repair. At 1-year follow-up, the child is doing well and no longer needs cardiac medication.

Comment

The close proximity of the RPA to the aorta theoretically renders it to compression by the latter. Although unheard of in the pediatric age group, dissecting aneurysms of the aorta have been described as producing acute occlusion of the RPA in adults [2].

The unusual aspect of this particular case is the orientation and extrinsic compression of the RPA. Although the exact mechanism can be debated, it is likely caused by abnormally high takeoff from the MPA and the sharp angulation the RPA must take to reach into the right lung. The aortic arch, being on the right side along with a relatively posterior location of the ascending aorta (Fig 1B), possibly contributed to the compression. Considering all these factors, including the abnormal lie and angulation of the RPA, it was logical to choose a method of repair that entailed not only straightening the angulation but also relocating the RPA anterior to the aorta. Both these objectives were accomplished by the Lecompte maneuver [1], which essentially had the effect of bringing the RPA in front of the aorta and lifting it anteriorly, thereby straightening the acute angle. Apart from the unusual anatomic condition, this report also adds to an expanding list of indications of the LeCompte maneuver in operations other than the arterial switch operation. To the best of our knowledge, a similar patient has not been reported in the English literature.

References


Amus-Kaye-Stansel (DKS) anastomosis is reported as a useful procedure for subaortic stenosis in patients with a functional single ventricle needing Fontan circulation. However, some reports describe the development of neoaortic (semilunar) valve regurgitation and the consequent need for reoperation [1, 2]. In cases of valve replacement, biological valves or homografts are usually used, but these valves have some late disadvantages, such as valve degeneration, calcification of the graft, and thromboembolic or infectious complications. In recent years, the interest in the use of tissue engineering (TE) techniques has grown, increasing the possibility of implanting the various TE valves currently in clinical practice.

A 9-year-old boy with original diagnosis of double-inlet left ventricle, transposition of the great arteries, and coarctation of the aorta received a staged operation for Fontan circulation. He underwent DKS anastomosis, modified Blalock-Taussig shunt, and coarctation repair at the age of 5 days. Bilateral bidirectional cavopulmonary shunt was done at 9 months, and Fontan completion was performed at 4 years. The postoperative course was uneventful, but semilunar (anatomic pulmonary) valve regurgitation developed 30 months after the Fontan operation. Computed tomography and angiography show the severe neoaoartic valve regurgitation (Figs 1A, 1B). The diagnosed valve dilatation and cusp deformity showed that anuloplasty or cusp reconstruction were not ideal procedures in this case. It was decided to perform a semilunar valve replacement with a TE aortic homograft.

The operation was performed through a median sternotomy. Aortic and bivacual cannulation was performed and cardiopulmonary bypass with moderate hypothermia (28°C) was established. After aortic cross-clamping, crystalloid cardioplegic solution was injected into the aortic root. After opening the neoaoartic (anatomic pulmonary) artery, we found elongated and dysplastic cusps of the semilunar valve. For valve replacement we used a fresh decellularized aortic homograft with a diameter of 23 mm (CorLife, Hannover, Germany) by the standard technique (Fig 2). Weaning from bypass was without any problems, and no changes of electrocardiography were found. The patient was extubated on postoperative day 1 and discharged from the hospital on postoperative day 7, completely recovered. At the 2-year follow-up examination after valve implantation, the TE valve was nonstenotic and fully competent (Fig 3), and the patient’s status is good.

Comment
The DKS operation contributes to an improved clinical outcome of the Fontan operation in patients who have a systemic ventricular outflow obstruction or the anatomic potential for this condition, such as double-inlet left ventricle with transposition of the great arteries and tricuspid atresia type II. The influence of the DKS anastomosis on the semilunar valves, especially for the pulmonary valve, remains controversial: mild or moderate postoperative pulmonary regurgitation has been observed in patients who underwent the DKS operation [3, 4]. In cases of severe regurgitation of the pulmonary valve, valve replacement or repair might become necessary [1, 2]. In situations of valve replacement, valve replacement by means of a homograft or a biological valve is the method of choice. However, implantation of these valves in pediatric patients often results in graft degeneration and failure [5], which is usually attributed to the high immunologic competence of children and young adults and leads to repeated operations.

Heart valve tissue engineering represents a potential alternative source to create viable, nonimmunogenic, and...

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Fig 1. Preoperative images. (A) Computed tomogram demonstrating markedly deleted, incompetent semilunar valve. (B) Still image of retrograde aortography. White arrow shows severe neoaoartic valve (Neo-AV) regurgitation. (Ao = aorta; F. Tunnel = Fontan tunnel.)
biologically active grafts. In our institute, we developed the method of decellularization of aortic and pulmonary valve allografts after harvesting them from cadavers and transplant patients and applied this type of graft successfully in humans [6]. The operative technique of implantation of these valves is the same as for the homograft implantation. We have experience with more than 100 implantations of such decellularized homografts in aortic and pulmonary position, and our follow-up has reached up to 10 years postoperatively. These valves have not degenerated and have provided excellent hemodynamics so far. Furthermore, our results show improved freedom from reoperation, provided low gradients in follow-up, and exhibited adaptive growth [7, 8].

We have experience of 28 patients with aortic valve replacement using decellularized aortic valve homografts, after extensive investigations in the sheep model [9]. These results encouraged us to apply this graft for the first time to replace a semilunar valve in a young patient after DKS anastomosis and Fontan operation. In this patient, neoaortic valve diameter was 28 mm preoperatively (z-value = 6); postoperatively, the diameter was 23 mm (z-value = 1.7), and 2 years after implantation a diameter of 25 mm corresponded to a z-value of 1.6. We observed growth within the normal range toward standard size. In accordance with further growth of the patient, we expect to see further appropriate homograft growth, similar to the promising tendencies with this kind of conduit reported previously [7].

In conclusion, we present the first case in which a neoaortic valve was replaced with a TE valve in patients after DKS anastomosis and the Fontan procedure. The midterm result is excellent, and so the TE valve may be promising in such cases. Long term follow-up and further experience are needed to evaluate the efficacy of this application.

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References
Value of Ultrasound in the Imaging-Guided Transthoracic Biopsy of Lung Lesions

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Transthoracic needle biopsy with fluoroscopic or computed tomographic guidance is a well-established and safe method for diagnosing malignant and benign thoracic lesions. Nonetheless, ultrasound is as effective as computed tomography for the guidance of transthoracic biopsies of peripheral pulmonary lesions and mediastinal tumors, and it offers some advantages. In this case report, we exemplify the proper use of ultrasound for the percutaneous biopsy of a lung lesion, aiming to show that it can be a safe, inexpensive, rapid, and effective alternative to CT in appropriate cases.


Imaging-guided percutaneous transthoracic biopsy is performed most frequently by a radiologist [1] and has become a widely accepted and effective minimally invasive technique for the diagnosis of a variety of intrathoracic lesions that are not readily accessible with bronchoscopy [2]. Transthoracic needle biopsy with fluoroscopic or computed tomographic (CT) guidance is a well-established and safe method for diagnosing malignant and benign thoracic lesions. Ultrasound (US) is as effective as CT for the guidance of transthoracic biopsies of peripheral pulmonary lesions and mediastinal tumors, and it offers several advantages [3].

Real-time US imaging allows for the dynamic evaluation of vessels and localization of target lesions that move during respiration. In US-guided transthoracic biopsy, the tip of the needle can be monitored throughout the procedure, and fine adjustments can be made quickly and precisely. This ability is especially beneficial in biopsies of small thoracic lesions. Moreover, US does not expose the patient to radiation and is less expensive than CT [3]. Here, we report a case in which US was used properly for percutaneous biopsy of a lung lesion, aiming to show that it can be a safe, inexpensive, rapid, and effective alternative to CT in appropriate cases.

An 80-year-old man with a history of prostate adenocarcinoma and squamous cell carcinoma of the larynx underwent thoracic CT (GE HI SPEED, General Electric Medical Systems, Milwaukee, WI), which revealed a solid lesion (~35 mm) in the lateral basal segment of the right lower lobe of the lung with no evidence of calcification (Fig 1). Inasmuch as the lesion was peripheral and had broad pleural contact, according to CT images before biopsy, with no air interposed between the CT lesion and the transducer, US (Philips Ultrasound, Bothell, WA) was selected as the guidance modality.

Fig 1. Axial chest computed tomographic (CT) image with mediastinum window and patient in dorsal decubitus position. Thoracic CT detected a solid lung nodule suggestive of malignancy in the periphery of the right lower lobe (arrow), measuring 35 mm. This lesion has broad pleural contact and is located immediately behind the rib, which makes CT-guided biopsy difficult.

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