

Journal für
Urologie und Urogynäkologie

Zeitschrift für Urologie und Urogynäkologie in Klinik und Praxis

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Journal für Urologie und

Urogynäkologie 2008; 15 (1)

(Ausgabe für Österreich), 21-22

Journal für Urologie und

Urogynäkologie 2008; 15 (1)

(Ausgabe für Schweiz), 17-18

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Krause & Pachernegg GmbH · VERLAG für MEDIZIN und WIRTSCHAFT · A-3003 Gablitz

P. b. b. 022031116M, Verlagspostamt: 3002 Purkersdorf, Erscheinungsort: 3003 Gablitz

Robotic Prostatectomy: Soon Number 1 in Europe?

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Abstract: Since 1990, laparoscopic surgery has undergone a tremendous evolution, pushed forward by the minimally invasive trend driven by our patients. Complex laparoscopic procedures, such as laparoscopic prostatectomy, have nevertheless faced significant difficulties, rendering them difficult to enter standard practice. However, robotic radical prostatectomy is expanding rapidly since the year 2000 especially in the USA, where actually approximately 70 % of radical prostatectomies are performed laparoscopically with the da Vinci system. This development is related to the facilitation the robot has brought to perform the difficult steps of laparoscopic prostatectomy. The functional outcome of robotic prostatectomy appears similar to the gold standard retropubic radical prostatectomy. This is also the case oncologically, although long-term data are needed for its final validation. The main problem of robotic

prostatectomy is its high material cost, significantly superior to that of the conventional laparoscopic or retropubic technique. The near future will tell how European health systems will react to the American robotic epidemic.

Kurzfassung: Robotische Prostatektomie: Bald die Nummer 1 in Europa? Seit 1990 ist im Bereich der laparoskopischen Chirurgie eine enorme Entwicklung zu beobachten, die durch die Nachfrage der Patienten nach minimal invasiven Eingriffen weiter vorangetrieben wird. Bei komplexen laparoskopischen Verfahren wie z. B. der laparoskopischen Prostatektomie stößt man jedoch auf erhebliche Probleme, wodurch sie nur schwer Eingang in die Standardpraxis finden. Die Anzahl robotischer radikaler Prostatektomien nimmt jedoch seit dem Jahr 2000 vor allem in den USA rasch zu, wo derzeit etwa

70 % dieser Eingriffe laparoskopisch mit dem DaVinci-System durchgeführt werden. Diese Entwicklung ist darauf zurückzuführen, dass der Roboter die komplizierten Schritte einer laparoskopischen Prostatektomie erheblich vereinfacht. Die funktionellen Ergebnisse der robotischen Prostatektomie scheinen mit jenen des Standardverfahrens, der retropubischen radikalen Prostatektomie, vergleichbar zu sein. Dies gilt auch in onkologischer Hinsicht, obwohl für ein endgültiges Urteil noch langfristige Daten notwendig sind. Das Hauptproblem der robotischen Prostatektomie sind die hohen Materialkosten, die erheblich über jenen der herkömmlichen laparoskopischen oder retropubischen Technik liegen. Die nähere Zukunft wird zeigen, wie die europäischen Gesundheitssysteme auf den Roboter-Boom in den USA reagieren. **J Urol Urogynäkol 2008; 15 (1): 21–2.**

Since its first performance in 2000, robotic radical prostatectomy has remarkably expanded because robotics facilitates the performance of this complex laparoscopic operation, less invasive than the gold standard retropubic prostatectomy. For evident reasons, patients are pushing behind this development, since they are looking for surgery with less post-operative pain and discomfort, less body trauma and blood loss, so as shorter hospital stay and quicker recovery.

In our institution indeed, a retrospective comparison of hospital stay and delay for returning to work between robotic and retropubic prostatectomy shows shorter duration for the former (difference of respectively 2 and 10 days).

Conventional laparoscopic prostatectomy does achieve a similar degree of minimally invasiveness for a significantly lower material cost. However, for inexperienced laparoscopists, its learning curve is steep and ranges between 80 to 100 cases [1]. The da Vinci robot (Intuitive Surgical, Sunnyvale, California, USA) provides two major technical improvements in comparison to conventional laparoscopy: instruments that pivot on a double axis at their tip instead of a single axis at the level of the abdominal wall, so as tridimensional instead of bidimensional vision. Hence, the difficult steps of laparoscopic prostatectomy are easier, allowing to shorten its learning curve.

In 2007, the proportion of radical prostatectomies performed with the da Vinci robot has shot up to approximately 70 % in the USA. Presently, this proportion is vastly lower in Europe, but may also follow such a trend. This paper will address the question in its title by comparing some of the oncologic and functional outcomes of robotic and conventional laparoscopic radical prostatectomy, so as their costs.

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The dissection at the junction between the prostate and the urethral sphincter is a technically highly demanding step of laparoscopic radical prostatectomy (LRP). It must be “sphincter-sparing” in order to preserve urinary continence, but must also avoid leaving any residual prostatic tissue (possibly neoplastic) on the sphincter. This difficult compromise has left several teams starting LRP with unsatisfactory oncologic results in their first hundred cases, with a rate of up to 40 % of margin positive specimens for intra-capsular tumours. For comparison, the gold standard of radical prostatectomy – retropubic prostatectomy – is 5 % [2].

We started robotic laparoscopic prostatectomy (RLP) a little less than 2 years ago at our institution, and collected prospective data in order to analyze the length of our learning curve. The interest of our experience is that our center has actually a medium size recruitment of radical prostatectomies (approximately 60 to 70 per year) which is the situation of many institutions. Considering that when initiating a technique, adapted cases have to be selected, this leaves even a single surgeon with not more than a weekly operation, a frequency that may also influence the learning curve.

To assess our robotic learning curve, we looked at our population of intra-capsular tumours (T2). It could be divided into 2 groups: The first 6 patients, whose positive margin rate was 50 %, and the next 44 patients, whose positive margin rate went down to 11 % (6 patients). Of these, only 2 patients had positive margins at the prostatico-sphincteric junction. So RLP was a significant leap forward in the learning curve process. Care was however taken to achieve such convincing results, namely restricting the number of operators to 1 (with respect to our moderate recruitment rate) and by respecting the technical principles of a team that had already been proven efficient [3].

From a functional stand point, we are also satisfied with RLP when looking at urinary continence. Of 61 patients evaluable

with a medium follow-up time of 9 months, 82 % (n = 50) were totally continent (37 had no pads and 13 wore one “security” pad per day). 11 % of patients required 1 pad per day, whereas 5 and 2 % required respectively 2 and 3 pads per day.

Our data on post-operative erectile function are not yet mature, but the literature appears optimistic, with the recovery amounting as high as 74 to 97 % in previously totally potent patients (Table 1). Our complication rate was low and included 1 abdominal wall hematoma, 2 scars infections, 1 partial peri-meatal ureteral obstruction (endoscopically reoperated: JJ insertion), 6 anastomotic leaks (all resolved with prolonged catheter drainage; non in the last 25 patients) and 1 foot paresthesia which recovered completely. Only 1 of our patients was transfused.

Robotic prostatectomy raises however a big socio-economic concern, since its material cost is high. Indeed, according to a

recent retrospective study performed in our division, it exceeds conventional laparoscopic prostatectomy by 2000.– CHF, and the gold standard of open radical prostatectomy by 1500.– CHF (including its advantage of a quicker return to professional activity). Nevertheless, the number of da Vinci robots sold in the USA at the end of the 3rd trimester of 2007 amounted to more than 540. In Europe, it was significantly lower with 119 systems.

In conclusion, the data here above suggest that RLP has a shorter learning curve than conventional LRP, and that its functional outcome is equivalent to the gold standard. Oncologic outcome appears also equivalent, but needs further validation on a long term basis [4]. Material costs do not seem to have hampered its development in the USA. The question is how Europe will follow considering its various health systems. Looking at the future, 3-D radiology planning appears to be the next incoming tool in laparoscopic surgery, and robotics appear particularly suited for that purpose. Hence, it appears that RLP will be the method of choice in a quite near future, owing to its minimal invasiveness, its potential for synergy with 3-D imaging, and eventually the upcoming of robotic intelligence.

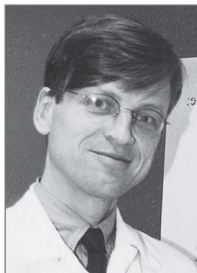
Table 1. Evidence-based data on erectile function recovery (%) after robotic radical prostatectomy (from [4]).

	n	Definition	Data Collection	Months			
				< 60 y	60 y	> 60 y	
Menon 03	200	intercourse	IIEF-5	25	64	nr	nr
Bentas 03	41	intercourse	questionnaire	nr	nr	20	nr
Menon 05	23	intercourse	IIEF-5	nr	nr	74	nr
Chien 05	56	quo ante	UCLA-PCI	54	66	69	nr
Ahlering 05	35	intercourse	IIEF-5	nr	nr	74	nr

Level of evidence: 4

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Christophe E Iselin, MD

After accomplishing his urologic residency at Geneva University Hospital, Christophe Iselin initiated laparoscopy in the division since 1992. He then completed two fellowships in USA: one in urologic oncologic surgery under the guidance of David F Paulson, and the other in reconstructive and female urology and urodynamics under the guidance of GD Webster, both at Duke University Medical Center, Durham, North Carolina. He was then appointed Chief of the Division of Urologic Surgery at Geneva University Hospital in 1998. He is now mainly specialized in prostate cancer and robotic surgery, which he has developed in Geneva since early 2006.

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