

## Radiofrequency resistant pulmonary atresia with intact septum: the use of Conquest Pro 12 coronary guidewire

### Radyofrekans perforasyona dirençli sağlam ventrikül septumlu pulmoner atrezili olguda Conquest Pro 12 guidewire kullanımı

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**Summary**– Pulmonary valve atresia with intact ventricular septum, which is a rare congenital heart defect, can be treated either surgically or via transcatheter. Nowadays, in many centers, transcatheter treatment options have become the standard of care for pulmonary atresia, with an intact ventricular septum, for eligible patients. More commonly, radiofrequency wires are used for the perforation of the atretic valve, and subsequently, balloon dilatation is performed. There are limited options for radiofrequency resistant atretic valves. Here, we present the case of 5 day-old male with a radiofrequency resistant atretic pulmonary valve, where perforation was successfully achieved using a Conquest Pro 12 coronary guidewire.

**Özet**– Ventrikül septumu sağlam pulmoner atrezi, nadir görülen ve kateter yoluyla veya cerrahi olarak tedavi edilebilen siyanotik doğuştan kalp hastalığıdır. Günümüzde birçok merkezde kateter yoluyla tedavi, seçilmiş hastalarda ilk basamak olarak kullanılmaya başlanmıştır. Radyofrekans kateterler atrezili pulmoner kapağın perforasyonunda sıklıkla ilk tercih olarak kullanılmaktadır. Kapak perforasyonu yapıldıktan sonra atrezili kapak valon valvüloplasti ile genişletilmektedir. Radyofrekans kateterlerin başarısız olduğu atrezili kapaklarda tedavi seçenekleri sınırlıdır. Burada sağlam ventrikül septumlu pulmoner atrezi tanısı ile izlenen ve kateter yoluyla tedavi sırasında radyofrekans kateterle perforasyonun başarısız olması üzerine Conquest Pro 12 tel ile kapak perforasyonu yapılan beş günlük erkek olgu sunuldu.

**P**ulmonary valve atresia with intact ventricular septum is a complex and uncommon congenital heart defect. The morphology of this defect is variable, and it can be treated by the creation of a Blalock-Taussig shunt and surgical pulmonary valvotomy, or via the transcatheter approach.<sup>[1]</sup>

Radiofrequency-assisted valvotomy and balloon dilatation has become the standard technique in many institutions, as the primary procedure in neonates with pulmonary atresia with intact septum, provided that the atresia is membranous in nature and that the subvalve infundibulum is well-developed. Early in the era of transcatheter intervention for this disease, the stiff end of the coronary guidewire, apart from the laser and radiofrequency wires, has been used to

successfully perforate the atretic pulmonary valve. The dictates of safety, efficacy, practicality, and cost have made the radiofrequency wire the predominant technique in use today. In coronary interventions, the development of stiffer wires has enabled the successful revascularization of lesions with chronic total occlusion. In recent years, Alwi et al. reported the successful use of the Conquest Pro coronary guidewire for the perforation of an atretic valve and subsequent interventions.<sup>[2]</sup>

#### CASE REPORT

A 5-day-old male patient was referred to our clinic due to cyanosis. Echocardiographic examination revealed pulmonary valve atresia with intact ventricular

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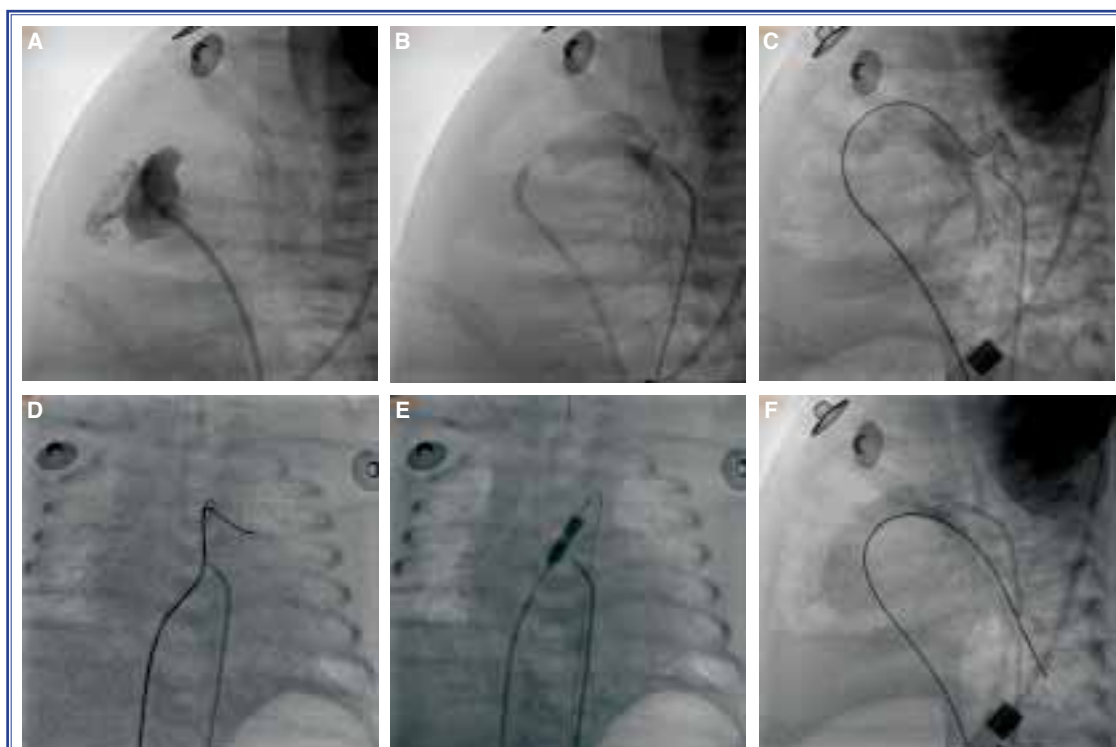
septum (bipartite) and patent ductus arteriosus, and transcatheter intervention was scheduled. The standard procedure was followed for the patient. The right ventriculogram showed a bipartite right ventricle with no right ventricular-dependent coronary circulation (Figure 1a). The tip of a 5 French Judkins right guiding catheter was placed beneath and perpendicular to the atretic valve plate. Initially, radiofrequency perforation (HAT 300 generator and 0.018-inch cerebral wire; Sulzer Osypka GmbH, Grenzach-Wyhlen, Germany) was attempted with energy up to 14 Watts in order to perforate the atretic portion; however, it could not be achieved (Figure 1b). The Conquest Pro 12 (Asahi Intecc Co. Ltd., Aichi, Japan) guidewire was then used in order to perforate the atretic valve. The wire was pushed forward with a gentle force to perforate the valve plate, and it easily perforated the atretic valve. This was confirmed by biplane angiography, and because the wire's tip was very heavy, the wire did not push further (Figure 1c). A 0.014-inch super-floppy guidewire was passed alongside the Conquest Pro 12 guidewire (Figure 1d), and the Con-

quest Pro 12 guidewire was pulled out. Once the pre-dilatation was done using a 3.5 mm x 2 cm coronary balloon (Figure 1e), the atretic part was opened with a 7 mm x 2 cm Tyshak Balloon (NuMED Canada Inc., Cornwall, Ontario, Canada) (Figure 1f). In addition, a 3.5 mm x 18 mm coronary stent was used for stenting the arterial duct during the same procedure.

## DISCUSSION

The options for the perforation of the atretic valve involve using a radiofrequency wire and a generator, or a laser wire and a generator, or the stiff end of the guidewire and a steerable radiofrequency catheter.<sup>[1,2]</sup>

Alwi et al.<sup>[2]</sup> reported the successful use of the Conquest Pro coronary guidewire for the perforation of the atretic valve in seven out of eight newborn babies. In one patient, the Conquest Pro coronary guidewire could not perforate the atretic valve, so the pulmonary valve was perforated using the radiofrequency wire. This wire is one of the stiffer guidewires available, having a tip-load of 9 g. Its 0.014-inch body allows



**Figure 1.** (A) A right ventriculogram showing a bipartite right ventricle with no coronary circulation from that ventricle. (B) Radiofrequency wire placed perpendicular to the atretic valve plate. (C) Conquest Pro 12 perforating the atretic valve. (D) A 0.014-inch super-floppy guidewire passing alongside the Conquest Pro 12 guidewire. (E) Pre-dilatation with coronary balloon. (F) Angiogram from the arterial side to show the ductus and right ventricular outflow tract.

the subsequent balloon valvuloplasty procedure, and the slip-coated (hydrophilic) tip can safely and effectively perforate the atretic valve in the more straight-forward cases. Alwi et al. also suggest stiffer guidewires like the Conquest Pro 12 which has a tip-load of 12 g, in challenging cases.

In our department, we use either the Conquest Pro coronary guidewire or a radiofrequency wire for the perforation of the atretic pulmonary valve. In recent years, Odemis et al.<sup>[3]</sup> reported the successful use of the Conquest Pro 12 coronary guidewire for the perforation of a functionally interrupted aorta in a 21-year-old female patient, who was resistant to radiofrequency perforation.

It may be difficult to direct the stiff tip of the Conquest Pro or heavier wires into a distal lower lobe branch for a stable wire position, and excessive force may lead to the dissection or perforation of this fragile vessel in neonates.<sup>[2]</sup> We did not advance the wire to the distal pulmonary arteries or descending aorta due to its high-penetration power, and the wire may advance subintimally, as in our previous experience.<sup>[3]</sup> After perforating the atretic pulmonary valve, a 0.014-inch super-floppy guidewire was passed alongside the Conquest Pro 12 guidewire, and afterward, the pre-

dilatation and dilatation procedures were performed.

When radiofrequency perforation is unsuccessful for perforating an atretic pulmonary valve, the Conquest Pro 12 guidewire can be used effectively. However, because the perforation risk is higher, it should be used cautiously in newborn patients.

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**Key words:** Heart valve diseases; newborn; pulmonary atresia with intact ventricular septum.

**Anahtar sözcükler:** Kalp kapak hastalıkları; yenidoğan; intakt ventriküler septumlu pulmoner atrezi.