Role of laparoscopic nephrectomy for refractory hypertension in poorly functioning kidneys

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ABSTRACT

INTRODUCTION Hypertension is a common medical problem mainly treated by effective antihypertensive drugs. Persistent hypertension can be difficult to manage and have detrimental effect on vital organs. Nephrectomy of poorly functioning kidneys may be indicated in a minority of such cases.

PATIENTS AND METHODS We performed laparoscopic nephrectomy on 12 patients with refractory hypertension.

RESULTS Eight had complete response, three had partial response and one had no response.

CONCLUSIONS Laparoscopic nephrectomy has a role in carefully selected adult patients with refractory hypertension due to non-functioning kidney. Patients need to understand the surgical risks as well as the small risk of failure to treat hypertension.

KEYWORDS

Hypertension – Laparoscopy – Nephrectomy

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Hypertension affects millions around the world.¹ Effective treatment is multifaceted starting with life-style changes to combination drug therapy. The main aim is to achieve a reduction in blood pressure (BP) to below 140/90 mmHg (systolic/diastolic) in order to minimise the risk of target organ damage.² Resistant hypertension is a challenge to clinicians. The risk of organ damage increases if BP is not controlled. In selected cases of renal disease, nephrectomy may allow adequate BP control in otherwise uncontrolled hypertension. The advancement of laparoscopic nephrectomy may lead to decreased morbidity and faster recovery in these patients.³

Patients and Methods

All patients referred to us had been treated for hypertension for more than 5 years. The indication for nephrectomy was uncontrolled hypertension despite long-term medical treatment, recurrent renal pain, pyelonephritis or poorly functioning kidneys. Antihypertensive medications in these patients included bendrofluzide, atenolol, labetalol, indapamide, perindopril, captopril and ramipril. Pre-operatively, patients had renal ultrasound, serum creatinine, urea and full blood count assessments. Patients had functional renograms to confirm the presence of a poorly functioning kidney (< 10% of split function). They underwent laparoscopic retroperitoneal nephrectomy under general

anaesthetic using a standard 3-port technique. Balloon dilatation of the retroperitoneal space was performed using a visual balloon dilating trocar (balloon inflated to 500 ml). CO₂ insufflation was commenced. The Gerota's fascia was opened and the renal vessels identified, clipped and cut. The kidney was carefully dissected free and removed through the extended middle camera port.⁴

A total of 12 patients (7 females, 5 males) underwent laparoscopic retroperitoneal nephrectomy between 2002 and 2006. The mean age was 41 years (range, 30–65 years). The pre-operative blood pressure was 165 ± 35 mmHg systolic and 102 ± 29 mmHg diastolic (mean ± SEM). Mean serum creatinine pre-operatively was 110 µmol/l (range, 53–125 µmol/l). Pre-operatively, five patients were on two antihypertensives, six were on one antihypertensive, and one was on four antihypertensive medications. Patients were followed up for a mean of 4.2 years (range, 2–6 years).

Results

The mean blood loss was 75 ml (range, 25–250 ml), mean operative time 112 min (range, 70–400 min) and mean hospital-stay 2.5 days (range, 2–4 days). The mean time for full recovery was 3 weeks (range, 2–6 weeks). Mean creatinine postoperatively was 113 µmol/l (range, 54–120 µmol/l).

Histological examination of nephrectomy specimens showed renal atrophy due to chronic hydronephrosis in eight patients, atrophy in three patients and nephrosclerosis in one patient. Postoperatively, blood pressure was 121 ± 9 mmHg systolic and 72 ± 6 mmHg diastolic in eight patients who stopped all antihypertensives. Three other patients had partial response with reduction in the number or the dose of antihypertensive medications. One patient had no change and was still on the same pre-operative antihypertensives at 30-month follow-up. There were no complications and no conversion to open surgery.

Discussion

Medical treatment for hypertension is highly effective; however, a minority of patients remain difficult to treat. Refractory hypertension is associated with increased cardiovascular risks.² It causes volume overload due to a range of factors including progressive renal damage, excessive dietary sodium intake and insufficient diuretic treatment.⁵ Renovascular disease can be excluded with computed tomography angiography, gadolinium-enhanced three-dimensional magnetic resonance angiography, captopril enhanced radionuclide scan and duplex Doppler flow study.^{6,7} Surgical or percutaneous transluminal revascularisation are effective treatment; however, it is not clear whether it is superior to medical treatment alone.⁸ Renal vein renin ratio (RVRR) can be used as a diagnostic and prognostic tool in renovascular hypertensive disease.⁹ It is an invasive test done with angiographic sampling; a high renin gradient on the affected renal side coupled with a low gradient on the contralateral side is called lateralisation. In a review of 100 sampling cases, Hasbak *et al.*¹⁰ found poor predictive value of lateralisation. In parenchymal disease, the value of RVRR is undetermined. In our series, all patients had unilateral end-stage kidneys and, therefore, angioplasty or RVRR assessments were deemed unnecessary.

Nephrectomy for unilateral parenchymal renal disease has been reported in the paediatric age group. In a cohort of 320 children, Baez-Trinidad *et al.*¹¹ performed 22 nephrectomies for hypertension, eight of whom had unilateral parenchymal renal disease including renovascular hypertension, page kidney, reflux nephropathy, and renal artery stenosis. All patients in this group had successful control of their blood pressure (complete and partial success) at 17-month follow-up. In another study, Johal *et al.*¹² performed unilateral nephrectomy on 21 paediatric patients, majority of which had scarred atrophic kidneys. They reported 16 (76%) complete response, four (19%) partial response, and one (5%) non-responder with average follow-up of 39 months. In our series, the response (complete and partial) is comparable at 91%. Longer follow-up is needed.

Before the advent of minimally invasive surgery, nephrectomy was a major undertaking with some patients left with a large scar and having still to take antihypertensives (partial or non-responders). Therefore, renal physicians were reluctant to consider the option of major surgery for a partial success and, on

balance, would always prefer medical treatment. The establishment of laparoscopic nephrectomy with its many advantages means that more patients with refractory hypertension can be considered for the surgical option.

Patients of child-bearing age, who are on angiotensin converting enzyme inhibitors (ACEI) and are considering pregnancy, usually have to discontinue ACEI and start other antihypertensive agents before conception. Laparoscopic nephrectomy could offer a minimally invasive option prior to their pregnancy and allow these patients to be free of medication. One of our patients became pregnant and had a child after her laparoscopic nephrectomy, although pregnancy was not the main indication for the operation.

Conclusions

Laparoscopic nephrectomy is minimally invasive and has a role in carefully selected adult patients with refractory hypertension due to non-functioning kidney. Patients need to understand the surgical risks as well as the small risk of failure to treat hypertension.

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