Unprotected Left Main Primary PCI via Distal Transradial Access in the Setting of STEMI-Related Cardiogenic Shock

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ABSTRACT

Despite all well-known benefits of transradial access, patients presenting with cardiogenic shock are usually submitted to coronary angiography and percutaneous coronary intervention via traditional transfemoral access, mainly due to challenge puncture of radial artery in the setting of hemodynamic instability.

We report a challenging case of STEMI-related cardiogenic shock requiring primary PCI of an occluded and unprotected left main, safety, and successfully performed via right distal trans radial access in the anatomical snuffbox.

Key words: Cardiogenic shock, distal transradial access, left main, primary percutaneous coronary intervention, ST-elevation acute myocardial infarction

INTRODUCTION

In comparison to classic transfemoral approach (TFA), transradial access (TRA) is cost-effective, due to fewer access site-related complications, patient earlier ambulation and greater postprocedural comfort. In patients with acute coronary syndromes (ACS), TRA diminishes net adverse clinical events, through a reduction in major bleeding and all-cause mortality and is thus recommended as standard approach (Class I, Level A) for coronary angiography (CAG) and percutaneous coronary intervention (PCI) by recent European guidelines on myocardial revascularization.

Despite all benefits of TRA, critically ill patients presenting with ACS-related cardiogenic shock usually underwent CAG and PCI via classic TFA, essentially due to challenge puncture of radial artery (RA) in the setting of hemodynamic instability.

As a refinement of the conventional proximal TRA (pTRA), distal TRA (dTRA) has many advantages in terms of risk of proximal radial artery occlusion (RAO), faster hemostasis, and operator-patient comfort.

CASE PRESENTATION

A 54-years-old woman, current smoker and with type 2 diabetes was referred to our catheterization laboratory due to antero-lateral STEMI complicated by cardiogenic shock, requiring high doses of dobutamine and norepinephrine.

Type A chest pain had been initiated about 18 h before. Emergency CAG was immediately performed via right dTRA (rdTRA) 6Fr [Figure 1]. Patient’s right upper arm was placed on a sideboard with the hand in a neutral position. After disinfection, the patient was covered with sterile drapes and asked to grasp her thumb under the other four fingers in order to bring the distal RA to the surface of the anatomical snuffbox, with slight ulnar wrist flexion.
After lidocaine local anesthesia, distal RA was immediately (first attempt) punctured proximal from the extensor pollicis longus tendon in the anatomical snuffbox using a 20G micropuncture plastic cannula-over-needle with the Seldinger’s technique, under an angle of 30-45 degrees, from lateral to medial, into the direction of proximal course of RA, without ultrasound (US) guidance.

After successful arterial puncture, with brisk back flow, a flexible, soft, straight 0.021” hydrophilic guidewire was smoothly advanced through the cannula and then used as a rail to sheath advancement through the RA. Our cases are routinely performed using a short 10 cm hydrophilic radial 6Fr sheath Radifocus® Introducer II Standard Kit (Terumo Corp., Tokyo, Japan), the default device in our cath lab. The 5Fr diagnostic TIG® catheter (Terumo Corp., Tokyo, Japan) is used for all patients as first choice.

Left main (LM) was occluded (TIMI flow 0) at its mid portion [Figure 2 and Video 1], with Rentrop 3 collaterals from dominant right coronary artery [Video 2].

Unprotected LM primary PCI was then performed via the same rdTRA, with an EBU 3.5 6Fr guiding catheter (Medtronic, Santa Rosa, CA, USA). After multiple LM-left anterior descending (LAD) predilations with 2.0/20 mm semi-compliant (SC) and 3.25/15 mm non-compliant (NC) balloons (diffuse and highly calcified atheromatosis), a very long 2.75/48 mm drug-eluting stent (DES) was deployed from distal LM up to mid LAD, and then post-dilated with the same 3.25/15 mm NC balloon. So, a second 3, 5/12 mm DES was carefully positioned and deployed from ostial up to distal LM, at minimal overlap with the previous one. Proximal optimization technique (POT) of LM stents portions from distal bifurcation up to its ostium was performed with a 4.0/08 mm NC balloon up to 26 atm.

A NHLBI Type B® LAD distal stent edge dissection was promptly fixed with deployment of an additional 2.25/15 mm DES. Successful recanalization of LM, LAD/branches and left circumflex/branches with final TIMI 3 flow was achieved [Figures 3 and 4, Videos 3 and 4]. Of note, intravascular ultrasound guidance was not possible due to reimbursment constraints.

At the end of the procedure, the sheath was pulled out for a few centimeters, and a TR BAND® Radial Compression Device (Terumo Corp., Tokyo, Japan) was placed over the puncture site. By following the concept of patent hemostasis (just enough pressure to prevent bleeding but not so much as to cause complete vessel collapse), TR band was inflated with only 2 mL above the “bleeding volume” at sheath removal and was left in situ for 20 minutes, when deflation process started, by removing 2 to 3 mL each 15 minutes. TR band was completely removed after two hours, without any further bleeding.

Proximal and distal right radial pulses were easily palpable after hemostasis and at hospital discharge, without any minor or major access site-related or clinical complications. Post-PCI transthoracic echocardiogram showed anterior wall and all apical segments akinesia, beyond septal and lateral walls hypokinesia and a left ventricle ejection fraction of 0.35 (Simpson’s method).

After two weeks of cardiac intensive care unit hospitalization, requiring invasive mechanical ventilatory support due to refractory pulmonary edema and gradual cardiogenic shock resolution, the patient was discharged home, with optimal medical treatment (aspirin, prasugrel,
rosuvastatin, bisoprolol, sacubitril-valsartan, and spironolactone).

**DISCUSSION**

Coomes et al. recently published a systematic scoping review of 19 publications comprising 4,212 participants undergoing cardiac catheterization via dTRA. Mean patient age was 63.8 years old; 23.0% were female. dTRA was primarily used for stable coronary artery disease (87.6%), with 41.7% for diagnostic procedures and 46.9% undergoing PCI. The overall success rate for dTRA approach was 95.4% (69–100%). Complications occurred in 2.4% of cases, the leading cause of complications being bleeding/hematoma (8.2%). However, none of these individual centers have reported their experience with dTRA as routine default approach for the procedures.

Since February 2019, patients referred to our Cathlab have been continuously included in the DISTrAl TRAnsradial access as default approach for Coronary angiography and interventions (DISTRACTION) registry (ensaioscilnicios.gov.br Identifier: RBR-7nzxkm), the first Brazilian prospective observational registry designed to evaluate dTRA as default approach for performing routine CAG and/or PCI. Our initial experience results have been recently published.\(^7\)\(^{16-17}\)

Mean patient age was 62.4-year-old, and most were male (65.9%). The majority (49.4%) of patients had ACS. Overall, 15.1% had STEMI. Distal RA was successfully punctured in all 435 consecutive patients, always without US guidance. We had only 3% access site crossovers (successful arterial puncture but failed wire advancement and sheath insertion), mainly performed via contralateral dTRA (53.8%). Successful dTRA sheath insertion was then achieved in 98.6% of all patients. Redo ipsilateral dTRA was performed in 2.5% of patients. Neither major adverse cardiac and cerebrovascular nor major ischemic local events were recorded. According to EASY hematoma classification,\(^18\) no significant access site-related hematoma type ≥2 was recorded. There was no documentation of hand/thumb dysfunction after any procedure.\(^7\)

To date, after the first 28 months, more than 3,000 consecutive patients have been enrolled, with high success and no major complication rates supporting the feasibility and safety of this new technique.

Complex PCI involving true bifurcations lesions requiring IVUS guidance and upfront two-stents techniques via redo dTRA as well as unprotected LM primary PCI in the setting of cardiogenic shock, also via dTRA, exactly like in the present case, have been recently published by our group.\(^8\)\(^9\)

dTRA has emerged as a novel access site in interventional cardiology. Current literature demonstrates high success and infrequent complications rates.\(^6\)\(^7\) It may provide important advantages over pTRA, including shorter hemostasis, patient comfort, and lower rates of proximal RAQ.\(^1\)\(^5\) Updated observational literature indicates dTRA is safe and reliable.\(^5\) Particularly for left dTRA, in comparison to classic left pTRA, since left upper arm can be positioned over patient’s belly towards the operator, catheters and PCI equipment can be more easily handled without the need of operators to bend over the patients, especially obese ones, thus with much more comfort.\(^7\)\(^10\)
CONCLUSION

In conclusion, really challenging cases of STEMI-related cardiogenic shock requiring primary PCI of occluded unprotected LM can be safely and successfully performed via dTRA by highly experienced transradial operators, with patient and operator comfort and significant reduction of access site-related complications.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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