Chapter 11

REVIEW OF SURGICAL TECHNIQUES IN THE REPAIR OF AORTIC ARCH HYPOPLASIA

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Definition and History

The Aorta is the main route in which blood is distributed throughout the body from the heart's exit. Obstructions or interruptions that may occur on this road affect organ and tissue nutrition according to the level in which it occurs. The length of the affected segment is also important as much as the severity of the obstruction. Hypoplastic aortic arch, which leads to serious clinical outcomes such as short segment stenosis known as aortic coarctation (CoA), is an arteriopathy condition that can vary from mild to intermittent arch. Hypoplastic aortic arch [HPa] is usually defined in relation to aortic coarctation [COA] and treatment plan is performed accordingly. In addition to prenatal and postnatal diagnostic opportunities, these infants can be early intervention thanks to advancing cardiac surgery techniques.

This disease was first described in an autopsy case by Morgagni in 1760. Following this, detailed pathoanatomical descriptions were made by Jordan (1827) and Reynaud (1828) ([1]). The first aortic coarctation repair in one patient was performed by Crafoord and Nylin in October 1944 ([2]). The successful procedure was also performed by other clinics, and in 1948 Clagett reported the first 21 patients operated at the Mayo Clinic ([3]).

Etiology; the etiological origin of aortic coarctation and hypoplasia of the arcus aorta is multifactorial. The accepted theories for coarctation are the postnatal narrowing of abnormal ductal tissue, intrauterine changes of blood flow in the aortic arch, and genetic causes. Hypoplasia and complex CoA can be accompanied by intracardiac and/or extracardiac pathologies such as in table 1.

Table 1. *Additional common pathologies*

- Bicuspid aortic valve
- Taussig-Bing anomaly,
- Double inlet left ventricle,
- Tricuspid Atresia
- Hypoplastic left heart syndrome (HLHS)
- Transposition of great artery (TGA)
- Serious right ventricular outflow obstruction
- Intracranial aneurism ([4]) (commonly Berry-type),

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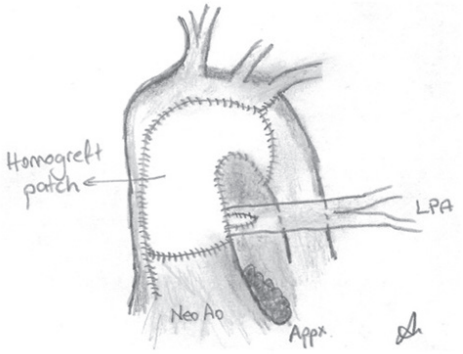
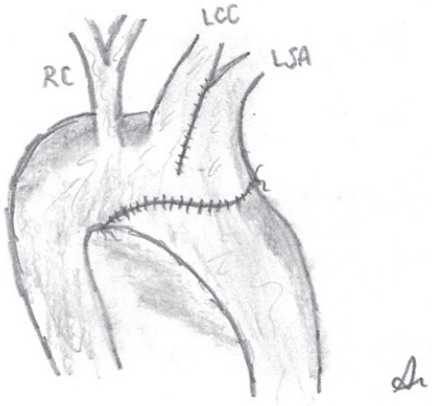


Picture 5b. *Interdigitating arch reconstruction (completed)*



Picture 6. *A tailored enlargement technique*

Tricks & Pitfalls; Paravertebral or mediastinal structures should not be excised more than necessary to prevent possible chylothorax. Phrenic nerve damage should be avoided during tissue preparation. By detecting the Abbott's artery, its ligation will eliminate the risk of possible bleeding. While thoracotomy is closing, it should be avoided that adjacent costa are closer to the top of each other.

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