Central perforation of atretic pulmonary valve using coronary microcatheter

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ABSTRACT

Percutaneous perforation of pulmonary valve, using 0.014" guidewires meant for coronary artery chronic total occlusion (CTO), is increasingly being performed for select cases of pulmonary atresia with intact ventricular septum (PA-IVS). Despite growing experience, procedural failures and complications are not uncommon. Even in infants treated successfully, the orifice created in the atretic pulmonary valve is eccentric. In this report, we present usefulness of coronary microcatheter in alignment of perforating coronary guidewire to the center of atretic pulmonary valve resulting in central perforation.

Keywords: Chronic total occlusion, coronary guidewire, microcatheter, pulmonary atresia with intact ventricular septum, pulmonary valve perforation

CASE SUMMARY

Percutaneous perforation of pulmonary valve, using 0.014" guidewires meant for coronary artery chronic total occlusion (CTO), is increasingly being performed for select cases of pulmonary atresia with intact ventricular septum (PA-IVS).[1-3] Technically, owing to a short segment of atresia, well-defined atretic pulmonary valve, a predictable distal vascular bed, pulmonary arteries, and a patent ductus arteriosus, PA-IVS is equivalent to a "simple CTO." In the majority, however, the catheter remains noncoaxial and uncomfortably away from pulmonary valve resulting in failures[1,2] and complications.[3] Movement of coronary guidewire further destabilizes the catheter and even when the perforation is successful, the orifice created is eccentric.[4]

A 5-month-old male infant with membranous PA-IVS was scheduled for percutaneous perforation of pulmonary valve. Multiple catheters failed to achieve coaxial position [Figure 1a] and prohibited attempt to perforate pulmonary valve. A 2.6 Fr Finecross MG coronary microcatheter (Terumo Corporation, Japan) was then used to bridge the gap between 5 Fr Judkins right coronary catheter and pulmonary valve [Figure 1b and Online Video 1]. The radiopaque marker at the tip of microcatheter allowed its manipulation and positioning to the center of pulmonary valve. An otherwise well-formed pulmonary valve with clear center helped in positioning of microcatheter [Figure 1b]. After ascertaining central engagement of microcatheter by test angiograms through the catheter, Conquest Pro (Asahi Intecc, Japan) guidewire was advanced within the microcatheter and pulmonary valve was perforated exactly at the center [Figure 1c, d and Online Videos 2, 3]. The microcatheter was then kept in the left pulmonary artery, and guidewire was changed to a nonpenetrating coronary guidewire. Subsequently, successful pulmonary valve balloon dilatation was achieved as per standard technique [Online Video 4]. Echocardiography showed flow through the center of

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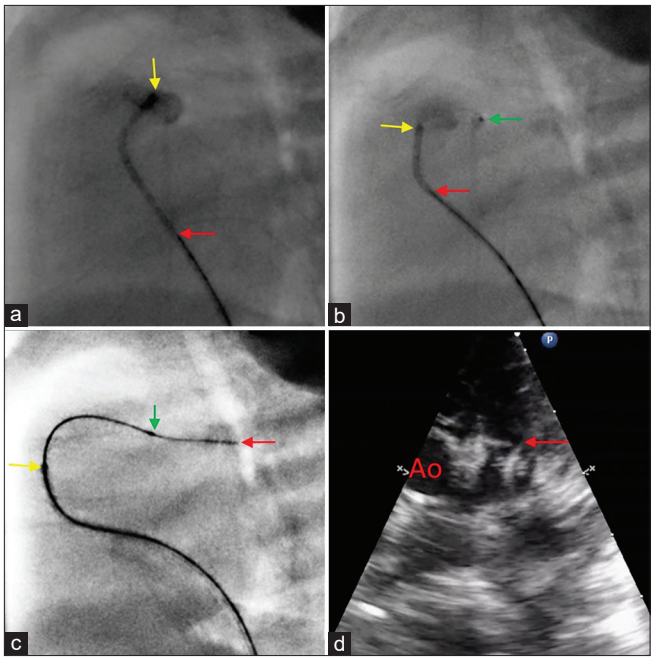

Figure 1: (a) Right ventricular outflow tract angiogram shows a well-formed atretic pulmonary valve with a noncoaxial Judkins right coronary catheter (yellow arrow) lying away from pulmonary valve prohibiting safe movement of Conquest Pro coronary guidewire (red arrow). (b) Coronary microcatheter (green arrow) placed through the catheter bridges the gap between catheter tip and pulmonary valve. Radiopaque marker allowed positioning of microcatheter to the center of atretic pulmonary valve (c) Guidewire (red arrow), placed through microcatheter (yellow arrow), perforating the pulmonary valve. The movement of guidewire and microcatheter has pushed the catheter back in right ventricular outflow tract away from the pulmonary valve. (d) Echocardiogram shows guidewire across pulmonary valve through a central perforation with normal motion of pulmonary valve leaflets

pulmonary valve with normal leaflet motion and trivial pulmonary regurgitation.

This report highlights the usefulness of microcatheter in perforating an atretic pulmonary valve. We hypothesize that the microcatheter allows engagement to the center of pulmonary valve, possibly the weakest area, and facilitates central perforation by 0.014" coronary guidewire. Arguably, this central perforation of valve is expected to preserve valve function with much lower risk of progressive pulmonary regurgitation.

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Conflicts of interest

There are no conflicts of interest.

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