

Novel Technique to Percutaneous Stent Implantation for Coarctation of the Aorta: Safari Wire Pacing

A 43-year-old female patient presented with uncontrolled hypertension and chest pain. Medical treatment included an angiotensin receptor blocker, hydrochlorothiazide, and calcium channel blocker. In her physical examination, blood pressure measured from the upper extremity was 150/96 mm Hg, and no pulse could be taken from the femoral artery and below. Thoracic computed tomography (CT) angiography showed severe coarctation in the distal left subclavian (Figure 1). Percutaneous stent implantation was considered for repair of the aortic coarctation.

After informed consent was signed by the patient with the modified Seldinger method, a 7 Fr sheath was placed in the right femoral artery and a 6 Fr sheath was placed in the left radial artery. Venous access was not required. Angiography showed a coarctation site distal to the left subclavian artery (Figure 2A). Blood pressure in the ascending aorta was measured as 121/77 mm Hg, and in the descending aorta it was measured as 99/78 mm Hg. The coarctation site was passed with a 0.035 hydrophilic wire and a Judkins right (JR) catheter, and the level of the aortic valve

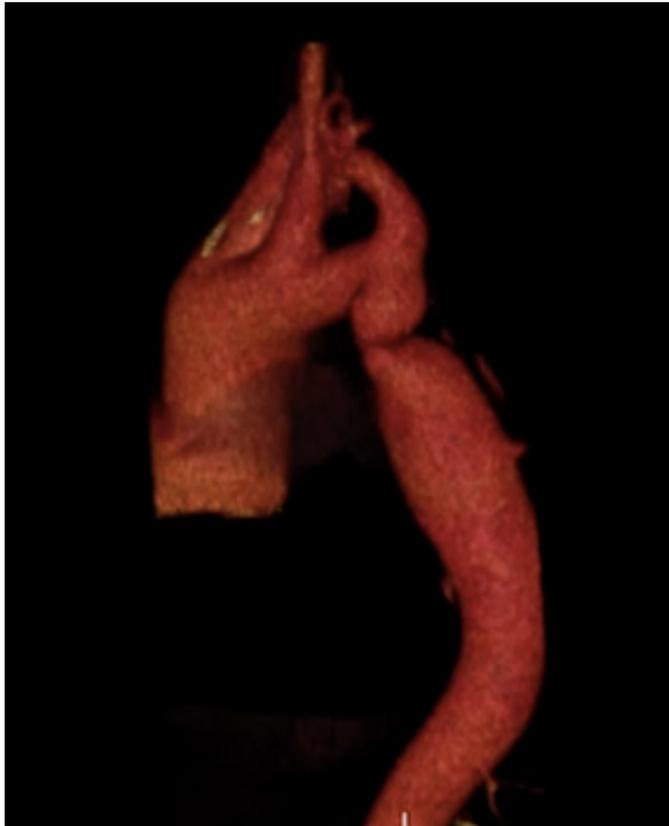


Figure 1. Preoperative computed tomography angiography showed significant coarctation of aorta.

E-PAGE ORIGINAL IMAGE



Veysel Özgür Barış ^{ID}

Fatih Poyraz ^{ID}

Emin Erdem Kaya ^{ID}

Department of Cardiology, Dr. Ersin Arslan Training and Research Hospital, Gaziantep, Türkiye

Corresponding author:

Veysel Özgür Barış

✉ veyselozgurbaris@gmail.com

Cite this article as: Barış VÖ, Poyraz F, Kaya EE. Novel technique to percutaneous stent implantation for coarctation of the aorta: Safari wire pacing. *Anatol J Cardiol.* 2024;28(1): E-3-E-5.



Copyright@Author(s) - Available online at anatoljcardiol.com.
Content of this journal is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License.

DOI:10.14744/AnatolJCardiol.2023.3786

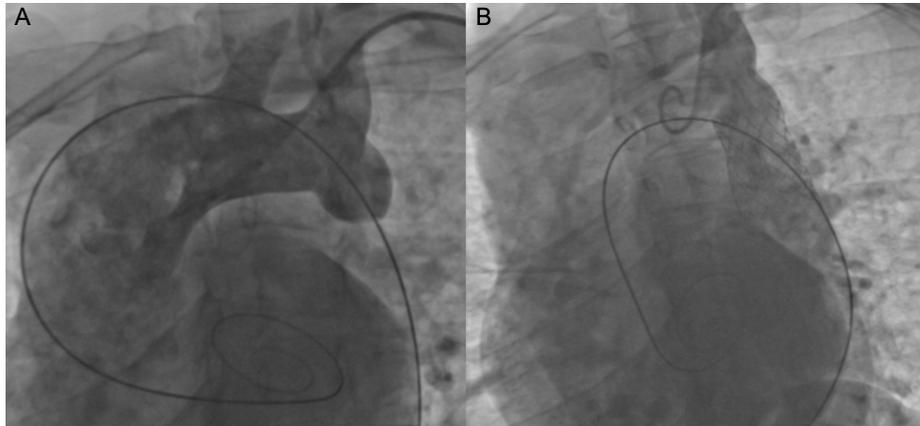


Figure 2. (A) Coarctation site distal to the left subclavian artery. (B) Angiography revealed that the stent was fully opened.

was reached. At this stage, the JR catheter was replaced with a pigtail. After falling into the left ventricle with a pigtail, the safari wire was placed in the left ventricle and a 16 mullen sheath from the femoral artery over safari wire was crossed from coarctation site. Optimus CVS 38 XL stent mounted on a 23 mm 50 mm balloon in balloon was deployed at the coarctation site (Figure 3). During stent implantation, cardiac output was reduced by left ventricle pacing over the safari wire. It was observed that the stent implanted in the coarctation segment was fully opened and it was coaxial with the aortic axis (Figure 2B). After stent implantation, the safari wire was taken into a pigtail and pulled from the left ventricle, and pressure traces were taken by pulling back on the stent area with the same pigtail, and it was observed that there was no residual gradient. On the follow up CT angiography 3 months later, it was observed that the coarctation site segment in

which the stent was completely apposed was and there was not any complication (Figure 4, Video 1).

Although percutaneous stent implantation is recommended as the first-line therapy in the guidelines for the treatment of aortic coarctation,¹ distal stent migration and aortic dissection are the most important complications of this procedure.² In the standard technique of stent implantation, the ascending aorta or the right subclavian artery is recommended for the stiff wire position.³ In order to reduce these complications, some modifications have been developed. There are



Figure 3. Stenting to coarctation of aorta with the safari wire technique.

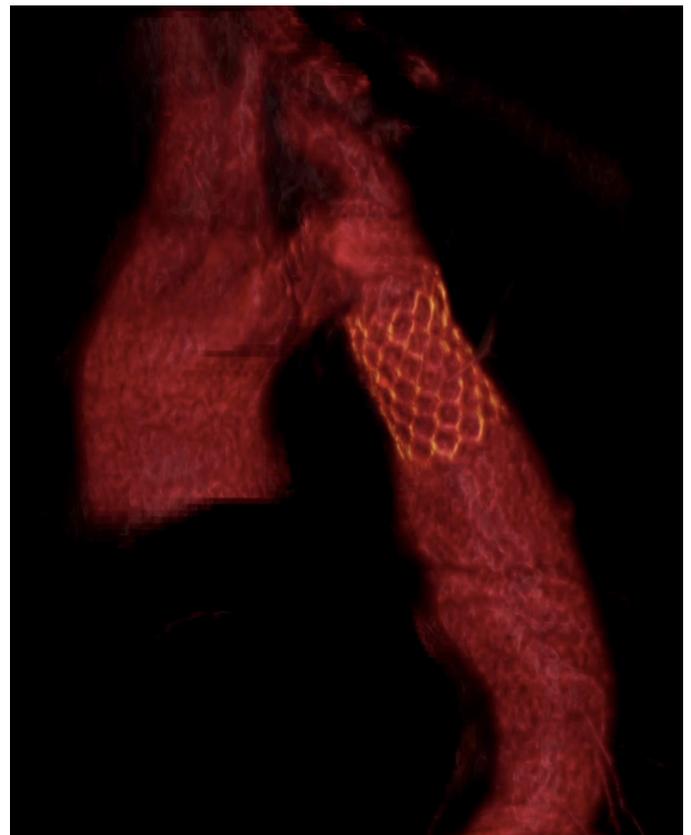


Figure 4. Postoperative computed tomography angiography showed the coarctation site segment in which the stent was completely apposed was and there was not any complication.

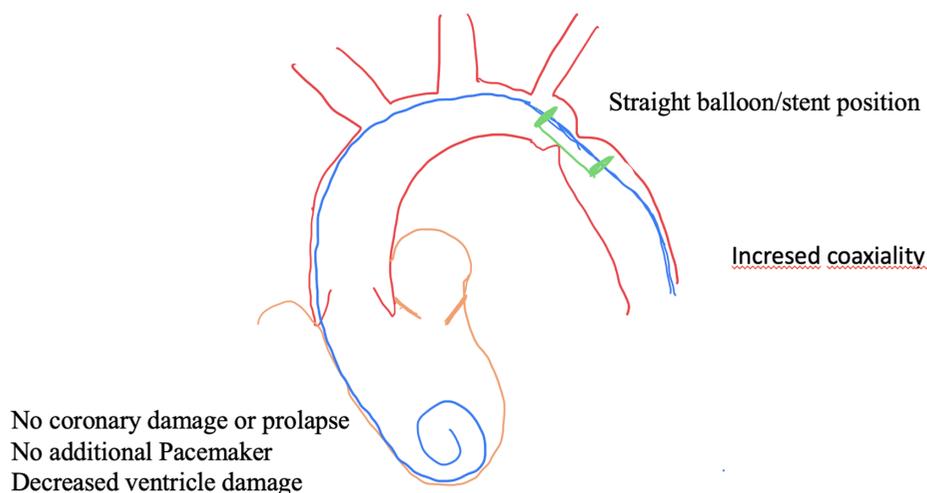


Figure 5. Schematic diagram of safari wire pacing technique.

operators who recommend placing the stiff wire in the right innominate artery to ensure straight balloon/stent placement to prevent dissection.⁴ However, distal embolization remains an important issue in this technique, since the distal stiff wire is not fixed. To overcome this challenge, the railway technique has been developed.⁵ In this technique, after sheath implantation in the right brachial artery, the hard wire was snared and clamped outside the artery. Although this technique increases the stability of the wire, it both prolongs the procedure time and increases the risk of complications due to reasons such as increasing the number of arterial interventions and using a snare. In addition, it will not be possible to use it in tortuous artery structures.

Although parking the stiff wire in the ascending aorta instead of the subclavian artery seems more reliable in terms of stent embolization, it carries the risk of stent malposition. However, this technique has risks of unintended damage to the coronary arteries or prolapse of the left ventricle during the procedure.⁴ For this reason, some operators suggest left ventricular apical placement of the stiff wire.⁶ The limitation of this technique is that the stiff wire could cause severe ventricular ectopia left ventricular perforation, since the tip of these wires are not pre-shaped.

It is also recommended to use right ventricular pacing to prevent stent embolization, especially when the coarctation is not too tight.³ However, this situation also requires central venous intervention and can bring with it very serious complications, such as right ventricular perforation.

The safari wire pacing technique, which we developed, overcomes all of these challenges (Figure 5). First of all, it gives a straight balloon/stent position, just as the wire is placed in the right subclavian. Moreover, it also eliminates the problem of increased stent migration. It also overcomes the problems of brachial artery intervention and snaring in railway technique. Drawbacks such as coronary damage or prolapse that can be seen in the placement of the stiff wire in the aorta are not in problem in this technique. Left ventricular perforation, which can be seen during the stiff wire using, just like amplatzer, is placed in the left ventricular apex, is almost never seen due to the preshaped of the safari

wire, and it is associated with a lower risk of tamponade.⁷ In addition, safari wire will give better results in difficult anatomy as it provides better support than other stiff wires. Left ventricular pacing with safari eliminates right ventricular apical pacing and the need for central venous access. In addition, using only safari wire will be more cost-effective than using stiff wire, temporary pacemaker lead, and central venous sheath.

Informed Consent: Written informed consent was obtained from the patient.

Declaration of Interests: The authors have no conflicts of interest to declare.

Funding: The authors declared that this study has received no financial support.

Video 1: Stenting for coarctation of aorta with the safari wire pacing technique.

REFERENCES

- Baumgartner H, De Backer J, Babu-Narayan SV, et al. 2020 ESC Guidelines for the management of adult congenital heart disease. *Eur Heart J* 2021;42(6):563-645. [CrossRef]
- Cheatham JP. Stenting of coarctation of the aorta. *Catheter Cardiovasc Interv*. 2001;54(1):112-125. [CrossRef]
- Alkashkari W, Albugami S, Hijazi ZM. Management of coarctation of the aorta in adult patients: state of the art. *Korean Circ J*. 2019;49(4):298-313. [CrossRef]
- Benjamin Smith SAQ, Kogure T. Coarctation of the aorta. *The PCR-EAPCI Textbook Percutaneous Interventional Cardiovascular Medicine*. 2023.
- Gillespie MJ, Kreutzer J, Rome JJ. Novel approach to percutaneous stent implantation for coarctation of the aorta: the railway technique. *Catheter Cardiovasc Interv*. 2005;65(4):584-587. [CrossRef]
- Gianluca Rigatelli ZSC, Nghia NT, Nguyen Lan, Hieu DHQ. Percutaneous intervention of cardiac congenital anomalies. In: Nguyen T, ed. *Practical Handbook of Advanced Interventional Cardiology*. 4th ed:652-653.
- Savvoulidis P, Mechery A, Lawton E, et al. Comparison of left ventricular with right ventricular rapid pacing on tamponade during TAVI. *Int J Cardiol*. 2022;360:46-52. 20220518. [CrossRef]