine insemination and, if necessary, by advanced assisted reproductive technologies like intracytoplasmic sperm injection (ICSI).

With unproven benefits, an invasive nature, no clear explanation for the actual mechanism of causation, an unpredictable outcome, and the availability of simpler, better alternatives like intra uterine insemination (IUI) and ICSI, I feel varicocelectomy is no longer indicated for male infertility, and if performed, it is the unkindest cut of all.

Author contributions: NP: Drafting, editing, and writing of the entire manuscript.

Acknowledgements: Dr Radha Pandiyan, Senior Consultant in Andrology and Reproductive Medicine, for help in redrafting the article.

Ethical approval: Institutional Review Board approval is not required.
Declaration of patient consent: Patient's consent not required as there are no patients in this study.
Financial support and sponsorship: Nil.
Conflicts of interest: There are no conflicts of interest.
Use of artificial intelligence (AI)-assisted technology for manuscript preparation: The authors confirm that they have used artificial intelligence (AI)-assisted technology to assist in editing and redrafting the manuscript.

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How to cite this article: Pandiyan N. Varicocelectomy – The Unkindest Cut of All. Fertil Sci Res. 2025;12:31. doi: 10.25259/FSR_39_2025