vascular lumen at all time frames within the cardiac cycle. Results are given in Figure 2 for four 2-dimensional cut planes in the ascending aorta before the bypass, in the descending aorta distal to the bypass, and for both the aortic arch and the proximal bypass (see also schematic analysis, Figure 2, below). The amount of blood flow was readily computed and is displayed as corresponding flow curves with unsuspecting pulse-wave diagrams. Remarkably, about 55% of ascending aortic blood flow volume was directed through the bypass, whereas only 22% was delivered to the aortic arch and thereby to the supra-aortic branches. This "aortic steal" effect led to the decision to introduce α_1 -mimetics. Using this medication, the patient had a relief of neurological symptoms in her daily life.

Discussion

Despite the limitations, such that MRI is not as widely available as ultrasonography and not ubiquitously available, the technique offers a unique possibility for comprehensive assessment of 3-dimensional vascular hemodynamics, especially in complex vascular geometries. More notably, the added information content not assessable with other imaging modalities has the potential to influence therapeutic decision

making, as in the case presented here. However, further serial assessments and patient studies are necessary to evaluate the potential to influence therapeutic decision making and planning of operative procedures in vascular disease.

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Endovascular repair of aortic arch aneurysm after achievement of local anesthesia

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Endovascular treatment of aortic arch aneurysm represents a major challenge, mainly because brain perfusion can be easily compromised during the procedure.

We share our experience with the hybrid approach to aneurysm of the aortic arch in a patient with prohibitive risk for aortic arch replacement under extracorporeal circulation.¹⁻⁴ The hybrid approach includes the construction of a prosthetic bypass between the right and left carotid arteries, followed by the deployment of an endoprosthesis in the aortic arch after achievement of local anesthesia.

In a 72-year-old obese (body mass index, 40) patient with chronic obstructive pulmonary disease (forced expiratory volume in 1 second,

<0.75 L), cardiac failure (left ventricular ejection fraction, 25%), and renal failure (creatinine clearance, 62 mL/min), a computed tomographic scan showed a saccular aneurysm of the aortic arch extending to 1 cm distal to the origin of the brachiocephalic trunk to 3 cm distal to the left subclavian artery, with a maximum diameter of 70 mm. The patient's EuroSCORE was 16, and predictive mortality was 68.71%.

Technique

We approached the aortic arch aneurysm repair after achievement of local anesthesia. The surgical strategy consisted of 2 steps. First, we performed a bypass between the right and left carotid arteries with an 8-mm e-PTFE prosthesis and occluded the left carotid artery proximally to the bypass. Then through a left femoral artery approach, an endoprosthesis was introduced under fluoroscopy and intravascular ultrasonographic control and controlled hypotension (50 mm Hg).³ We choose an endoprosthesis with a diameter of 40 mm and a length of 115 cm, with an oversizing of 20%.

The endoprosthesis was deployed in such a way that the bare springs were on the origin of the brachiocephalic trunk (Figure 1).

Fluoroscopy and transesophageal echocardiography were performed to confirm appropriate graft deployment and the absence of

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Figure 1. The aortic arch aneurysm has been excluded, deploying an endoprosthesis in such a way that the bare springs were on the origin the brachiocephalic trunk. The left carotid artery and left subclavian artery have been occluded. The prosthetic bypass between the right and left carotid arteries guarantees optimal cerebral perfusion.

endoleaks. No contrast medium was used. The postoperative period was eventful, and the patient was discharged on day 4. An injected computed tomographic scan performed on day 6 confirmed the absence of endoleak (Figure 2).

Discussion

It is possible to treat aortic arch aneurysm after achievement of local anesthesia,⁴ and we believe this surgical strategy should be

Figure 2. Computed tomographic scan on day 6 postoperatively confirmed the complete exclusion of the aneurysm.

considered as a potential alternative to conventional aortic arch aneurysm surgery in high-risk patients.

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