



Diagnosis of perigraft seroma formation by use of echocardiography after modified Blalock–Taussig shunt

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Abstract Perigraft seroma is a collection of non-secretory fibrous pseudomembrane surrounding a vascular graft, which is a collection of clear, sterile fluid. Thoracal computed tomography, Magnetic Resonance Imaging, and thoracal ultrasonography have been proposed for diagnosis of this pathology. A consecutive modified Blalock–Taussig (m-BT) shunt complicated by perigraft seroma formation, which is diagnosed using a Doppler ultrasonography (US), is presented here.

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Case report

A 10-month-old female infant was referred to our clinic with cyanosis and dispnea. Echocardiographic study revealed the presence of tetralogy of Fallot and pulmonary atresia. The left mBT shunt was constructed with a 4 mm polytetrafluoroethylene (PTFE) graft. Continuously intravenous heparin was given after surgery (2 mg/kg/day) for two days

postoperatively. Following the operation, cyanosis disappeared and continuous murmur was heard on the second intercostal space. However, her oxygen saturation decreased and respiratory distress began within six days after surgery. The infant was immediately entubated. Chest X-ray showed a large and well demarcated left superior mediastinal mass, pleural effusion, and a marked tracheal displacement to the contralateral side (Fig. 1). The echocardiographic study revealed a large cystic formation at the arcus aorta and encircling of the functioning PTFE graft (Fig. 2). A continuous flow across the shunt was found, and an 80 mmHg systolic gradient was recorded from PTFE graft.

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Figure 1 X-ray film showing a large and well demarcated mass in the chest of the left upper mediastinum.

Chest X-ray showed the enlargement of the mass and blood gas oxygen saturation was decreased and the patient could not be extubated after two days from entubation, and because of progressive decrement of the arterial oxygen saturation and developing signs of respiratory distress, she underwent urgent re-thoracotomy.

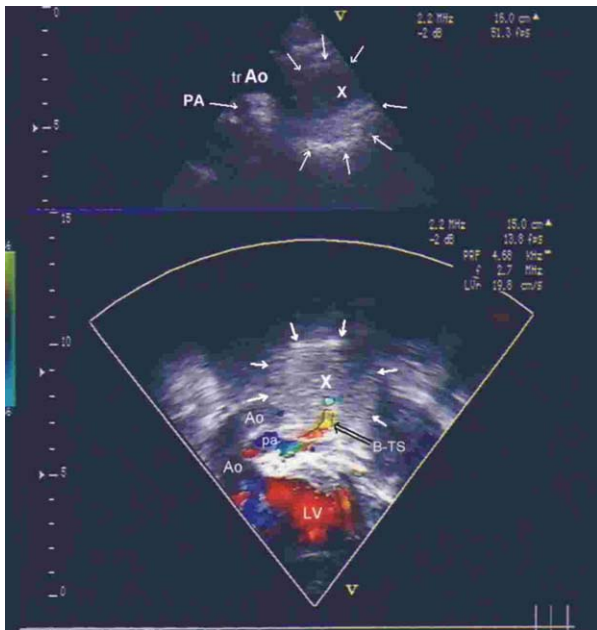


Figure 2 Subcostal transthoracic echocardiography is demonstrating a large cystic formation at the arcus aorta and encircling the functioning PTFE graft (a 80 mmHg gradient was obtained across the synthetic material). Tr-Ao: transverse aorta, Ao: Aorta, PA: Pulmonary artery, B-TS: Functioning B-T shunt in color Doppler, LV: Left Ventricle. Arrows are showing the cystic formation.

At the operation, dimension of the mediastinal mass was found as 4×5 cm (Fig. 3). Fluid was aspirated and the seroma was evacuated. There was a low degree of kinking and anterior angulation of the PTFE graft; however, thrill was palpable. As the seroma was removed, kinking and angulation of the graft was lost and oxygen saturation increased from 40–50% to 95% immediately. Postoperative course of the patient was uneventful, and she was extubated on postoperative second day. She was discharged from hospital on the fifth day without evidence. The patient was symptom free six months after operation, and there was no evidence of seroma formation in the serial echocardiographic examinations.

Discussion

Since 1976, polytetrafluoroethylene graft (Gore-Tex®) was used for modified Blalock–Taussig shunt in congenital cardiac disease.¹ In the literature, several complications of the m-BT shunts such as thrombosis, aneurysm formation, hematoma and perigraft seroma were reported.^{2,3} The incidence has been reported as 6.8–9.5% following peripheral graft material,⁴ and 18.8% ratio has been reported after m-BT shunt procedure.² A perigraft seroma is defined as a sterile collection of fluid in a non-secretory wall surrounding a shunt. However, the cause of seroma formation is not clear

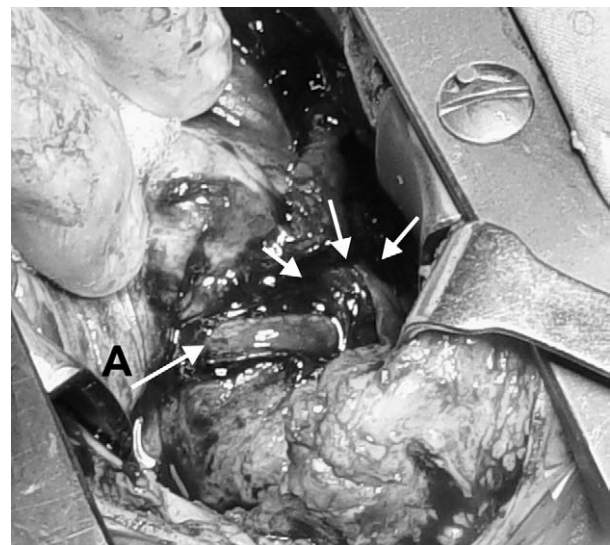


Figure 3 Surgical appearance of the seroma formation and anterior angulation of the PTFE graft shown in this figure. Arrow A is showing an angulated and functioning m-BT shunt due to posterior compression by a large seroma formation.

yet. Generally, the most widely accepted theory is handling of the PTFE graft causes leakage because of a change from a hydrophobic state into a hydrophilic one.⁵ Optimal therapeutic strategies are not clear yet. However, the removal of the mass is obtained cure in 72% of symptomatic patients. Number of imaging techniques were defined for diagnosis of perigraft seroma such as computed tomography (CT),^{6,7} Magnetic Resonance Imaging^{6,8} (MRI) and thoracic ultrasonography.⁹ Therefore, a negative result on sonography should lead to further investigation with CT or MRI.

The Doppler US has an advantage over the other imaging techniques because it can detect shunt blood flow, and no radiation exposure in critically ill infants. In addition, US with Doppler require no patient transportation. A positive finding on sonography means that no further radiologic investigations are indicated.

In summary, the chest radiography shows the first sign of the seroma after m-BT shunt, using thoracic sonography, it is also possible to demonstrate the perigraft seroma and the function of m-BT shunt. Thoracic CT or MRI may be performed in revealing perigraft seromas. When the seroma was found in the critically cases, US has an advantage over CT and MRI because of its portability and capability for bedside use. We recommend the use of US with Doppler as a first diagnostic tool because of information about m-BT shunt functioning and infants cardiac functions at the same time. When infant cannot be extubated and they have no evidence of airway infection, although they have

a functioning m-BT shunt, perigraft seroma formation should be kept in mind.

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