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Case Report

Partial nephrectomy for renal cell carcinoma in an allograft kidney with limited functional reserve

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Abstract

The increased risk of malignancies is a well-recognized complication of organ transplantation. When renal cell carcinoma (RCC) occurs in kidney transplant recipients, less than 10% of it affects the allograft. Recent experience suggests that partial allograft nephrectomy for tumours less than 4 cm may be considered the treatment of choice. We report a case of a 3.3 cm RCC discovered in a renal allograft. Limited allograft function was due to segmental infarction after transplant surgery and chronic allograft nephropathy. She underwent successful partial allograft nephrectomy. At 36 months post-surgery, there is no evidence of RCC recurrence and she remains free of renal replacement therapy.

Keywords: immunosuppression; partial nephrectomy; renal cell carcinoma; renal transplant

Introduction

Malignancy is a recognized complication of renal transplantation. In Australia, it is estimated that 25% of all renal transplant recipients surviving for 20 years will develop a non-skin cancer [1]. Renal cell carcinoma (RCC) accounted for 4.6% of *de novo* cancer in solid organ transplant recipients, but the majority occurred in native kidneys and less than 10% in allograft kidneys [2].

Most tumours arising in allograft kidneys were traditionally treated by radical nephrectomy. A number of case reports have been published on partial nephrectomy as a treatment option particularly when the RCC is less than 4 cm [3–6]. We report a case of RCC in a kidney allograft compromised by previous segmental infarction and chronic allograft nephropathy (CAN), which was treated successfully with nephron-sparing partial nephrectomy.

Case report

A 47-year-old woman with end-stage renal disease due to reflux nephropathy underwent deceased donor renal transplantation in 1994. This was complicated by upper pole segmental infarction 12 days after transplantation. Her serum creatinine on discharge was 140 μmol/L. Maintenance immunosuppressive therapy included cyclosporine and azathioprine. CAN was confirmed on biopsy 7 years after transplantation. Subsequently, cyclosporine was changed to sirolimus. Sirolimus was changed to tacrolimus 2 years later due to heavy proteinuria (4.5 g/day).

Eleven years after transplantation, a 3.3 cm mass was found in the lower pole of the renal allograft during transabdominal ultrasound for investigation of pelvic pain. Magnetic resonance imaging confirmed the presence of a complex cystic mass that was highly suspicious for a RCC. There was no radiological evidence of local and distant metastases or involvement of the native kidneys. At that time serum creatinine was 259 μmol/L.

The patient underwent a partial allograft nephrectomy. The surgical procedure was the same as described by Merkel *et al*. [3]. Histopathology confirmed a multilocular cystic RCC with free parenchymal resection margins.

Post-surgery, she developed acute tubular necrosis of the allograft and required three haemodialysis sessions. She subsequently made an uneventful recovery with serum creatinine 272 μmol/L on discharge. The maintenance immunosuppressant was not altered before or after surgery. Three years after surgery, there is no evidence of RCC recurrence and she remains free of renal replacement therapy.

Discussion

Traditionally, the treatment for RCC arising from kidney allografts has been allograft nephrectomy, withdrawal of immunosuppressive therapy and resumption of dialysis. However, recent data suggest that partial nephrectomy is emerging as a viable alternative option. Butler *et al*. reported that radical nephrectomy and partial nephrectomy provided equally effective treatment for single, localized RCC of less than 4 cm in native kidneys [7]. One long-term follow-up study has found the cancer-specific survival to be 100% at 10 years in patients who underwent partial

nephrectomy with tumours less than 4 cm [8]. RCC involving transplant recipients appear to have similar biological behaviour as those involving patients without immunosuppression [9]. As a result, the use of partial nephrectomy has been extrapolated into the management of RCC in kidney allografts.

There were 18 cases of tumour in renal allografts treated by partial nephrectomy reported in the worldwide literature [6]. Of these cases, 13 (81%) had RCC, 2 had oncocytoma, 1 had angiomyolipoma and the pathology was not reported in 2 cases. Of the RCC cases, 11 cases (85%) were small lesions measuring less than 4 cm while one was 6 cm and the other 9 cm. Mean time of diagnosis after transplantation was 11.1 years (range: 1 month to 21.5 years). In this series, mean follow-up after partial allograft nephrectomy was 32 months (range: 0.5–138 months) with no patient reported to develop local recurrence, renal failure or distant dissemination.

Although the data are limited, the evidence so far indicates that nephron-sparing surgery provides a durable cancer control of tumours less than 4 cm without significant compromise to graft function. Therefore, partial graft nephrectomy may be proposed as the treatment of choice for tumours less than 4 cm. This would avoid returning patients to dialysis that is associated with inferior life expectancy and quality of life when compared with a functioning graft. Moreover, partial graft nephrectomy avoids overtreatment of unexpected non-malignant tumours.

In the majority of previous cases, partial graft nephrectomy was performed on good functioning allograft with serum creatinine between 79 and 158 μmol/L. However, in the case described, the graft function is compromised because of segmental infarction and CAN. Partial graft nephrectomy in allograft kidneys with severe compromised function has only been reported in two previous cases, one with creatinine of 211 μmol/L and 222 μmol/L in the other [4,5]. Graft function in these two cases was still preserved after 6 and 22 months, respectively. To our knowledge, the described case is the first to have undergone successful partial allograft nephrectomy in the setting of segmental infarction.

Partial nephrectomy of the renal allograft is a challenging procedure to undertake. It is performed in a non-naïve surgical field where severe inflammation and scarring are usually present, making kidney mobilization, pedicle control and parenchymal resection often difficult. The continuous perfusion of the allograft with the cooled Ross solution preserved the residual kidney function, as seen in the Merkel's case [3] and the current case. This continuous perfusion also made it easier to identify and individually ligate all vessels in the cut surface to minimize blood loss. Intra-operative ultrasound can assist in gaining satisfactory clearance and preserve renal parenchyma for optimal renal function. It also allowed exact determination of the extent of these lesions if polycentricity is present [10].

RCC arising from a renal allograft is rare. Data are accumulating to suggest that preservation of renal function can be achieved by partial nephrectomy without sacrificing control of the malignancy.

Conflict of interest statement. None declared.

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