24th CARDIOVASCULAR SUMMIT

TCTAP2019 Daily News

Inside this Issue

Monday, April 29, 2019

2019 New Data from AMC; Novel and More with Expert Commentary

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TICAKOREA: Ticagrelor Versus Clopidogrel in ACS Patients

Compared to Caucasians, East Asian patients are regarded as more susceptible to bleeding events but relatively resistant to thromboembolic events, even on a higher prevalence of high on-treatment reactivity, a phenomenon that is referred to as "East Asian paradox". In the PHILO trial targeting East Asian (Japanese, Korean, and Chinese) patients, ticagrelor was associated with a higher rate of bleeding events and a non-significant higher risk of ischemic events compared to clopidogrel. As such, the superior efficacy of ticagrelor, as observed in the PLATO trial, was questioned in East Asian patients, and more alarmingly, the pronounced bleeding risk with ticagrelor use was of concern. In this context, we conducted a practical randomized trial to compare the safety and efficacy of ticagrelor with those of clopidogrel in Korean patients with acute coronary syndrome (ACS) who were planned for an invasive strategy.

The TIcagrelor versus Clopidogrel in Asian/KOREAn patients with ACS intended for invasive management (TICAKOREA; ClinicalTrials.gov Unique Identifier: NCT02094963) trial was a multi-center, investigator-initiated, open-label, randomized, controlled trial that aimed to assess safety and efficacy of ticagrelor versus clopidogrel on top of low-dose aspirin in Korean patients with non–ST-elevation or ST-elevation ACS. We enrolled men and women at least 18 years of age who presented with ACS with or without ST-elevation, with an onset of symptoms in the previous 24 hours, for whom an invasive management was planned. Patients in the ticagrelor group received a loading dose of 180 mg orally, followed by a maintenance dose of 90 mg twice a day. Those in the clopidogrel group received a loading dose of 600 mg orally, followed by a maintenance dose of 75 mg per day. The primary safety endpoint was the occurrence of clinically significant bleeding (a composite of major bleeding or minor bleeding according to the PLATO criteria) at 12 months. Secondary safety endpoints included major, minor, or fatal bleeding defined by the PLATO criteria, major or minor bleeding according to the Thrombolysis in Myocardial Infarction (TIMI) definition, bleeding according to the Bleeding Academic Research Consortium (BARC) definitions, and premature discontinuation of the study medications. Secondary efficacy endpoints included major adverse cardiovascular events (MACE; a composite of death from cardiovascular causes, myocardial infarction [MI], or stroke) and its individual components, as well as all-cause death, a composite of all-cause death, MI, or stroke, repeat revascularization, and stent thrombosis. Exploratory efficacy end points included the occurrence of a composite of death from cardiovascular causes, spontaneous MI (excluding periprocedural MI), or stroke.

A total of 800 patients were enrolled between July 5, 2014, and June 30, 2017, from 10 major centers in Korea. We randomly assigned 400 patients to receive ticagrelor therapy and 400 patients to receive clopidogrel therapy add-on aspirin. At 12 months, the primary safety end point of clinically significant bleeding (PLATO-defined total major or minor bleeding) occurred in 45 patients (11.7%) in the ticagrelor group and in 21 patients (5.3%) in the clopidogrel group (hazard ratio [HR], 2.26; 95% confidence interval [CI], 1.34–3.79; p=0.002) **(Figure 1A)**. The cumulative rate of the primary safety endpoint was also significantly higher in the ticagrelor group by the landmark analysis starting 30 days after randomization (p=0.004). A higher rate of bleeding with ticagrelor was revealed in all categories of bleeding (procedure-related, coronary artery bypass graft [CABG]-related, and non-procedure- or CABG-related), although statistical significance was achieved only for non-procedure- or CABG-related. The rate of the PLATO major bleeding was also higher in the ticagrelor group than in the clopidogrel group (7.5% vs. 4.1%, p=0.04). Fatal bleeding occurred only in 4 patients treated with ticagrelor. The higher rate of bleeding in the ticagrelor group was similarly demonstrated according to different criteria of TIMI or BARC definitions **(Figure 2)**.

The secondary efficacy endpoint of MACE (a composite of death from cardiovascular causes, MI, or stroke) was occurred in 36 patients (9.2%) in the ticagrelor group and in 23 patients (5.8%) in the clopidogrel group (HR, 1.62; 95% CI, 0.96-2.74; p=0.07) **(Figure 1B)**. However, in landmark analysis starting 30 days

Continued on page 8

Today's Highlights

Coronary Symposium
8:30 AM - 6:00 PM
Coronary Theater, Level 1

Complex PCI
8:30 AM - 10:30 AM
Presentation Theater 2, Level 1

2019 New Data from AMC; Novel and More with Expert Commentary
9:45 AM - 11:00 AM
Presentation Theater 1, Level 1

TCTAP Award 2019 "Best Young Scientist Award"
11:45 AM - 12:00 PM
Presentation Theater 1, Level 1

CTO
2:00 PM - 4:00 PM
Presentation Theater 2, Level 1

Imaging & Physiology
4:00 PM - 6:00 PM
Presentation Theater 1, Level 1

Moderated Abstract and Complex Case Competition
8:30 AM - 4:40 PM
Abstract & Case Zone, Level 1

CE Program for Nurses (Pre-registered needed)
8:30 AM - 5:20 PM
Room 202, Level 2

Training Center
10:30 AM - 3:30 PM
Training Center, Level 1*

Satellite Symposium: Morning Roundtable Forum
7:00 AM - 8:10 AM*

Lunchtime Activities
12:45 PM - 1:45 PM*

*For details on the locations, please check TCTAP 2019 App

General Information

Shuttle Bus

Free shuttle bus will run between COEX and several hotels.
Visit the **CVRF Booth** for more information.

Certificate of Attendance

Certificate of Attendance for TCTAP 2019 will be distributed along with the badge.

Cyber Station / Free Mobile Recharge

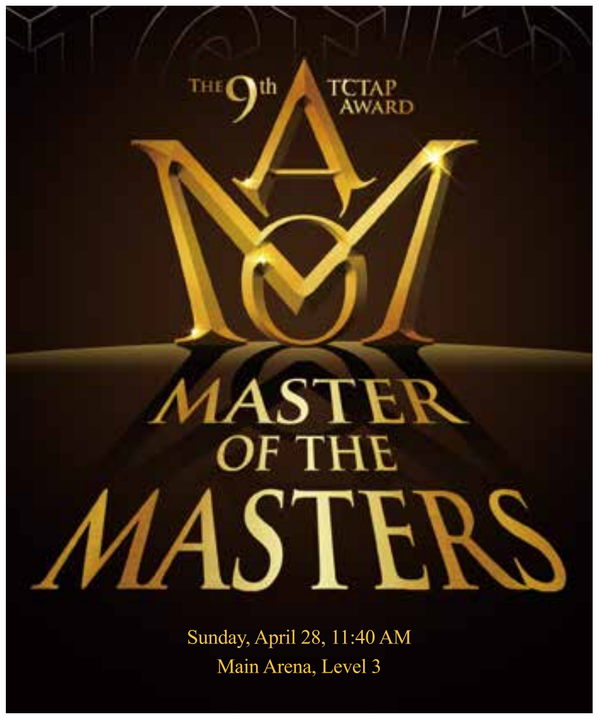
- CVRF Booth, Grand Ballroom Lobby, Level 1
- Lounge, Exhibition (B2) Hall, Level 1
- Lounge next to Registration Booth, Exhibition (B2) Hall Lobby, Level 1

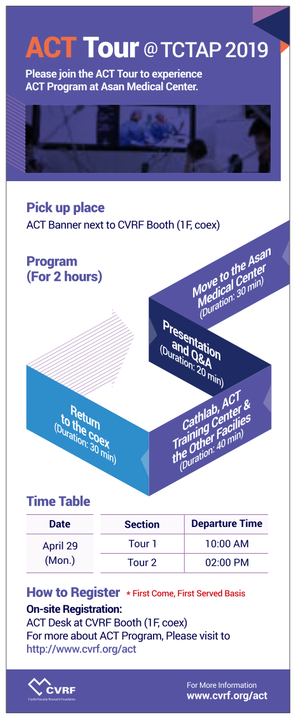
Registration / Lost and Found / Coat Room

- Opening Hours:
  8:30 AM - 6:30 PM, Saturday, April 27
  6:00 AM - 6:00 PM, Sunday, April 28 - Tuesday, April 30
- Registration Booth, Exhibition (B2) Hall Lobby, Level 1

Tour Information

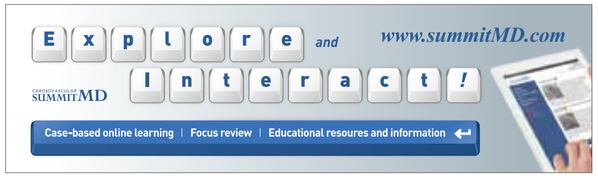
- Grand Ballroom Lobby, Level 1
- Tour information will be provided by COSMO JIN Tour and Korea Tourism Organization.





Program at a Glance

	Coronary Theater *Level 1*	Presentation Theater 1 *Level 1*	Presentation Theater 2 *Level 1*	Other Session Rooms	Room 202 Level 2	Abstract Zone I, II *Level 1*	Case Zone I, II, III *Level 1*
07:00	Satellite Symposium- Morning Roundtable Forum						
07:30							
08:00							
08:30	Live Case & Lecture Session II	Spotlight of Major Clinical Studies	Hot Topics Complex PCI				
09:00							
09:30							
10:00							
10:30	Live Case & Lecture Session III	2019 New Data from AMC				Moderated Abstract Competition	Moderated Complex Case Competition
11:00		Featured Clinical Research from Abstracts & Best Young Scientist Award	Hot Topics Left Main, Bifurcation & MVD PCI				
11:30							
12:00	Live Case Session IV						
12:30							
13:00	Satellite Symposium - Lunchtime Activities				CE Program for Nurses *Korean Session		
13:30							
14:00	Live Case & Lecture Session V	Hot Topics Valves	Hot Topics CTO				
14:30							
15:00							
15:30	Live Case & Lecture Session VI					Moderated Abstract Competition	Moderated Complex Case Competition
16:00							
16:30		Hot Topics Imaging & Physiology	Hot Topics Endovascular				
17:00							
17:30	Live Case Session VII						
18:00							
18:30							
19:00				Satellite Symposium Evening Symposium			
19:30							
20:00							



TCTAP Wrap-up Interviews

Here the most debated issues will be discussed in an interactive way. TCTAP 2019 Wrap-up Interviews are 20-minute moderated interview sessions in open studio.

The purpose of these interviews is to address professional knowledge and experience on selected topics in details with world's leading experts in the field of cardiovascular medicine. Distinguished experts will provide various aspects of the selected topics and exchange lessons learned through open discussions.

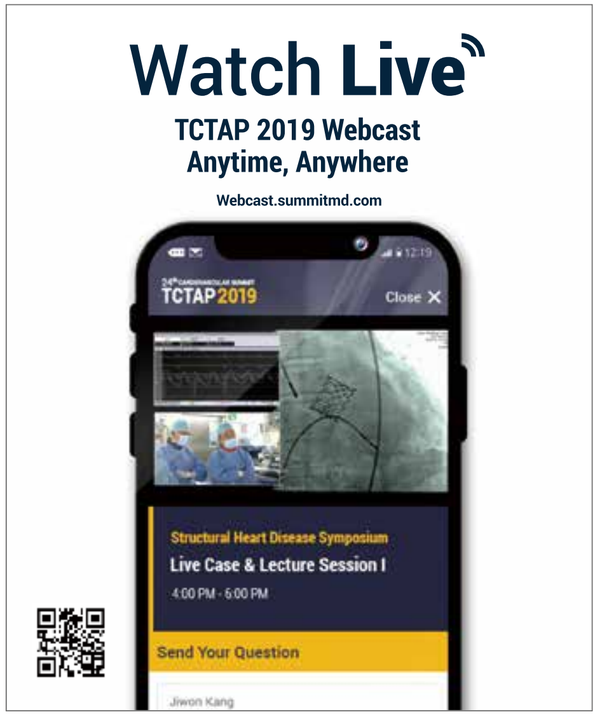
Monday, April 29

Complex
11:00 AM - 11:20 AM
Moderators: Marie-Claude Morice, Chiung-Jen Wu
Interviewees: Aloke V. Finn, Akiko Maehara, Philip M. Urban

LM & Bifurcation
12:30 PM - 1:00 PM
Moderators: Seung-Jung Park, Gregg W. Stone
Interviewees: Antonio Colombo, Thierry Lefevre, John Ormiston

Valve
4:30 PM - 4:50 PM
Moderators: Alain G. Cribier, Eberhard Grube
Interviewees: David J. Cohen, Vinayak Bapat, Jian (James) Ye

Completed interviews will be broadcast on our websites at **www.summit-tctap.com, www.youtube.com/CVRFevents,** and on **TCTAP mobile application**.



Live Case Transmission from World-Renowned Medical Centers

Asan Medical Center, Seoul, Korea
- 8:30 AM - 10:00 AM @ Coronary Theater, Level 1
- Operator(s): (Case #4) Seung-Jung Park, Do-Yoon Kang
  (Case #5) Jung-Min Ahn, Kyusup Lee

Severance Hospital, Seoul, Korea
- 10:00 AM - 11:30 AM @ Coronary Theater, Level 1
- Operator(s): Myeong-Ki Hong, Chul-Min Ahn
- Imaging Interpreter: Jung-Sun Kim

Asan Medical Center, Seoul, Korea
- 11:30 AM - 12:30 PM @ Coronary Theater, Level 1
- Operator(s): (Case #6) Michael S. Lee, Pil Hyung Lee
  (Case #7) Duk-Woo Park, Hyun Woo Park
- 2:00 PM - 3:30 PM @ Coronary Theater, Level 1
- Operator(s): (Case #8) Duk-Woo Park, Gyung-Min Park
  (Case #9) Jung-Min Ahn, Se Hun Kang
- 3:30 PM - 5:00 PM @ Coronary Theater, Level 1
- Operator(s): (Case #10) Antonio Colombo, Do-Yoon Kang
  (Case #11) James Flaherty, Hanbit Park
- 5:00 PM - 6:00 PM @ Coronary Theater, Level 1
- Operator(s): (Case #12) Alan C. Yeung, Yong-Hoon Yoon
  (Case #13) Do-Yoon Kang, Seung-Jung Park

Hot Topics

Complex PCI: ISR, High-Bleeding Risk Patient and Calcification Treatment

Marie-Claude Morice, MD
Institut Hospitalier Jacques Cartier, France

Michael S. Lee, MD
UCLA School of Medicine, USA

Which Stent and Which Dapt Regimen for High Bleeding Risk Patients?

Patients at high bleeding risk (HBR) who require percutaneous coronary intervention (PCI) are a challenging group who need careful evaluation of both their thrombotic and bleeding risks when selecting a stent and determining the duration and intensity of antithrombotic management. Until recently, the perceived need for a very short course of dual antiplatelet treatment (DAPT) often led operators to prefer a bare-metal stent (BMS) to a drug-eluting stent (DES) for such patients. In this context, several trials have been performed to investigate the safety and efficacy of short-term DAPT for HBR undergoing PCI. First, the LEADERS FREE trial recently showed that, together with a 1-month DAPT course, a polymer-free metallic drug-coated stent (DCS) was both safer and more effective than a BMS for patients at HBR who were followed for 2 years. At 2 years, the primary safety endpoint had occurred in 147 DCS and 180 BMS patients (15.3%) (hazard ratio [HR]: 0.80; 95% confidence interval [CI]: 0.64 to 0.99; p=0.039). Major bleeding occurred in 8.9% of DCS and 9.2% of BMS patients (p=0.95), and a coronary thrombotic event (myocardial infarction and/or stent thrombosis) occurred in 8.2% of DCS and 10.6% of BMS patients (p=0.045).

Very recently, the results of the SENIOR trial came out **(Figure 1)**. A total of 1,200 patients aged more than 75 years-old were randomly assigned (596 [50%] to the DES group and 604 [50%] to the BMS group). The primary endpoint occurred in 68 (12%) patients in the DES group and 98 (16%) in the BMS group (RR 0.71 [95% CI 0.52- 0.94]; p=0.02). Bleeding complications (26 [5%] patients in the DES group and 29 [5%] patients in the BMS group; RR 0.90 [0.51-1.54]; p=0.68) and stent thrombosis (3 [1%] in the DES group and 8 [1%] in the BMS group; RR 0.38 [0.00-1.48]; p=0.13) at 1 year were infrequent in both groups.

Thus, a strategy of combination of a DES to reduce the risk of subsequent repeat revascularizations with a short BMS like DAPT regimen to reduce the risk of bleeding event seems like an attractive option for elderly patients who have PCI. In addition, we are waiting for the results of the new ongoing two trials: "MASTER DAPT" and Onyx ONE global RCT study. The major new MASTER DAPT study is set to compare within current guidelines, abbreviated versus prolonged DAPT, following implantation with a drug-eluting bioresorbable polymer stent (Ultimater). Patients (n=4,300) with HBR features have been randomly assigned to one of the treatment options in 130 hospitals across 34 countries. The study primary endpoints are noninferiority for net adverse clinical events; superiority for bleeding; and noninferiority for ischemic endpoints of abbreviated versus prolonged DAPT at 1 year. The Onyx ONE global RCT study is set to compare Resolute Onyx versus BioFreedom with 1 months DAPT among HBR patients. Patients (n=2,000) with HBR features have been randomly assigned to one of the stents in 90 hospitals. This study primary endpoints are composite of cardiac death, myocardial infarction, and stent thrombosis at 1 year.

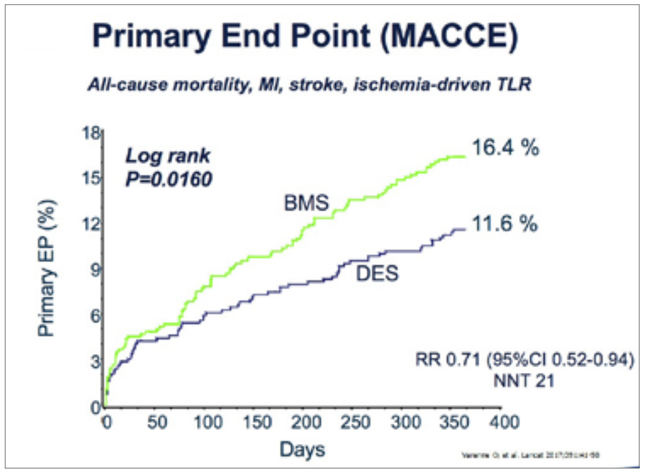


Figure 1. SENIOR trial: primary endpoint

Emerging and Novel Atherectomy Tools: Updates and Clinical Trials

Coronary calcification was associated with increased risk of complications, including death, myocardial infarction (MI), target vessel revascularization (TVR), and stent thrombosis. There have been many efforts to solve the calcium of these coronary arteries, one of which is orbital atherectomy. The ORBIT II (Evaluate the Safety and Efficacy of OAS in Treating Severely Calcified Coronary Lesions) trial reported low rates of procedural ischemic complications after treatment of de novo, severely calcified lesions with the Diamondback 360° Coronary Orbital Atherectomy System (OAS) (Cardiovascular Systems, Inc.). The present analysis reports the final, 3-year follow-up results from ORBIT II. There were 360 (81.3%) subjects who completed the protocol-mandated 3-year visit. The overall cumulative rate of 3-year major adverse cardiovascular events (MACE) was 23.5%. The 3-year target lesion revascularization rate was 7.8% **(Figure 2)**. In the final 3-year analysis of the ORBIT II trial, orbital atherectomy of severely calcified coronary lesions followed by stenting resulted in a low rate of adverse ischemic events compared with historical controls. The real-world multicenter registry using orbital atherectomy showed acute and short-term adverse clinical rates were low in very complex coronary anatomy (MACE rates was 1.7%). In severe calcified unprotected left main coronary artery (ULMCA), orbital atherectomy is an acceptable treatment option. The retrospective cohort trial using 62 patients who underwent PCI with orbital atherectomy for ULMCA disease showed low MACCE rates at 1 years. Orbital atherectomy is a safe and effective treatment strategy for patients with severe coronary artery calcium.

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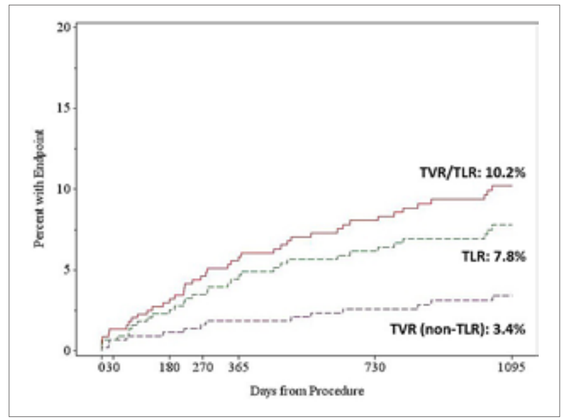


Figure 2. 3-year follow up results of ORBIT II

Hot Topics

Left Main, Bifurcation and MVD PCI

Antonio Colombo, MD
EMO GVM Centro Cuore Columbus, Italy

John Ormiston, MD
Intra, New Zealand

In the intervention area, percutaneous coronary intervention (PCI) for left main (LM), bifurcation and microvascular disease (MVD) is the one of the challenging and debating areas. In this regard, there are four lectures prepared on this topic.

Dr. Antonio Colombo (EMO GVM Centro Cuore, Columbus and San Raffaele Hospital, Italy) will provide the general concept for handling bifurcation PCI during his presentation.

In particular, he will present four factors of decision-making for side branch (SB) PCI as the following:

1. Diameter of the branch
2. Percentage of stenosis of the SB and length of the lesion
3. Territory of distribution
4. Does the SB need PCI at baseline?

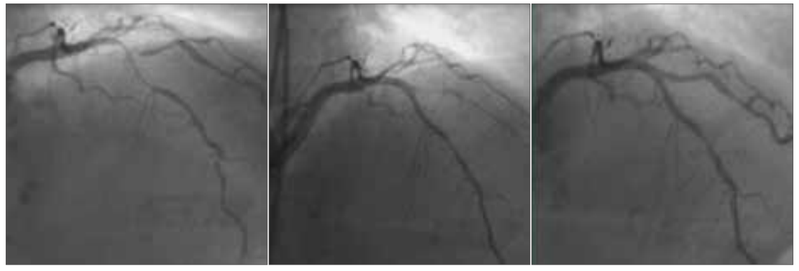


Figure 1. Case study: hemodynamic compromising after stenting

Considerations for decision-making of side branch PCI should be based on the importance of side branch to the patient. For better understanding, Dr. Colombo will be presenting some cases during the presentation.

As shown in **Figure 1**, an 80 year-old male experienced severe hemodynamic compromising after stenting. After TAP stenting, final result was very nice and patient was stabilized. Hemodynamic compromising is the one of the important factors of side branch PCI. Other factors include extent or territory of side branch, bifurcation angle, and operator's limitation.

Furthermore, Dr. Colombo will also discuss about functional evaluation of fractional flow reserve (FFR), which sometimes shows discordance with angiographic or intravascular ultrasound (IVUS) findings.

Dr. John Ormiston (University of Auckland School of Medicine, New Zealand) will be giving a presentation titled 'How Bench Testing has Aided Optimization of Bifurcation PCI'.

His presentation will focus on optimal deployment and post-dilatation of a single stent in a bifurcation lesion.

Dr. Ormiston became interested in bench testing in 1994, after a manufacturer provided this photograph showing a round ostium without distortion following stent side-dilatation **(Figure 2)**.

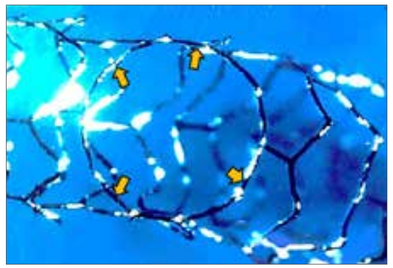


Figure 2. After stent side-dilation

In 1998 and 1999, he discovered and reported for the first time regarding distortion after dilation through the side of stent, narrowing lumen of the stent beyond side branch, and mal-apposition of the stent opposite to the side branch.

In 1999, he reported that kissing balloon post-dilatation corrected distortion while maintaining side branch ostial size **(Figure 3)**. As you can see from the figure, after side branch dilatation, there was distortion of stent and narrowing lumen of main branch. However, after kissing post-dilatation, the openings of main branch and side branch are well-maintained.

He will also present a case of provisional bifurcation stenting, for which mal-apposition at proximal main vessel is concerned, showing that a shorter balloon size to the proximal main vessel could be useful for advancement up to the carina and

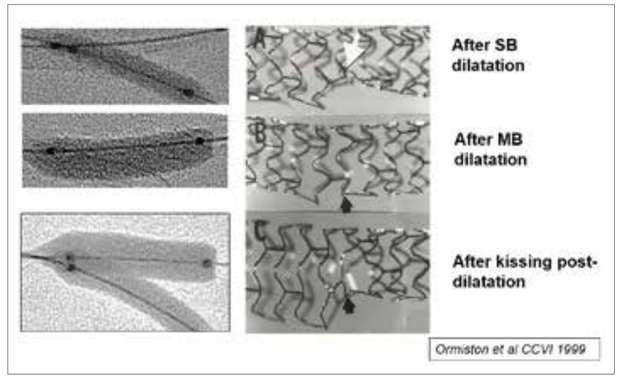


Figure 3. Results of kissing balloon post-dilation

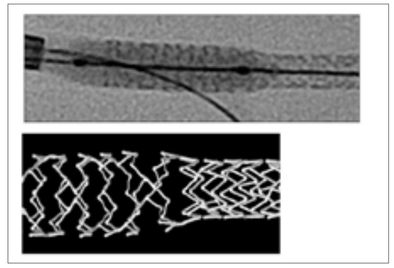


Figure 4. Effects of POT

inflation **(Figure 4)**.

Side-branch dilatation after distal wire crossing would cause stent distortion which could be correctable by final kissing balloon. Otherwise, if a wire crosses proximally, side-branch balloon dilatation causes a metallic carina. If the metallic carina has been formed, operator should concern not to push the metallic carina to side-branch during POT.

In addition, Dr. Ormiston will provide further insights into the optimal strategies for provisional stent deployment in a bifurcation as the following:

1. Wire both branches and position stent across SB
2. Stent sized for distal MB and deploy stent trapping SB wire
3. Position balloon sized to proximal MB up to carina for POT
4. First POT – dilate entire proximal MB stent
5. Rewire SB through side of stent ditally and check crossing site with OCT would be optional strategy
6. Remove trapped wire
7. Inflate SB balloon sized to SB at high-pressure
8. inflate MB balloon sized to distal MB at high-pressure
9. Low pressure kissing balloon post-dilatation and deflate balloons simultaneously
10. Position re-POT balloon up to SB not be acrossed
11. Inflation re-POT balloon proximal to SB

Thierry Lefevre, MD
Institut Hospitalier Jacques Cartier, France

William F. Fearon, MD
Stanford University School of Medicine, USA

Dr. Thierry Lefevre from Massy, France prepared a presentation titled 'Clinically Relevant SB in Bifurcation PCI - Yes We Can Define It Well and Apply It in Real PCI'.

He will discuss in-depth into relevant SB. The definition of relevant SB is a branch that you do not want to lose during the procedure, and one treatment option of avoiding SB occlusion is simply protecting it with a wire.

In addition, relevant SB may be the source of ischemia in >10% of the myocardium after the procedure **(Figure 5)**.

More than 10% of myocardium at risk of ischemia is known to be associated with SB length, SB size, and unique diagonal branch **(Figure 6)**. To explain this finding, Dr. Lefevre will be introducing 'fractional myocardial mass (FMM)' during his presentation, which is calculated based on the vessel length from CT scan. According to a study by HY Kim, et al., it has been reported that the predictors of %FMM ≥10% were side branch length ≥73 mm and left main bifurcation.

His presentation will focus on the idea of 'don't do too much for side branches'. He will elaborate on the the following four points to support that idea: 1) Long-term clinical outcomes are determined by main vessel in the majority of cases, not by side branch; 2) optimizing main vessel stenting is far more important than correcting angiographic appearance of the side branch; 3) Protect the SB if you don't want to lose it; 4) Think twice (area of myocardium and iFR/FFR) before stenting the side branch.

Dr. William F. Fearon (Stanford University School of Medicine) will give a presentation titled 'PCI for MVD - Complete Revascularization for MVD and LM: Anatomic or Functional Concept'.

In regards to the issue of complete revascularization, there are three unresolved major questions:

1) Is complete revascularization necessary with PCI for multivessel coronary disease?; 2) Is "functionally complete" revascularization with deferral of CAD based on FFR as effective as anatomic complete revascularization?; and 3) Does ischemia trump anatomy?

Definitions of complete revascularization is different from anatomic vs. noninvasive functional perspectives. In the anatomic way, all diseased arterial systems with vessel size ≥1.5 mm with at least one stenosis >50% received a graft (or stent). Functionally complete revascularization means all lesions with FFR ≤0.80 receive a graft (or stent).

Dr. Fearon will introduce one report by Hambraeus K, et al. to convey the message on the importance of complete revascularization. According to the report by Hambraeus K, et al, anatomic complete revascularization showed less probability of death/MI and repeat revascularization compared with the incomplete revascularization **(Figure 7)**. He will also present the study results by Ahn, et al. which compared 5-year outcomes between complete and incomplete revascularization in accordance with PCI or CABG **(Figure 8)**.

He will also focus on the "functionally" complete revascularization guided by FFR. He will introduce the FAME-2 study; the concept of 'Residual SYNTAX Score (RSS)' or 'Residual Functional SYNTAX Score'.

In his presentation, Dr. Fearon will focus on the findings showing anatomic complete revascularization is associated with improved outcomes after PCI and that anatomic complete revascularization with PCI compares favorable with CABG. Also, the presentation will discuss on the potentially better outcome of functionally complete revascularization guided by FFR with PCI, which is being tested in a prospective fashion in the FAME 3 trial.

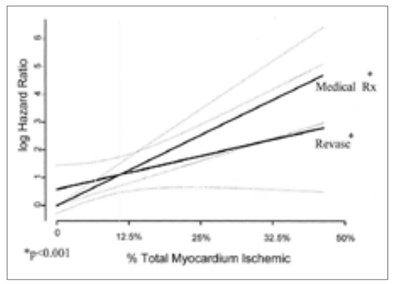


Figure 5. Short-term survival benefit (Revascularization vs. OMT)

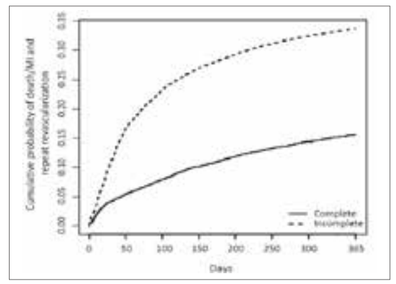


Figure 7. Cumulative probability of death, MI, and repeat revascularization up to 1 year of follow-up

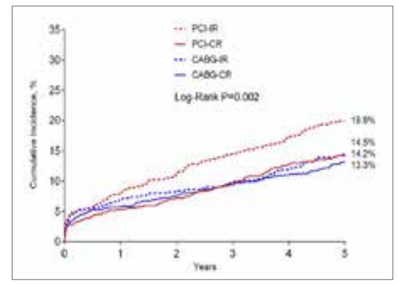


Figure 8. Cumulative incidence of complete vs. incomplete revascularization with PCI or CABG at 5 year outcomes

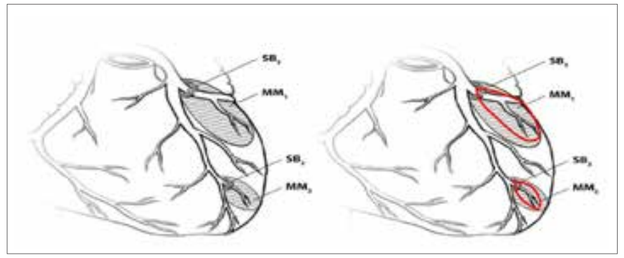


Figure 6.
Relation of angiographic SB calibre to myocardial mass

Hot Topics
Left Main, Bifurcation & MVD PCI
›› Monday, April 29, 10:30 AM - 12:15 PM
›› Presentation Theater 2, Level 1

Hot Topics

2019 New Data from AMC; Novel and More with Expert Commentary

Duk-Woo Park, MD
Asan Medical Center,
Korea

Continued from page 1

after randomization, the cumulative rate of MACE was similar between two the treatment groups (p=0.91). The 12-month rate of post-hoc modified MACE (a composite of cardiovascular death, spontaneous MI or stroke) was similar between the ticagrelor and the clopidogrel groups (5.4% vs. 4.3%, p=0.47).

In this trial of Korean ACS patients with or without ST-elevation for whom an early invasive strategy was planned, ticagrelor was associated with an increased rate of clinically significant bleeding at 12 months compared to clopidogrel. The rates of PLATO major and fatal bleeding were also significantly higher in the ticagrelor group. Similar results were observed according to different bleeding scales of the TIMI or BARC criteria. For efficacy endpoint, ticagrelor was associated with a non-significant higher rate of MACE compared to clopidogrel. However, given that the broad observed confidence intervals that limit the reliability of any conclusions regarding efficacy, these efficacy findings cannot be considered clinically directive.

The present study identified safety concerns regarding bleeding complications of standard dose ticagrelor without clear benefits of ischemic complications in East Asian/Korean patients with ACS. In addition to the "East Asian paradox", these findings suggest that a tailored antiplatelet strategy balancing the risk of ischemia and bleeding is required to improve the efficacy and safety of ACS treatment in East Asian patients. Further research to evaluate the efficacy and safety of adjusted dose of ticagrelor for East Asian population with ACS and/or percutaneous coronary intervention (PCI) is warranted.

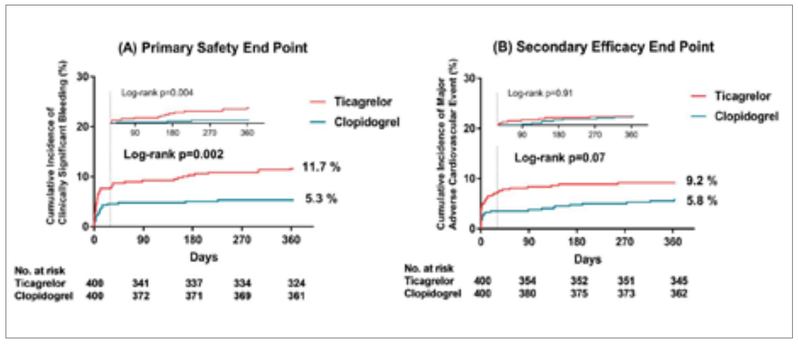


Figure 1. Cumulative incidence of the primary safety endpoint and a secondary efficacy endpoint

	Ticagrelor (N=400)	Clopidogrel (N=400)	Hazard ratio for Ticagrelor (95% CI)	P value
PLATO major or minor	45 (11.7)	21 (5.3)	2.26 (1.34 - 3.79)	0.002
PLATO major	29 (7.5)	16 (4.1)	1.89 (1.03 - 3.48)	0.04
PLATO life-threatening	18 (4.6)	8 (2.0)	2.33 (1.02 – 5.37)	0.05
PLATO minor	20 (5.2)	5 (1.3)	4.16 (1.56 - 11.1)	0.004
TIMI major or minor	37 (9.6)	18 (4.6)	2.16 (1.23 - 3.79)	0.01
TIMI major	19 (4.9)	8 (2.0)	2.47 (1.08 - 5.64)	0.03
TIMI minor	20 (5.2)	10 (2.5)	2.07 (0.97 - 4.42)	0.06
BARC 2,3,4 or 5	41 (10.6)	24 (6.1)	1.78 (1.07 - 2.94)	0.03
BARC 3,4 or 5	27 (7.0)	15 (3.8)	1.87 (1.00 - 3.52)	0.05
BARC 2	19 (5.0)	9 (2.3)	2.17 (0.98 - 4.80)	0.06

Figure 2. Safety endpoints according to the different bleeding criteria

10-Year Follow-Up of MAIN-COMPARE Registry and Substudies

Recently, two large trials comparing coronary artery bypass graft (CABG) and percutaneous coronary intervention (PCI) with contemporary drug-eluting stent (DES) (EXCEL [Evaluation of XIENCE Everolimus Eluting Stent Versus Coronary Artery Bypass Surgery for Effectiveness of Left Main Revascularization] and NOBLE [Nordic-Baltic-British Left Main Revascularization Study]) showed conflicting results and raised further uncertainty on the optimal revascularization strategy for left main coronary artery (LMCA) disease. Moreover, both trials reported a trend toward late catch-up or crossover in the rates of death or the composite endpoint of death, stroke, or myocardial infarction favoring CABG over PCI during the late period of follow-up. Therefore, longer-term follow-up is necessary to examine additional differences between PCI and CABG over time. The MAIN-COMPARE (Revascularization for Unprotected Left Main Coronary Artery Stenosis: Comparison of Percutaneous Coronary Angioplasty Versus Surgical Revascularization) registry was designed to compare outcomes of PCI and CABG for unprotected LMCA disease in multiple centers of Korea. We now report the very long-term (10-year) results of the MAIN-COMPARE study with a systematic linkage to data from a national population registry of vital statistics.

The MAIN-COMPARE study included consecutive patients with unprotected LMCA disease (defined as stenosis of >50%) who underwent either CABG or PCI as the index procedure at 12 major cardiac centers in Korea between January 2000 and June 2006. Patients with prior CABG, concomitant valvular or aortic surgery, or ST-segment elevation myocardial infarction or cardiogenic shock were excluded. The study endpoints were death from any cause; the composite of all-cause death, Q-wave myocardial infarction, or stroke; and target-vessel revascularization.

Comparative treatment analyses between PCI and CABG were performed in the overall cohort, the early cohort of the bare-metal stent (BMS) era (wave 1 of the registry: BMS vs. concurrent CABG between January 2000 and May 2003), and the late cohort of the DES era (wave 2 of the registry: DES vs. concurrent CABG between May 2003 and June 2006) **(Figure 3)**.

Figure 3. Study diagram

The median duration of follow-up among all patients was 12.0 years (interquartile range: 10.7 to 13.5 years); the maximum follow-up was 17.6 years. In the overall population, there were no significant differences between the PCI and CABG groups with respect to the risks of death and composite of death, Q-wave myocardial infarction, or stroke stratified by the time period of before and after 5 years. The risk of target-vessel revascularization was consistently higher in the PCI group **(Figure 4)**.

In comparison of DES and the contemporary CABG group, there was no significant difference between the 2 groups in the risks of death (hazard ratio [HR]: 1.02; 95% confidence interval [CI]: 0.71 to 1.46) and composite risk of death, Q-wave myocardial infarction, or stroke (HR: 0.91; 95% CI: 0.66 to 1.27) up to 5 years. However, after 5 years, there was a continuous separation of the curves, with a significantly higher risk of death (HR: 1.35; 95% CI: 1.00 to 1.81) and a serious composite outcome (HR: 1.46; 95% CI: 1.10 to 1.94) in patients with DES than in patients with concurrent CABG **(Figure 5)**.

In this large scale, multicenter cohort of patients with LMCA disease, there was no significant difference in the rates of death and a composite endpoint of death, Q-wave myocardial infarction, or stroke between the PCI and the CABG groups up to 10 years. However, in the cohort comparing DES and concurrent CABG, PCI with DES implantation was associated with higher risks of death and serious composite outcomes compared with CABG after 5 years: the treatment benefit of CABG has diverged over time during continued follow-up. The rate of target-vessel failure was consistently higher in the PCI group. Further research is needed to clarify the mechanisms underlying differences in very long-term vascular outcomes after PCI and CABG for LMCA disease.

Hot Topics
2019 New Data from AMC; Novel and More with Expert Commentary
›› Monday, April 29, 9:45 AM - 11:00 AM
›› Presentation Theater 1, Level 1

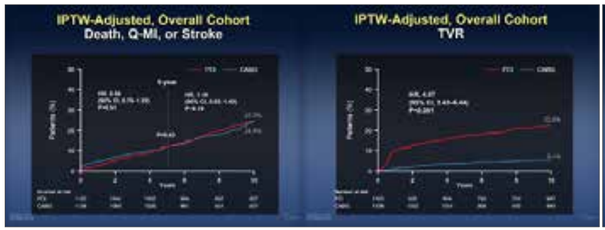


Figure 4. Adjusted 10-year event rates with the use of inverse probability weighting in the overall cohort of patients who underwent PCI or CABG

Figure 5. Adjusted 10-year event rates with the use of inverse probability weighting in the wave 2 cohort of patients who underwent PCI or CABG

Hot Topics

Imaging & Physiology

Myeong-Ki Hong, MD
Severance Hospital, Korea

Bon-Kwon Koo, MD
Seoul National University Hospital, Korea

The Clinical Value of IVUS: Data and its Application in Cath Lab

Intravascular ultrasound (IVUS) has been widely used for percutaneous coronary intervention (PCI). According to previous recommendations about the usage of IVUS for PCI, IVUS may be considered to optimize stent implantation in selected patients or may be reasonable to assess severity and optimize treatment of unprotected left main lesions. Beyond these recommendations, several studies have tested the clinical impacts of IVUS-guided PCI in various coronary lesions. A randomized trial investigating the clinical usefulness of IVUS in patients with long coronary lesions (implanted stent ≥28 mm in length) showed that IVUS-guided PCI reduced 1-year occurrence of ischemic-driven target lesion revascularization in half compared with angiography-guided PCI. Similar to long coronary lesions, IVUS-guided chronic total occlusion intervention also reduced 1-year occurrence of major adverse cardiac event defined as a composite of cardiac death, myocardial infarction, or target-vessel revascularization. In addition to randomized trials, several meta-analyses showed the reduced risk of major adverse cardiac events in patients treated with IVUS guidance compared to those with angiographic guidance. Despite these consistent results, there was no improvement on the recommendation to the use of IVUS according to the revised ESC/EACTS guideline in 2018. Recently, the ULTIMATE study including 1,448 all-comer patients who required drug-eluting stent implantation demonstrated the reduced rate of target-vessel failure at 12 months in IVUS-guided group compared with angiography-guided group. Furthermore, several randomized trials are now under investigation regarding the beneficial effect of IVUS guidance in all-comer patients or those with complex coronary lesions. There are currently limitations to the use of IVUS during PCI, but it is expected that IVUS will soon be used more widely in patients with coronary artery disease.

The Advance of FFRCT

Invasive measurements of coronary artery blood flow and pressure can be used to assess whether atherosclerotic disease is causal of ischemia. Fractional flow reserve (FFR) is defined as the ratio of flow in the diseased vessel divided by the flow that would be attained in the vessel in the hypothetical case where the vessel was normal. Current ESC guidelines on myocardial revascularization assign a class I-A recommendation to FFR for the detection of ischemia-related lesion when objective evidence of vessel-related ischemia is not available.

Non-invasive CT-derived computed FFR (FFRCT) is a novel technology that enables non-invasive assessment of the functional significance of lesions from computational fluid dynamics (CFD) applied to coronary computed tomography angiography (cCTA). Three prospective multicenter clinical studies – DISCOVER-FLOW, DeFACTO, NXT trial - have been conducted to evaluate the diagnostic performance of FFRCT. In these trials, FFRCT was demonstrated as superior to cCTA stenosis severity-based diagnosis. In the real-world ADVANCE registry, FFRCT-modified treatment recommendation in up to two-thirds of subjects as compared to cCTA alone, was associated with fewer invasive coronary angiography without obstructive disease, and predicted revascularization, while helping discriminate subjects at lower risk of adverse events.

Since FFRCT technology enabled non-invasive methods to model patient specific coronary geometry and physiology, this technology can be also utilized in other clinical applications. Virtual intervention can provide guidelines to determine the optimal strategy for treating complex lesions before the invasive procedure **(Figure 1)**. In addition, this technology is applicable to the analysis of hemodynamic parameters related with plaque progression and rupture. It could identify high risk plaques for acute coronary syndrome (ACS) and help guide optimal treatment for high risk patients in EMERALD study. The EMERALD II study will confirm the value of non-invasive hemodynamic assessment in ACS risk prediction.

Continuous refinement of FFRCT is expected to better replicate patient characteristics, thereby improve diagnostic accuracy and contribute to improving patients' care in clinics.

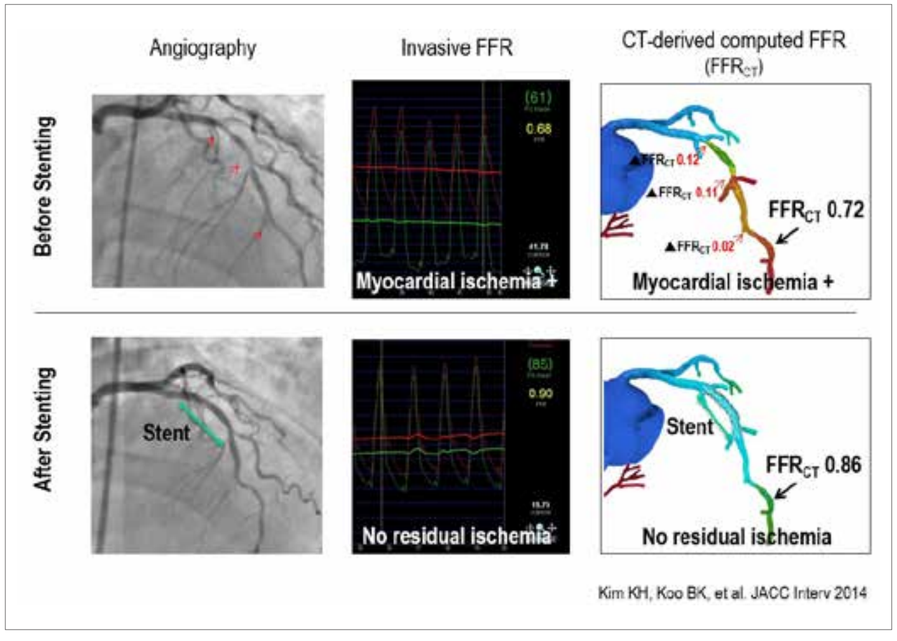


Figure 1. Planning the treatment strategy using virtual revascularization & CT-derived computed FFR

Hot Topics
Imaging & Physiology
›› Monday, April 29, 4:00 PM - 6:00 PM
›› Presentation Theater 1, Level 1

Complex PCI: ISR, High-Bleeding Risk Patient and Calcification Treatment

Continued from page 5

Aloke V. Finn, MD
CVPath Institute, Inc., USA

The Mechanism of ISR: Insights from Pathologic Studies

Drug-eluting stents (DES) are used today in almost all cases for revascularization of coronary artery stenosis. While DES reduce the rate of in-stent restenosis (ISR), they do not eliminate it. Because the overall number of procedures using DES worldwide is enormous, even a small percentage of 5-10% represents a significant number of patients who suffer from target lesion revascularization due to restenosis. Moreover, permanent polymer DES have shown a steady rate of increasing target lesion revascularization over time, suggesting different temporal neointimal formation in BMS restenosis, which usually occurs within the first year after implantation. This may not represent just neointimal growth but also in-stent atherosclerotic plaque formation attributed to accelerated neoatherosclerosis within DES. It is essential for the interventionalist to understand the mechanisms of restenosis and its causes.

At the pathological levels there are important differences between stents that have restenosis (cross sectional lumen area stenosis of ≥75%) versus those that are patent (<50%). Restenotic lesions tend to occur in longer stents and DES restenotic lesions tend to be focal - usually at the proximal or distal ends of the stent rather than diffuse, which is more common in BMS. Maximum inter-strut distances tend to be greater in restenotic segments, suggesting differences in drug penetration into tissues as one of the causes of restenosis. This may be exaggerated in areas of heavy calcification due to greater injury with medial tears. In addition, in-stent restenosis may be also dependent on the type of underlying plaque. The presence of necrotic core is associated with less neointima as compared to stable plaque.

The character of the neointima is also different in BMS and DES lesions of similar ages (median duration 509 days for DES and 516 for BMS). There was lower cellularity for DES versus BMS with lower collagen content but higher proteoglycan extracellular matrix for DES. Both stent types showed an increase in collagen and decrease in proteoglycans over time though the process was more dynamic in BMS versus DES (with no changes in both between 1-2 years). Greater inflammation was correlated with restenosis in BMS but not in DES. Overall atherosclerotic changes within the neointima were more frequent for DES (33%) versus BMS (7%).

The pathology of in-stent chronic total occlusion (CTO) in DES versus BMS is also variable. In the majority of in-stent CTO in both BMS and DES were due to acute thrombotic occlusion (51% BMS, 67% DES) followed by restenosis (31% BMS, 8% DES), and least frequent from neoatherosclerotic plaque rupture (9 % BMS, 4% DES). Most thrombotic occlusions in BMS and DES are associated with medial tears. Neointimal calcification is rare in both types of in-stent CTOs.

These data highlight the importance of pathologic factors which determine the characteristic of restenosis in DES versus BMS. Overall appropriate stent expansion with optimal inter-strut spacing is an important determinant of better outcomes in DES while temporal differences in the composition of the neointima are observed in DES and BMS.

Hot Topics
Complex PCI: ISR, High-Bleeding Risk Patient and Calcification Treatment
›› Monday, April 29, 8:30 AM - 10:30 AM
›› Presentation Theater 2, Level 1

TCTAP Award

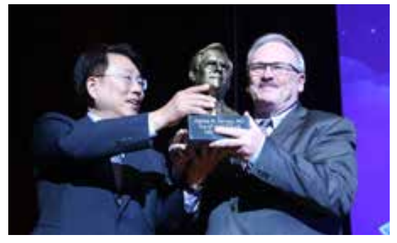
Dr. Patrick W. Serruys Is Presented the 9th TCTAP Award "Master of the Masters"

Dr. Patrick W. Serruys, a professor of Cardiology in the Cardiovascular Science Division at Imperial College in London (UK), has been selected as the recipient of the 9th TCTAP Award "Master of the Masters". The award ceremony was held on Sunday, April 28, 2019.

TCTAP Award "Master of the Masters" has been bestowed annually upon the most distinguished cardiologist who has made meritorious contributions and has been playing a significant leading role in the field of interventional cardiology, as well as in TCTAP over the years.

Dr. Patrick W. Serruys studied medicine at the University of Leuven, Belgium. From the beginning of his career to being an expert in cardiology, he devoted a lot of time at the Thorax Center, Erasmus Medical Centre from 1977 to 2014. He was a Chief of Interventional Cardiology at the Thorax Center from 1997 to 2012, and a professor of Medicine until April 1st, 2014, at Erasmus Medical Centre, Netherlands. He once mentioned that if he writes an autobiography, the title would be "Thorax Center".

There are many intellectual achievements of Dr. Patrick W. Serruys. In 1986, he introduced stenting in patients in the Netherlands. Then, he conducted the first randomized trial with stenting that led to the approval of the technique by the Food and Drug Administration in the USA. He regards this as the most important achievement of him. In 1999, he developed drug-eluting stents, which drastically reduced restenosis after procedures, with Dr. Eduardo Sousa. In 2006, he devised a fully biodegradable drug-eluting scaffold. It was a huge discovery since a permanent metallic stent would not need to be implanted in patients.



In addition to his numerous researches, he has brought notable professional results as well. He had (co-) authored more than 3375 ISI-recognized publications and also was an editor of 45 books and textbooks. Through all these outstanding work and contribution, he won the Gold Medal Award of the European Society of Cardiology in 2012, as well as the TCT Career Achievement Award in 1996.

As a great teacher and a mentor, Dr. Patrick W. Serruys has trained more than 250 interventional cardiologists. He has always emphasized the importance of being curious and opening to the novelty. He said, "If you see somewhere unexplored, you have to go there. That's the place to work. That's the place to discover new thing."

TCTAP Award 2019
"Master of the Masters"
›› Sunday, April 28, 11:40 AM - 12:00 PM
›› Main Arena, Level 3

Hot Topics

Endovascular: Calcium Assessment and Its Solution

Sang Woo Park, MD
Konkuk University Medical Center, Korea

Robert Bersin, MD
Swedish Heart and Vascular (Emeritus), French Southern Territories

Lawrence A. Garcia, MD
St. Elizabeth's Medical Center, USA

Paclitaxel DCBs for Femoral-Popliteal Disease: Pitfall and Current Status

Paclitaxel has been playing an important role for improving drug coated device. Developing technology of excipient for device such as stent or balloon, many drug coated devices were introduced and evaluated with using paclitaxel. Most recent data for paclitaxel-coated stent (IMPERIAL) showed that long releasing drug stent (Eluvia) had higher primary patency rate than conventional drug eluting stent (DES) (Zilver PTX). And many drug-coated balloon (DCB) (IN. PACT, Lutonix, Stellarex, etc.) also has shown good primary patency for two or three years. Therefore, DES and DCB nowadays are the standard therapies for stenotic disease of femoropopliteal arteries.

However, recent meta-analysis of summary-level data suggests that there is an increased mortality risk at two and five years with the use of drug-eluting technologies in the treatment of femoropopliteal artery disease. In this meta-analysis, at 2 years (12 RCTs with 2,316 cases), there was significantly increased all-cause death in the case of paclitaxel versus control (7.2% vs. 3.8% crude risk of death; risk ratio, 1.68; 95% CI, 1.15-2.47). Up to five years (3 RCTs with 863 cases), all-cause death further increased in the case of paclitaxel (14.7% vs. 8.1% crude risk of death; risk ratio, 1.93; 95% CI, 1.27-2.93). And there was a significant relationship to what the investigators called paclitaxel dose-time product, and absolute risk of death in the paclitaxel arms. The mechanism of harmful effect of paclitaxel was suggested that paclitaxel has very low solubility, and when it is transferred into the vessels and arteries it stays there for an extended period of time. Since publication of the meta-analysis, several criticisms were reported on the statistical methods used, to the data itself, and interpretations.

The long-term safety data from the IN.PACT was published contrasting with previous meta-analysis. The researcher investigated the plausibility of a relationship between paclitaxel and mortality based on patient-level analysis. The mortality rates were not significantly different between standard PTA and DCB cohort (88.9% vs. 90.7%, p=0.399) **(Figure 1)**. The mean nominal dose of paclitaxel was not different between DCB patients who died and survived (11.8±7.3 vs. 11.4±7.4, p=0.529), and also there was no relationship according to dose-level. This independent patient-level meta-analysis demonstrates that paclitaxel DCBs are safe, and there is no correlation between any level of paclitaxel exposure and mortality.

Sirolimus DCBs for Femoral-Popliteal Disease: Emerging Role and Future Perspectives

Despite developing of technology for paclitaxel coating balloon, there are several problems to reducing primary patency rates. Its effectiveness reduced markedly in calcified lesions and sometimes particulate embolism occurred due to flaking of coating paclitaxel. Especially, recent meta-analysis showed higher mortality in paclitaxel using device than conventional device.

Unlike paclitaxel, sirolimus has several advantages (cytostatic action, wide safety-margin and therapeutic range) that better result is expected if it can be coated onto balloon. However, sirolimus cannot easily enter into arterial tissue and also cannot stay enough time to maintain therapeutic levels. To overcome these weaknesses, sirolimus-coated balloon (SELUTION) with micro-reservoirs and novel cell adherent technology (CAT) has been developed and the results of the SELUTION FIH trial have been reported. The micro-reservoirs, which are unique to the SELUTION drug-coated balloon, facilitate controlled and sustained release of sirolimus, which provides a therapeutic effect in treating lesions over a prolonged period.

The SELUTION FIH trial was a prospective, controlled, multicenter, open, single-arm clinical investigation. Researchers evaluated the safety and efficacy of SELUTION in the treatment of lesions of the femoropopliteal arteries, duplex ultrasound and angiographic assessment at six-month. The primary endpoint of the study was angiographic late lumen loss at six months. Secondary endpoints included major adverse events, primary patency, and angiographic binary restenosis. In this study, fifty patients were enrolled at four German center.

Median late lumen loss of the target lesion was 0.19 mm (-1.16; 3.07) at six months. The rate of target lesion revascularization was 2.3% which is the lowest result that has ever been reported in a drug-coated balloon FIH study at six months. There were excellent outcomes despite 34% moderate or heavy calcified lesions **(Figure 2)**. The incidences of either death or any amputations were not observed. This outstanding results support that SELUTION is the first drug-coated balloon with sustained release of sirolimus to be effective treatment of femoropopliteal artery lesions. Further studies are required to confirm these findings in larger patient populations.

Lithotripsy for Calcific Lesion: When and How

Lower extremity revascularization for obstructive arterial disease has grown in both scope and scientific data. The current myriad of devices has, with few exceptions, gained their position through a scientific protocol, demonstrating their benefit with regard to primary patency and outcomes. Again, with few exceptions, there have been few that have dealt with the real-world patients we see in the lab daily with extensive disease and more importantly those with extensive calcification.

Many devices, principally atherectomy, have been developed either through directional or rotational means to disrupt, and ultimately, "change the arterial compliance" to allow for more definitive therapies without the resistance to treatment (dilation or stent expansion) due to arterial non-compliance and calcification. These atherectomy devices do perform well and consistently to the point that in the superficial femoral artery (SFA), for a leave nothing behind strategy, they have become primary therapies.

Atherectomy devices have great benefits and in the experienced hands perform very well. However, they do have an additional cost for the procedure and their need for distal protection may be another financial consideration as today's market of tight marginal costs can become daunting.

Lithoplasty is a balloon catheter that has been developed specifically to provide arterial compliance changes without the increased costs and issues with alternative technologies. The device (Shockwave INC, XX USA) is based on the concept that local microcavitation energy could provide focused energy to break superficial, medial and deep wall calcifications in the same way focused energy waves break renal calculi **(Figure 3)**. The waves are generated in the nodes and travel out and in the same way of fluid dynamics will interact and have ebbs and tides, where a wave encounters a base of a wave or a wave encounters another wave.

The key element for this device is the familiarity of an angioplasty balloon and the familiarity of simple angioplasty. The technique for use is to engage a lesion and dilate the balloon to a simple inflation pressure of 4 atms and activate the system. The device in the periphery has 5 nodes that fire in sequence. The two proximal and distal work in tandem providing the nodal energy to disrupt in situ calcification as groups. However, the central nodes works independently. Their firing sequence is tightly controlled such that although the center works independently, its function is similar in the additive process to disrupting the calcification due to summation of nodal energy.

The device has initiated its pivotal trial in the US for efficacy and safety in the SFA for subjects with heavy calcification and lesions up to 18 cms in length. This trial will be an assessment of the combination of lithoplasty with drug-coated balloon (DCB) in these subjects. The unknown here will be what we will presume is a success in these groups. We have little data regarding these subjects and outcomes that would be beneficial compared to DCB alone. This is the critical point of science.

In its commercial use in the US, the device is growing in popularity due to the ease of use in the myriad of calcific locations that we treat. The use in the iliac, common femoral, superficial femoral and popliteal arteries appears promising and limits the time in the procedure for arterial compliance change to allow final device choice and outcomes.

The best locations in my experience have been where we would generally employ atherectomy. These cases of long, calcified lesions appear to have the greatest benefit with lithoplasty. The ease of use to effective dilation and arterial compliance is very efficient and appears to be cost effective in early analysis.

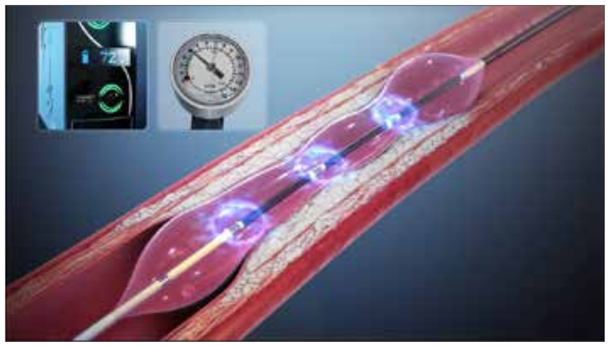


Figure 3. The concept of lithoplasty

Hot Topics
Endovascular: Calcium Assessment and Its Solution
›› Monday, April 29, 4:00 PM - 6:00 PM
›› Presentation Theater 2, Level 1

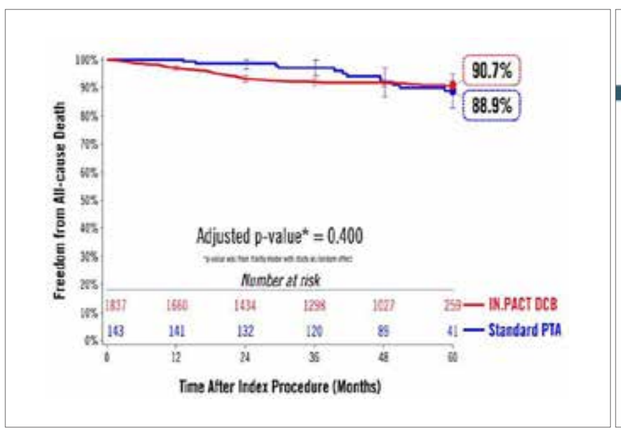


Figure 1. Comparison of mortality rate between IN.PACT DCB vs. standard PTA

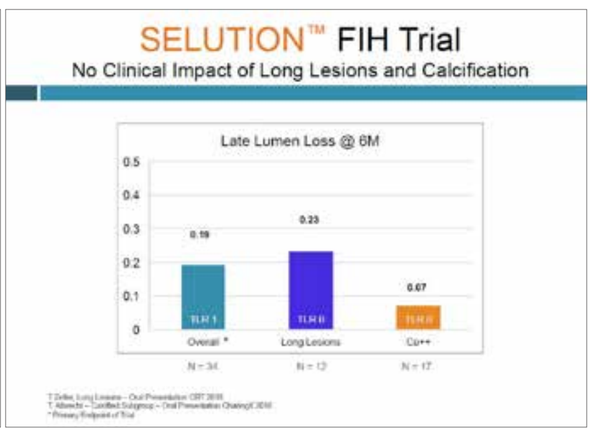


Figure 2. SELUTION FIH trial outcomes at six months

TCTAP Award

The 7th TCTAP Best Young Scientist Award Given to Dr. Jeehoon Kang

Jeehoon Kang, MD
Seoul National University Hospital, Korea

Here, it's our pleasure to introduce this year's award winner, Dr. Jeehoon Kang,

who is a very talented and enthusiastic interventional cardiology at Seoul National University Hospital (SNUH).

He has a considerable interest in percutaneous intervention for structural heart disease and in critical care, as well as left ventricular (LV) assisting devices. He completed his internship and residency in the Department of Internal Medicine at Seoul National University, and since then, he had been a distinguished fellow in Cardiology until he joined as the faculty member of SNUH last year.

There are more than 23 brilliant papers that are first-authored by the winner and published in highly recognized international journals, including JACC Cardiovascular Imaging, Heart, Thrombosis and Haemostatisis, Am Heart J, Korean Circ J, and etc. He has also received numerous awards, such as Best Oral Abstract Presenter at TCTAP in 2018, Best Oral Abstract Presenter at KSIC in 2017 and This year's Fellow Trainee at SNUH in 2017, to name a few. He is pursuing his career in interventional cardiology as a member of the Korean Society of Interventional Cardiology, of Echocardiography, and of Critical Care Medicine.

Q1) You've accomplished so much in this field at a very young age. It can be fairly said that it is barely possible for ordinary trainees to achieve such an accomplishment under pressure of hard work and tight schedule. Could you tell us some of your good practices in your daily life which led to your success?

I am more than flattered to be given this prize, and I would like to express my gratitude to everyone around me. Although I think that my present achievements are far from a success, I do admit that I have done additional work to reach my present status. Probably, the strongest motivation to maintain my research was the current academic trend of interventional cardiology. I tried to update my knowledge by reading newly released articles, attending various conferences, and having discussions with my senior colleagues. I could feel in my instinct that I should exert myself to keep up with the current trend and furthermore to make a voice in the international societies of cardiology.

Q2) Who would be the person, if you consider one mentor, having affected you the most?

This is a very difficult question. I can definitely say that many senior members in our department have given a positive influence on my career, making it impossible to consider 'the most'. However, I could say that Drs. Hyo-Soo Kim, Bon-Kwon Koo, and Kyung-Woo Park have supported me both materially and morally during my entire career. I am still receiving boundless support from my senior colleagues, which is a grateful gift for me.

Q3) Which subfield of cardiology do you consider committing yourself to in a future decade?

I would like to commit my future decade in optimal treatment for coronary artery disease patients. Despite the vast amount of data from previous trials, we still do not know the answers for many questions in this field. This includes, who optimal candidates are for PCI, what the best specific strategy is for PCI, and how we should apply adjunctive treatments. Little is known and much needs to be clarified, which leaves a lot to be done. Especially, I find that there is a deep need for cardiology specialists in the field or critical care medicine. Although we always feel that we are treating critically ill patients, ironically, we have very few consensuses in treating critical patients. Aforementioned question will give me lots of homework which I may focus on for the next decade in my career.

Q4) What role do you think AI (Artificial Intelligence) is going to have in your research subject?

Regarding the risk stratification model for clinical events after PCI, I am very eager to see what AI can do to increase the accuracy of these models. Although we know various factors that are predictors of adverse clinical events, current models which incorporate these factors show at most a moderate predictive value. AI could be used to identify unknown predictors, and to develop a sophisticated model. If AI is able to develop a better model which could be used in the clinic, I think that we should not hesitate in applying it in the field.

Q5) What word best describes your feeling of being the winner of this prestigious award?

I will express my status as a feeling of 'responsibility'. Now that I have received this prestigious award, I feel great responsibility to show a notable response. I hope that my future research will meet this expectation.

TCTAP Award 2019
"Best Young Scientist Award"

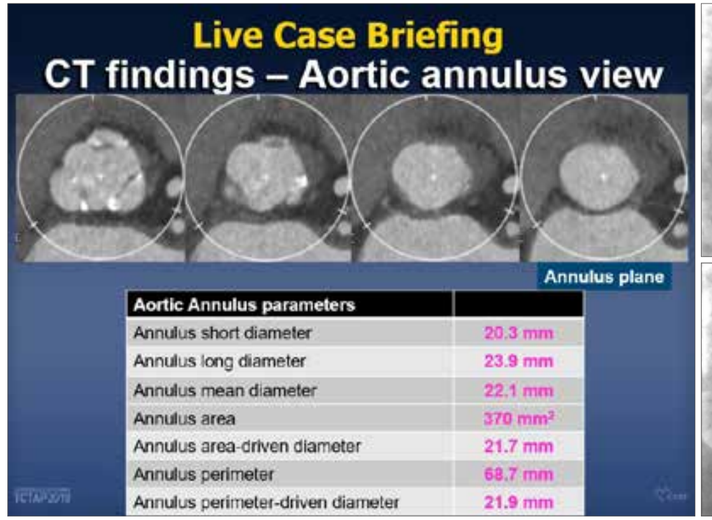
›› Monday, April 29, 11:45 AM - 12:00 PM
›› Presentation Theater 1, Level 1

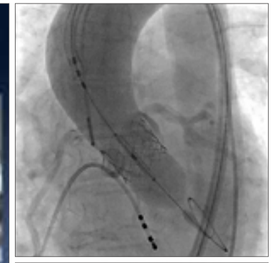
Live Cases

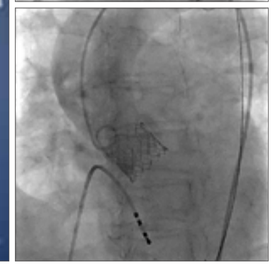
Yesterday's Hot Lives

This case was a very meaningful with collaboration of the two masters of intervention, Dr. Alain G. Cribier, the legend of transcatheter aortic valve replacement (TAVR), and Dr. Seung-Jung Park. An 82 year-old female was admitted for dyspnea on exertion (NYHA Fc Class II). The electrocardiography showed right bundle branch block with left ventricular (LV) hypertrophy. She had a history of hypertension. The transthoracic echocardiography showed tricuspid aortic valve and severe aortic stenosis with normal LV systolic function (EF=60%). The aortic valve area by continuity equation was 0.6 cm^2, maximal transaortic flow velocity was 4.6 m/s, and mean and peak pressure gradient were 83/46 mmHg, respectively. The computed tomography (CT) scan showed mean annulus diameter of 22.1 mm, area of 370 mm^2 and perimeter of 68.7 mm. The distance from annulus to LM and right coronary artery (RCA) ostium were 13.1 and 17.1 mm, respectively. There was no evidence of significant coronary artery stenosis on the CT. Her STS score was 2.987% and EuroScore was 8.97%. The bilateral femoral artery was very tortuous, thus, it was decided to approach via the right femoral artery with the minimal diameter of 7.4 mm for the operator's preference. After discussion, it was planned to implant the 23 mm Sapien 3 valve.

Under conscious sedation, 6 Fr sheath and temporary pacemaker were inserted through the left femoral vein, and 7 Fr sheath and 6 Fr pig-tail catheter were inserted through the left femoral artery. An 8 Fr sheath was inserted through the right femoral artery, and the right femoral artery was dilated with 14 Fr Ultimum sheath.

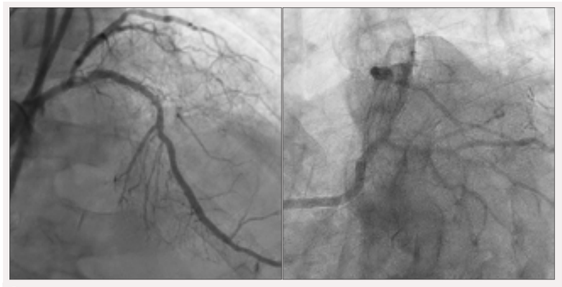






An Amplatz Left (AL) 1 diagnostic catheter with a 0.035 inch Amplatz Stiff Wire was used to cross the aortic valve, and pre-ballooning was not performed because of low amount of calcium. Then, Sapien 3 valve was introduced, and under fluoroscopy control, a 23-mm Sapien 3 prosthesis with nominal volume was placed and successfully deployed at the best position of the aortic annulus. After the valve implantation, fluoroscopy and transthoracic echocardiography showed trivial aortic regurgitation without any acute complications. After the intervention, the puncture site was closed with a Proglide.

An 81 year-old male was admitted for effort chest pain. His coronary risk factors were hypertension, hyperlipidemia and current smoker. He underwent percutaneous coronary intervention (PCI) at proximal to mid left anterior descending artery (LAD) and proximal right coronary artery (RCA), 13 years ago. Repeated in-stent restenosis (ISR) lesion at proximal to mid LAD was treated with percutaneous old balloon angioplasty (POBA) or stent implantation, 12 or 11 years ago, respectively. Coronary angiography showed significant stenotic lesions at left main bifurcation and severe in-stent restenosis at proximal LAD. The fractional flow reserve (FFR) value of LAD was 0.75. Left coronary artery was engaged with 8 Fr JL 3.5 guiding catheter. Using the BMW guidewire, we passed to LAD and LCX. Emerge NC balloon 2.5 x 15 and Synergy stent 2.75 x 28 were used at proximal LCX, and Emerge NC 2.75 x 15 was used as a high-pressure balloon, then the balloon Crush was done with NC TRCK 3.75 x 15. LM and proximal LAD ISR lesion was covered with Synergy 4.0 X 20 after plaque modification with NC TREK 3.75 X15. And then, high-pressure balloon was applied at overlap area of two stents of proximal LAD ISR with NC TREK 3.75 X 15 and Neon NC 4.0 x 15 was used at LM as a high-pressure balloon. Finally, the kissing balloon technique was used for LM bifurcation lesion with NC TREK 3.75 x 15 for LAD and Powered Lacrosse 2.75 x 15 for LCX. The final angiography showed well-positioned and expanded stent with TIMI 3 flow.



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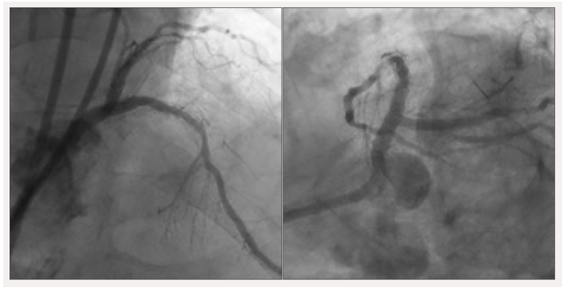


Post

Hot Topics

CTO: Retrograde Channel Technical Forum and Current Pitfalls and Evidence of CTO-PCI

Kambis Mashayekhi, MD
University Heart Center Bad Krozingen, Germany

Seung-Whan Lee, MD
Asan Medical Center, Korea

Academic Research Consortium - CTO - Criteria on CTO Collaterals

The members of the Academic Research Consortium (ARC) – coronary total occlusion (CTO) held a meeting in November 2018. The purpose of the ARC was to create a dynamic, transparent and collaborative forum to develop consensus definitions and a standard nomenclature for pivotal clinical trials of medical devices and to disseminate such definitions and recommended processes into the public domain. As the leader of a working group focused on complexity scores and collaterals in CTO, I report about the criteria on CTO collaterals we developed.

We defined collaterals (CL) as inter-arterial connections that provide blood flow to a vascular territory whose original supply vessel is obstructed. CL were divided into septal CL and non-septal CL. Septal CL run exclusively through the interventricular septum, whilst non-septal CL can have intramyocardial or an epicardial course. Perforation of septal CL is often benign. By contrast, bleeding from non-septal CL may have dramatic hemodynamic consequences by causing tamponade or compressive hematomas, often life-threatening, especially in post-CABG patients.

Collateral vessels were defined as contralateral, ipsilateral and bridging. Contralateral CL arise from the opposite artery (right to left coronary and vice versa), while ipsilateral CLs originate from the proximal part of the occluded artery. Bridging CL are a variety of ipsilateral collaterals, usually very small (CC ≤1), short connections between the proximal and the distal cap, not suitable for the retrograde approach as they are generally very fragile and enter close to the distal cap of the CTO vessel pointing downward. The Rentrop-Classification describes the filling pattern of the occluded artery segment more than the collaterals. Therefore, the ARC recommends the Werner classification for a semi-quantitative assessment of the CL in CTO patients.

In the commonly used hybrid approach and recently published Asia Pacific Algorithm, the existence of an "interventional" CL, suitable for retrograde recanalization, plays a major role in the decision tree. It is recognized that "interventional collateral" is a subjective definition which varies with operator experience, technical proficiency, and type of wires and microcatheters available. The feasibility of attaining retrograde access is largely unpredictable, with even dedicated retrograde operators having a CL passage failure rate of more than 20%, excluding bypass grafts, which are regularly used for retrograde approach, but not CL per definition. Therefore, a careful review (e.g. selective visualization) of the anatomical characteristics of CLs is recommended. A scoring system including tortuosity and size for predicting suitable collaterals was recently described **(Table 1)**. The ARC recommends feasibility and risk assessment of CLs with respect to appropriate discrimination of suitable and non-suitable collaterals to maximize the safety of a retrograde approach.

Table 1. Anatomical predictors for non-suitable collaterals modified by McEntegart et al.

Characteristics	Definition
Type	Non-septal CL
Size	CC 0 or <1 mm in non-septal CL
Angle	Adverse channel entry of exit angle of <45 degree
Rupture risk	CL at high risk of damage as a non-septal collateral with ≤ half the diameter of the microcatheter
Multiple bifurcations	Particularly at points of marked curvature, or just after collateral channel entry
Extreme length	Difficult to negotiate with equipment, even with the use of a shortened guide and mother-daughter catheter
Severe tortuosity	**Proposal:** Presence of ≥2 high-frequency, successive curves (within 2 mm) in the context of non-septal collaterals and ≥1 high-frequency curve that failed to uncoil in diastole for septal channels (thus a measure of channel distensibility). A high-frequency curve is defined as a curve that is >180 degrees occurring within a segment length <3 times the diameter of the collateral.

Clinical Implication from In-depth QoL Analysis from the DECISION-CTO

Percutaneous coronary intervention (PCI) effectively relieves ischemia and improves symptoms in patients with coronary artery disease (CAD). Likewise, PCI for chronic total occlusion (CTO) has achieved an important role in reducing symptoms and improving quality of life (QoL) based on the results of several randomized and observational studies. However, the recently published Drug-Eluting stent implantation versus optimal medical treatment in patients with ChronIc Total OccluSION (DECISION-CTO) trial demonstrated somewhat conflicting result, as there was no significant difference in QoL between the CTO-PCI and no CTO-PCI strategy. This observation was likely due to the specific design of the trial, as randomization and baseline QoL assessments were done before any intervention including PCI for obstructive non-CTO lesions. Although the observed promising effect of PCI for non-CTO lesions on QoL is of clinical value and may have a practical implication for patients with CTO, it was difficult to assess the contribution of CTO-PCI itself on symptom improvement among the study population.

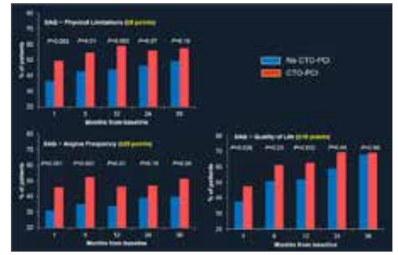


Figure 1. Proportion of patients with clinically meaningful QoL improvement in the overall population

A post hoc analysis of the QoL outcomes from the DECISION-CTO trial showed that the proportion of patients with clinically meaningful increases in SAQ-physical limitation (≥8 points from baseline), angina frequency (≥20 points), and QoL (≥16 points) domain scores was higher among those treated with CTO-PCI strategy than those treated with no CTO-PCI strategy, particularly at 1, 6, and 12 months **(Figure 1)**.

This observation implies that CTO-PCI may have had further effect on QoL in selected patients enrolled in the trial. Further analysis was performed after stratifying patients into those who had isolated CTO disease and multivessel CAD accompanied by a CTO. The baseline scores were similar in all QoL scales between the two groups. The mean score difference between the CTO-PCI and no CTO-PCI group was relatively higher in patients with isolated CTO disease than those with multivessel disease at 1 month time point. The proportion of patients with clinically meaningful increases in key SAQ domains was consistently higher in patients treated with CTO-PCI than those treated with no CTO-PCI in both groups, but with a higher degree in the isolated CTO disease. This in-depth QoL analysis from the DECISION-CTO trial emphasizes the role of PCI not only for the obstructive non-CTO lesions but also for the CTOs. When dealing with patients with CAD accompanied by a CTO, treatment strategy should be selected with careful assessment of the candidate coronary lesions attributable to the patient's symptoms and QoL **(Figure 2)**.

Figure 2. Proportion of patients with clinically meaningful QoL improvement stratified by isolated CTO disease and multivessel disease

Hot Topics
CTO: Retrograde Channel Technical Forum and Current Pitfalls and Evidence of CTO-PCI
›› Monday, April 29, 2:00 PM - 4:00 PM
›› Presentation Theater 2, Level 1

Coronary Symposium

Debates: Should All CTOs Be Opened?

Gerald Werner, MD
Klinikum Darmstadt GmbH, Germany

Seung-Jung Park, MD
Asan Medical Center, Korea

Pros

There are several established reasons to indicate whether a revascularization attempt should be made in a patient with a chronic total occlusion (CTO).

1. Improvement of symptoms

The effect of a successful revascularization can be evaluated by the Seattle Angina Questionnaire (SAQ) to assess quality of life (QoL). In a number of small trials, but also in large registries and recently the randomized EUROCTO trial, a clear improvement of angina frequency, quality of life and relief of physical limitations was observed. The contrasting observation of the DECISION-CTO trial, where there was also an improvement after CTO PCI but similarly in the control arm, can be explained by the high frequency of non-CTO PCI in the control arm.

Many of the patients with a CTO will be considered as patients with silent ischemia. Despite the observation that collaterals will prevent regional dysfunction and myocardial infarction (MI) in many of these patients, the functional capacity of the collateral system to increase myocardial blood supply during exercise is limited. The fractional flow reserve (FFR) assessed distal to an occluded artery is typically in the range below 0.5, which clearly indicates myocardial ischemia.

2. Improvement of left ventricular (LV) function

The potential effect of a reopened CTO on LV function was established with the first attempts to treat CTOs by PCI. The improvement of left ventricular ejection fraction (LVEF) varied, but vessel patency was mandatory for the achievement of LV recovery. Other predictors of LV improvement are more severely impaired LV function at baseline (<60%). In a recent randomized trial, no improvement was observed, however, the baseline EF was well above 50% when not much of improvement can be expected.

3. Complete revascularization in multivessel disease

The important negative impact of incomplete revascularization on prognosis was reemphasized by the analysis of the SYNTAX trial. A high residual SYNTAX score (rSS) is related to increased mortality. The SYNTAX score is heavily influenced by the presence of a CTO, and therefore the presence of a CTO was the best predictor of incomplete revascularization. CTOs are found in half of the patients with the highest rSS. This underscores the relevance of treating multivessel patients with adequate PCI technique including the revascularization of any CTO in these patients in order to achieve an outcome comparable to coronary artery bypass surgery (CABG).

4. Improvement of prognosis

In patients with stable angina pectoris, no single large randomized clinical trial on revascularization versus medical therapy has so far shown an improvement in survival. However, the problem remains a selection bias that prevents the inclusion of severely symptomatic patients. Given the rather benign mortality over a long period in the range of 6-8% at 3-4 years, it is difficult to show a benefit with studies of less than 4,000 participants.

Cons

The results from recently published randomized trials have shown that the benefit of CTO PCI in terms of quality of life and exercise capacity, but not in survival benefit. Those results imply the CTO PCI might be beneficial only in selected patients, which concludes that the revascularization should not be performed routinely for all CTOs.

1. The distinguishing features of CTO

In CTO lesion, coronary artery was occluded chronically and acute event could not occur such as plaque rupture or thromboembolization. And the development of collaterals is another key characteristic of CTO, which gives blood supply to myocardium distal to occluded artery. According to the location of CTO and collateral status, myocardial ischemia assessed by various stress tests can reveal normal or small burden of ischemia, especially in single vessel CTO.

2. Unclear survival benefit of CTO PCI

Recently, two randomized trials (EUROCTO and DECISION-CTO) comparing PCI + optimal medical therapy (OMT) with OMT for CTO have been published. Those trials did not show any significant difference between two treatment strategies in terms of major adverse cardiovascular events. Without benefit of survival gain, the role of CTO PCI should be restricted for symptom relief itself. Additionally, with higher rate of complication and lower success rate, decision of PCI should not be made routinely for all patients with CTO.

3. PCI is not suitable for multi-vessel disease (MVD) with CTO

In contrast to single vessel CTO, MVD with concurrent CTO lesion are related with higher proportion of jeopardized myocardium. Therefore, these patients would be beneficial for revascularization in terms of symptom control and future cardiovascular events. However, MVD with CTO is also associated with higher risk for periprocedural and long-term cardiovascular events after PCI. And almost patients are categorized into high SYNTAX score group, which is indication for CABG in current guideline rather than PCI. Therefore, CABG must be a better option for the MVD patients with CTO, whose revascularization would be the most beneficial.

Coronary Symposium
Live Case & Lecture Session I
›› Sunday, April 28, 4:00 PM - 6:00 PM
›› Coronary Theater, Level 1

CE Program for Nurses

Monday, April 29

Nurse Continuous Education Course

Organized by Korean Nurses Association
* Only pre-registered persons through Korean Nurses Association are allowed to participate.

>> Monday, April 29, 8:30 AM - 5:20 PM
>> Room 202, Level 2

Time	Session	Lecturer
8:30 AM	Anatomy and Assessment of Cardiovascular System	Se Hun Kang
9:20 AM	Break	
9:30 AM	Ischemic Heart Disease and Antiplatelet Agents	Se Hun Kang
10:20 AM	Break	
10:30 AM	Clinical Trial & Role of Clinical Research Nurse (CRN)	Elisabet Kim
12:00 PM	Lunch Time	
1:20 PM	Nursing Care: Cardiovascular Disease	Hyun Jin Lee
2:10 PM	Break	
2:20 PM	Interpretation of EKG	Chang Hee Kwon
3:10 PM	Break	
3:20 PM	The Latest Knowledge of Coronary Intervention	Mineok Chang
4:10 PM	Break	
4:20 PM	Nursing Care: Cardiac Rehabilitation	Seo Jin Lim

Hot Topics

Valves

Jian (James) Ye, MD
St. Paul's Hospital, Canada

Transcatheter Mitral Valve Replacement: Current Evidence and Experience

Mitral valve disease is the most prevalent type of valvular heart disease. Surgery has been the standard treatment of symptomatic mitral valve disease, providing both symptomatic and survival benefits. However, a significant number of patients with severe mitral regurgitation (MR) are not referred or declined for surgery due to advanced age, severe left ventricular dysfunction, and/or significant comorbidities. In patients with functional MR, the role of valve surgery is unclear in providing survival benefit. Transcatheter mitral valve replacement (TMVR) has been developed and applied in very high-risk patients with mitral valve disease. The feasibility of TMVR with various devices has been demonstrated and the early clinical outcomes have been promising with a few types of TMVR devices.

Since the first TMVR with the CardiAQ device (Edwards Lifesciences) was performed in human in 2012, a dozen of TMVR devices have already been implanted in ~300 patients with MR at high risk or extremely high risk for surgery. The majority of TMVR valves were implanted using a transapical approach under general anesthesia and the guidance of fluoroscopy and transesophageal echocardiography. Up to date, the devices with relatively large clinical experience are the Tendyne valve (Abbott Vascular), Tiara valve (Neovasc Inc.) and Intrepid valve (Medtronic), which are implanted using a transapical approach. The devices exclusively using the transfemoral/transseptal approach are the SAPIEN M3 valve (Edwards Lifesciences) and Caisson TMVR valve (LivaNova PLC). The CardiAQ device and Gate stent (NaviGate Cardiac Structures Inc.) can be implanted using either a transapical or transfemoral/transseptal approach. The HighLife two-component TMVR system (HighLife Medical, Inc.) is implanted using both transfemoral and transapical approach for implantation of ring and valve, respectively. With these devices, reported technical success rates ranged from 75% to 100%, and 30-day mortality from 0% to 17%. Significant improvements in the technical success rate and 30-day morality have been reported with optimization of valve designs and delivery systems, more clinical experience and improved pre-procedural screening and planning. Pre-procedural multimodality imaging, including echocardiography and CT, is essential for TMVR. Pre-procedural imaging is used to define the type and severity of MR; to confirm patient eligibility according to the anatomic characteristics and the prosthetic valve designs; to assess potential risks of procedure/device-related complications; and to plan the procedure. At this stage, the screening failure rate is quite high mainly due to anatomical reasons.

TMVR has been confronted with more challenges than transcatheter aortic valve implantation as the structure and function of the mitral valve is much more complex than that of the aortic valve. The main challenges that have not been overcome include left ventricular outflow tract (LVOT) obstruction with hemodynamic compromise after valve implantation, embolization/failure of the anchor of a bioprosthesis, perivalvular leak, high rate of thrombosis, and high screening failure rate due to anatomical reasons. However, TMVR is evolving to become a potentially new alternative for the treatment of symptomatic MR in patients at high surgical risk. Two randomized controlled clinical trials, APOLLO trial (Intrepid TMVR device versus surgical mitral valve replacement), and SIMMIT trial (Tendyne TMVR versus surgical mitral valve replacement or repair), have been initiated.

Hot Topics
Valves
›› Monday, April 29, 2:00 PM - 4:00 PM
›› Presentation Theater 1, Level 1

TCTAP Award

Prof. John Ormiston for Chien Foundation Award for Outstanding Lectureship & Lifetime Achievement in PCI to be Presented at TCTAP 2019

John Ormiston
Intra, New Zealand

The 11th Chien Foundation Award

Professor John Ormiston was selected for the Chien Foundation Award for Outstanding Lectureship & Lifetime Achievement in PCI at TCTAP 2019 and the presentation of this honored award took place on April 28th (Sunday) at Presentation Theater 1, Level 1, COEX at 3:06 pm.

John Ormiston graduated from the University of Otago Medical School, New Zealand, in 1972 and trained in cardiology at Green Lane Hospital in Los Angeles, USA.

He played a major role in developing interventional cardiology and has been hailed as the "father of interventional cardiology" in New Zealand.

He founded interventional cardiology research at Green Lane Hospital more than 25 years ago. His research has been clinical, and in addition, he is internationally known for his bench testing of cardiological devices. Moreover, he also has published 300 scientific papers in peer reviewed journals and Lancet editorials. In 2004, he was appointed as Associate Professor and in 2014 as full Professor of Medicine at the University of Auckland School of Medicine. In 2008, the Royal College of Physicians, London, awarded him an honorary fellowship (FRCP).

In 2011, for services to medicine, he became an Officer of the New Zealand Order of Merit, which is one of the orders established in New Zealand by Queen Elizabeth II.

He founded the very successful Mercy Angiography (now called, Intra). In addition, 20 years ago, he was a founding member of New Zealand's largest cardiology group, the Auckland Heart Group.

In 2017, at the Paris PCR meeting, he received the Ethica Award, the highest honor of the European cardiovascular intervention academies.

TCTAP Award 2019
Chien Foundation Lectureship Award

›› Sunday, April 28, 3:06 PM - 3:10 PM
›› Presentation Theater 1, Level 1

Moderated Complex Case Competition

Hot Cases

Supawat Ratanapo, MD
Phramongkutklao Hospital,
Thailand

Quan Manh Nguyen, MD
Vietnam National Heart Institute,
Vietnam

Anterior ST-Elevation Myocardial Infarction in Dengue Shock Syndrome and Platelet of 10,000

Yesterday afternoon, Dr. Supawat Ratanapo of Phramongkutklao Hospital, Thailand, presented a unique case of STEMI patient in Dengue shock syndrome.
A 34-year-old male with morbid obesity and recently diagnosed diabetes presented with high-grade fever for 5 days and secretory diarrhea. He developed septic shock with multiple organ failure, coagulopathy, and severe thrombocytopenia with platelet less than 10,000/㎣. One day after hospitalization, he developed sudden acute respiratory failure requiring intubation and progressive shock despite multiple vasopressors. His laboratory findings showed WBC 870/㎣, hemoglobin of 21 g/dL, platelet 10,000/㎣. His INR was 4.1. Dengue titer was positive and he was diagnosed with dengue shock syndrome. The patient's electrocardiogram after intubation revealed anterior ST elevations from V1 to V4. Emergent bedside echocardiogram showed anterior wall hypokinesis with reduced ejection fraction. Emergency cardiac catheterization was performed under ultrasound-guided radial access. He had radial artery collapse secondary to poor intravascular volume. A coronary angiogram showed complete thrombotic occlusion in the proximal-mid LAD with TIMI 0 flow **(Figure 1)**.

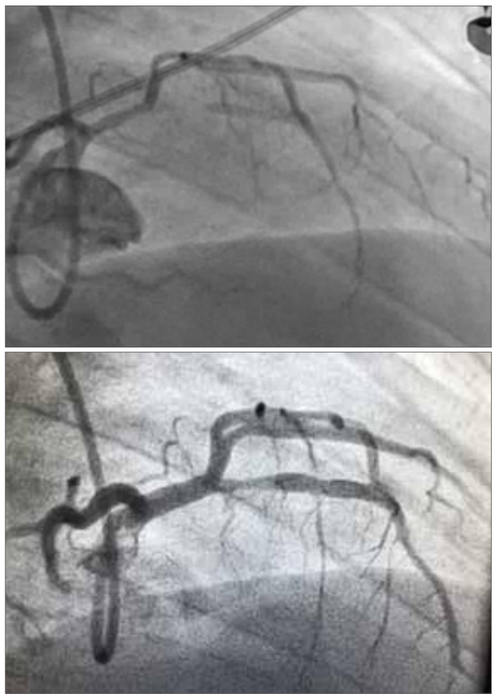


Figure 1. Pre & Post coronary angiography

Given his severe thrombocytopenia and high bleeding risk, there was no anticoagulant or antiplatelet medications given during the procedure. The left main was engaged with a 6 Fr EBU 3.5 guide catheter. The lesion was wired with a Runthrough wire. Then the lesion was successfully treated with percutaneous transluminal coronary angioplasty with compliance balloons 2.0x20 mm and 2.5x20 mm up to 20 atmospheres. Post-angioplasty, there was TIMI 3 flow with residual stenosis 20-30% **(Figure 1)**. There was a resolution of ST elevation in anterior leads. The radial sheath was successfully withdrawn with hemostasis band applied. There was no antiplatelet or anticoagulant given after the procedure. Also, there was no acute post-procedure complication. The patient was transferred to CCU for further management.

Dr. Supawat Ratanapo commented, "ST-elevation myocardial infarction is very rare in the setting of severe thrombocytopenia secondary to dengue infection. A dengue virus may increase the risk of coronary plaque rupture and thrombus formation despite platelet 10,000 per cubic milliliter of blood. Coronary intervention with balloon angioplasty via ultrasound-guided radial access can be performed safely in this setting".

"Mother-in-child" Thrombectomy Technique in a Young Man with AMI and Large Thrombus Burden Undergoing PCI

Yesterday, Dr. Quan Manh Nguyen of Vietnam National Heart Institute, Vietnam, introduced a successful thrombectomy case using the "Mother-in-child" technique. A 31-year-old male presented inferior STEMI, and fifteen minutes after visit, the patient had suffered from cardiac arrest. Ventricular arrhythmia was in monitor, no blood pressure, and the patient was shocked with 200J biphasis twice. Sinus rhythm came back, and then he was sent to cath-lab. The angiography showed total occlusion in the 3rd segment of RCA, very large RCA, and normal left coronary.

For treatment, 6 Fr sheath was used for the right femoral artery, guiding JR 4.0 6 Fr, and Runthrough guidewire to go through the occlusion. Then, Thrombuster II catheter was used for thrombectomy, but there was no effect. It was then pre-dilated by balloon NC Euphora 3.5x20. After ballooning, thrombectomy continued but there was no flow. Finally, the team decided to use the "Mother-in-child" technique. A 5 Fr ST01 guide catheter was put into the JR 6Fr catheter and they pushed it to the occluded segment. They used the 50 mL cylinder to make negative pressure to perform thrombectomy. After 3 attempts, some large thrombus were taken out of the coronary. The flow was rescued, and TIMI III flow was restored. There was no tight stenotic lesion, so it was checked by IVUS. Fortunately, no significant stenotic lesion was presented, so they decided not to perform stenting. The patient was stable, and he was sent back to CCU.

Dr. Quan Manh Nguyen concluded, "Mother-in-Child" technique is simple, effective method for thrombus aspiration in a patient with AMI associated with a large thrombus in right coronary artery".

Moderated Complex Case Competition I
1-4. Complex PCI

›› Sunday, April 28, 2:00 PM - 3:10 PM
›› Case Zone I, Level 1

Moderated Abstract Competition

Hot Abstract

Mark Resty Baldoz Rivera, MD
Khoo Teck Puat Hospital,
Singapore

Gastrointestinal Bleeding Events with or Without Proton Pump Inhibitors Among Patients Post Primary Percutaneous Coronary Intervention

Gastrointestinal bleeding (GI) is a known complication after primary percutaneous coronary intervention (PCI) while on dual antiplatelet therapy (DAPT). About 0.7%-3% of patients with acute coronary syndrome (ACS) may develop acute GI bleeding after PCI. However, in studies involving the Asian population, the risk of acute GI bleeding can be as high as 9%. The 2017 ESC focused update on DAPT recommended the routine use of PPIs as a strategy to reduce the risk of bleeding. However, the 2016 ACC/AHA Focused Update on Duration of Dual Antiplatelet recommended a more judicious use of proton-pump inhibitors (PPIs) focusing on patients with a history of prior GI bleeding treated with DAPT, and reasonable for those with an increased risk of GI bleeding including advanced age and those with concomitant use of warfarin, steroids, or NSAIDs.

Yesterday afternoon, Dr. Mark Resty Baldoz Rivera of Khoo Teck Puat Hospital, Singapore, introduce the single center experience of his and his colleagues about GI bleeding after primary PCI. They did a retrospective review of all patients presenting with STEMI undergoing primary coronary intervention from December 2016 to December 2017. Baseline characteristics, history of chronic renal insufficiency, previous history of GI symptoms or GI bleeding, and history of gastroprotective drugs prior to admission were recorded. All patients presenting with STEMI were subsequently followed up in the clinic. All patients were loaded with aspirin 300 mg and ticagrelor 180 mg if there were no contraindications and underwent primary PCI. Intravenous heparin was given peri-procedure and bailout therapy with glycoprotein IIb/IIIa were utilized as required. Patients who subsequently developed an indication for triple therapy (left vein [LV] thrombus/atrial fibrillation) were switched from ticagrelor to clopidogrel (aspirin/clopidogrel/oral anticoagulant [OAC]).

There were a total of 281 patients who presented with STEMI and underwent primary percutaneous coronary intervention. Out of the 281 patients, 12 patients were started on triple therapy, 6 patients had true aspirin allergy and were on ticagrelor monotherapy and 16 patients died during the index admission. There were subsequently 247 patients who were on DAPT. In the DAPT group, there were 14 (5.66%) cases of GI bleeds during the index admission and in the triple therapy group, there were 2 (16.67%) cases of GI bleeds. Up to three months post-discharge, there were 3 cases of GI bleeds in the DAPT group and none in the triple therapy group. Of these three patients, two were naïve to PPI whilst the other patient had a recurrent GI bleeding from the index admission. Comparing the number of GI bleed events that occurred during admission and from admission to 3 months, it was statistically significant that there were more bleeds during the index admission (Fisher's exact p=0.0113).

Dr. Mark Resty Baldoz Rivera concluded, "Our center's GI bleeding incidence among post PCI patients on DAPT is in line with other Asian registries but this remains a small number of patients. GI bleeds occur early in line with all the other studies. Oral proton pump inhibitors did not seem to protect against these early GI bleeding events".

Moderated Abstract Competition I
1-6. Acute Coronary Syndromes

›› Sunday, April 28, 4:40 PM - 4:50 PM
›› Abstract Zone I, Level 1

Yesterday's Highlights

Glorious Best Presenters from Competition Session

A number of interesting abstracts were submitted from all over the world to TCTAP 2019, and then a few abstracts, and cases were selected to be presented at the Moderated Competition after being strictly reviewed by the scientific committee.

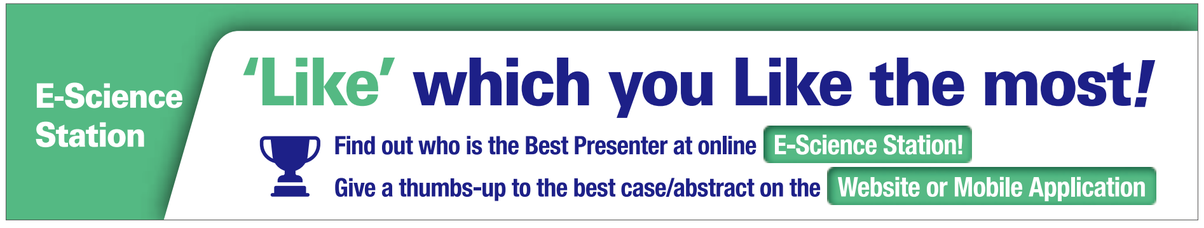
Approximately 72 authors made presentation at the Moderated Abstract, and Case Competition Session and only 14 presenters were selected as the Best Presenters by evaluation.

Best Abstract Presenters

1-4. Imaging & Physiology: **Ki Fung Cliff Li** (Singapore)
1-5. Acute Coronary Syndromes: **Kenta Hashimoto** (Japan)
1-6. Acute Coronary Syndromes: **Yue Liu** (China)
2-4. Coronary Intervention: **Farhat Fouladvand** (Bulgaria)
2-5. Coronary Intervention: **I-Fan Liu** (Taiwan)
2-6. Miscellaneous: **I-Ming Chen** (Taiwan)

Best Case Presenters

1-4. Complex PCI: **Hou Tee Lu** (Malaysia)
1-5. Complex PCI: **Yoshiki Nagata** (Japan)
1-6. Complex PCI: **Yuzo Akita** (Japan)
2-4. Imaging & Physiology: **Wataru Yamamoto** (Japan)
2-5. Imaging & Physiology: **Ching Ju Wu** (Taiwan)
2-6. Complex PCI: **Nobuaki Igarashi** (Japan)
3-4. Complex PCI: **San Samrany** (Cambodia)
3-5. Complex PCI: **Naoki Shibata** (Japan)



Xience short DAPT

Xience

SUPERIOR SAFETY[2] DEMONSTRATED

with 1-month DAPT in the 3,000-patient RCT

STOPDAPT 2[1]

XIENCE: 1-MONTH VS. 12-MONTH DAPT

1 MONTH	SHORT 1-MONTH DAPT N=1,500	12 MONTH	12-MONTH DAPT N=1,500
	• 1-MONTH: **Aspirin + P2Y12** • AFTER 1-MONTH: **Clopidogrel monotherapy**		• 0 TO 1-MONTH: **Aspirin + P2Y12** • 1 TO 12-MONTH: **Aspirin + Clopidogrel** • 12 TO 60-MONTH: **Aspirin monotherapy**

PRIMARY ENDPOINT: Cardiovascular death/myocardial infarction/ definite stent thrombosis/stroke/TIMI major or minor bleeding

1. Watanabe et al., ACC 2019
2. XIENCE met the primary safety endpoint of cardiovascular death/myocardial infarction/stroke/definite stent thrombosis/TIMI major or minor bleeding with a non-inferiority p value of <0.001. STOPDAPT 2, Dr. Kimura, ACC 2019.

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