EUROPEAN UROLOGY 51 (2007) 12–14

available at www.sciencedirect.com
journal homepage: www.europeanurology.com

European Association of Urology

Editorial – referring to the article published on pp. 186–192 of this issue

Nephron-Sparing Surgery: Current Developments and Controversies

Marco Carini *, *Andrea Minervini*, *Sergio Serni*

Department of Urology, University of Florence, Careggi Hospital, Florence, Italy

After the initial perplexity on the long-term oncologic efficacy of open nephron-sparing surgery (NSS), several studies in the past decade have shown that NSS offers equally effective local control and similar 5- and 10-yr disease-specific survival rates compared to radical nephrectomy [1]. Currently, NSS represents the most accredited surgical therapy for treating renal masses of <4 cm in greatest dimension. Furthermore, many refinements and advances have been made to improve this technique, its safety, and the results, leading to a progressive decrease in the need for either open or laparoscopic radical nephrectomy even for scarcely exophytic and centrally located lesions. Nevertheless, the treatment of small renal masses represents an area of increasing interest and controversy that is mainly driven by the trend towards a narrowing of the recommended surgical margins and by the advent of new minimally invasive laparoscopic and percutaneous procedures. Several papers have been published recently on the necessary amount of normal tissue that should be excised with the tumour to avoid the risk of local recurrence, concluding that if the tumour is completely excised, the width of the resection margin is irrelevant and not correlated with disease progression [2]. We then went further, challenging the accepted wisdom and proposing simple enucleation, which has the advantage of preserving more kidney parenchyma and avoiding major bleeding and the opening of the collecting system; it is also associated with a reported long-term incidence of local recurrence similar to that of partial nephrectomy [3]. Between 1986 and May 2006, 392 patients had kidney surgery for pathologically confirmed pT1a renal cell cancer (RCC), of whom 333 (85%) had simple enucleation and 59 (15%) had radical nephrectomy. Moreover, the number of NSS procedures performed in our department has increased over time due to the increasing surgical experience and better understanding of the technique. Nowadays, if technically feasible, NSS is attempted in all patients with sporadic, unilateral, clinically T1a tumour and is converted to radical nephrectomy only in the presence of an infiltrative growing tumour with no adequate pseudocapsule. However, with the increasing focus on minimally invasive surgery and advanced ablative technologies, several papers showed that NSS can be safe using the laparoscopic approach, and others proposed the use of ablative technologies such as radiofrequency ablation, high-intensity focused ultrasound, and cryoablation, guided either laparoscopically or percutaneously. The cryoablation technique is the more promising ablative technology, reporting the ability to achieve reliable cell kill [4], with the percutaneous approach being a promising minimally invasive alternative for poor surgical candidates by avoiding surgical morbidity and general anaesthesia. Laparoscopic cryoablation offers visual control both of the kidney surface and the ice-ball and safer cryoprobe removal, with easy checking for tumour bleeding with the ability to stop it during surgery.

DOI of original article: 10.1016/j.eururo.2006.06.002
* Corresponding author. Clinica Urologica I, Azienda Ospedaliera Careggi, Università di Firenze, Villa Monna Tessa, Viale Pieraccini 18, 50139, Firenze, Italia. Tel. +39 055 417645; Fax: +39 055 4377755.
E-mail address: carini@unifi.it (M. Carini).

 doi:10.1016/j.eururo.2006.09.003

As with laparoscopic NSS, the first rule to obtain the best surgical results is to duplicate the open surgical procedure, and good results were reported by many centres [5]. Nevertheless, laparoscopic partial nephrectomy remains a challenging procedure because of the difficulty of keeping the warm ischaemia time to <30 min due to technical problems in intracorporeal suturing and to the lack of reliable methods for haemostasis, both of which are limitations for most urologists. Such reasons led some authors to evaluate whether robotic partial nephrectomy could represent a viable alternative to laparoscopic NSS with the goal of decreasing the technical difficulty of intracorporeal suturing and thus decreasing the warm ischaemia time [6–8]. Recent studies by Gettman et al. [6] and Phillips et al. [7] suggested that robotic partial nephrectomy is a safe, feasible, and reproducible technique, reporting their results in a series of 13 and 12 patients, respectively. In this issue of the journal, Kaul et al. from the Vattikuti Urology Institute (a centre with a long experience with robotic radical prostatectomy) present their initial results using a modified port template (inverse triangle) in 10 patients, with the longest reported follow-up available for robotic partial nephrectomy [8]. The average size of the tumour was 2.3 cm (range: 1.0–3.5 cm). The mean console and warm ischaemia time were very promising, at 158 min and 21 min, respectively. One patient had a positive surgical margin but there was no tumour recurrence after a mean follow-up of 15 mo (range: 6–28 mo), and the authors conclude that robotic partial nephrectomy is a viable alternative to open or laparoscopic partial nephrectomy in carefully selected patients with small renal tumours. Although reporting very promising oncologic results, one positive surgical margin at final pathologic analysis (1 of 10) is not something to take into consideration; furthermore, 3 of the 10 patients had postoperative complications such as bleeding requiring transfusions (patient 2), urine leakage (patient 7), and re-exploration requiring nephrectomy (patient 10). Moreover, the use of the da Vinci robotic system implies higher costs, the need for accurate port placement, and the necessary presence of two surgeons experienced in laparoscopy and robotic surgery.

Papers published on open NSS have set a very high standard and led to this procedure being considered the preferred treatment in patients with single, sporadic renal masses of <4 cm in greatest dimension, by which other therapeutic methods should be measured. We think that every proposed minimally invasive therapy should be compared and proved to be equal in oncologic efficacy and safety to that of open NSS, and only after this step should it be considered a viable alternative to open NSS. If this is, indeed, the case for laparoscopic NSS in selected patients with surgery performed by selected and well-trained surgeons adept at intracorporeal suturing, it is not so for robotic NSS and for laparoscopic or percutaneous cryoablation of renal tumours, which are promising techniques needing larger series and longer follow-up periods before being compared with open NSS.

At the same time, open NSS is also widening its horizons to expand the indications to tumours of >4 cm in greatest dimension. Indeed, these tumours behave in a more aggressive way than pT1a and yield a poorer prognosis, but cancer-specific survival is not related to the type of surgical procedure used (NSS vs. radical nephrectomy). Moreover, although larger tumours have been associated with a higher risk of multifocal disease [1], several recent papers showed that multifocality is not directly related to the tumour's greatest dimension [9,10]. Lang et al. reported an incidence of multifocality for tumours of ≤4 cm and ≤7 cm of 12.9% and 10.9%, respectively, showing no significant correlation between multifocality and tumour size [9]. DiMarco et al. retrospectively reviewed the pathologic features associated with multifocality in a series of 2373 patients treated by radical nephrectomy [10]. The incidence of multifocality in the pT1a and pT1b RCCs (clear cell and papillary cell subtypes, taken together) was 6.4% and 2.2%, respectively. A possible explanation for these findings can be found in an excellent retrospective review of 1970 RCCs from the Mayo Clinic [11]. The authors found that each 1-cm increase in tumour size was associated with a 17% increase in the odds of clear cell compared to papillary RCC. Indeed, for smaller tumours (<4 cm), the incidence of clear cell and papillary cell subtypes was 66.3% and 30.6%, respectively, whereas for tumours 4–7 cm the incidence of clear cell subtype increased to 82.7% and that for papillary subtype decreased to 14.1%. The papillary histologic subtype is the most accredited risk factor for multifocality, along with perinephric invasion (pT3a).

Therefore, we consider that the indications for elective NSS will be expanded to include highly selected and well-counselled patients with tumours ≥4 cm in size.

In conclusion, the approach to conservatively treating small renal masses is evolving towards laparoscopy and the use of robotic surgery and laparoscopically guided cryoablation could either decrease or avoid the technical difficulty of intracorporeal suturing and permit more widespread use of laparoscopy. Percutaneous cryoablation could represent a further step forward by avoiding surgical morbidity and general anaesthesia. The published results are promising but larger series and longer follow-up times are needed before these techniques can be compared with open NSS. On the other hand, open NSS is expanding its indication to include selected patients with tumours of ≥4 cm and in this scenario the trend towards a narrowing of the recommended surgical margins/simple enucleation will allow maximum preservation of renal parenchyma and a lower incidence of major complications. These aspects will be helpful, especially for the laparoscopic approach, in which a bloodless surgical bed would be useful to decrease ischaemic time and reduce the incidence of postoperative tubular necrosis. However, blunt tumour dissection using the natural cleavage plane between the pseudocapsule and normal parenchyma might be more challenging with the laparoscopic approach leading to a higher risk of rupture of the pseudocapsule/positive surgical margins [12].

References

[1] Uzzo RG, Novick AC. Nephron sparing surgery for renal tumors: indications, techniques and outcomes. J Urol 2001;166:6–18.

[2] Castilla EA, Liou LS, Abrahams NA, et al. Prognostic importance of resection margin width after nephron-sparing surgery for renal cell carcinoma. Urology 2002; 60:993–7.

[3] Carini M, Minervini A, Masieri L, Lapini A, Serni S. Simple enucleation for the treatment of PT1a renal cell carcinoma: our 20-year experience. Eur Urol 2006;50: 1263–71.

[4] Collyer WC, Landman J, Olweny EO, et al. Comparison of renal ablation with cryotherapy, dry radiofrequency, and saline augmented radiofrequency in a porcine model. J Am Coll Surg 2001;193:505–13.

[5] Albqami N, Janetschek G. Laparoscopic partial nephrectomy. Curr Opin Urol 2005;15:306–11.

[6] Gettman MT, Blute ML, Chow GK, Neururer R, Bartsch G, Peshel R. Robotic-assisted laparoscopic partial nephrectomy: technique and initial clinical experience with da Vinci robotic system. Urology 2004;64:914–8.

[7] Phillips CK, Taneja SS, Stifelman MD. Robot-assisted laparoscopic partial nephrectomy: the NYU technique. J Endourol 2005;19:441–5.

[8] Kaul S, Laungani R, Sarle R, et al. Da Vinci-assisted robotic partial nephrectomy: technique and results at a mean of 15 months of follow-up. Eur Urol 2007;51:186–92.

[9] Lang H, Lindner V, Martin M, et al. Prognostic value of multifocality on progression and survival in localized renal cell carcinoma. Eur Urol 2004;45:749–53.

[10] DiMarco DS, Lohse CM, Zincke H, Cheville JC, Blute ML. Long-term survival of patients with unilateral sporadic multifocal renal cell carcinoma according to histologic subtype compared with patients with solitary tumors after radical nephrectomy. Urology 2004;64:462–7.

[11] Frank I, Blute ML, Cheville JC, et al. Solid renal tumors: an analysis of pathological features related to tumor size. J Urol 2003;170:2217.

[12] Carini M, Minervini A, Lapini A, Masieri L, Serni S. Simple enucleation for the treatment of renal cell carcinoma between 4 and 7 cm in greatest dimension: progression and long-term survival. J Urol 2006;175:2022–6.