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Editorial

The Significance of Self-Expandable Stents in Patients with Congenital Heart Disease in Current Era

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▸ See the article "Self-Expandable Stents in Vascular Stenosis of Moderate to Large-Sized Vessels in Congenital Heart Disease: Early and Intermediate-Term Results" in volume 49 on page 932.

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Balloon expandable intravascular stents have been used with success to support vessel walls after dilation in the coronary and peripheral circulations in adults. After the Palmaz stent has been studied by Mullins et al.,[1] balloon expandable stents have been used for obstructive vascular lesions that tend to recoil after dilatation in the management of congenital heart disease. The use of self-expandable stents was subsequently applied to patients who had stenotic pulmonary vessels, obstructive right ventricle outflow tract, and coarctation of aorta.[2][3] By its flexibility and conformity, the self-expandable stents have been used in various clinical applications, such as the gastrointestinal tract, respiratory tract, and cardiovascular system.

The known advantages and disadvantages of self-expandable stents are as follows. They have the advantages of requiring a smaller sheath for introduction, a longer length for placement across long stenotic segments and decreased risk of embolization by pre-mounting the stent onto the catheter.[3] Therefore, compared with balloon-expandable stents, the benefits of the self-expandable stent include larger available sizes.[4] The inherent risk of balloon rupture with incomplete stent expansion described during deployment of Palmaz stents could be avoided and placement in tortuous vessels facilitated.[5] However, there are several limitations of the self-expandable stent.[3] As early complications, the possibility of distal migration was suggested. By its innate nature, with gradual increase in the diameter, the radial force decreases and development of eccentric radial force due to unequal rate of expansion may propel the stent to migrate in either direction.[3] And, neo-intimal ingrowth has been suggested. Regions of the self-expanding stent might not be adhering close enough to the luminal wall of the vessel, predisposing to friction, abrasion, inflammation and ultimately neo-intimal proliferation.[3] Additionally, there have been a few reports of fracture of self-expandable stents used in the gastrointestinal tract or peripheral vessels. A further problem in the use of the self-expandable stent is the failure to keep pace with the patient's somatic growth. The final diameter of the stented vessel achieved during implantation may not be adequate as the young patient grows.[2]

The main advantage of a self-expandable stent is that a larger sized stent can be used with a small sheath.[2] Because of these advantages, self-expandable stents can be an alternative option in areas where large sized balloon expandable stents are not available and have been used for patients with congenital heart disease in these areas.[2][4] These advantages are used

in valved stents for percutaneous aortic or pulmonary valve insertion.[6-9] In department of congenital heart disease, patients with pulmonary valve disease are potential subjects of percutaneous pulmonary valve replacement (PPVR) and are in the younger age group. The first developed Melody valve for PPVR was the most widely used until now,[10] but the size of the valve was limited by balloon expandable system and the use of larger sheath was required. Subsequently developed valves (Harmony valve,[8] Venous P-valve,[9] and Pulsta valve[7]) use self-expandable system to allow larger size valves and smaller sheaths. And, the flexibility and conformity make it easy to adapt to a various right ventricular outflow tract shapes. Considering the developmental trends of these instruments, the use of self-expandable stents in the pediatric intervention department is likely to expand, and pediatric interventionists may need to become familiar with the use of self-expandable stents.

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