Original Research Paper

Volume - 14 | Issue - 01 | January - 2024 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Cardiology

CLINICAL CASE : INTEREST OF IVUS IN THE DECISION DURING PERCUTANEOUS CORONARY INTERVENTION

M. Chtioui	Head of cardiology department, Oued Eddahab Military Hospital, Faculty of Medicine and Pharmacy of Agadir
M. E. Cherradi	Cardiology Department, Oued Eddahab Military Hospital, Faculty of Medicine and Pharmacy of Agadir
O. Ammor	Cardiology Department, Oued Eddahab Military Hospital, Faculty of Medicine and Pharmacy of Agadir
I. Meziane	Cardiology Department, Oued Eddahab Military Hospital, Faculty of Medicine and Pharmacy of Agadir

KEYWORDS :

INTRODUCTION:

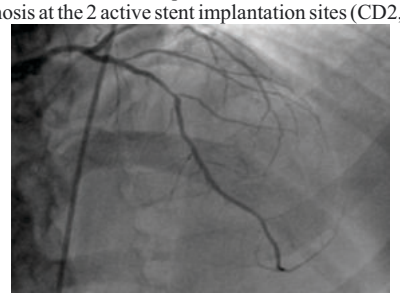
Intravascular ultrasound (IVUS) is a useful diagnostic method that provides valuable information about the coronary vessel lumen, dimensions, plaque burden and its characteristics. The primary use of IVUS in coronary intervention is to guide interventional strategies and evaluate optimal stent deployment. Since the introduction of the drug-eluting stent (DES), concerns about restenosis have diminished. However, high-risk lesion subsets are routinely treated with DESs, and the incidence of suboptimal outcomes after stent deployment, such as stent underexpansion, incomplete stent apposition, edge dissection, and the risk of stent thrombosis, increased accordingly. (1)

Clinical case:

Patient aged 63, followed for ischemic heart disease since 2012, triple stented on a circumflex artery and a right coronary artery, maintaining good left ventricular function, and without other cardiovascular risk factors. Presented in September 2020, for typical, recurrent stress angina, not responding to medical treatment and in whom a disputed stress test indicates percutaneous coronary intervention.

Coronary angiography: A

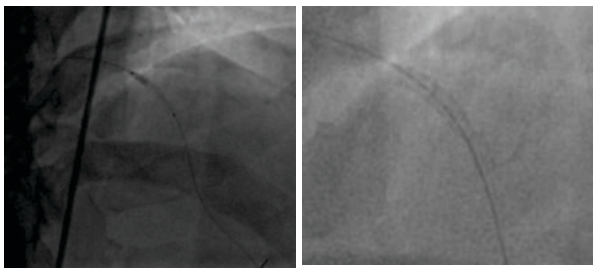
TC: of normal length without stenosis IVA: arises from the TC, of normal size and giving 2 diagonal branches, presents at the level of its middle segment a significant stenosis (50-70%) of type B1, encompassing the origin of the second diagonal . Cx: free from restenosis at the bare stent implantation site. CDte: dominant, free from restenosis at the 2 active stent implantation sites (CD2, CD3)



A

Percutaneous coronary intervention: B ; C

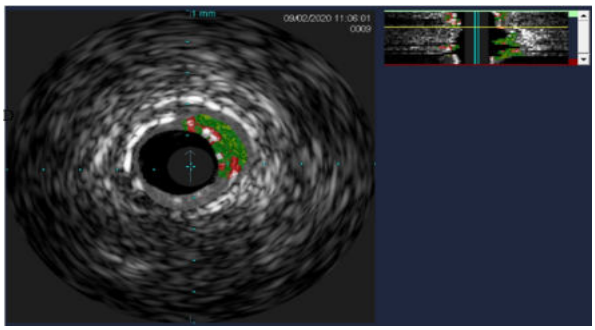
The decision to dilate the middle IVA was taken at the same operating time, so a Guiding 6F Ebu3.75 Launcher carrier probe is positioned at the level of the common trunk in a selective manner and provides good support. A RUNTHROUGH NS guide crosses the lesion and is positioned distal to the middle anterior descending artery. Anterograde placement of an EMERGE BOSTON NC 3x12 mm balloon at the level of the middle anterior descending artery on the lesion to pre-dilate the lesion. Inflation is carried out at a maximum pressure of 12 ATM for a total duration of 30 sec. No imprint was noted during inflation. Anterograde placement of a PROMUS ELEMENT 2.5x20 mm active stent at the level of the middle anterior descending artery on the lesion. Inflation is carried out at a maximum pressure of 11 ATM for a total duration of 30 seconds. The deployment of the endoprosthesis is considered submaximal on its distal third, we decide to explore the lesion by endocoronary ultrasound



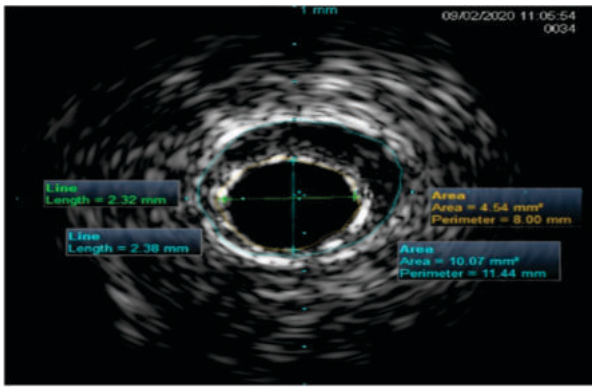
B **C**

IVUS :D ;E ;F

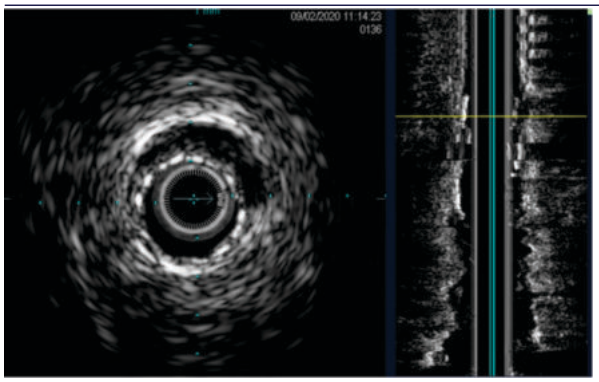
In order to optimize the deployment of the endoprosthesis, antegrade placement of an Eagle Eye Platinium IVIJS Catheter (Philips Medical Systems) which revealed insufficient impaction of the stent at the distal level.



D

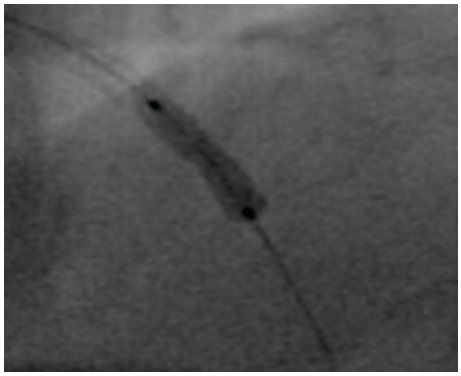


E



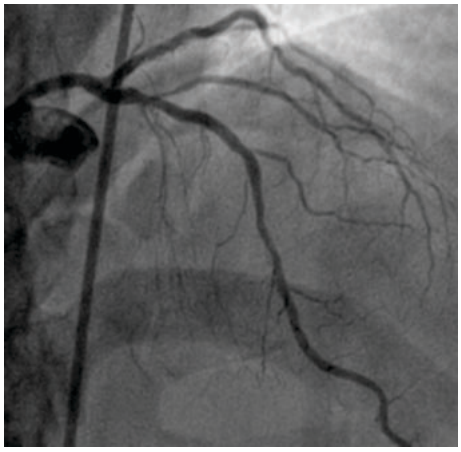
F

We then decide to place, via the antegrade route, the EMERGE BOSTON NC 3x12 mm balloon at the level of the intrastent middle anterior descending artery. Inflation is carried out at a maximum pressure of 18 ATM for a total duration of 30 seconds. No imprint was noted during inflation.



G

After final angiographic control, the middle anterior descending artery was free of significant lesion. There are no visible dissection lines. There is no evidence for a thrombus at this level. Coronary flow is normal (TIMI 3). No spasm was induced during the procedure.



H

DISCUSSION:

Stent underexpansion and stent malapposition after coronary angioplasty, defined as a lack of contact of one or more stent mesh(es) with the vessel wall, are poorly understood phenomena, probably underestimated. by angiography, and whose prognostic impact, particularly in terms of stent thrombosis, remains subject to controversy. They can occur immediately after the gesture, or appear late, at a distance from it; the mechanisms are represented by initial under-deployment, favored by complex anatomy (occlusion, aneurysm, long lesion, etc.) and technical "insufficiency" (poor assessment of the real diameter, inflation at too low pressure), as well as by delayed debridement of the thrombus, observed in particular after angioplasty in the acute phase of infarction, and finally due to secondary positive remodeling of the treated artery. (2) Our case presents one of the frequent problems in the catheterization room, in fact partial stent misapposition is common when the anatomical conditions are unfavorable, and it is not rare when the lesion is long, calcified, dilated at nominal pressure.

IVUS allowed us, a posteriori, to objectify the persistence of a stenosis of the coronary lumen post-stenting (CSA lumen = 4.54 mm2 compared to an EEL CSA of 10.07 mm2), to identify the nature of the plaque (in this case a mixed plaque with little calcification – arc of calcifications =20◦) with a safety margin, which allowed post-stenting dilation with a supra-nominal pressure (18 ATM) of a non-stenting balloon. compliant. It is interesting to note that in a recent study, 20 to 30% of stents were incorrectly deployed (3), IVUS has been used to detect suboptimal results after an apparently angiographically successful stent deployment at the both in the DES and bare metal BMS stent eras. Predictors of IVUS that are associated with increased adverse outcomes include smaller MSA, stent underexpansion, stent edge dissection, incomplete stent apposition, and incomplete lesion coverage (4,5)

IVUS allows a more aggressive intervention using a larger diameter balloon with confidence in terms of safety; Thus, BMS implantation under IVUS guidance may provide greater MSA and more favorable clinical outcomes compared to angiography-guided PCI. DES led to a marked reduction in the rate of stent restenosis and the need for repeat revascularization compared to BMS (6,7). Due to their effectiveness, high-risk lesions and clinical conditions, including bifurcation lesions, long lesions, calcified lesions, left main disease, diabetes, and multivessel disease, are now routinely treated with DES (8). Thus, the risk of stent underexpansion, incomplete stent apposition, and incomplete lesion coverage increases and these suboptimal stent deployment conditions have been reported to be strong IVUS predictors of stent restenosis and thrombosis of stent. Suggesting that IVUS-guided stent implantation still has a central role even in the DES era. Many studies have evaluated the clinical benefits of IVUS-guided PCI compared to angiography-guided PCI alone in the DES era. of the BMS (9) In a meta-analysis of 2193 patients from seven randomized trials, the rates of angiographic restenosis at 6 months and target vessel revascularization were significantly lower in the IVUS PCI group than in the angiography group (22% vs 29%, $p = 0.02$ and 13% vs 18%, $p < 0.001$, respectively), with no difference in mortality rates (2.4% vs 1.6%, $p = 0.18$) or Myocardial infarction (3.6% vs 4.4%, $p = 0.51$) (10)

CONCLUSION:

IVUS can provide direct section images as well as longitudinal images of the coronary vessel wall. It has also contributed to our understanding of the mechanisms in coronary atherosclerotic plaques and provided real-time information on stented segments after coronary interventions. Possible criteria for optimal IVUS stent deployment are complete apposition of the stent to the vessel wall, adequate stent expansion, and complete lesion coverage without edge dissection. Recent data suggest that IVUS-guided PCI may reduce long-term mortality compared with angiography-guided PCI, especially after DES implantation. Optimization of IVUS stent deployment during PCI can be considered a routine practice in daily PCI, especially for complex lesion procedures.

REFERENCES:

1. Yoon H-J, Hur S-H. Optimization of Stent Deployment by Intravascular Ultrasound. Korean J Intern Med. mars 2012;27(1):30-8.
2. Mansour H, Dupouy P, Pernès J-M. Coronary stent malapposition. Sang Thromb Vaiss. juin 2012;24(6):279-92.
3. Räber L, Mintz GS, Koskinas KC, Johnson TW, Holm NR, Onuma Y, et al. Clinical use of intracoronary imaging. Part 1: guidance and optimization of coronary interventions. An expert consensus document of the European Association of Percutaneous Cardiovascular Interventions. EuroIntervention J Eur Collab Work Group Interv Cardiol Eur Soc Cardiol. 20 août 2018;14(6):656-77.
4. Fitzgerald PJ, Oshima A, Hayase M, Metz JA, Bailey SR, Baim DS, et al. Final results of the Can Routine Ultrasound Influence Stent Expansion (CRUISE) study. Circulation. 1 août 2000;102(5):523-30.
5. Hong M-K, Lee CW, Kim J-H, Kim Y-H, Song J-M, Kang D-H, et al. Impact of various intravascular ultrasound criteria for stent optimization on the six-month angiographic restenosis. Catheter Cardiovasc Interv Off J Soc Card Angiogr Interv. juin 2002;56(2):178-83.
6. Moses JW, Leon MB, Popma JJ, Fitzgerald PJ, Holmes DR, O'Shaughnessy C, et al. Sirolimus-eluting stents versus standard stents in patients with stenosis in a native coronary artery. N Engl J Med. 2 oct 2003;349(14):1315-23.
7. Colombo A, Drzewiecki J, Banning A, Grube E, Hauptmann K, Silber S, et al. Randomized study to assess the effectiveness of slow- and moderate-release polymer-based paclitaxel-eluting stents for coronary artery lesions. Circulation. 19 août 2003;108(7):788-94.
8. Park S-J, Kim Y-H, Park D-W, Lee S-W, Kim W-J, Suh J, et al. Impact of intravascular

ultrasound guidance on long-term mortality in stenting for unprotected left main coronary artery stenosis. Circ Cardiovasc Interv. juin 2009;2(3):167-77.
9. Oemrawsingh PV, Mintz GS, Schalij MJ, Zwinderman AH, Jukema JW, van der Wall EE, et al. Intravascular ultrasound guidance improves angiographic and clinical outcome of stent implantation for long coronary artery stenoses: final results of a randomized comparison with angiographic guidance (TULIP Study). Circulation. 7 janv 2003;107(1):62-7.
10. Parise H, Maehara A, Stone GW, Leon MB, Mintz GS. Meta-analysis of randomized studies comparing intravascular ultrasound versus angiographic guidance of percutaneous coronary intervention in pre-drug-eluting stent era. Am J Cardiol. 1 févr 2011;107(3):374-82.