plication can be successfully managed by intrapleural hilar reapproximation technique (Figure 1, B). The pleuropericardial flap is retracted toward the midline, and the pleura is reapproximated to achieve hemostasis.

This technique must be in the armamentarium of every pediatric cardiac surgeon who intends to apply the sutureless technique as a primary repair in adhesion-free pericardium.

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Reply to the Editor:

I thank Dr Konstantinov for his thoughtful letter. I entirely agree with the first half of his statement. For complex total anomalous pulmonary venous connection, especially with a poorly developed confluence, the primary sutureless technique (in which the opened edge of the posterior left atrium is sutured to the posterior pericardium, leaving the filleted open pulmonary venous confluence to drain freely in the neo-left atrium) offers many advantages. It has become my default technique when the traditional pulmonary venous confluence to left

atrium suture anastomosis is impractical. As of June 2006 (11 months after the operation), the subject of our report is growing well, with no evidence of pulmonary venous obstruction according to echocardiography. Clearly, I also agree that "a thorough understanding of the anatomic relationship of the pulmonary venous confluence, posterior pleuropericardial junction, and phrenic nerve is required to perform a complication-free repair," and that it "It is crucial to open the venous confluence widely to ensure an unobstructed connection." Those are surgical tenets. To incise the pleuropericardial junction inadvertently, however, one must be cutting quite deeply into the pulmonary veins themselves. That is something that is rarely required. Usually, an incision of a few millimeters into each vein will suffice. Occasionally, the pulmonary veins themselves are diffusely stenotic and require a deeper incision. That is exceptional, however, and usually occurs in a reoperative situation. I would also caution against using sutures at the level of the pleuropericardial junction and pulmonary veins (Konstantinov's Figure 1, B). The risk of recurrent or residual pulmonary venous stenosis is ever present in these patients, and even a 1- to 2-mm encroachment into the pulmonary venous lumen by a suture intended for hemostasis may have catastrophic consequences. If one feels that a suture at this level is absolutely necessary, then the lumen of the veins should be inspected after tying it.

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Subclavian artery from ascending aorta or as the first branch of the aortic arch: Another variant of persistent fifth aortic arch

To the Editor:

We read with interest the articles by Krishnamoorthy and colleagues¹ and by Krishnan and colleagues² reporting 3 cases of tetralogy of Fallot with right aortic arch and left subclavian artery originating from the ascending aorta. Both groups claim these to be the only such cases reported in the literature. Although we agree that this anatomic set is rather uncommon, we consider it to be a well-established malformation, with several similar cases described previously.³

The presumed uniqueness of such cases has arisen from the incomplete understanding of aortic arch development in the context of these malformations and consequent misinterpretation. Krishnamoorthy and colleagues¹ propose persistence of the left fourth arch in the setting of partial double arch as the basis of the anomaly. In the normal arrangement, however, both fourth aortic arches are always persistent, one forming the first segment of the subclavian artery at its origin from the innominate artery and the other giving rise to the distal aortic arch between the carotid and subclavian artery. When the subclavian artery arises from the ascending aorta or as the first branch of the aortic arch, we believe exactly the opposite occurs; in the presence of a right aortic arch, the fourth left arch is interrupted, and the subclavian artery is continuous with the ascending aorta through a persistent left fifth aortic arch and possibly a short segment of the dorsal aorta, as originally proposed by Moes and colleagues.^{3,4}

Conversely, Krishnan and colleagues² advocate incomplete cephalad migration of the seventh intersegmental artery, describing it as an aberrant subclavian artery arising from the ascending aorta. The subclavian artery is not aberrant, however, and the left dorsal aorta, which connects the subclavian artery to the descending aorta in the presence of a truly aberrant subclavian artery, is normally absent.

Persistence of the fifth aortic arch, first described by Van Praagh and Van Praagh,⁵ is a rare condition that may occur in several forms: (1) double-lumen aortic arch, with or without arch hypoplasia or coarctation; (2) with interrupted fourth homolateral arch or proximal homolateral dorsal aorta (between the attachment of the fourth and fifth arches), resulting in type A or B interrupted aortic arch, respectively; (3) with interrupted fourth heterolateral arch, resulting in connection of the subclavian artery to the ascending aorta or as the first branch of the aortic arch; and (4) systemic-to-pulmonary connection, with or without pulmonary or systemic obstruction. On the basis of cases described to date, we propose a concise yet comprehensive classification of the 5th persistent aortic arch, placing particular emphasis on embryological derivation and clinical relevance (Table 1). Interruption of the homolateral proximal dorsal aorta, or contralateral fourth aortic arch, results in the brachiocephalic arteries arising apparently

TABLE 1. Proposed classification on the basis of embryologic and clinical relevance

Type A	Systemic-to-systemic shunt
1	Double-lumen aortic arch with or without arch hypoplasia or coarctation
2	With type A or B interrupted aortic arch
3	Subclavian artery from ascending aorta or as first branch of the aortic arch
Type B	Systemic-to-pulmonary shunt
1	With pulmonary obstruction
2	With systemic obstruction
3	With unrestricted systemic and pulmonary flows

from a common trunk or a common bicarotid trunk, respectively, when coexisting with a persistent fifth aortic arch. An appreciation of the nature of these aortic arch anomalies and a full understanding of the persistence of the fifth aortic arch will aid recognition and avoid confusion when encountered during either imaging or surgery.

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Reply to the Editor:

We thank Drs Oppido and Davies for their comments on our article. We respect their opinion that this entity has been previously described. Our report sought to highlight the fact that the origin of subclavian artery from ascending aorta has not been described in patients with tetralogy of Fallot. We tried to give an alternative embryologic explanation for the anomaly. The hypothesis proposed by Moes and colleagues¹ is a plausible explanation.

Some features in our patient pointed to a double arch: higher location of the right aortic arch and crossing of left bronchus by the proximal left subclavian artery. In addition, tetralogy of Fallot, as in our case, is the most common congenital heart disease associated with double aortic arch.²

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Traumatic rupture of the aorta in children—stenting or surgical intervention? A word of caution

To the Editor:

We read with interest the article entitled “The effect of changing presentation and management on the outcome of blunt rupture of the thoracic aorta.”¹ We commend the authors for their work. We agree with them that the nature and the management of traumatic rupture of the aorta (TRA) is changing. The authors stated that “Currently, we consider all patients to be candidates for endograft approaches if the anatomy is suitable” and concluded by stating that “As

newer devices are studied, the endovascular stent grafts might very well ultimately become the primary treatment of choice at all centers.” This is where we would like to sound a word of caution with regard to TRA in children. We agree with the proposed guidelines by Kouchoukos and colleagues.² A new technique involves uncertainty and risk. The pressure for rapid adoption can lead to deviations from the fundamental principles of surgery, which might compromise the quality and safety of patients.² As the technology evolves, there is a danger of subjecting younger patients to stent grafting.

The incidence of TRA in children ranges from 0.1% to 1% of all children with major chest injuries, and their management is a challenge. The experience of most centers is limited to a few case reports. Pediatric patients differ from adult patients in that significant intrathoracic injury can occur in the absence of rib fracture because of the increased compliance and elasticity of the chest wall. The key to management is to maintain a high index of suspicion in cases of high-speed collisions.

There have been case reports of endovascular aortic stent grafts being used in younger patients.³ The known complications of stents include occlusion of the left main stem bronchus, erosions, perigraft leak, graft migration, limb ischemia, arch perforation, entrapment, infection, pseudoaneurysm, distal embolization, and femoral artery complications. The fate of the stent is unknown, and there are no long-term results.³

We recently treated a 10-year-old boy with TRA. Aortography revealed an aneurysm just distal to the left subclavian artery indicative of an acute aortic transection (Figure 1). The possibility of using an aortic stent graft was raised because there was a successful outcome in a 17-year-old boy previously. In view of this child's age and the potential uncertainties of stenting in a growing child, we decided on the operative option.

Through a left thoracotomy, left heart bypass was instituted, and end-to-end anastomosis of the aorta was performed. The patient made an uneventful recovery and was doing well at 4 months' follow-up.

We propose that TRA in children be repaired whenever feasible and that stents be reserved only as a salvage procedure. We recommend the use of left heart bypass to maintain cerebral perfusion and to minimize spinal injury. If heparin is contraindicated,