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Urothelial carcinoma transmission via kidney transplantation

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Abstract

Transmission of urothelial carcinoma via solid organ transplant has never been reported in the literature to our knowledge. We report a case of transmission of this tumour to a kidney recipient. The donor was a 37-year-old woman, victim of a subarachnoid haemorrhage. The recipient was a 21-year-old girl, with a history of chronic kidney disease secondary to neurogenic bladder. This fatality has been rarely described in literature, but never with this histological type of cancer. Nowadays, with the expanded criteria for donation, older people are accepted as donor because of the shortage of organs. However, this may increase the likelihood of the number of cancer transmission.

Keywords: cancer; cancer transmission; kidney donation; kidney transplantation

Introduction

Upper urinary tract transitional cell carcinoma (TCC) refers to malignant changes of the transitional epithelial cells lining the urinary tract from the renal calyces to the ureteral orifice. These neoplasms account for <5% of all renal tumours, and <1% of genitourinary neoplasms [1].

Tumours of the upper tract are twice as common in men, and the peak incidence occurs between age 50 and 60 [2].

Multifocality is common since the entire urothelial surface is affected by the same carcinogenic influences (the 'field cancerization' effect), although bilateral upper tract tumours occur in <2% of cases.

Over 90% of tumours of the renal pelvis and ureter are of urothelial origin, most commonly TCC, and histologically identical to bladder tumours. The histological grade of the tumour correlates with the pathologic disease stage, with low-grade tumours generally having earlier stage disease and a better prognosis [3].

Squamous cell carcinomas (SCC) account for ~8% of renal pelvic tumours and are associated with a poorer prognosis than TCCs, because they tend to be sessile and deeply invasive at presentation. SCCs have been associated with antecedent calculi or chronic infection [4]. Adenocarcinoma of the renal pelvis is exceedingly rare.

In rare cases, tumours from outside the genitourinary tract may spread to the renal pelvis or ureter by haematogenous or lymphatic channels, or may involve these structures by direct extension [5].

Transmission of high-grade urothelial carcinoma in solid organ and bone marrow transplants has never been reported in the literature to our knowledge. There are some case reports of others tumours transmission, and their consequences can be devastating to the organ recipient [6–9].

We present a case of transmission of high-grade urothelial carcinoma from a 37-year-old deceased donor, victim of a subarachnoid haemorrhage.

Case Report

A 21-year-old woman, with a history of myelomeningocele, neurogenic bladder and chronic kidney disease received a deceased donor kidney transplantation. The donor was a previously healthy 37-year-old woman, who suffered a subarachnoid haemorrhage. The allograft had a good macroscopic aspect, and the cold ischaemia time was 12 hours. Two other recipients had benefited from a liver and a kidney transplant from the same donor. Immunosuppression consisted of basiliximab and methylprednisolone at induction, followed by a post-transplant regime comprising tacrolimus, mycophenolate mofetil (MMF) and prednisone. After 13 days, an ultrasonographic needle-guided biopsy of the allograft was performed because of a delayed allograft function. The biopsy occurred without any complication. The histopathology revealed only an acute tubular necrosis. No peritubular capillaritis or tubulitis were observed, and immunostaining for C4d was negative. On the 20th post-operative day, she recovered renal function and was discharged from the hospital. Three months later, she was readmitted because of a gross haematuria. An allograft Doppler sonography and an arteriography suggested that an arteriovenous fistula and an endovascular embolization should be performed to stop the bleeding. After 16 days, she was discharged without any complaint, but modest intermittent bleeding occurred a few days later. One month after the first episode, a new embolization was made because of life-threatening haematuria. At this moment, the patient had an isolated episode of fever, and a chest X-ray revealed a bilateral interstitial infiltrate. At that time, she had no dyspnoea. Antimicrobial therapy was prescribed, and a chest computed tomography (CT) revealed a random distribution of micro- and macronodules in both lungs. An echocardiogram did not show any vegetation, and a control chest CT conducted after 21 days showed enhancement of the nodules (Figure 1). The patient was complaining of mild dyspnoea, and a percutaneous lung biopsy was performed. No bacterial, fungal, mycobacterium or neoplastic cell was identified, just necrotic tissue. Another episode of gross haematuria occurred, and a surgical allograft removal was done 7 months after the transplant. The histopathology of the transplanted kidney revealed an invasive urothelial carcinoma. Immunosuppression was then discontinued. A few days later, the patient had an isolated episode of haemoptysis, and an open lung biopsy was performed. The hypothesis of metastasis was confirmed, and a chemotherapy with paclitaxel started. One month after the biopsy, she had a sudden and intense headache, undergoing loss of consciousness. A cranial CT revealed a large parietal haemorrhage. She died on the next day.

At this time, the state organ procurement was advised of the neoplasm transmission. The 37-year-old lady had donated her other kidney and her liver. A few days later, a child that received the liver was submitted to an abdominal ultrasonography that showed nodules in her liver. A biopsy confirmed the tumoural aetiology.

The other patient that received the other kidney had no other signs of the neoplasm transmission.

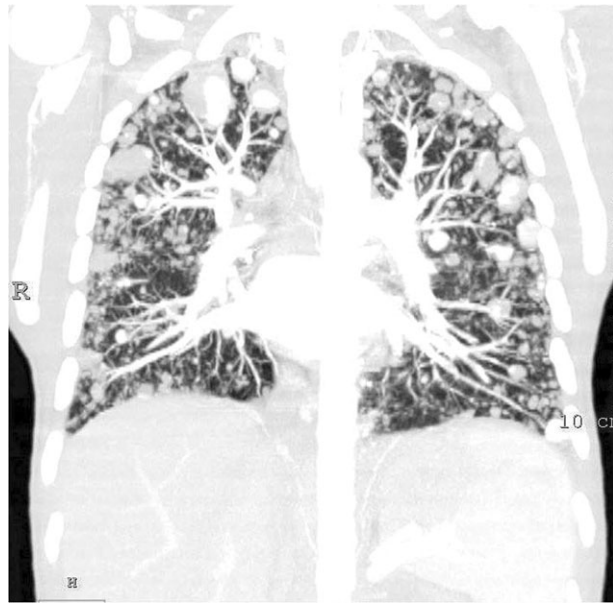


Fig. 1. Chest CT with multiple nodules randomly distributed.

Discussion

Malignancy after transplantation can occur in three different ways: *de novo* occurrence, recurrence of malignancy and donor-related malignancy. Transmission of malignancy in an immunosuppressed recipient usually occurs when the tumour is undetected before or during the organ donation or it may be misdiagnosed.

Studies have shown that the rate of cancer transmission from donors with known or incidentally discovered malignancy ranges from 42 to 45%. The incidence of donor neoplasm transmission is uniform among all solid organ recipients [6]. The mean time from transplantation to presentation of the donor malignancy transmission is 2 months, although time ranges from 2 days and 38 months in a study published by Buell and co-workers. The patient described in this manuscript presented the symptoms related to the tumour 3 months after the transplant.

The most frequently reported transmission of non-central nervous system (CNS) tumour has been renal cell carcinoma followed by melanoma and choriocarcinoma [7]. There are few case reports about transmission of other tumours like adenocarcinoma and sarcoma, both of which appear to be highly aggressive. To our knowledge, this is the first case of urothelial cell carcinoma transmitted from a solid organ transplant. This tumour presented a very aggressive evolution. In some patients, cessation of immunosuppression leads to rejection of the tumour by the recovering immune system of the recipient [8]. On the presented case, withdrawal of these drugs did not result in any improvement of the pulmonary lesions, and chemotherapy was introduced.

Since the extra-neural spread of primary brain tumours is rare (0.4 to 2.3%) [9], transplantation of organs from donors with primary CNS malignancies has generally been accepted. The risk factors for extra-neural spread have been

determined and include cell type and tumour grade, history of neurosurgical processes like craniotomy, ventriculosystemic or peritoneal shunt, history of tumour radiation and duration of the disease [10]. However, the absence of risk factors does not exclude the possibility of extra-neural spread [11].

Although in the presented case the donor was not a high-risk patient for cancer, severe organ shortages have led to donor pool expansion to include older individuals, patients with hypertension, diabetes and a past history of cancer. This might increase the risk of neoplasm transmission.

Conflict of interest statement. None declared.

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