Building a Coronary CTO Program: Lessons Learned

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Disclosures

• No financial disclosures
Introduction

• Coronary Chronic Total Occlusion (CTO) → 100% stenosis, >3 months
• Prevalence 5% - 30% of cardiac catheterizations
• PCI attempted only in 5% - 30% of these patients
• Complication rate ~ 2%

• PCI → US and European Guidelines: Class IIa (level of evidence B)
Successful CTO PCI and mortality

- Meta-analysis 25 studies
- \( N = 29,315 \) procedures
- Mortality OR 0.52 (0.43, 0.63)
- MACE OR 0.59 (0.44, 0.79)

Am J Cardiol 2015;115:1367e1375
CTO PCI debate

• Retrospective VA registry, N = 2394, 2 year survival improved with successful CTO PCI (HR 0.67; 95% CI: 0.47 to 0.95; p = 0.02)

• However, 5-year prospective study N = 1173 (Japan)

J Am Coll Cardiol Intv 2016;9:530–8

J Am Coll Cardiol Intv 2017;10:866-75
What about the remainder 70+% of patients who did not have a PCI attempt?
EXPLORE

• Randomized, N = 304, STEMI, Europe. Staged CTO PCI vs. Med Rx.

Primary endpoint: MRI LVEF and LVEDV at 4 months

J Am Coll Cardiol 2016;68:1622–32
Decision-CTO

- Randomized, multicenter
- N = 834, Asia
- OMT vs. PCI

- Criticisms:
  - Patient selection
  - Endpoint selection
  - Periprocedural MI in PCI
  - ~20% cross-over rate
  - Slow enrollment
  - Early termination, power

Primary End Point
(Death, MI, Stroke, Repeat Revascularization)

Seung-Jung Park (ACC 2017)
CTO PCI in the future

- Randomized data vs. Medical Therapy
  - EURO-CTO trial (NCT01760083) → quality of life parameters at 12 months, and clinical endpoints at 3 years.
  - SHINE-CTO (NCT02784418) → PCI vs. sham procedure → 6 mo Quality of life

Need to define:
- Role of myocardial viability testing
- Outcome differences based on number and location of CTOs
- Better collateral assessment methods and their significance
- Role of different devices or techniques in long-term outcomes
- Cost-effectiveness

J Invasive Cardiol 2014;26(9):427-32
Circ Cardiovasc Interv 2016;9(5). pii: e003586
J Am Coll Cardiol; 2017;10(9):889-891
J Cardiol 2017;69(6):799-807
How CTO PCI might improve patient outcomes

CTO revascularization

↓ ischemia

- Improvement in LVEF
  - ↑ 4% LVEF

- Decrease in arrhythmias

- Protection vs. “double jeopardy”
  - STEMI + CTO
  - 13% ↑ mortality

- Relief of angina,
  - ↑ QOL

Decrease in mortality

Symptom improvement

Am J Cardiol 2015;116:8e14
Int J Cardiol. 2015;187:90-6
Need for expertise in CTO interventions

• Undoubtedly many patients do need CTO PCI

• Establishing an organized program is important
  • Higher operator volume \( \rightarrow \) improved outcomes in CTO
  • Advanced techniques (e.g., “Hybrid approach”) \( \rightarrow \) higher revascularization success rates

Curr Cardiol Rev. 2015 Sep 9. [Epub]
J Invasive Cardiol. 2014 Sep;26(9):427-32
Circ Cardiovasc Interv. 2016 May;9(5). pii: e003586
Programmatic recommendations

• Build a CTO PCI team, identify and promote a CTO leader
• Buy-in from colleagues, Department/Partners, Administration
• Include: surgeons, non-invasive, “Heart team” approach
• Avoid ad hoc CTO PCI
• Review and plan each case
• Document thoroughly (history, access, EF, ischemia, viability)
• Calculate J-CTO score, SCAI PCI risk calculator, etc.
• Establish a CTO PCI day
Practical recommendations

Day of the procedure
• Review each CTO PCI case plan (including all cath lab personnel/fellows); slides
• Ensure all required equipment is available (in particular, complication cart)

After procedure
• Follow-up patients, yet return them to the referring source
• Follow-up Quality assurance data (NCDR, other registries)
Passion

- CTO program → strong desire to better serve patients

- Conviction of CTO PCI benefits when indicated

- Drive to navigate through challenges, learning curve and external factors
Work

- Acquire **knowledge**
- Acquire **technical** skills
  - Societies or Industry; proctoring programs
  - CTO device knowledge
- Education of staff, administration and colleagues
- Metrics and Quality control (local, NCDR)

Focus

- **Invest time** and effort in program development; strategy
  - Goals
  - Methods
  - Metrics
  - Resources
- May need to “**sacrifice**” involvement in other programs (e.g., endovascular, structural) at least during the early stages
Persist

• Some procedures will be long, require use of several techniques and many pieces of equipment

• Failures will exist

• Complications will occur

• Use these experiences in a constructive way for improvement

Push

• Ability to motivate others

• Perseverance, particularly after failures or complications
Ideas

• Challenges are opportunities, rather than threats

• Multiple opportunities for improvising and problem solving
  • e.g. “Hybrid Approach” advocates early change if barriers are encountered

Cardiovasc Revasc Med. 2016 Jan-Feb;17(1):3-4
Good

• “Practice makes perfect”
  • Getting good and better at something is a lifelong endeavor
  • → “Only perfect practice makes perfect” (Vince Lombardi)

• With experience, procedure success will increase; procedures will be shortened

• Advanced techniques will be learned or even devised

Serve

• The goal and the driver of CTO PCI should be the desire to help patients
Teamwork

- Help of interventional colleagues (e.g., coverage during procedures or training courses)
- Database creation to establish potential patients
- Proactive communication with referring MDs
- Multidisciplinary discussions with referring MDs, Heart Team
Ibidem: Amputation Prevention Programs

1. Passion
2. Work
3. Focus
4. Persist
5. Ideas
6. Good
7. Push
8. Serve
9. Teamwork
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