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Research Article

Open Partial Nephrectomy: Results from an 8 Year Study

Abstract

Introduction: Nephron sparing surgery is an effective treatment for RCC. Oncological outcome is equivalent to radical nephrectomy, with the added functional advantage. It is underutilized, especially in tumours in anatomically challenging positions like central and hilar positions.

Methods: We analyzed the hospital case notes and electronic records of 90 consecutive cases of partial nephrectomies, done at our hospital over the last 8 years. We collected data on the tumours number, size, position (upper zone, central/hilar and lower zone), histology, margin status, operative time, ischemic time, peri-operative complications, length of stay and recurrences so far. We analysed these data according to tumour site (hilar/central vs. polar).

Results: 43% of tumours were in the middle zone, 32% lower and 25% upper zone. 81% had elective and 19% imperative indication for nephron sparing surgery. 15% had bilateral tumours. Cold ischemia was used in 40% of the time (20.7 min), warm ischemia in 17% (7.2 min) and no arterial clamping in 43% of the time. The collecting system was opened in 79% of cases. Average operative time was 130 min and length of stay 7.2 days. Complications included, chest infection (4.5%), urinary retention (3.4%), ARF(3.4%), re-operation(2.2%), urinary leak(2.2%) and incisional hernia(5.6%). To date there has been no recurrences or metastatic disease. There was no difference in these results between central/hilar tumours as opposed to upper and lower pole tumours.

Conclusion(s): Although may be more technically challenging, nephron sparing surgery for central and hilar tumours is safe and effective.

Introduction

Renal cell carcinoma (RCC) has an estimated rate of 4.4–11.1 per 100 000 person-years [1]. Partial nephrectomy (PN) is the gold standard for small renal masses technically amenable to nephron-sparing surgery (NSS) [2]. Standard indications for NSS fall into three categories: absolute, relative and elective. Absolute indications include circumstances where radical nephrectomy would render the patient anephric, with a subsequent immediate need for dialysis [3]. Relative indications for NSS include patients with unilateral RCC and a functioning contralateral kidney when the contralateral kidney is affected by a condition that threatens its future function, e.g. calculous disease, chronic pyelonephritis, renal artery stenosis, ureteric reflux, or systemic diseases such as diabetes and nephrosclerosis [3]. Elective indications for NSS include patients with localized unilateral RCC and a normal contralateral kidney [3].

With greater surgical experience, more complex and challenging cases involving multiple, central, and larger masses are now conducted [2]. The preservation of renal function associated with PN [4-6], combined with equivalent oncologic outcomes resulted in American Urological Association and European Association of Urology to declare PN as the gold standard [2,7].

Objective

To present the results of an 8 year study on nephron sparing surgery in a regional urology center. To compare results with other series using minimally invasive surgery, nephron sparing surgery which are underutilized in the treatment of renal cell carcinoma.

Methods and Materials

Over the past 8 years data was collected on 102 cases of open partial nephrectomy at Worcestershire Acute Hospitals by two senior surgeons. Via retrospective study of case notes & electronic records, we collected data the position of tumour, (lower, central/ hilar, upper zone), operative and ischaemic time, length of stay, post-operative complications, metastases and recurrence during follow up.

The technique used was as follows. A supra 11th rib loin incision was made, with retraction of the rib. The kidney was mobilized and identification vessels identified. Mannitol (i.v.) was administered before arterial then venous occlusion and rapid cooling with slush ice if cold ischaemia was required. After tumour removal, repair was achieved with use of an argon beam laser, flow seal and surgi-cell with polydioxanone (PDS) suture used to under-run exposed vessels and repair the pelvicalyceal system.

Results

38 cases were in females, 64 in males. The median age of the patients was 56.6 (range 23-80) years. The tumour presentation was incidental in 63 cases, 9 with haematuria, loin pain in 7, recurrent UTIs in 4, 8 undergoing surveillance and 2 with tuberous scelerosis. 51 patients were none smokers, 16 patients had not specified, and 35 were smokers. In 41 cases the tumour was on the right.

Histology was RCC in 61 cases, angiomyolpoma 8 cases, oncocytoma 7 cases, cystic hypernephroma 1, simple cyst 1. Of renal cell carcinoma the pathology was clear cell in 45 cases, chromophobe

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5, clear and granular cell 3, granular cell 3, papillary 4. One case had a sarcomatoid component. 18 had cystic architecture.

Staging T1a 36 cases, T1b 20 cases, T2 1 case, T3a 2 cases, T3b 1 case.

Fuhrman grading: 3 cases grade 1, grade 2 28 cases, grade 3 25 cases, grade 4 4 cases.

Tumour multifocality was present in 4 cases. Tumour margins were present in 4 cases. Necrosis was present in 11 cases. Vascular invasion was present in 7 cases. No cases had nodal involvement.

Discussion

We have demonstrated for the majority of tumours in the central hilar region, using this procedure, there is no undue prolonged operative time or length of stay when operating on renal tumours in this region. The efficacy of this system is demonstrated by an extremely low percentage of complications that can occur and no recurrence. Nephron sparing surgery although technically challenging gives good oncological control whilst preserving renal function.

Nephron sparing surgery is considered effective and safe, with acceptable complication rates [3,5,6]. Partial nephrectomy (PN) offers a functional advantage over radical nephrectomy for many cases of localized renal cell carcinoma. Long-term renal function remains stable in most patients with solitary kidneys after a reduction of more than 50% in renal mass [8]. A number of techniques are now available for treatment of RCC including cryoablation, radiofrequency ablation, and laparoscopic PN (LPN) and robotic PN [4]. Yet open partial nephrectomy (OPN) remains the gold standard for those who would be rendered anephric those likely to have renal insufficiency in the near future and increasingly in the management of smaller unilateral tumour. However, PN is underutilized particularly in anatomically challenging cases Table 1.

Table 1:

Comparison with other UK series	Worcester	Guys and Oxford Patel et al. [3]	Queen Elizabeth, Birmingham Wallace et al. [4]
Number	102	100	147
Cold Ischaemia time %	42	35	98.6
Warm Ischaemia time %	11.7	44	1.4
Ischaemia time (cold)	23 mins (16-50)	33 mins (10-120)	
Ischaemic time (warm)	9 mins (7-18)	22 mins (9-50)	
Length of stay (days)	7(2-24)	6(3-50)	10 (3-56)
Operative complications			
Conversion to nephrecotmy %	3.3	4	2.7
Ureter opened %	-	1	-
Primary bleeding%	2	3	6
Urinary leak%	2	1	1
Acute Renal Failure %	5	13	3.4
Perinpehric collection/ Haematoma %	6.6	4	-
Wound infection %	-	3	0.7
Upper GI bleed %	-	1	0.7
Pulmonary Embolism %	-	1	1.4
Urinary Retention %	5	1	0.7
Incisional hernia %	6.6	-	0.7

Conclusions

As shown it is a safe operation with acceptable complication rates. Nephron sparing surgery appears to be under-utilized in the UK, especially for elective indications. In experienced hands there are fewer 'Unfavorable locations' unsuitable for nephron sparing surgery. If robotic or laparoscopic options are not available, open surgery, in experienced hands is a suitable alternative.

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