Successful Treatment of True Left Main Bifurcation Lesion with Mini-Crush Technique in a Case of Cardiogenic Shock

Li-Tan Yang, Shih-Hung Chan

Division of Cardiology, Department of Internal Medicine, National Cheng Kung University Hospital, Tainan, Taiwan
Brief history

• 82-year-old man
• Coronary risk factors:
  – Age
  – Hypertension
  – Hyperlipidemia
• Admission this time due to unstable angina
Physical examination & images

- **Vital sign:**
  BP: 169/68 mmHg, TPR: 36.3/53/18
  → SBP 80 mmHg
- **PE:** bibasilar rales
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ACS with cardiogenic shock
Urgent coronary angiogram was performed
Diagnostic coronary angiography

90% stenosis at distal bifurcation of left main involving ostium of LAD, LCX
Diagnostic coronary angiography

LAD: ostial 80~90% stenosis, mLAD 70~80% stenosis
LCX: ostial 70~80% stenosis
Diagnostic coronary angiography

- RCA: 70~80% stenosis in ostium, 50% stenosis in distal RCA and 70~80% stenosis in PDA branch.
Diagnosis

- Acute coronary syndrome with cardiogenic shock
- CAD/3-vessel-disease with a **true left main** bifurcation lesion (Medina 1,1,1)

- The patient refused CABG.
What is the target lesion to treat?

1. Left main bifurcation + middle LAD lesions
2. RCA first, then left main bifurcation + middle LAD lesions

- If it is elective PCI, RCA will be managed first.
- Due to cardiogenic shock status, the culprit lesion: left main bifurcation + middle LAD lesion were managed first.
- RCA lesion was left to staged PCI.
Provisional One stent or Two stent for the bifurcation?

1. Provisional one stent technique
2. Two stent technique

- Two stent instead of one stent
  - Both LAD, LCX supplied large territory
  - Both LAD, LCX are ostial lesions

One stent in either vessel compromise the other!
What kind of two-stent technique for the bifurcation?

1. T and protrusion (TAP)
2. Simultaneous kissing stents (SKS)
3. Culotte technique
4. Mini-crush technique

- TAP: risk of SB compromise; neocarina formation
- SKS: too much stent strut in LM hinder further interventions
- Culotte: risk of SB compromise; risk of failed rewiring to SB

Mini-Crush technique was chosen. Safer due to SB patency is for sure.
Engagement

We placed IABP, temporary pacemaker first for cardiogenic shock

7 Fr EBU 3.5 guiding catheter

“Runthrough hypercoat” wire to LAD, “Fielder” wire to LCX
POBA of LM-proximal LAD

"Tazuna" balloon (2.0mm/20mm), 6-10 bars
Stenting for middle LAD

After POBA

Direct stenting: Resolute® stent (3.0mm/24mm), 10 bars
After stenting for middle LAD
POBA of LM-proximal LCX

Tazuna balloon (2.0mm/20mm), 10 bars
After POBA for LM-proximal LCX
Preparation of Stenting for LM-proximal LCX

"Resolute" stent (3.0mm/18mm) in LM-pLCX

Balloon of "Resolute" stent (3.0mm/24mm) in LM-pLAD
Stent for LM-proximal LCX

"Resolute" stent (3.0mm/18mm) for LM-pLCX
Crush of LM-LCX stent

Balloon of "Resolute" stent (3.0mm/24mm) in LM-pLAD used to crush LM-pLCX stent

Rewiring to LCX

Open stent struct for LCX:
"Tazuna" balloon (2.0mm/20mm)
Stenting for LM-proximal LAD

After crushing the LM-pLCX stent

"Resolute" stent (4.0mm/38mm) for LM-pLAD
After stenting LM-pLAD
"Sapphire" NC balloon (3.0mm/15mm) at LM-LCX
"Sapphire" NC balloon (3.5mm/18mm) at LM-LAD
Kissing ballooning with 10~12 bars for two times
Final result
Take home message

• Two-stent strategy for a true LM bifurcation lesion involving both ostium of LAD & LCX
• RCA lesion was disregarded this time
Establishment of a patent flow in culprit lesions is more critical.
• Angiographically guided PCI without IVUS is acceptable in LM intervention in a patient with cardiogenic shock.
選擇 mini-crush，甚麼是最重要的步驟：final kissing；若是不能完成 final kissing 可能的原因是：failed wiring or failed balloon passing

Mini-crush 比較安全的原因是：patency of MB, SB is more sure

若是不能做 final kissing 最怕是甚麼？restenosis rate is higher

→ 折衷 manage it in elective PCI next time

為何沒有用 stent crush stent：1. 可能 LCX wire 會被 LAD stent 拮住 2. interventionist’s preference 3. predilatation of LM-LAD, 也可以估計 LAD 大小

為了避免 LM ostium restenosis → so we place the stent near the LM ostium

沒用 IVUS 如何知道 Left main 大小：Murray’s Law: (a+b) x 0.67

為何 LAD stent 放 4.0，最後 kissing stent 拿 3.5 stent：從 final angiogram 來看 LAD, LCX 皆有點 stepdown, 所以也許他們 size 皆有點高估, we fear to over-dilate the LM