



ANDROLOGY/SEXUAL MEDICINE  
ORIGINAL ARTICLE

# Varicocelectomy: Modified loupe-assisted versus microscopic technique – A prospective comparative study



Mohammad H. Alkandari\*, Adel Al-Hunayan

Department of Urology, Mubarak Al-Kabeer Teaching Hospital, Kuwait University, Jabriya, Kuwait

Received 29 August 2016, Received in revised form 30 October 2016, Accepted 13 December 2016  
Available online 2 February 2017

## KEYWORDS

Loupe-assisted;  
Microscopic;  
Varicocelectomy;  
Guidelines;  
Tourniquet

## ABBREVIATIONS

LV, loupe-assisted  
varicocelectomy;  
MV, microscopic  
varicocelectomy

**Abstract** *Abstract objective:* To compare our novel loupe-assisted varicocelectomy (LV) technique to the 'gold standard' demanding microscopic varicocelectomy (MV) technique for the management of varicoceles.

*Patient and methods:* Our LV technique, featuring testicular delivery and proximal spermatic cord occlusion using a tourniquet, has not been used before nor to our knowledge has it been reported in the literature. In the LV group, inguinal incision was done prior to testicular delivery and spermatic cord occlusion. Pampiniform and gubernacular veins were identified then tackled. Proximal spermatic cord occlusion helped in identifying those veins, and not confusing them with other cord structures that should be preserved. In all, 95 infertile men were included in this prospective, comparative study; and divided into LV and MV groups. They were followed-up for 1 year, pregnancy achievement, improvements in semen parameters, and complication rates were assessed.

*Results:* Both groups had statistically significant pregnancy rates and negligible complication rates. However, LV cost 33% less than MV and was quicker to perform. We did not find that the MV technique was better than our simple, more cost-effective, less time-consuming LV technique.

\* Corresponding author.

E-mail address: [al\\_kanderim@hotmail.com](mailto:al_kanderim@hotmail.com) (M.H. Alkandari).

Peer review under responsibility of Arab Association of Urology.



Production and hosting by Elsevier

**Conclusion:** Our novel LV technique has similar success and complication rates as the ‘gold standard’ MV technique for the management of varicoceles, and is more cost-effective and less time consuming.

© 2017 Arab Association of Urology. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

## Introduction

Varicocelectomy is a common procedure used in urology, as it is indicated for varicocele-associated infertility, varicocele-associated hypogonadism, decreased testicular size, and persistent pain. Varicoceles are present in ~15% of normal males and in 40% of males with infertility [1,2].

Different varicocelectomy techniques are used by urologists, including inguinal, subinguinal, retroperitoneal, laparoscopic, angiographic, loupe-assisted (LV) and microscopic varicocelectomy (MV). No structured guidelines have been developed to indicate which technique is better for the management of varicoceles [1]. However, MV has been reported as the ideal technique by many studies, as there are fewer postoperative complications and lower recurrence rates associated with this procedure [3–5]. There are only a few studies available on LV, and to our knowledge, this is the first study that has been conducted on the use of LV to treat infertility using a surgical loupe with testicular delivery and occlusion of the spermatic cord proximally. Moreover, this is the first investigation to compare our LV to the MV technique.

The present study was conducted to compare our LV technique to the MV technique. The MV technique requires microsurgical skills that extend beyond the residency level and a particular operative setup, whilst the LV technique can be performed in any operating room and by less experienced surgeons.

## Patients and methods

In all, 95 patients were included in this prospective, non-randomised, comparative study, of which 43 (45%) underwent LV and 52 (55%) underwent MV. The study sample was recruited between January 2011 and July 2014 from the co-author’s private clinic; each case had a minimum history of infertility for 1 year (primary or secondary), and they presented with left-sided palpable varicoceles, which were either associated with the presence or absence of pain and abnormal semen parameters. Two semen analyses were performed before the procedure and 3 months after the procedure; the patients were all followed-up for 1 year postoperatively, monitoring for complications, semen parameters, and conception.

Patients were offered both options with an explanation of the advantages and limitations of each (including the associated costs), and the patients themselves made the final decision as to which technique they wished to undergo. All of the patients in this study signed written informed-consent forms. The study was approved by the local research ethics committee.

## Procedures

For the LV technique, a surgical loupe (42 cm/16”; Keeler Ltd, West Berkshire, UK) with a magnification of  $\times 2.5$  was used to perform an inguinal varicocelectomy with testicular delivery, as well as occlusion of the spermatic cord at the level of the internal ring using a tourniquet. In addition to ligation and division of the pampiniform plexus in the standard technique, the gubernacular veins were also identified and tackled, as in Goldstein’s technique [6]. The tourniquet use facilitated vein recognition, enabling us to differentiate between veins, arteries, and lymphatics, thus sparing the latter two structures.

The second group of patients underwent a subinguinal MV using a surgical microscope (Marmar technique [7]) with a magnification of  $\times 20$  (VARIO 700; Carl Zeiss Meditec AG, Jena, Germany). Spermatic and gubernacular veins were ligated and divided, and the artery and lymphatics were identified and spared. Ligation with or without division of varicocele veins was done for both groups. Individuals in both groups were operated on by the same surgeon. Intraoperative Doppler ultrasonography was not used. The operative time calculated started after spermatic cord isolation, and ended after veins ligation.

## Statistical analysis

For univariable analysis, continuous variables were presented as the mean (SD), whilst categorical variables were presented as frequency and percentage. For bivariable analysis, the Student’s *t*-test was used for statistical analysis of the normally distributed continuous variables in both groups. Chi-square and Fisher’s exact tests were used for comparison between categorical variables in both groups. A  $P < 0.05$  was considered as statistically significant. Data were stored and analysed by the use of the Statistical Package for the Social Sciences (SPSS®, Chicago, IL, USA) version 20.

**Table 1** Demographic distribution of the population.

Variable	LV	MV	P
Number of patients	43	52	
Mean (SD; range)			
Age, years	30.07 (7.78; 17–42)	28.75 (7.41; 18–42)	0.468
Testis volume, mL			
Right	12.30 (3.02; 5–16)	12.46 (2.45; 6–16)	0.925
Left	10.30 (1.60; 8–15)	10.17 (1.65; 8–16)	0.627
Laterality, <i>n</i>			0.595
Left only	35	40	
Bilateral	8	12	
Grade of left varicocele, <i>n</i>			0.096
I	5	9	
II	25	36	
III	13	7	

## Results

Patients in both groups were matched according to age, as well as the side and grade of the varicocele. They were also matched according to testicular volume, using bivariate analysis, as shown in Table 1.

The study groups did not exhibit any statistically significant differences across any of the confounding factors (Table 1). All patients underwent ligation and division of the dilated veins. The only indication for surgery was infertility (either primary or secondary), and the patients recruited for this study underwent left-sided varicocelectomy alone, as the surgeon always staged the bilateral cases and performed the surgery on the left side first. The LV procedure cost USA \$1000, and the MV technique cost USA \$1325, excluding medications and hospital stay related fees; LV costs were 33% less than MV costs. For the preoperative and postoperative semen analysis parameters, there were significant improvements in both groups (Table 2). All patients completed the surgery without intraoperative complications, and they were discharged home on the same day, with an average in-hospital stay of 4 h after being moved to the ward from the operating room. The patients also had comparable pregnancy and postoperative complication rates. More than 50% of the patients were able to impregnate their spouses from both groups. Complications were minimal and subsided in a couple of days, either spontaneously or with the aid of supportive measures. The exception to this was varicocele recurrence, which occurred in < 10% of patients in

both groups; one patient in the LV group developed a postoperative hydrocoele. However, both the mean operative time and the financial cost to the patient were statistically and clinically significantly in favour of LV (Table 3).

## Discussion

Despite the fact that varicoceles are the commonest treatable factor of male infertility, there is no consensus as to the 'gold standard' technique that should be used to address them [1]. However, MV was accepted as a standard treatment by experienced clinicians in a large literature review, as compared to other techniques, excluding LV [8]. Other studies also concluded that MV had the lowest recurrence and complication rates, but the procedure was associated with a longer operative time [3,5]. Al-Said et al. [5] published a paper in the *Journal of Urology* in 2008 and argued that MV also requires more surgical skills and experience.

In the present study, although most patients in both groups had borderline sperm density and forward motility values, these two parameters improved significantly after either intervention.

One study that was conducted on a smaller number of cases ( $n = 26$ ) showed significant intraoperative anatomical differences between the two techniques, but they neither occluded the spermatic cord nor delivered the testis [9]. Classical LV has proven its efficacy in multiple studies, especially when it was compared to classic open techniques [10–12].

**Table 2** Semen analysis results.

Sperms variable	LV			MV		
	Preoperative	Postoperative	P	Preoperative	Postoperative	P
Count, million/mL, median (range)	15 (3–32)	24 (4–55)	< 0.001	9.6 (1.0–48.5)	23 (1.5–56.3)	< 0.001
Progressive forward motility, %, mean (SD)	34.84 (10)	47.86 (12.19)	< 0.001	32.42 (9.05)	45.28 (13.24)	< 0.001

**Table 3** Operative details.

Variable	LV (n = 43)	MV (n = 52)	P
Operative time (left side only), min, mean (SD; 95% CI)	19.80 (3.49; 18.7–20.9)	36.1 (2.72; 35.3–36.9)	<0.001
N (%)			
Early complications			
Scrotal oedema	0	1 (1.9)	0.924
Haematoma	3 (6.7)	2 (3.8)	0.827
Late results			
Pregnancy rate	23 (53.5)	31 (59.6)	0.548
Late complications			
Recurrence	4 (9.3)	4 (7.7)	0.928
Hydrocoele	1 (2.3)	0	0.924
Pain	2 (4.6)	2 (3.8)	0.75

Until the present study, our LV technique has never previously been reported or compared to MV in any direct comparison study. We think that the comparable outcomes between our LV and the ‘standard’ MV technique might be due to testicular delivery and cord occlusion, which provides more venous dilatation, and thus results in easier detection and preservation of the artery and lymphatics.

The most important finding in the present study is the statistically and clinically significant difference in operative times. Thus, an operative list that would only accommodate two MVs would easily be able to handle five cases if our LV approach was applied instead. Furthermore, LV requires that a surgeon masters the classical inguinal varicocelectomy technique alone, which is unlike MV; LV is also a cheaper, residency level procedure.

Unfortunately, our relatively small sample size, the lack of data on the total price paid by each patient (particularly for the procedure, hospital stay, medications, and follow-up), and the comparatively short postoperative follow-up period may be regarded as limitations to our present study. However, such preliminary findings support our recommendation for a larger, multicentric, prospective, randomised control study, comparing both procedures and using more restricted selection criteria.

## Conclusion

LV with testicular delivery and proximal spermatic cord occlusion is more cost effective, quicker, and easier to learn than MV, and has a similar success rate.

## Conflicts of interest

The authors report no conflicts of interest in this work; no financial aid was provided.

## Source of funding

None.

## Acknowledgment

English-language editing of this manuscript was provided by Journal Prep.

## References

- [1] Valentino M, Bertolotto M, Derchi L, Pavlica P. Children and adults varicocele: diagnostic issues and therapeutical strategies. *J Ultrasound* 2014;**17**:185–93.
- [2] Capece M, Imbimbo C. The varicocele: the proper therapy for the proper patient. *Urologia* 2014;**81**:165–8.
- [3] Al-Kandari AM, Shabaan H, Ibrahim HM, Elshebiny YH, Shokeir AA. Comparison of outcomes of different varicocelectomy techniques: open inguinal, laparoscopic, and subinguinal microscopic varicocelectomy: a randomized clinical trial. *Urology* 2007;**69**:417–20.
- [4] Peng J, Long H, Yuan YM, Cui WS, Zhang ZC, Pan WB. Comparison of the outcomes of microscopic varicocelectomy and laparoscopic varicocelectomy. *Beijing Da Xue Xue Bao* 2014;**46**:541–3.
- [5] Al-Said S, Al-Naimi A, Al-Ansari A, Younis N, Shamsodini A, A-sadiq K, et al. Varicocelectomy for male infertility: a comparative study of open, laparoscopic and microsurgical approaches. *J Urol* 2008;**180**:266–70.
- [6] 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.
- [7] Marmar JL, Kim Y. Subinguinal microsurgical varicocelectomy: a technical critique and statistical analysis of semen and pregnancy data. *J Urol* 1994;**152**:1127–32.
- [8] Choi WS, Kim SW. Current issues in varicocele management: a review. *World J Mens Health* 2013;**31**:12–20.
- [9] Zhang H, Liu XP, Yang XJ, Huang WT, Ruan XX, Xiao HJ, et al. Loupe-assisted versus microscopic varicocelectomy: is there an intraoperative anatomic difference? *Asian J Androl* 2014;**16**:112–4.
- [10] Hsieh ML, Chang PL, Huang ST, Wang TM, Tsui KH. Loupe-assisted high inguinal varicocelectomy for sub-fertile men with varicoceles. *Chang Gung Med J* 2003;**26**:479–84.
- [11] Abdelrahman SS, Eassa BI. Outcome of loupe-assisted subinguinal varicocelectomy in infertile men. *Nephrourol Mon* 2012;**4**:535–40.
- [12] Hsieh ML, Huang ST, Chen Y, Huang HC, Wang TH, Chu SH, et al. High inguinal loupe-assisted varicocelectomy for subfertile men with varicoceles: technical feasibility, clinical outcomes and complications. *Arch Androl* 2006;**52**:179–83.