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Cardiology

Acquired Aortic Arch Anomalies and Right Radial Approach: Practical Solution

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Abstract **Original Research Article**

Introduction: Morphological abnormalities of the arch and its branches can also be acquired with the aging of the population and cardiovascular risk factors. These arteries become deformed, dilated, and curved, making coronary exploration by the right radial approach very delicate. ***Objective of the study:*** To propose a new strategy for the approach of the right radial consisting of the use of a long, hydrophilic-coated armed introducer instead of the usual 7 cm introducers, which will allow us to compensate for the change of approach. We hope to reduce the time of scopy, the complications and the quantity of contrast medium used, through a retrospective descriptive study including 08 patients. ***Result:*** The mean age in the group was 77 years with a male/female sex ratio of 7. - The clearly predominant cardiovascular risk factor apart from age was hypertension in all groups: 62%. Eight patients with sinuosity and long armed introducer: seven with 6 Fr and 90 cm long, one with a long introducer of 100 cm and 4 Fr. The use of a long-armored introducer made it possible to perform coronary angiography in 8 patients with extreme sinuosity and coronary dilatation for the needy without any complications. The average scanning time is eight minutes for a coronary angiography. Without increasing the amount of contrast medium. In addition to the success of the coronary angiography, a control of the left mammary bypasses in two patients with tortuosities of the right subclavian and a very tortuous path could be carried out. No per-procedural complications were reported. These path anomalies were overcome with excellent support and ease through the use of the long-armed introducer. ***Discussion and conclusion:*** Anomalies of the aortic arch make coronary angiography via the right radial approach a difficult procedure. The use of a long armored hydrophilic coated introducer via the right radial approach is possible, effective and safe. It is a promising technique that is preferable to the change of approach for aortic arch anomalies, whether acquired or congenital. A large-scale study including more patients and more centers will surely allow bettering demonstrating the effectiveness and safety of its use.

Keywords: Aortic arch, acquired, angiography, radial approach, introducer, complications.

INTRODUCTION

Morphological abnormalities of the arch and its branches can also be acquired with the aging of the population and cardiovascular risk factors. These arteries become deformed, dilated, and curved, making coronary exploration by the right radial approach very delicate.

METHODOLOGY AND OBJECTIVE OF THE STUDY

1- Study population

This is a retrospective descriptive study including 08 patients. They included patients in whom significant sinuosities of the right subclavian or brachiocephalic artery trunk were discovered during the examination.

2- Work objective

To propose a new strategy for the approach of the right radial consisting of the use of a long, hydrophilic-coated armed introducer instead of the usual 7 cm introducers, which will allow us to compensate for the change of approach. We hope to reduce the time of scopy, the complications and the quantity of contrast medium used.

3- Studied parameters

a- Success or failure of the procedure judged by the change of approach.
b-Scopy time.

c- Amount of contrast medium.
d-Complications:

- Per-procedural stroke and supra-aortic trunk or aortic dissection.
- Local complications at the radial puncture site, particularly post-procedural radial artery thrombosis or forearm hematoma.

RESULT

Table-1: Group Summary Chart

	Gender	Age	Risk factor	Reason	Technique	TS:COR/ATL	Complication
Case N°1	**M**	80	AGE	ST+ ACS	ILA 90 cm	6/17	NONE
Case N°2	**M**	73	HTA+TABAC	STABLE ANGINA	ILA 90 cm	6/21	NONE
Case N°3	**M**	81	HEREDITE CORONAIRE	STABLE ANGINA	ILA 90 cm	8/19	NONE
Case N°4	**M**	82	HTA+DT2	UNSTABLE ANGINA	**ILA 90 cm**	5/11	NONE
Case N°5	**M**	78	HTA+HCT+TABAC	STABLE ANGINA	**ILA 90 cm**	6/19	NONE
Case N°6	**M**	65	TABAC+HCT	UNSTABLE ANGINA	**ILA 90 cm**	11/5	NONE
Case N°7	**M**	73	HTA+TABAC	STABLE ANGINA	**ILA 90 cm**	17/13	NONE
Case N°8	**F**	82	HTA	STABLE ANGINA	**ILA 100cm**	27	NONE

Case N°2:

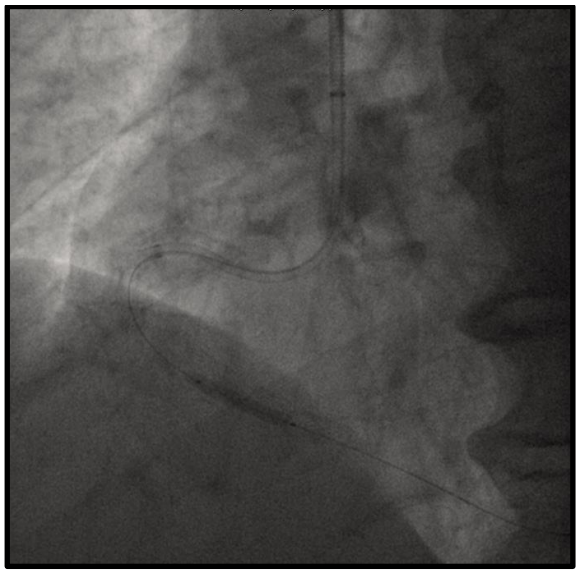

Fig-1: Image showing the 6Fr AL1 carrier catheter exiting the armored introducer with the 0.014 guidewire and angioplasty on CD 3 with perfect stability and co-axiality (case 2).

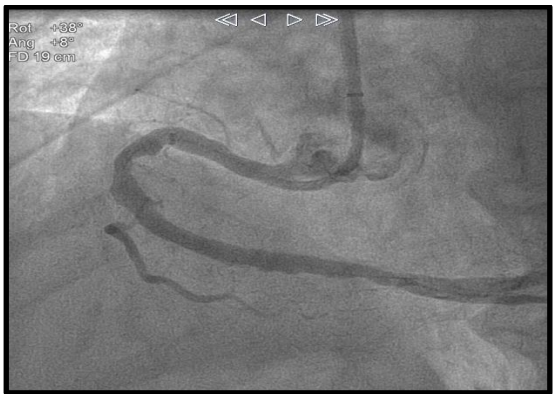

Fig-2: Excellent Final result of CD3 dilation (case 2).

Case N°5 :

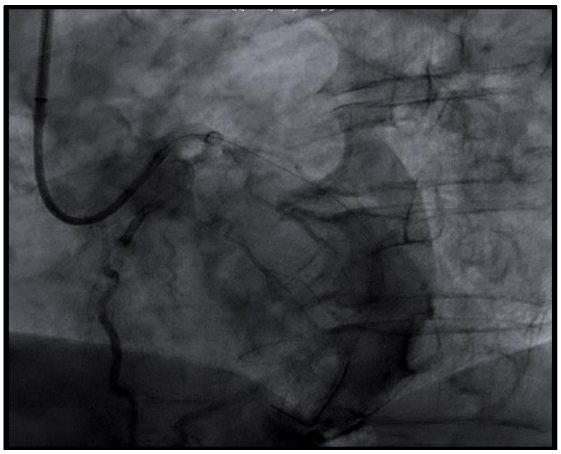

Fig-3: The stability of the left carrier probe with 0.014 guides through the long introducer (case 5).

Case N°7 :

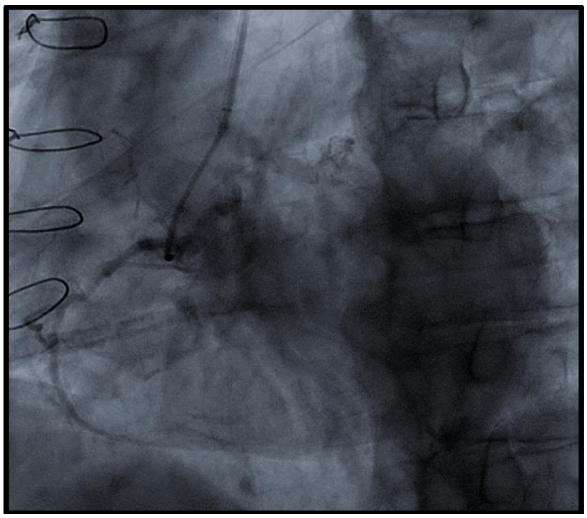

Fig-4: Successful cannulation of the right coronary with the long introducer despite very difficult access (case 7).

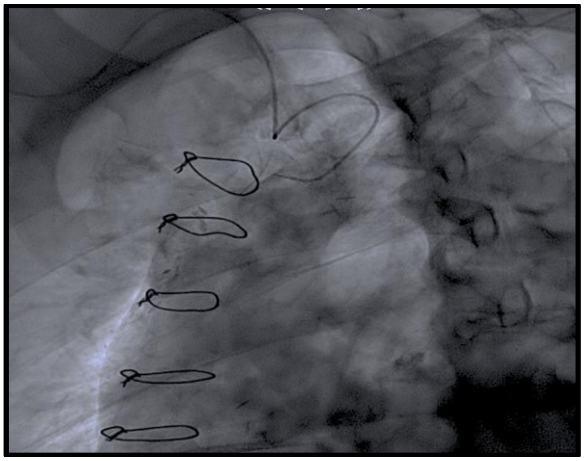

Fig-5: Aspect of angulation between right SC and aorta in this bypassed patient (case 7).

Case N°8 ;

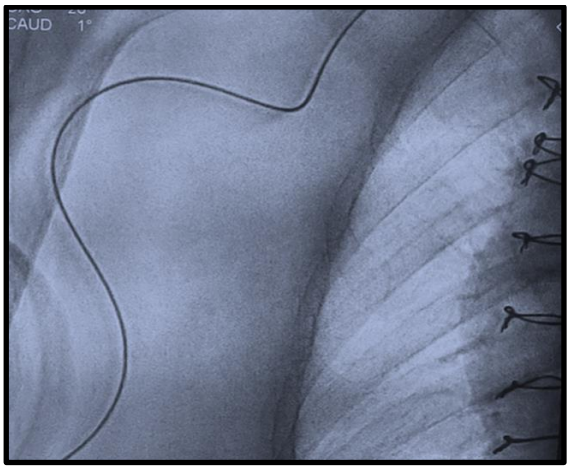

Fig-6: Sinuosities of the arterial path from the axillary portion (case 8)

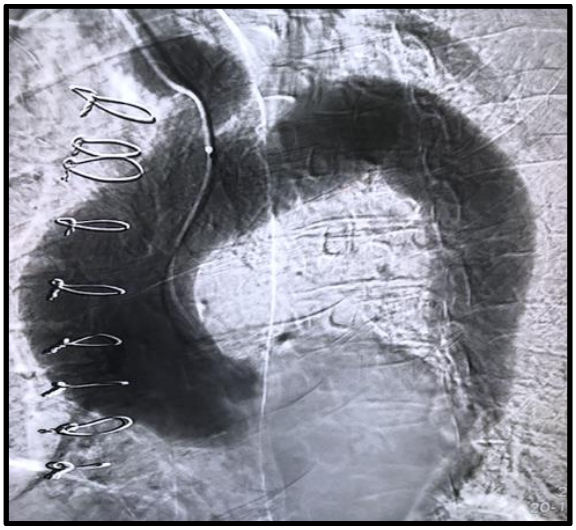

Fig-8: Angiography showing the continuation of the arterial path with a large sinuosity of the TABC and a dilated and horizontalized ascending aorta (case 8).

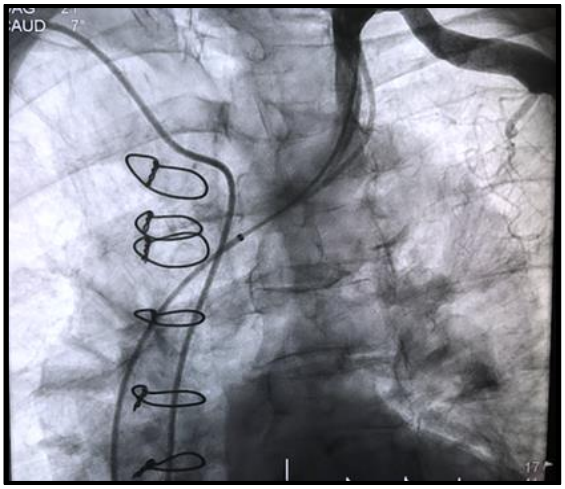

Fig-9: Successful cannulation of the left subclavian despite all this travel with the Long Fortress introducer (case 8).

DISCUSSION

1- Acquired arch anomalies

A-Description

I-Aneurysm
2- Arteriomegaly
3-Dolicho-Arteries
4-Polyaneurysmal dystrophy
5- Angiodysplasia
6- Arterial occlusions

B- Etiologies

- Inflammatory and systemic diseases: Takayashu's disease, Horton's disease and Behcet's disease.
- Radiation lesions are also to be considered,
- Mechanical causes such as folds, extrinsic compressions, tumors.

2- Solutions tested

Through published series, practices are approaching using hydrophilic guides and using different probes to be able to position in the ascending aorta and attempt to catheterize the 2 ostia.

In our practice, we adopt a new approach, which is the use of hydrophilic-coated long armed introducers via the right radial approach.

In most cases, a Terumo Destination type long armed introducer with a diameter of 6 French and a length of 90 centimeters is used. This is a hydrophilic introducer intended primarily for peripheral interventional procedures. However, its use in the right radial approach for coronary angiography or angioplasty has proven to be of great interest and provides good support for angioplasty.

More rarely, a 4 French diameter, 100-centimeter-long Fortress introducer or a Shuttle Flux Cook introducer are used.

The steps are described as follows

1. First, the presence of a sinuous path is confirmed by an angiography of the Supra Aortic Trunks, at best in vascular mode before reaching the coronary sinuses.
2. A hydrophilic guidewire, most often Terumo Stiff double length 260 centimeters long, is used. In most cases, a JR4 probe in 4 French to orient the guide towards the right side of the aortic arch allows going towards the ascending aorta; a deep inspiration can sometimes facilitate this passage.
3. Once the guidewire is at the level of the aortic sigmoid, it is pushed as far as possible, forming a large U shape, in order to have maximum support and, above all, to avoid guidewire recoil.
4. The usual introducer and the JR4 probe are then removed.
5. A small incision is made at the puncture site to allow the introducer to pass through the skin.
6. The mounting of the introducer on the hydrophilic guide must be delicate, taking care of the two ends, both of the guide and of the introducer
7. Maintaining a strict fixed point on the guide.
8. Once the introducer has been placed in the coronary sinuses, the dilator is removed and the probes are introduced, either diagnostic or carrier, depending on the context.

The JL3.5 catheter can be very useful to catheterize the right coronary by straightening its first curvature held in the introducer so that it will behave like a JR4 catheter. This reduces the time of the procedure.

3- DISCUSSION OF RESULTS

Eight patients with sinuosity of the right subclavian or TABC with or without dilated aorta making it very difficult to perform coronary angiography or coronary angioplasty.

8 patients with sinuosity and long armed introducer:

- 7 with 6 Fr and 90 cm long.
- 1 with a long introducer of 100 cm and 4 Fr.

The mean age in the group was 77 years with a male/female sex ratio of 7. The predominant cardiovascular risk factor, apart from age, was hypertension in all groups: 62%.

The use of a long-armed introducer allowed to perform coronary angiography in 8 patients with extreme sinuosities and coronary dilatation for the needy without any complication.

The average scan time is 8 minutes for a coronary angiography which is acceptable for such sinuous paths without having to change to femoral or left radial. Without increasing the amount of contrast medium.

This approach has been used in stable patients as well as in emergency ACS situations. A case of ST+ ACS in an 80-year-old patient with a mega-dolichoartery of the right subclavian had a primary angioplasty on the IVA with excellent support and a scan time of 6 min for the coronary angiography and 17 min for the angioplasty without having to switch to femoral.

These path anomalies were overcome with excellent support and ease through the use of the long-armored introducer.

In addition to the success of the coronary angiography, a control of the left mammary bypasses in two patients with tortuosities of the right subclavian and a very tortuous path could be performed.

No per-procedural complications were reported.

The strengths of the long introducer during coronary angiography or angioplasty via the right radial approach are:

- Safety and efficiency of the technique.
- Comfort of work for the operator.
- Reduction of the procedure time, and of the scopy time
- Less quantity of contrast medium.
- Can be done in an emergency context instead of the femoral route.
- Allows control of the left mammary arteries.

It would be desirable to carry out a prospective study using only long armed introducers in all patients with acquired anomalies in first intention, to better analyze all the parameters allowing it to be validated as a reference technique instead of the femoral route.

CONCLUSION

Anomalies of the aortic arch make coronary angiography via the right radial approach a difficult procedure.

The use of a long armored hydrophilic coated introducer via the right radial approach is possible, effective and safe.

It is a promising technique that is preferable to the change of approach for aortic arch anomalies, whether acquired or congenital.

A large-scale study including more patients and more centers will surely allow to better demonstrate the effectiveness and safety of its use.

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