

Adnexal tumor found during a brain-dead donor organ retrieval: a case report*

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Abstract

Pre-donation evaluation of organ donors is important. Organ quality directly affects both short- and long-term survival rates of transplanted organs and recipients after transplantation. Contraindications to donation are directly related to recipient survival and medical ethics. The following information is included in this organ donation case report: detailed medical history (primary disease and surgical history), blood type, infectious diseases, coagulation function, biochemical function, tumor biomarker, indicators related to tuberculosis infection, microbial culture indicators, lung computed tomography (CT) scan, and abdominal ultrasound (heart, liver, gallbladder, pancreas, spleen, kidneys, ureters, bladder, adnexa). We found a 10 cm × 10 cm space-occupying lesion in the abdominal cavity in this donor organ retrieval surgery. Frozen or paraffin sections showed that the space-occupying lesion was malignant. The organ donor was not suitable due to the malignant tumor, and the transplantation surgery was canceled. We analyzed this case of organ donation to provide a reference for the follow-up donation evaluation process. This case study reveals the limitations of preoperative non-invasive assessment, the necessity of preoperative multi-dimensional assessment of organ function, and the exclusion of donation contraindications.

Key words: organ donation; donation evaluation; tumor

Received: 31 October 2022

Revised: 24 November 2022

Accepted: 10 December 2022

Organ donation after a citizen's death has become the main source of organ transplantation in China [1]. The quantity and quality of donated organs have become a new topic in organ donation. To match the growing organ demand, an increasing number of marginal organ donors are being covered by our evaluation and maintenance system. Therefore, balancing the use of donated organs and ensuring organ quality and recipient safety has become a major challenge for Organ Procurement Organizations (OPO) and transplant surgeons [2]. Currently, a complete system has been developed for the functional evaluation of donated organs; however, due to the limitations of emergency acquisition and preoperative evaluation,

contraindications for donation may not be noticed [3]. In 2016, the "Expert Consensus on the Function Evaluation and Maintenance of Donated Organs Donated for Chinese Citizens after the Death," published by the Chinese Journal of Transplantation, clearly stated that organs containing malignant tumors (except intracranial tumors) cannot be donated [4]. Therefore, all donations from individuals with malignant tumors are contraindicated to ensure the safety of the recipient. In combination with previous cases in which adnexal tumors were found in organ donation surgeries, this study will allow the process of evaluation and contraindication exclusion for donation cases to be further optimized and will provide evaluation

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* Supported by grants from the National Natural Sciences Foundation of China (No. 81800580), Wuhan Federation of Social Sciences (No. WHSKL2020140), and the Sichuan Medical Law Research Center (No. YF20-Y05).

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experience for subsequent cases.

Case introduction

Medical history

The patient's family members described the patient as follows: 41 years of age, female sex, a 4-year history of hypertension, and a cesarean section. The patient was unconscious when found on the ground by family members one day prior, with no convulsions in her limbs. She presented with dyspnea and incontinence and was immediately sent to the emergency department of the local hospital. Head CT scan showed brain herniation, a large left cerebral hemorrhage in the lateral cerebral hemisphere, and a rupture into the ventricle. Emergency tracheal intubation and ventilator-assisted ventilation were subsequently performed, and the patient was transferred to the intensive care unit for treatment and symptomatic support, including dehydration and hemostasis. The neurosurgeon suggested surgical treatment, but the family refused after being informed about the patient's current condition and the risks of the operation. Therefore, she was transferred to our hospital (Tongji Hospital, Tongji Medical College, Huazhong University of Science and Technology, Wuhan, China) for further treatment with a diagnosis of "ventricular herniation and massive cerebral hemorrhage." The patient was in a deep coma without spontaneous breathing, and brainstem reflexes were not observed. Cerebral blood flow and somatosensory-evoked potentials were consistent with brain death. According to the standard protocol, the family members have signed to discontinue all rescue therapies and proceed with organ donation.

Donation evaluation

Vital signs: The patient was in a deep coma with tracheal intubation and synchronized intermittent mandatory ventilation: FiO₂, 80%; BP, 91/64 mmHg (under the treatment of vasopressors); heart rate, 91 bpm; SpO₂, 95%. **Body check:** bilateral pupils were unequal (left D = 4.5 mm, right D = 5.0 mm), light reflex not observed; bilateral lung breath sounds slightly thicker; scattered moist rales could be heard; and abdominal soft, mobile, dull, negative, and bowel sounds could still be heard. There was no edema in the lower extremities, and no pathological signs were elicited on either side. The assessment of clinical brain death was completed, and the donation of medical ethics materials was completed.

Laboratory tests for blood were as follows: white blood cell count, 13.95×10^9 /L↑; neutrophil percentage, 88.7%↑; neutrophil count, 12.37×10^9 /L↑; lymphocyte percentage, 7.7%↓; lymphocyte count, 1.07×10^9 /L↓; eosinophil percentage, 0.1%↓; eosinophil count, 0.01×10^9 /L↓; mean hemoglobin concentration, 309 g/L↓;

RBC distribution width, SD, 50.2 fL↑. For biochemical tests: albumin, 25.4 g/L↓; urea, 15.20 mmol/L↑; sodium, 164.3 mmol/L↑; creatinine, 223 μmol/L↑; eGFR (based on the CKD-EPI equation), 22.9 mL/min/1.73m²↓; chlorine, 127.9 mmol/L↑; high-sensitivity cardiac troponin I, 824.3 pg/mL↑↑↑. For coagulation tests: D-D dimer quantification, 0.65 μg/mL↑; prothrombin time, 19.0 seconds↑; prothrombin activity, 51.0%↓; international normalized ratio, 1.57↑; fibrinogen, 7.04 g/L↑; activated partial thromboplastin time, 51.0 seconds↑; procalcitonin, 5.92 ng/mL↑; amino-terminal pro-brain natriuretic peptide (NT-proBNP), 515 pg/mL↑; creatine kinase (CK), 1175 U/L↑. For tumor markers: Alpha-Feto protein (AFP), 6.8 ng/mL; carcinoembryonic antigen (CEA), 1.91 ng/mL; Carbohydrate antigen 199 (CA199), 19.32 U/L. Abdominal B-ultrasound showed no obvious abnormalities of the liver, gallbladder, pancreas, spleen, or any fluid in the right pleural cavity, and an abnormal echo in the abdominal cavity was suspected to be due to a dilated bowel with fecal accumulation.

Results

Abdominal space-occupying was found during the organ retrieval operation, as shown in the intraoperative image (Fig. 1), and the frozen and paraffin section reports during the operation showed that the space-occupying tumor was of adnexal mesenchymal origin, suspected to be an endometrial stromal sarcoma accompanied by implantation of the liver capsule (Fig. 2). The donor was not suitable for organ donation due to the malignant tumor, and the liver and kidney transplantation surgery was canceled.

Discussion

In cases where the organ donor has a malignant tumor, the life safety of the recipient is directly impacted, the occurrence of early cancer and carcinoma *in situ* is hidden, and the methods of preoperative exclusion are limited. For donors with primary central system tumors, related risks can be excluded according to the pathological results before donation. However, it is more difficult to identify abdominal tumors, such as those in the gastrointestinal tract, breast, and adnexa.

A case report was published by Frederike Bemelman at the Amsterdam Academic Medical Center in the *American Journal of Transplantation*. Four patients who successfully received lung, left kidney, liver, and right kidney transplants developed breast cancer with similar histological types within 16 months to 6 years after surgery. All the organs donated to these four patients came from the same donor, but no evidence of breast cancer was found at the time of donation^[5]. A DNA test proved that the breast cancer cells came from the organ

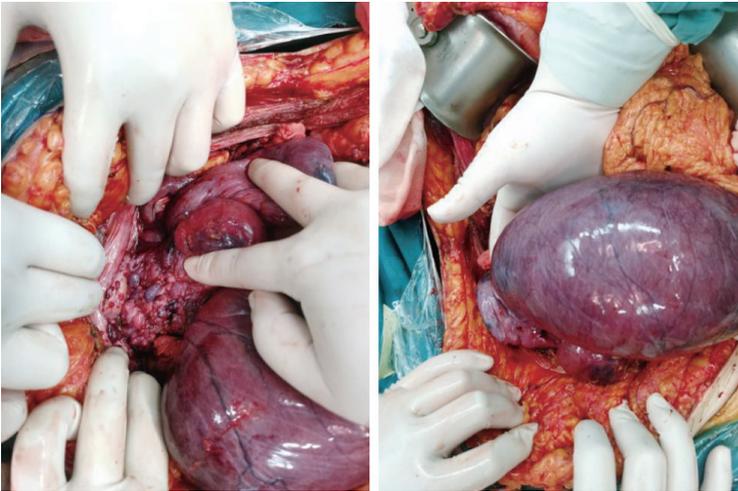


Fig. 1 During the operations, abdominal space-occupying was found

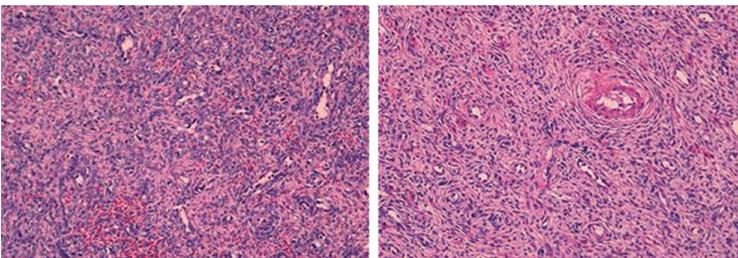


Fig. 2 Rapid biopsy results during the operation showed that the space-occupying tumor was adnexal mesenchymal, suspected to be endometrial stromal sarcoma, and accompanied by implantation of the liver capsule. Pathological diagnosis (HE $\times 200$): (1) Tumor of mesenchymal origin, low potential malignancy, endometrial stromal sarcoma. IHC: CD10 (+), CD34 (-), SMA (+), DES (+), Caldesmon (-), ER (+), PR (+), RB1 (+), ALK1 (-), CD31 (-), CD117 (-), DOG1 (-), S-100 (-), SOX10 (-), H3K27Me3 (+), INT1 (+), HMB45 (-), Melan-A (-), Cathepsin K (-), STAT6 (-), FH (+), Ki-67 (-), and EBER CISH (-). (2) Tumor tissue similar to ovarian and uterine walls was seen on the liver capsule surface, which was considered to be implantable dissemination of the tumor

donor, but the donor had no prior history of tumors and no abnormalities had been found during the preoperative examination. In this report, although the preoperative non-invasive evaluation did not detect the tumor, the presence of *in situ* or early-stage carcinoma could not be excluded, and tumor-infecting events occurred in the circulating tumor cells after transplantation. Therefore, a preoperative examination cannot completely exclude the presence of a tumor. This case also confirmed that organ transplantation may transfer the malignant tumor from the donor to the organ recipient. Even if no obvious tumor metastasis is found, individuals with tumors are not suitable donors.

Some cancer patients are permitted to donate organs, and some scholars have compared the data of the British Transplant Registry with the national data of England, Wales, and Northern Ireland (1985–2001). In a previous study, 495 organs from 177 donors with intracranial malignant tumors were transplanted into 448 recipients, but no metastasis from donor-derived tumors was found [6]. This study concluded that the organs of patients with

primary intracranial malignancies are safe for organ transplantation. Although cancer metastasis may occur after organ donation from patients with such primary diseases, the risk is very low. In all malignancies, the risk of intracranial tumor metastases outside the central nervous system is very low, and studies have shown that when individuals with high-risk factors and glioblastoma multiforme are excluded, those with primary intracranial tumors are suitable donors [7].

A clinical decision support system can facilitate living kidney donor assessments [8]. Our center has established a set of standardized evaluation procedures for early donation evaluation. This evaluation includes the following: detailed medical history (primary disease and surgical history), blood type, infectious diseases, coagulation function, biochemical function, tumor biomarkers, indicators related to tuberculosis infection, microbial culture indicators, lung CT, abdominal ultrasound (heart, hepatobiliary, and pancreas, spleen, kidneys, ureters, bladder, and appendages), as well as contrast-enhanced ultrasonography and preoperative

needle biopsy of the liver and kidneys.

Routinely, the relevant inspections and tests should be completed before donation surgery, and the maintenance and evaluation team, including the transplant physician, will complete the standardized evaluation. In this case, the relevant preoperative examinations were comprehensive, abdominal B-ultrasound abnormalities were reported, and an abnormal echo in the abdominal cavity was suspected to be due to a dilated bowel with fecal accumulation. The adnexal tumor was found during the kidney and liver retrieval, although the preoperative evaluation had been well-established. This discrepancy was mainly due to the low resolution of the bedside B-ultrasound and the lack of clinician experience. In addition, the evaluation team failed to clarify the lesions indicated by abnormal echoes in the abdominal cavity, such as through further non-invasive examinations with CT or MRI, to clarify the relationship between the lesions and surrounding tissues. However, our center has developed a whole-process evaluation procedure, abnormal information reporting, and a discussion system. Although the tumor lesions could not be accurately detected before donation surgery, the abnormal information tracking procedure was implemented in the donation process because of the abnormal inspection indicators before donation. However, because of the accurate judgment of the surgeon during the operation, the consultation of the relevant clinical department during the operation, and the pathological diagnosis of the tumor lesion, the OPO finally terminated the donation.

Organ donation assessment is not an independent unit but runs throughout the entire organ donation process and requires the support of various systems and departments. For example, detailed case records, assessment techniques, and strategies will all affect the accuracy of the assessment. Therefore, when setting up an evaluation process, different processes should be set up according to the situation in each case, and a flexible evaluation method should be established to improve evaluation accuracy.

Based on this case, the donation evaluation process has been further improved, and clinical surgeons have been established to participate in the entire evaluation process. The medical staff of the pre-donation maintenance group should start the operation after evaluation, the relevant special information should be reevaluated during the operation, and the pathological diagnosis should be processed to reevaluate organ quality. Considering the current status of organ donation evaluation, we hope that the evaluation process described in this study will be beneficial to our organ donation evaluation work and ensure the safety of the recipients' operations.

Acknowledgments

Not applicable.

Funding

This study was supported by grants from the National Natural Sciences Foundation of China (No. 81800580), Wuhan Federation of Social Sciences (No. WHSKL2020140), and the Sichuan Medical Law Research Center (No. YF20-Y05).

Conflicts of interest

The authors indicated no potential conflicts of interest.

Author contributions

All authors contributed to data acquisition and data interpretation, and reviewed and approved the final version of this manuscript.

Data availability statement

Not applicable.

Ethical approval

Not applicable.

References

1. Luo AJ, Xie WZ, Wei W, et al. Public opinion on organ donation after death and its influence on attitudes toward organ donation. *Ann Transplant*. 2016;21:516-524.
2. Abt PL, Marsh CL, Dunn TB, et al. Challenges to research and innovation to optimize deceased donor organ quality and quantity. *Am J Transplant*. 2013;13(6):1400-1404.
3. Knight SR, Cao KN, South M, et al. Development of a clinical decision support system for living kidney donor assessment based on national guidelines. *Transplantation*. 2018;102(10):e447-e453.
4. Chinese Society of Organ Transplantation of Chinese Medical Association, Organ Transplantation Branch of Chinese Medical Doctor Association. Expert consensus on organ function evaluation and maintenance of donation after citizen's death in China (2016). *Chin J Transplant (Electronic Edition)(Chinese)*. 2016;10(4):145-153.
5. Matser YAH, Terpstra ML, Nadalin S, et al. Transmission of breast cancer by a single multiorgan donor to 4 transplant recipients. *Am J Transplant*. 2018;18(7):1810-1814.
6. Watson CJ, Roberts R, Wright KA, et al. How safe is it to transplant organs from deceased donors with primary intracranial malignancy? An analysis of UK Registry data. *Am J Transplant*. 2010;10(6):1437-1444.
7. Cacciatori A, Godino M, Bengochea M, et al. Organ donation and primary central nervous system tumors. *Transplant Proc*. 2020;52(4):1024-1029.
8. Bugeja A, Clark EG. A clinical decision support system can help facilitate living kidney donor assessments. *Transplantation*. 2018;102(10):1601-1602.

DOI 10.1007/s10330-022-0607-7

Cite this article as: Zhang B, Shi HB, Xu J, et al. Adnexal tumor found during a brain-dead donor organ retrieval: a case report. *Oncol Transl Med*. 2022;8(6): 314-317.