

Intraoperative ventricular tachycardia during hepatectomy with right atrium and inferior vena tumor derived from hepatocellular carcinoma

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To the Editor:

Institutional Review Board approval and informed consent were exempted because no ethical problem was involved in this case report. After the operation, informed consent for publication was obtained from the patient.

A 65-year-old man with hepatocellular carcinoma in the middle hepatic vein invading the right atrium and inferior vena cava presented for hepatectomy and resection of the right atrium tumor under cardiac pulmonary bypass. Preoperative electrocardiogram and coronary angiography were normal. Preoperative transthoracic echocardiography indicated the right atrium tumor extended from the middle hepatic vein via the inferior vena cava.

Hepatectomy was started before resecting the right atrium tumor under cardiopulmonary bypass. The anesthetic method was general anesthesia maintained with sevoflurane, fentanyl, and rocuronium. Transesophageal echocardiographic examination (TEE) before surgery revealed a tumor in the right atrium and opening of the inferior vena cava (Fig. 1a). The size of the right atrium tumor was about 2×3 cm, and the inferior vena cava was largely occupied by the tumor. When hepatectomy

had almost been completed, the lead II electrocardiogram suddenly showed an elevated ST wave that became a wide QRS wave. The patient developed an acute decrease of end-tidal carbon dioxide and a loss of arterial pressure with the waveform. TEE revealed a deformed right atrium tumor and occlusion of the tricuspid valve caused by the tumor (Fig. 1b). The occlusion of the tumor was not released. Direct cardiac massage was performed immediately, and adrenaline and xylocaine were given intravenously. About 3 min later, the ECG returned to a normal waveform and the patient recovered from cardiovascular collapse. After cardiopulmonary resuscitation, hepatectomy was continued and completed. Subsequently, resection of the right atrium tumor under cardiopulmonary bypass was performed with no problems.

There are many reports of successful operations and management of surgery combining hepatectomy and resection of a right atrium tumor, but intraoperative cardiovascular collapse during surgery has not been reported. The finding of TEE during ventricular tachycardia revealed that the shape and size of the right atrium tumor changed and that the tricuspid valve was occluded by the tumor. This finding indicated that resecting the liver had loosened the right atrium tumor, and occlusion of the tricuspid valve caused by the loosened tumor precipitated cardiovascular collapse.

Transesophageal echocardiographic examination is an effective monitoring method for detecting an intraoperative critical incident [1, 2]. Our report suggests that sudden cardiovascular collapse may occur as a result of occlusion of the tricuspid valve by a tumor during hepatectomy that is complicated by a right atrium and inferior vena tumor, and TEE is essential for monitoring hepatectomy complicated by such a metastasis.

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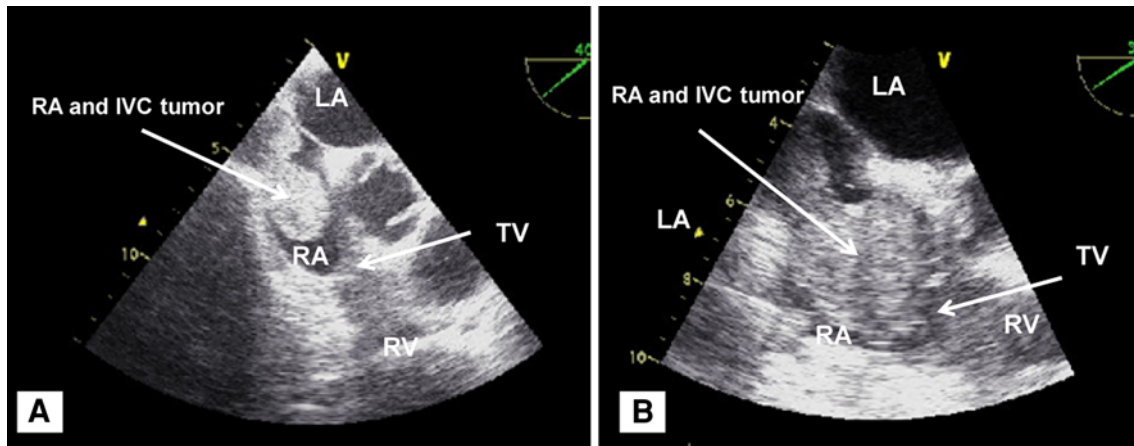


Fig. 1 Transesophageal echocardiographic examination showed a tumor in the right atrium and opening of the inferior vena cava (**a**) (*arrows*). During ventricular tachycardia, the tricuspid valve was

occluded by the deformed right atrium tumor (**b**) (*arrows*). RA right atrium, LA left atrium, RV right atrium, IVC inferior vena cava, TV tricuspid valve

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