

# Report on varicocele and infertility

*The Practice Committee of the American Society for Reproductive Medicine\**

Birmingham, Alabama

Varicoceles, defined as abnormally dilated scrotal veins, are present in 15% of the normal male population and in approximately 40% of men presenting with infertility (1). The preponderance of experimental data from clinical and animal models demonstrates an adverse effect of varicoceles on spermatogenesis. Venous reflux and testicular temperature elevation appear to play important roles in varicocele-induced testicular dysfunction, although the exact pathophysiologic mechanisms involved are not yet completely understood. Despite the relationship between varicoceles and sperm production, incontrovertible evidence for a clinical benefit of varicocele repair in improving fertility has been elusive. This review offers recommendations for evaluation and treatment of varicoceles.

## DETECTION OF VARICOCELES

Evaluation of a patient with a varicocele should include a careful medical and reproductive history, a physical examination, and at least two semen analyses. The physical examination should be performed with the patient in both the recumbent and upright positions. A palpable varicocele feels like a “bag of worms” and disappears or is very significantly reduced when the patient is recumbent. When a suspected varicocele is not clearly palpable, the scrotum should be examined while the patient performs a Valsalva maneuver in a standing position.

Only larger varicoceles, which are typically easily palpable, have been clearly associated with infertility. Therefore, ancillary diagnostic measures, such as scrotal ultrasonography, thermography, Doppler examination, radionuclide scanning, and spermatic venography, should not be used for the detection of subclinical varicoceles in patients without a palpable abnormality. Scrotal ultrasonography is indicated for evaluation of an inconclusive physical examination of the scrotum. Spermatic venography may be useful to demonstrate the anatomic position of refluxing spermatic veins that recur or persist after varicocele repair.

## INDICATIONS FOR TREATMENT OF A VARICOCELE

When the male partner of a couple attempting to conceive has a varicocele, treatment of the varicocele should be considered when all of the following conditions are met: 1) the

Revised by ASRM June 2006.

Received and accepted July 28, 2006.

\*This report was originally published in April 2001 as a joint report with the Male Infertility Best Practice Policy Committee of the American Urological Association.

Reprints will not be available.

varicocele is palpable on physical examination of the scrotum; 2) the couple has known infertility; 3) the female partner has normal fertility or a potentially treatable cause of infertility; and 4) the male partner has abnormal semen parameters or abnormal results from sperm function tests. Varicocele treatment for infertility is not indicated in patients with either normal semen quality or a subclinical varicocele.

An adult male who is not currently attempting to achieve conception, but has a palpable varicocele, abnormal semen analyses, and a desire for future fertility, also is a candidate for varicocele repair. Young adult males with varicoceles who have normal semen parameters may be at risk for progressive testicular dysfunction and should be offered monitoring with semen analyses every one to two years, in order to detect the earliest sign of reduced spermatogenesis.

Adolescent males who have unilateral or bilateral varicoceles and objective evidence of reduced testicular size ipsilateral to the varicocele also should be considered candidates for varicocele repair (2–5). If objective evidence of reduced testis size is not present, then adolescents with varicoceles should be followed with annual objective measurements of testis size and/or semen analyses in order to detect the earliest sign of varicocele-related testicular injury. Varicocele repair should be offered on detection of testicular or semen abnormality.

## VARICOCELE TREATMENT, INTRAUTERINE INSEMINATION (IUI), AND ASSISTED REPRODUCTION

Varicocele repair, IUI, and in vitro fertilization/intracytoplasmic sperm injection (IVF/ICSI) are options for the management of couples with male factor infertility associated with a varicocele.

The decision on which method of management to use is influenced by a number of factors. Most importantly, varicocele repair has the potential to reverse a pathological condition and to achieve a permanent cure for infertility, as opposed to IUI or ART which are required for each attempt at pregnancy. Other factors to be considered include the age of the female partner, the unknown long-term health effects of IVF and ICSI on the offspring resulting from these techniques, and the greater cost effectiveness of varicocele treatment compared to IVF with or without ICSI (6). Finally, failure to treat a varicocele may result in a progressive decline in semen parameters, further compromising future fertility (7–9).

Varicocele repair is not usually indicated when IVF is otherwise required for the treatment of a female factor. However, there are certain circumstances in which treatment of a varicocele should be considered before ART, even when a female factor is present. Specifically, varicocele repair has been suggested to restore at least low numbers of sperm to the ejaculate in some men with non-obstructive azoospermia due to either hypospermatogenesis or late maturation arrest (10, 11). In such cases, varicocele repair may restore sperm to the ejaculate, thus making it possible to perform IVF/ICSI without testicular sperm aspiration or extraction. Therefore, testicular biopsy and varicocele repair may be offered to such men, although the value of varicocelectomy in non-obstructive azoospermia remains controversial (12).

## TREATMENT OF VARICOCELES

There are two approaches to varicocele repair: surgery and percutaneous embolization. Surgical repair of a varicocele may be accomplished by various open surgical methods, including retroperitoneal, inguinal and subinguinal approaches, or by laparoscopy. Percutaneous embolization treatment of a varicocele is accomplished by percutaneous embolization of the refluxing internal spermatic vein(s). None of these methods has been proven superior to the others in its ability to improve fertility.

### Surgical Repair

Most experts perform inguinal or subinguinal surgical repair employing loupes or an operating microscope for optical magnification. Techniques using optical magnification maximize preservation of arterial and lymphatic vessels while reducing the risk of persistence or recurrence of varicocele (13). Laparoscopy has been used for varicocele repair but this approach carries the risk of major intraperitoneal complications, such as injury to the bowel, bladder, and major blood vessels. Although uncommon, intraperitoneal complications may be serious and require laparotomy for correction.

### Percutaneous Embolization Treatment

Percutaneous embolization to repair varicoceles may be associated with less pain than occurs after the standard inguinal surgical approach, but requires a physician with experience in interventional radiologic techniques. Moreover, in some patients, interventional access to the internal spermatic veins cannot be achieved because of technical problems.

### Complications

The potential complications of varicocele repair occur infrequently and are usually mild. All approaches to varicocele surgery are associated with a small risk of wound infection, hydrocele, persistence or recurrence of varicocele and, rarely, testicular atrophy. Potential complications from an

inguinal incision for varicocele repair include scrotal numbness and prolonged pain.

## RESULTS OF VARICOCELE TREATMENT

Surgical treatment successfully eliminates over 90% of varicoceles. The results of percutaneous embolization are variable and depend on the experience and skill of the interventional radiologist performing the procedure. Most studies have reported that semen quality improves in a majority of patients following varicocele repair (14).

The fertility outcomes of varicocele repair have been described in numerous published studies. Most such studies lack adequate numbers of patients, randomization, and/or controls. Therefore, it is not possible to draw a clear conclusion regarding the impact of varicocele repair on fertility. The majority of published controlled studies has not been randomized and has not included only men with palpable varicoceles, men with abnormal semen analyses, and/or men with normal female partners. Most trials have observed improved fertility after varicocele treatment and only a few have concluded that varicocele treatment has little or no effect on fertility. A review of 12 controlled studies found a pregnancy rate of 33% (95% confidence interval [CI], 28–39) in couples in which the male received treatment for a varicocele, compared with 16% (95% CI, 13–20) in untreated couples over one year (6).

There are only two well-designed, randomized, controlled studies using men with palpable varicoceles, abnormal semen parameters, and normal spouses (15, 16). Although one of the two observed no greater likelihood of pregnancy after varicocele repair, it did demonstrate significant improvement in testis volume and semen parameters compared to those in untreated controls (16). The second study, using a crossover design, observed a statistically significant improvement in fertility following varicocele repair (15). The largest randomized controlled study of infertile men with varicoceles observed improved fertility in men treated with varicocele repair. However, because the World Health Organization (WHO) has not published the report, the findings have not yet been thoroughly evaluated (17). The 2004 Cochrane meta-analysis of eight previously published studies reported no effect of varicocele repair on fertility. However, the analysis also included men with normal semen parameters or subclinical varicoceles, for which varicocele repair is not recommended, based on expert opinion (18).

Despite the absence of definitive studies on the impact of varicocele repair on fertility, varicocele treatment should be considered as a choice for appropriately selected infertile couples because: 1) varicocele repair has been proven to improve semen parameters in most men; 2) varicocele treatment may improve fertility; and 3) the risks of varicocele treatment are small.

## FOLLOW-UP

Patients should be evaluated after varicocele treatment for persistence or recurrence of the varicocele. If the varicocele persists or recurs, internal spermatic venography may be performed to identify the site of persistent venous reflux, and followed by either surgical ligation or percutaneous embolization of the refluxing veins. Semen analyses should be performed at approximately three-month intervals during the first year after varicocele treatment or until pregnancy is achieved. IUI and ART should be considered for couples with persistent infertility despite an anatomically successful varicocele repair.

## SUMMARY AND RECOMMENDATIONS

- Adolescents who have a varicocele and objective evidence of reduced ipsilateral testicular size should be offered varicocele repair. Adolescents who have a varicocele but normal ipsilateral testicular size should be offered follow-up monitoring with annual objective measurements of testicular size and/or semen analyses.
- Young men who have a varicocele and normal semen analyses should be followed with semen analyses every one to two years.
- Adult men who have a palpable varicocele and abnormal semen analyses but who are not currently attempting to conceive should be offered varicocele repair.
- Routine evaluation of infertile men with varicoceles should include a medical and reproductive history, physical examination, and a minimum of two semen analyses. Imaging studies are not indicated for the standard evaluation unless physical exam is inconclusive.
- Varicocele treatment should be offered to the male partner of a couple attempting to conceive, when all of the following are present: 1) a varicocele is palpable; 2) the couple has documented infertility; 3) the female has normal fertility or potentially correctable infertility; and 4) the male partner has one or more abnormal semen parameters or sperm function test results.
- Varicocele repair may be considered as the primary treatment option when a man with a varicocele has suboptimal semen quality and a normal female partner. IVF with or without ICSI may be considered the primary treatment option when such treatment is required to treat a female factor, regardless of the presence of varicocele and reduced semen quality.
- Persistence or recurrence of a varicocele may be treated by either surgical ligation or percutaneous embolization of the refluxing veins. After treatment of a varicocele, semen

analysis should be performed at approximately three-month intervals for at least one year or until pregnancy occurs.

- The treating physician's experience and expertise, together with the options available, should determine the approach to varicocele treatment.

## REFERENCES

1. Nagler HM, Luntz RK, Martinis FG. Varicocele. In: *Infertility In The Male*. Edited by Lipshultz LI and Howards SS, St. Louis: Mosby Year Book, 1997, p.336-359.
2. Okuyama A, Nakamura M, Namiki M, Takeyama M, Utsunomiya M, Fujioka H, et al. Surgical repair of varicocele at puberty: preventive treatment for fertility improvement. *J Urol* 1988;139:562-4.
3. Paduch DA, Niedzielski J. Repair versus observation in adolescent varicocele: a prospective study. *J Urol* 1997 Sep;158(3 Pt 2):1128-32.
4. Yamamoto M, Hibi H, Katsuno S, Miyake K. Effects of varicocelectomy on testis volume and semen parameters in adolescents: a randomized prospective study. *Nagoya J Med Sci* 1995;58:127-32.
5. Sigman M, Jarow JP. Ipsilateral testicular hypotrophy is associated with decreased sperm counts in infertile men with varicoceles. *J Urol* 1997; 158:605-7.
6. Schlegel PN. Is assisted reproduction the optimal treatment for varicocele-associated infertility? A cost-effective analysis. *Urology* 1997;49:83-90.
7. Chehval MJ, Purcell MH. Deterioration of semen parameters over time in men with untreated varicocele: evidence of progressive testicular damage. *Fertil Steril* 1992;57:174-7.
8. Gorelick J, Goldstein M. Loss of fertility in men with varicocele. *Fertil Steril* 1993;59:613-6.
9. Witt MA, Lipshultz LI. Varicocele: a progressive or static lesion? *Urology* 1993;42:541-3.
10. Matthews GJ, Matthews ED, Goldstein M. Induction of spermatogenesis and achievement of pregnancy after microsurgical varicocelectomy in men with azoospermia and severe oligoasthenospermia. *Fertil Steril* 1998;70:71-75.
11. Kim ED, Leibman BB, Grinblat DM, Lipshultz LI. Varicocele repair improves semen parameters in azoospermic men with spermatogenic failure. *J Urol* 1999;162:737-40.
12. Schlegel PN, Kaufmann J. Role of varicocelectomy in men with non-obstructive azoospermia. *Fertil Steril* 2004;81:1585-8.
13. Goldstein M, Gilbert BR, Dicker AP, Dwosh J, Gnecco C. Microsurgical inguinal varicocelectomy with delivery of the testis: an artery and lymphatic sparing technique. *J Urol* 1992;148:1808-11.
14. Schlesinger MM, Wilets IF, Nagler HM. Treatment outcomes after varicocelectomy. A critical analysis. *Urol Clin North Am* 1994;21: 517-29.
15. Madgar I, Weissenberg R, Lunenfeld B, Karasik A, Goldwasser B. Controlled trial of high spermatic vein ligation for varicocele in infertile men. *Fertil Steril* 1995;63:120-4.
16. Nieschlag E, Hertle L, Fishedick A, Abshagen K, Behre HM. Update on treatment of varicocele: counselling as effective as occlusion of the vena spermatica. *Hum Reprod* 1998;13:2147-50.
17. Evers JL, Collins JA. Assessment of efficacy of varicocele repair for male subfertility: a systematic review. *Lancet* 2003;361:1849-52.
18. Evers JL, Collins JA. Surgery or embolisation for varicocele in subfertile men. *Cochrane Database Syst Rev* 2004;(3):CD000479.