Unrelenting Left Main Disease in an Unyielding Patient

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Clinical History

- 72 years old Chinese lady

- Background and CV Risk Factors:
  - Hypertension
  - Hyperlipidemia
  - End stage renal failure on hemodialysis
  - Alpha thalassaemia trait
  - History of Duke’s A carcinoma of colon s/p Left hemicolecotomy
  - Right ovarian cyst s/p resection

- Presented on 24 Sept 2010 for right sided pulling chest pain of 4-5 days duration associated with dyspnoea
  - Usually occurring during dialysis
Clinical History

• Diagnosed as a non ST elevation MI
  – ECG: T inversions in inferior and lateral leads
  – Cardiac enzymes elevated (Trop T 0.6)

• Transthoracic echocardiogram
  – LVEF 45%
  – Anterior hypokinesia consistent with underlying ischaemia
  – Grade 1 LV diastolic dysfunction

• Treated with dual antiplatelets (aspirin, clopidogrel) and subcutaneous clexane

• Planned for angiogram
Angiogram findings on 27 Sept 2010

• Left coronary angiogram showed 90% stenosis of ostial LAD and 60% stenosis of ostial LCX with moderate to severe calcification

• Right coronary angiogram showed luminal irregularities

• Patient not keen for bypass
Elective PCI on 1 Oct 2010

- A 7Fr EBU 3.5 guiding catheter was engaged into the left coronary artery through the right femoral artery

- A 0.014 inch Fielder wire and a 0.014 inch Asahi Sion wire were inserted into the LAD and LCX respectively
Elective PCI on 1 Oct 2010

- Predilation of heavily calcified ostial LAD
  - Maverick2 OTW 2.0X15mm balloon
  - Followed by Maverick2 OTW 2.5X15mm balloon
  - Lesion then prepared with Ultra 2 Monorail 2.75X10mm cutting balloon at 8atm

- Predilation of ostial LCX with Maverick2 OTW 2.5X15mm balloon
Elective PCI on 1 Oct 2010

Simultaneous Kissing Stent technique

- Xience Prime 3.5X23mm stent at ostial LAD (12 atm)
- Xience Prime 3.5X15mm stent at ostial LCX (12 atm)
Elective PCI on 1 Oct 2010

• Post-stenting kissing balloon dilatations
  – Voyager NC 3.5X15mm balloon at ostial LAD
  – Voyager NC 3.5X12mm balloon at ostial LCX

• IVUS interrogation confirmed adequate stent apposition with new LMS carina. Good final angiographic result
Progress

• Episode of chest discomfort on 20 Mar 2011

• Diagnosed with recurrent NSTEMI
  – ECG: widespread ST depression
  – Cardiac enzymes: peak Trop T 0.545

• Patient was compliant to dual anti-platelet therapy

• In view of persistent chest discomfort, urgent angiography on 21 Mar 2011
Urgent PCI on 21 Mar 2011

- LAD stent with 70% ISR
- New de novo mLAD lesion with 90% stenosis
- LCX stent with 95% ISR
Urgent PCI on 21 Mar 2011

- Treatment strategy as a bridge to surgery
- POBA
  - Monorail Maverick 2.5X15mm to pLCX
  - Monorail Maverick 2.5X15mm to pLAD
  - Kissing balloon inflations with 20% residual stenoses in both lesions
  - mLAD lesion received POBA with Monorail Maverick 2.5X15mm with residual stenosis of 50%
Elective PCI on 29 Mar 2011

- Patient again refused CABG and opted for further PCI!

- Successful PCI to mLAD with Integrity 3.0X15mm with 0% residual stenosis

- PCI to LMS bifurcation with kissing DEBs (B.Braun Sequent Please)
  - 3.5X17mm in LCX
  - 3.5X15mm in LAD
Elective PCI on 29 Mar 2011

- Residual stenoses of 10% in both pLAD and ostial LCX lesions. IVUS confirmed satisfactory final stent apposition

- Patient remained well until....
15 Aug 2011

- Another episode of chest tightness with ST depression in V4-6

- Angiogram on the same day revealed distal LM 70% ISR, ostial LAD 95% ISR and ostial LCX 95% ISR
16 Aug 2011

- Strongly advised for CABG but remained undecided

- Developed further chest pain and ST elevation in V2-3 on 16 Aug 2011 with acute PCI activated

- POBA
  - Trek 3.0X15mm to distal LM
  - Trek 3.0X15mm to prox LAD
  - Trek 3.0X15mm to ostial LCX

- Residual stenoses of 30% 

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[angiogram image]
16 Aug 2011

- IVUS done revealed adequate stent apposition
Progress till Present

- Now agreeable for CABG

- Check angiogram on 14 Sept 2011 (1 month after last intervention)
  - Moderate ISR of 50% at prox LAD and 60% at ostial LCX
Progress till Present

• Seen by Cardiothoracic Surgeon and patient again decided against CABG

• Presented Jan 2012 with unstable angina
  – Repeat angiogram 11 Jan 2012
    • Stable LMS bifurcation
    • Ostial RCA 80% stenosis likely from ruptured plaque with PCI done using
      Resolute Integrity 4.0X12mm

• Currently stable and still not keen for bypass
**Summary**

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<td>NSTEMI - Diagnostic angiogram revealing significant ostial lesions of LAD and LCX</td>
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<td>Month 2</td>
<td>Elective simultaneous kissing stents to LAD and LCX</td>
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<td>Month 7</td>
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<td>Month 16</td>
<td>Angiogram for unstable angina – stable LMS bifurcation ISR</td>
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Should further management be

- Guided by symptoms?
- Guided by check angiogram in another 6 months?
Approach to Left Main Bifurcation

- Coronary bifurcations are complex lesions that pose challenges with increased risks of complications and restenosis\(^1\)
  - More turbulent blood flow
  - Higher shear stress

- Usage of drug eluting stents have improved results but long term restenosis still remains a problem

- Decisions in treating a bifurcation lesion include
  - Whether to employ a one stent or two stent strategy
  - Technique used (T-stent, Simultaneous Kissing Stents, Crush, Culotte)

\(^1\) Al Suwaidi et al. Immediate and long-term outcome of intracoronary stent implantation for true bifurcation lesions. *J Am Coll Cardiol* 2000;35:929-936
Our Case

- Simultaneous kissing stents (SKS) technique employed

- Considerations included:
  - Size of branches and large territories of distribution
  - Involvement of ostial of both branches
  - Angulation between branch vessels
  - Healthy proximal left main large enough to accommodate dual stents (at least two-thirds of the aggregate diameter of the two stents)
  - Achievement of optimal acute angiographic result
  - SKS technique has previously been shown to lower in-hospital and 30-day MACE rates\(^2\) with high procedural success\(^3,4\) when compared to single stent approaches

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SKS technique

• Advantages
  – No need to cross stent struts to access either branch
  – Definite branch coverage by DES compared to e.g. T-stenting especially in cases where angulation between the branch vessels are less than 70 degrees

• Disadvantages
  – Persistent metal carina
    • Risk of thrombosis, re-stenosis
    • Challenging if reintervention is required
  – At least 7Fr catheter to allow advancement of two stents simultaneously
Kissing DEBs for bifurcation ISR

• Challenges in management of bifurcation ISR
  – Lack of evidence
  – Repeat stenting problematic

• Options have included
  – Brachytherapy\(^5,6\)
  – Usage of drug eluting balloons\(^7\)

• Decision made for kissing DEBs use in view of availability and familiarity in our institution

• Evidence for use in non-bifurcation ISR (Paccocath I/II, PEPCAD II) and in bifurcation lesions (PEPCAD V, DEBUIT Registry)


Discussion

• Bifurcation lesions remain challenging especially if the left main artery is involved

• CABG remains the traditional invasive strategy although PCI can still be considered in selected patients not keen for surgical intervention

• Independent predictors of 2 yr MACE in patients with bifurcation lesions of the left main artery vs those with ostial and midshaft lesions include age, female gender, diabetes and renal dysfunction8

• At risk patients (including our example) can benefit from a Heart Team approach with consultations by both the cardiologist and cardiothoracic surgeon

• With the SKS technique, the creation of a new carina could predispose the patient to further restenosis from possible increased turbulence of blood flow.

• In patients who receive bifurcation stenting of the left main artery that is complicated by in-stent restenosis, there is lack of evidence for optimal further management.

• From this case, surgical intervention should be considered when bifurcation stenting has ‘failed’.

• We await further advancements:
  – From trials involving DES for left main intervention
    • e.g. EXCEL Trial - Evaluation of XIENCE PRIME™ or XIENCE V® versus Coronary Artery Bypass Surgery for Effectiveness of Left Main Revascularization
  – DEBs for bifurcation ISR
  – And the introduction of dedicated bifurcation/bioresorbable stents.