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Commentary

Commentary: A Complex Issue with a Straightforward Answer

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See Article page 231.

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In the current issue, Lee et al. [1] present an intriguing study on the relationship between the modified Blalock-Taussig shunt (mBTS) and subsequent pulmonary arterial status. However, the results mainly demonstrated no significant findings in this regard. Despite the authors' thorough investigation into how shunt configuration might affect pulmonary arterial growth, only the angle of shunt insertion was significantly associated with changes in the Z-score of the pulmonary artery.

The pattern of pulmonary arterial growth following mBTS is a topic of considerable interest. However, there is a lack of *in-vivo* evidence concerning the anatomy of shunt anastomosis and the subsequent growth of the pulmonary arteries. Liu et al. [2] used computational analysis to show that a vertical anastomosis could result in evenly distributed blood flow to both pulmonary arteries. Furthermore, multiple reports have indicated that a distally placed shunt can lead to increased pulmonary arterial blood flow [3-5]. This study is particularly valuable as it has replicated these results in a clinical setting. However, it is important to consider several critical factors in the meantime.

Firstly, we need to determine which characteristics of shunt configuration most significantly affect pulmonary arterial growth. The shunt itself is the primary characteristic that influences blood flow across it. Specifically, the total length of the shunt may be the main characteristic that requires investigation. Given the anatomy of the great arteries and potential shunt pathways, secondary characteristics such as the insertion angle and the distance from the bifurcation site might be influenced by the length of the shunt. However, measuring the shunt's length can be complicated due to its non-linear trajectory. Therefore, observing the entire length of the shunt in a single scan frame presents a significant challenge.

Another important consideration is time. Many patients who require mBTS often share similar clinical characteristics, such as age, body weight, and the anatomical configuration of the great vessels and ductus arteriosus. However, their postoperative clinical courses can vary widely. Consequently, the duration for which mBTS is needed can also differ significantly among patients. Therefore, some patients may need further interventions, such as the insertion of an additional shunt or shunt revision. Therefore, managing the diverse clinical courses of these patients presents significant challenges. Furthermore, there is a considerable risk of attrition and the potential need for pulmonary arterial augmentation. If possible, analyzing a sufficient number of patients with similar clinical profiles would make the analysis and conclusions of this study more concise and clearer.

Lastly, numerous factors can influence pulmonary arterial blood flow, including the type of shunt (e.g., central

shunt), the arterial source, and the surgical approach [6,7]. Each technique offers its own benefits and drawbacks, and some may be chosen specifically to promote better growth of the pulmonary artery. However, creating a vertical anastomosis presents potential challenges. While it can increase blood flow to the pulmonary artery, it may also lead to morbidity due to pulmonary overcirculation. Additionally, a vertically oriented, short anastomosis line may cause stenosis. It is critical to achieve a reliable anastomosis when placing an mBTS, as failure to do so can result in severe complications, such as shunt thrombosis.

Since there are countless factors to consider in order to achieve better outcomes after mBTS, this issue is indeed complex. However, as surgeons, we can only adopt several practical approaches. One of these is to strive for a definitive, straightforward answer.

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