sibility of endotracheal intubation. Survival is due to either 'incidental' endoesophageal intubation or prompt surgical tracheostomy (Floyd type I).

Surgical repair or palliation of associated congenital cardiac lesions has been never described in the literature, because most affected patients usually die before any attempt at surgical intervention. This is the first patient to our knowledge to survive palliation of the respiratory tract malformation as well as definitive intracardiac repair. She is now thriving and is currently being evaluated for definitive surgical reconstruction of the airway and alimentary tract.

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Formation of a stenotic fibrotic membrane at the distal anastomosis of bovine jugular vein grafts (Contegra) after right ventricular outflow tract reconstruction

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The surgical correction of many congenital right ventricular outflow tract (RVOT) anomalies necessitates the interposition of an extracardiac valved conduit. A variety of conduits have been used, and a few years ago the xenogenic valved conduit Contegra (Medtronic, Inc, Minneapolis, Minn) was introduced into clinical practice.¹⁻³ The graft consists of a jugular bovine vein segment containing a native trileaflet valve. It presents several advantages relative to other available conduits because it demonstrates a high pliability of the graft tissue, provides abundant conduit material proximal and distal to the valve for RVOT reconstruction, and is readily available in a large range of sizes.

Although a few reports have been published, little information exists regarding the fate of the conduit after implantation. The resection of 2 Contegra grafts in our experience amounting to 67 implantations prompted us to report these cases and to analyze the reason for conduit failure.

Clinical Summary

Between May 2001 and January 2003, the Contegra conduit was implanted in 67 patients for RVOT reconstruction, including cor-

rection of tetralogy of Fallot and pulmonary atresia (n = 34), Ross procedure (n = 17), correction of truncus arteriosus (n = 7), Rastelli procedure (n = 4), and other procedures (n = 5). Routinely performed intraoperative and postoperative echocardiography demonstrated excellent conduit performance in all patients. At 12 and at 8 months after implantation, however, 2 patients (3%) showed increasing pressure gradients as great as 50 mm Hg at the distal anastomoses and eventually required reoperation with graft replacement (Figure 1, A). Both patients had undergone repair of tetralogy of Fallot with a 12-mm Contegra conduit, which was selected because of the patients' diminutive pulmonary arteries.

Pathologic Findings

Macroscopic inspection revealed the formation of an internal annular membrane anchoring at the level of the distal anastomosis, with proximal extensions into the valve sinuses in both explanted grafts. The valve leaflets were unaffected and well preserved (Figure 1, B).

Histologic analysis demonstrated a fibrinous composition of the membranes partially covered with granulation tissue and the preservation of the collagen structures of all three vessel wall layers of the conduits with, however, a reduced density of the medial collagen fibers. The infiltration with lymphocytes and macrophages was observed in all layers but was predominantly in the adventitia and on the internal lumina of the grafts.

Discussion

Because of the recent introduction of the Contegra conduit, experiences regarding its long-term performance are limited, and until now only a single conduit failure, an aneurysmal dilatation, has been reported.⁴ Here we report 2 cases of conduit failure from the formation of an intimal membrane that led to severe RVOT stenosis at 8 and 12 months after implantation. Both patients had been treated for tetralogy of Fallot and severe hypoplasia of the pulmonary arteries and had received the smallest available conduit size

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Figure 1. A, Right ventricular angiogram of patient 2 demonstrating a stenosis of the Contegra conduit at the level of the distal anastomosis 8 months after implantation. B, Macroscopic inspection of the explanted conduit of patient 2 revealed formation of an almost complete annular membranous ring at the level of the distal anastomosis, which anchored on the suture line and extended proximally into the valve sinuses.

of 12 mm. In those cases with a size discrepancy between the conduit and the pulmonary bifurcation (which we always preserve), a reduction of the diameter is performed by us to create a harmonious distal anastomosis. The formation of the fibrous membrane at the side of this transition zone suggests the involvement of a disadvantageous turbulent flow pattern. It should be emphasized, however, that those 2 cases are the only ones showing such a evolution in a series of 67 Contegra conduit implantations, among which 20 patients received 12-mm grafts.

The microscopic analysis of the explanted conduits demonstrated a moderate generalized inflammatory reaction of the grafts, with a disruption of the native extracellular matrix and architecture. Similar observations have been reported for explanted homografts, and further long-term evaluation and follow-up are definitely needed to determine the significance of these findings.⁵ In light of the function of homografts in the pediatric population, comparable and perhaps even superior results might be expected for the long-term performance of the Contegra conduits.

Although this report describes 2 cases of graft dysfunction caused by the formation of a stenotic membrane at the distal anastomosis, the Contegra conduit remains an attractive choice for RVOT reconstruc-

tion, especially in small sizes. It is still not an ideal solution, and its superiority to homografts has yet to be proved for small sizes.

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