

Multimodality Preoperative Planning and Postoperative Follow-up of a Hybrid Cardiac Intervention

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ABSTRACT

We describe the case of a 59-year-old man who had aortic regurgitation and a hypoplastic aortic valve and for whom an echocardiography evaluation revealed a vascular tumor in the roof of the left atrium, which was suspected to be a hemangioma. After undergoing preoperative invasive catheter coronary angiography, echocardiography, and multislice computed tomography examinations, the patient underwent an aortic miniroot replacement. Intraoperative findings confirmed the findings of the preoperative evaluations. The tumor, although macroscopically verified as a hemangioma, was not resected because of the tumor's position and size, and the threat of uncontrollable bleeding. After an uneventful postoperative clinical course, a subsequent successful transcatheter coil occlusion of the coronary fistula from the left circumflex coronary artery was performed as an alternative to surgical resection of the tumor. This case emphasizes the future role of a multimodality hybrid approach for diagnosis, planning (different 2- and 3-dimensional imaging modalities), and treatment in the form of combining interventional (transcatheter) and surgical (open heart) techniques, which could optimize different treatment strategies. This approach could be further improved by increasing the installations of hybrid operating rooms.

HOW TO DO IT – A CASE REPORT

A 59-year-old man experienced aortic regurgitation with a hypoplastic aortic valve, which had been diagnosed 4 years before. In addition, an echocardiography evaluation revealed a vascular tumor in the roof of the left atrium that was suspected to be a hemangioma. An invasive catheter coronary angiographic examination revealed a fistula of the left circumflex artery to the tumor. For better visualization,

we performed a multislice computed tomography (MSCT) examination to size the tumor and provide a topographic illustration (Figure 1). The 3-dimensional volume-rendering technique illustrated the shape and morphology of the tumor and demonstrated its vascularization via a fistula from the left circumflex coronary artery. The 2-dimensional multiplanar reformation allowed exact sizing of the tumor and yielded cross-sectional dimensions of 5.9 cm × 8.4 cm in the transverse plane.

The patient underwent surgery and received an aortic miniroot replacement. Intraoperative findings confirmed the echocardiography, MSCT, and catheter angiography results (Figure 2). The tumor, although macroscopically verified to be a hemangioma, was not resected because of the tumor's position and size and because of the threat of uncontrollable bleeding. Two months later, after an uneventful postoperative clinical course, the patient underwent a successful transcatheter coil occlusion of the coronary fistula from the left circumflex coronary artery as an alternative to surgical resection of the tumor (Figure 3).

The 6-month follow-up examination showed that the patient had fared very well, with the MSCT examination confirming successful and persistent coil embolization of the fistula, a decrease in vascularization, and a decrease in the total size of the tumor to 4.5 cm × 6.5 cm (Figure 4).

DISCUSSION

We have described an incidental finding of a cardiac tumor, which is the typical mode of discovery for such tumors [Brizard 1993; Burke 1996]. We detected the tumor mass during an echocardiographic assessment of the aortic valve. The age and sex of the patient (59 years, male) are typical characteristics for hemangiomas [Thomas 2004]. Hemangiomas are rare [Reynen 1996], however, and thus no clear guidelines exist regarding the ideal therapeutic procedure. More important is to precisely tailor the preoperative planning and therapeutic strategy to the patient to minimize the danger of complications. In this case, we performed a CT scan, which produced 2- and 3-dimensional images capable of providing a detailed description of the morphology and topography of the cardiac tumor. In addition, we also used this imaging

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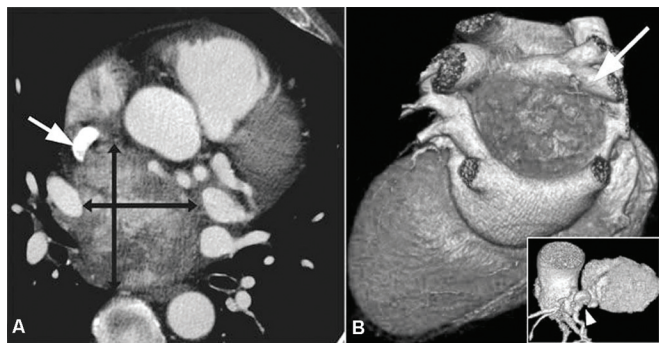


Figure 1. A, Size of the vascular tumor (black arrows) and the compressed superior vena cava (white arrow). B, 3-Dimensional image of the tumor (white arrow) and the fistula from the left circumflex artery (white arrowhead).

technique as a noninvasive postoperative follow-up tool and as a quality-control tool for assessing the patient's treatment. The vessel feeding the hemangioma in this case was identified as a coronary fistula from the circumflex artery. Different techniques—surgical and interventional—have been described for closing coronary fistulas and have shown good results; surgery is more invasive, however [Armsby 2002].

In our case, the patient showed a combination of problems, ie, valvular disease and a hemangioma fed by the circumflex artery. The aortic valve insufficiency was treated by means of an aortic miniroot replacement. Although the aortic valve replacement was performed through a median sternotomy with cardiopulmonary bypass, the risk was considered too high for a resection of the hemangioma in the same session. Both the position of the tumor and the feeding fistula arising from the circumflex artery were hidden behind the aorta. Surgical resection in this situation seemed inappropriate because of the risk of injuring

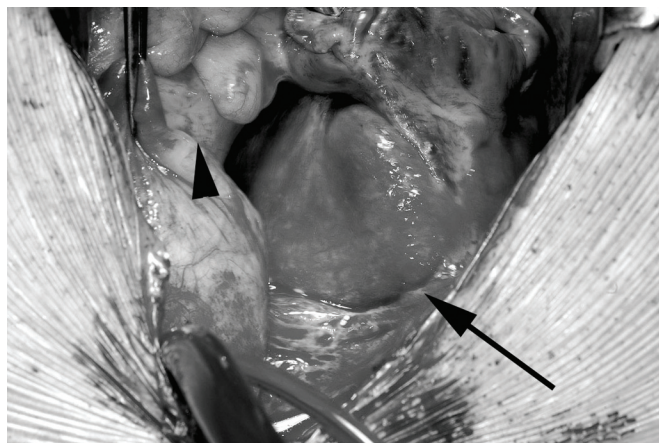


Figure 2. Intraoperative finding of the hemangioma (arrow) on the roof of the right atrium and partially behind the aorta (arrowhead). Because of the adverse positioning of the tumor, intraoperative exposition of the coronary fistula was not possible.

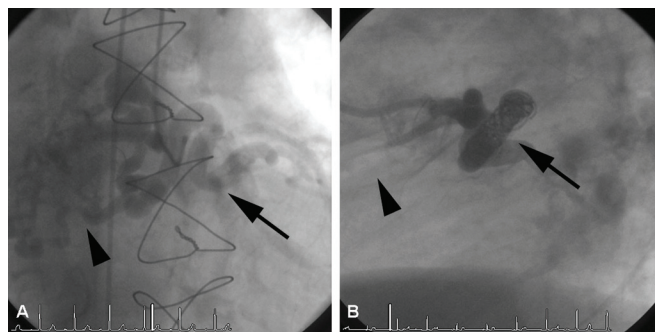


Figure 3. A, Coronary angiography of the hemangioma (arrow) and the coronary fistula originating from the circumflex artery (arrowhead). B, Successful transcatheter coiling of the coronary fistula originating from the circumflex artery (arrow) and disappearance of the hemangioma (arrowhead).

the tumor and the circumflex artery, and of consequent massive, uncontrollable bleeding. Therefore, we decided to treat the hemangioma in a second intervention, which was performed during the same hospital stay. Different techniques exist for interventional closing of a fistula [Armsby 2002]. In this case, we performed a coiling procedure without any complications. A follow-up dual-source CT showed a distinctly reduced tumor 6 months after the intervention (Figure 4).

We have demonstrated that although we successfully performed an aortic miniroot replacement through a median sternotomy, the performance of a percutaneous intervention as a second step to treat the hemangioma was an integral part of the procedure, and we have shown that this 2-step approach can be performed successfully.

CONCLUSION

This case emphasizes the future role of a multimodality hybrid approach for diagnosis, planning (different 2- and 3-dimensional imaging modalities), and treatment in the form of combining interventional (transcatheter) and

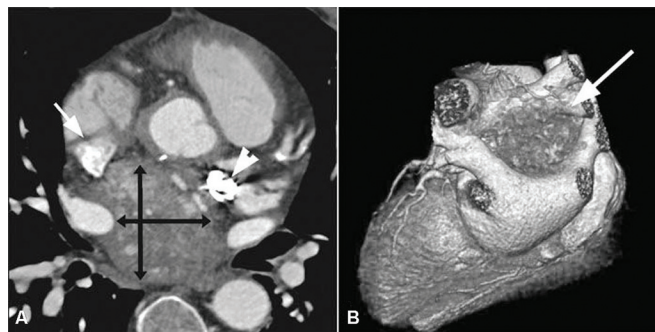


Figure 4. A, Decreased vascularization and size of the hemangioma (black arrows) along with decompression of the superior vena cava (white arrow). Note coils in the fistula from the left circumflex artery (white block arrow) after embolization. B, The decrease in tumor volume can be appreciated in the 3-dimensional image.

surgical (open heart) techniques, which could optimize different treatment strategies. This approach could be further improved by increasing the installations of hybrid operating rooms.

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