Blackwell Publishing

Robot-assisted varicocelectomy
DOI: 10.1111/j.1745-7262.2008.00354.x

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·*Original Article*

Initial experience with robot-assisted varicocelectomy

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Abstract

Aim: To determine if robot-assisted varicocelectomy can be safely and effectively performed when compared to microscopic inguinal varicocelectomy. **Methods:** Eight patients aged 29.1 ± 12.5 years underwent microscopic subinguinal varicocelectomies: seven patients with left-sided repair, and one patient with bilateral repair. Eight patients aged 22.0 ± 8.0 years underwent robot-assisted varicocelectomies: seven patients with left-sided repair and one patient with bilateral repair. **Results:** The average operative time for microscopic inguinal varicocelectomy was 73.9 ± 12.2 min, whereas the robot-assisted technique took 71.1 ± 21.1 min. There were no difficulties in identifying and isolating vessels and the vas deferens with robot-assisted subinguinal varicocelectomy. Hand tremor was eliminated using the robotic procedure. Patients who underwent either microscopic or robot-assisted varicocelectomies were able to resume daily activities on the day of surgery and full activities within 2 weeks. There were no complications or recurrences of varicocele. **Conclusion:** From our experience, compared to microscopic surgery, robot-assisted varicocelectomy can be safely and effectively performed, with the added benefit of eliminating hand tremor. *(Asian J Androl 2008 Jan; 10: 146–148)*

Keywords: varicocele; microscopic varicocelectomy; robot-assisted varicocelectomy

1 Introduction

A varicocele is defined as a meshwork of distended blood vessels in the scrotum, usually left-sided, resulting from the dilatation of the spermatic veins. It is currently the most common surgically correctable finding identified in men being evaluated for infertility, and is observed in 8.0%–16.2% of the normal male population and in 21%–39% of infertile men [1, 2].

Several theories have been proposed to explain the observed pathophysiology of varicoceles. Semen quality uniformly declines in animals with induced varicoceles, even when only a left varicocele is produced. The reduction in scrotal temperature after varicocele ligation supports a causative role of increased temperature on the infertility produced by the varicocele. It has been hypothesized that varicoceles cause hypoxia, which might play a role in altering spermatogenesis in the varicocele patient [3]. Recently, a higher frequency of sperm cells with fragmented DNA has been reported in the ejaculate of subjects with varicocele, in comparison with fertile donors, a phenomenon that might be correlated with an increase in reactive oxygen species [4].

Numerous studies have reported the significant benefits on semen parameters with surgical treatment of varicocele [4–7, 8]. Currently there are several surgical approaches available for the treatment of varicocele, including the retroperitoneal high ligation technique, laparoscopic ligation of spermatic veins, the open inguinal approach, and the subinguinal microscopic procedure. Of these approaches, several studies have come to the conclusion that subinguinal microscopic varicocelectomy, a minimally invasive procedure, offers the best outcomes, including shorter hospitalization stays, preservation of the testicular arteries and lymphatics, least number of postopera-

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tive complications and recurrences, and a higher number of pregnancies [2, 9]. The microscopic approach also takes the longest amount of time to perform. Surgeons need time to become accustomed to dealing with micro-instruments and operating without being able to see their hands.

Today, robot-assisted operations are gaining popularity in urological procedures. A benefit of robotic surgical systems is the increased dexterity that the operator has with use of the instruments, which allows the use of traditional surgical techniques and movements in a minimally invasive environment. The motion-scaling and tremor-filtering also permit more measured, precise movements for complex tasks. They also provide advanced viewing capabilities that provide a large, stable, immersive 3-D image. With more experience using these robotic systems, dramatic improvements in speed and skill can occur [10, 11].

The present study reports our preliminary experience using robot-assisted varicocelectomy in comparison with the standard microscopic varicocelectomy for the treatment of varicocele.

2 Materials and methods

Eight patients aged 29.1 ± 12.5 years underwent microscopic subinguinal varicocelectomies: seven patients with left-sided repair, and one patient with bilateral repair. Eight patients aged 22.0 ± 8.0 years underwent robot-assisted varicocelectomies: seven patients with left-sided repair and one patient with bilateral repair.

All varicocelectomies were performed through subinguinal incisions (Figure 1A). The spermatic cord was exposed and delivered out of the wound, and a Penrose drain placed underneath the cord structures (Figure 1B). At this time the Da Vinci robot or operating microscope was then brought in and placed above the surgical field (Figure 1C). The testicular artery and vas deferens with vasal artery and small vasal veins were identified and isolated (Figure 1D). All other veins within the cord were isolated (Figure 1E) and ligated with 5-0 Vicryl sutures and divided (Figure 1F). At the completion of the varicocelectomy, only the testicular artery, lymphatics and vas deferens with its vessels remained.

3 Results

The average operative time for microscopic inguinal varicocelectomy was 73.9 ± 12.2 min, whereas the robot-assisted technique took 71.1 ± 21.1 min. Average follow-up time for the patients in the microscopic inguinal varicocelectomy group was 34.3 ± 6.4 months, whereas for the robot-assisted technique, the average follow-up time was 10.9 ± 7.1 months (Table 1).

In our experience, with the robot-assisted subinguinal varicocelectomy, there were no difficulties in identifying and isolating vessels and the vas deferens. A short learning curve for tying 5-0 sutures was required because of the lack of tactile sensation when using the robot. In comparison to the microscopic technique, there was no hand tremor noticed with the robotic technique. Patients in both groups were able to resume daily activities on the day of surgery and full activities within 2 weeks. Nei-

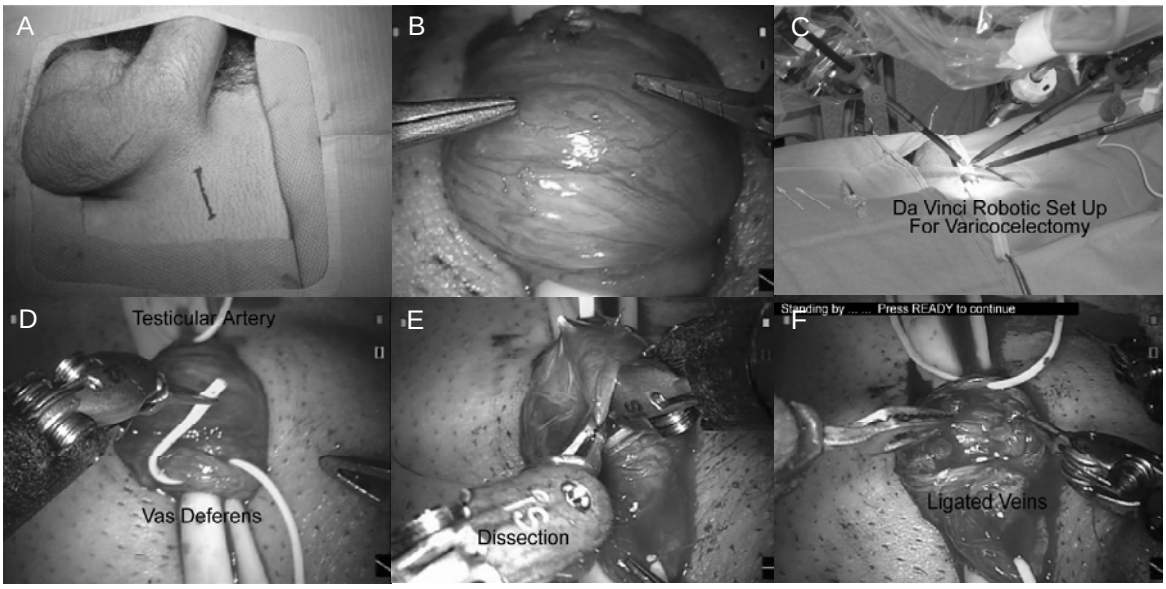

Figure 1. (A): Subinguinal incision. (B): Spermatic cord exposure. (C): Da Vinci robot set up. (D): Testicular artery and vas deferens isolation. (E): Spermatic vein isolation. (F): Spermatic vein ligated and divided.

Table 1. Data of microscopic and robot-assisted varicocelectomies.

	Age (years)	Average operative time (min)	Follow-up time (months)
Microscopic technique 8 patients, 9 varicocelectomies	29.1 ± 12.5	73.9 ± 12.2	34.3 ± 6.4
Robot-assisted technique 8 patients, 9 varicocelectomies	22.0 ± 8.0	71.1 ± 21.1	10.9 ± 7.1

ther intraoperative or postoperative complications nor recurrences of varicocele were observed in either group undergoing varicocelectomy.

4 Discussion

To our knowledge this is the first report regarding the use of robot-assisted varicocelectomy. From our experience, we believe that robot-assisted varicocelectomy can be safely and effectively performed when compared to microscopic surgery. In terms of operating time, there does not seem to be a significant difference even with our initial experience with robotic varicocelectomy. It is a common understanding that with increasing experience and interaction with the Da Vinci robot, surgeons are able to perform any given task more quickly over time. In addition, there is an added benefit of eliminating tremor with the robot in comparison to the microsurgical technique. Also, the advantage of decreased intraoperative and postoperative complications experienced with the microsurgical technique is maintained with the robot technique.

The cost-effectiveness and efficacy regarding the improvement of semen quality and pregnancy for patients with infertility treated with robot-assisted subinguinal varicocelectomy needs to be studied in a larger population.

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