BRIEF COMMUNICATIONS

FALSE-POSITIVE DIAGNOSIS OF ASCENDING AORTA DISSECTION BY SINGLE-PLANE TRANSESOPHAGEAL ECHOCARDIOGRAPHY

Eugenio Neri, MD,[a] Dominique Maiza, MD,[a] Gwenael Bureau, MD,[b] Gil Lebreton, MD,[a] Annie Gringore, MD,[a] Olivier Coffin, MD,[a] Massimo Massetti, MD,[a] Jean Claude Potier, MD,[b] and Gilles Grollier, MD,[b] *Caen, France*

Acute descending thoracic aorta dissection was diagnosed on the basis of a contrast computed tomographic scan in a 72-year-old hypertensive man with acute chest pain. At physical examination, the patient was in stable condition, all pulses were present, arterial pressure was 180/85 mm Hg, and a mild aortic diastolic murmur was audible. Electrocardiography showed a 62 beat/min normal sinus rhythm, with no signs of ischemia. Chest radiography showed a moderate mediastinal enlargement. At contrast computed tomographic scan, the descending thoracic aorta showed the signs of acute dissection, with a false lumen with low flow inside evidenced by poor opacification and without evidence of reentry. The transverse aorta was not well visualized, and it was not possible to detect the upper limit of the dissection. The ascending aorta appeared dilated, but no intimal flap could be identified.

We decided to perform transesophageal echocardiography (TEE). We used the Aloka MNI-0260-2, 5 MHz monoplanar transducer (Aloka, Co., Ltd., Tokyo, Japan), which showed an important dissection extending from the innominate artery into the ascending aorta. The ascending aorta appeared dilated, and a flap could be seen above the aortic valve (Fig. 1). No intimal tear was seen, suggesting a retrograde dissection mechanism. Mild aortic valve regurgitation was also noted, and no pericardial effusion was seen. Monoplanar TEE confirmed the presence of a dissection with low flow within the false lumen in the descending thoracic aorta.

Because of the dramatic aspect of the lesion and the suspicion of a retrograde dissection of ascending and transverse aorta, we decided to operate on the patient without delay. A median sternotomy was decided on because of the involvement of the ascending aorta in the dissection. The left common femoral artery was prepared, and the cervical region was included in the operative field. Intraoperative inspection showed a moderately dilated ascending aorta with neither hematoma nor aortic wall abnormality. When the aortic arch was completely exposed, no signs of dissection were detected along the entire circumference of the vessel. The supraaortic branches were intact, whereas evidence of the dissection was detected distally at the origin of the left subclavian artery during the operation.

Because of poor exposure by the median sternotomy approach, we decided on a conservative strategy to avoid treating the uncomplicated descending aortic dissection. We also decided against inspecting the aorta from the inside with the aid of cardiopulmonary bypass because of the negative effects of systemic anticoagulation on the spontaneous evolution of thrombosis of the false lumen of a descending thoracic aorta dissection.

Another TEE investigation was performed after operation with the aid of a multiplanar probe (Hewlett-Packard model 21 364 A, 5 MHz multiplanar transducer; Hewlett-Packard Co., Medical Products Group, Andover, Mass.). It showed normal ascending and transverse aorta (Fig. 2), in contrast to the monoplane TEE study, and confirmed the descending aortic dissection. An artifact on monoplanar TEE dramatically simulating an aortic dissection was evident.

The patient's recovery was uneventful. Contrast computed tomographic scan and multiplane TEE were performed before the patient's discharge from the hospital. Both showed thrombosis of the false lumen. Patient follow-up with weekly multiplanar TEE has confirmed the healing of the descending aortic dissection, with absence of flow inside the false lumen shown by Doppler probe.

The close anatomic relationship between the esophagus and the vascular structures in the chest allows excellent image resolution of TEE. Recently introduced multiplanar TEE has further increased the sensitivity of this technique, providing more complete definition of the ascending aorta, aortic arch, and descending aorta. This improved definition overcomes some of the limitations of monoplanar TEE. The sensitivity of multiplanar TEE is estimated to range between 97% and 99%; the specificity ranges between 77% and 100%.[1]

False-positive findings are mainly caused by acoustic artifacts in the ascending aorta, where aortic dilatation, wall atherosclerosis, and calcifications may lead to erroneous interpretations. Evangelista and colleagues[2] state that echocardiographic artifacts may occur in as many as 40% of patients with dilated aortic roots. Banning and associates[3] reported the case of a patient whose TEE showed a dissection of descending thoracic aorta and a linear shadow in the ascending aorta, which was interpreted as a dissection flap. Surgical inspection revealed an annuloaortic ectasia with dissection of the descending

From the Thoracic and Cardiovascular Department,[a] and the Cardiology Department,[b] University Hospital, Caen, France.

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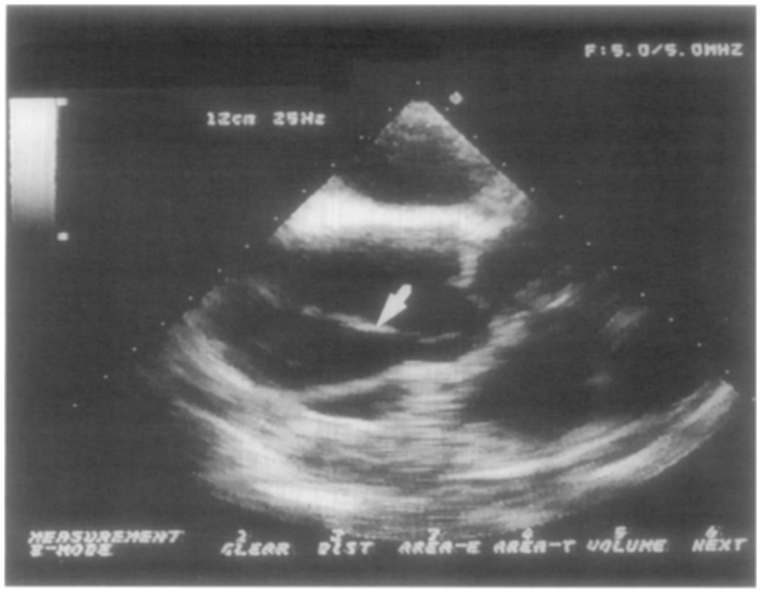

Fig. 1. Monoplanar TEE of the ascending aorta. *Arrow* indicates image of intimal flap above aortic valve.

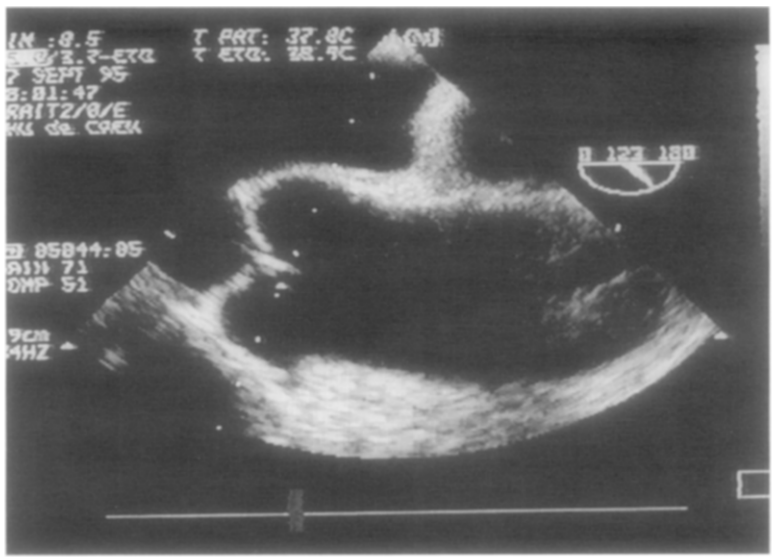

Fig. 2. With multiplanar TEE, no intimal flap image is shown in ascending aorta above aortic valve.

aorta below the origin of the left subclavian artery. That case, which is surprisingly similar to the one we describe here, shows that in emergency circumstances the knowledge of the risk of acute aortic dissection, with a mortality rate of 1% per hour,[4] may potentiate the risk of a false-positive diagnosis.

A retrospective blind review of single-plane TEE images was performed to investigate the possibility of individual interpretation bias. Five experienced readers were consulted, and all made the same diagnosis of acute dissection. They considered the finding of aortic root enlargement, associated with the intimal flap image in the presence of a descending aorta dissection especially suggestive of dissection.

Even if there is debate regarding the choice and the number of investigations to be performed, TEE plays a central role in the diagnosis of suspected dissections because of its accuracy, safety, convenience, and speed. In some institutions, TEE is the sole diagnostic investigation.[3] The goal of this report is to warn the surgical community about the risks of misleading information and incorrect decisions that can occur with monoplanar

TEE because of artifacts. In urgent circumstances, even if the need to minimize delay appears to justify the desire to reduce the number of studies, reliable information is mandatory. We therefore believe that only highly accurate techniques such as multiplanar TEE should be employed in diagnosing aortic dissections.

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STENTED ELEPHANT TRUNK PROCEDURE FOR AN EXTENSIVE ANEURYSM INVOLVING DISTAL AORTIC ARCH AND DESCENDING AORTA

Yukio Suto, MD, Keishu Yasuda, MD, Norihiko Shiiya, MD, Toshifumi Murashita, MD, Masakazu Kawasaki, MD, Michiaki Imamura, MD, Kou Takigami, MD, Shigeyuki Sasaki, MD, Yoshiro Matsui, MD, and Makoto Sakuma, MD, *Sapporo, Japan*

Replacement of extensive portions of the aorta remains a formidable task, especially in patients with poor risk conditions and those with pulmonary disease. In this article, we present a successful single-stage replacement of the arch and descending aorta through sternotomy with the "stented" elephant trunk procedure in a patient at high risk.

A 71-year-old woman, who had undergone prosthetic graft replacement because of a thoracoabdominal aortic aneurysm 6 years previously, was admitted to the hospital because of an extensive aneurysm involving distal aortic arch and descending aorta. Computed tomography showed that the aneurysm was enlarged to 72 mm in diameter and was extended to 3 cm above the proximal anastomosis of the previous prosthetic graft. Because severe pleural adhesion caused by old tuberculosis was found at previous operation, we decided to operate through a median sternotomy without entering the left pleural space. For this purpose, the elephant trunk technique[1] was used and the distal end of the trunk was fixed with a stent under endoscopic guidance.

Operative procedure. The ascending aorta and the aortic arch were exposed through a median sternotomy. Cardiopulmonary bypass was established by ascending aortic and bicaval cannulations. The patient was cooled to a rectal temperature of 20° C. Cardiac arrest was obtained with ascending aortic crossclamping and antegrade and retrograde cold blood cardioplegic solution. Under selective cerebral perfusion and systemic circulatory arrest, the aortic arch was transected just proximal to the aneurysm at the level of the origin of the left subclavian artery. A Gianturco stent (Cook, Bloomington, Ind.), 40 mm in diameter and 50 mm in length, was inserted and fixed to a 30 mm collagen-coated woven Dacron graft, and an endoscope was inserted through it. This combined graft was constricted by three purse-string sutures. Under endoscopic guidance, the combined graft was inserted into the aneurysm as an elephant trunk prosthesis. The distal end of the graft was located 3 cm above the proximal anastomotic site of the previous graft to preserve the intercostal flow, which was identified with the endoscope at 2 cm above the proximal anastomosis. Dense mural thrombus was present in the aneurysm, and no other patent intercostal and bronchial artery was identified. The length of the trunk was about 10 cm. The stent was then expanded by releasing the purse strings to fix the distal end of the trunk.

The proximal portion of the graft was anastomosed to the aortic stump (Fig. 1, *A*), and the invaginated portion of the graft was pulled out. Subsequently, total arch replacement was done with 24 mm gelatin-coated knitted Dacron fabric with four branches. First the branched graft was connected to the elephant trunk, and systemic reperfusion and rewarming were started through the fourth branch. Then the branched graft was anastomosed to the native ascending aorta, and the ascending aorta was unclamped for coronary reperfusion. Finally three arch vessels were sutured end to end to the branch grafts (Fig. 1, *B*). The patient was weaned from bypass without problems. The postoperative course was uneventful. Angiography undertaken 4 weeks after operation indicated adequate expansion of the stent and no blood flow around the graft (Fig. 2).

Discussion. Since Borst, Walterbusch, and Schaps[1] introduced the elephant trunk technique in 1983 this technique has been widely used for staged aortic replacement.[2-4] In addition, these investigators reported one case

From the Department of Cardiovascular Surgery, Hokkaido University, Sapporo, Japan.

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Address for reprints: Yukio Suto, MD, Department of Cardiovascular Surgery, Hokkaido University School of Medicine, Kita-14, Nishi-5, Kita-ku, Sapporo, Japan 060.

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