When & How I Use Rotational Atherectomy for Unprotected Left Main Stem PCI: A Personal Experience 2000 - 2006

Joe Motwani
Consultant Cardiologist,
Southwest Cardiothoracic Centre (SWCC),
Derriford Hospital,
Plymouth, Devon, UK
NO CONFLICT OF INTEREST TO DECLARE
Rotational Atherectomy

- Developed early 1980s, David Auth PhD during ‘new device era’
- Unique operating principle – differential cutting of inelastic (calcified/fibrotic) tissue
- Fall from favour/use late 1990s –
  1. unfavourable restenosis data (ERBAC, ARTIST)
  2. regarded as time-consuming to use
However...

During past few years, scope of PCI has advanced greatly, including several subsets:

- Complex, calcified lesions
- Very elderly patients (10% JGM PCI pts > 80yrs)
- Patients with extensive comorbidity (CRF etc) turned down for CABG

that provide resurgent role for Rotablator in improving procedural outcome.

In 2006, 55 RA of 462 total PCIs (11.9%)

Is there contemporary evidence to support this practice?
ROCCSTAR Trial

Randomisation Of Calcified Coronary Stenoses to TAXus stenting with or without Rotational atherectomy

- 132 patients – at least one moderate-severely calcified lesion on fluoroscopy
- Rotablation/DES vs DES alone
- Primary endpoint – 8 month binary angiographic restenosis
- Secondary endpoints – procedural success/MACE; acute/subacute/late stent thrombosis
ROCCSTAR – recruitment to date

113 patients

57 Roto/DES
- 34 large
- 23 small
(3mm or >)

56 DES alone
- 34 large
- 22 small

92% angiographic follow up
ROCCSTAR – 2 observations to date re impact of Rotablation on procedural outcome in calcified lesions

1. In arriving at 56 pts in DES alone limb, of 64 pts intended for this limb, 8 (12.5%) unable to predilate fully (placed in ROCCSTAR Rotablator registry)

2. Subacute stent thrombosis 2/56 (3.6%) in DES alone limb (both in small vessels) vs 0/57 in Roto/DES limb
2000 – 2006

Unprotected LMS PCI  N = 165

of which

Rotablation unprotected LMS  N = 44
(based on strict indication of moderate-severe calcification of LMS +/- LAD ostium +/- Cx ostium)

= 27% of total unprotected LMS
Aspects of Technique

- Maximum burring duration 10-15 secs/pass
- 42 pts – single burr; 2 pts – stepped approach (only necessary if very severe lesion in very large LMS)
- Maximum burr:artery ratio in this LMS series 0.5 +/- 0.1, mean +/- SD (NB STRATAS, CARAT)

1 pt 2.25 mm burr
5 pts 2.0 mm burr
12 pts 1.75 mm burr
19 pts 1.5 mm burr
7 pts 1.25 mm burr
Evidence favouring ‘conservative’ burr:artery ratio also increases applicability of Rotablation to radial/ulnar approaches:

Of 44 LMS Rotablation
28 radial*
8 ulnar*
7 femoral (but none since July 03)
1 brachial

*7F, 8F in 25 pts
Aspects of Technique by Location
A. Body of LMS (N = 2/44) - simplest
NB guidewire bias in eccentric lesion
B. Ostial LMS (N = 6/44)

Ideally, use 7F non-support guide
C. Distal LMS  Medina 100, 110, 101 (N = 12/44)

Single (rota)wire, Rotablate & stent LMS + affected limb, leave other limb alone
D. Distal LMS Medina 111 Ca1 M

Beyond Medina – 2 other features to consider re Rotablation
A. One or both limbs calcified (Ca1, Ca2)
B. Non-roto limb > or < 90% (M, S)

PRE

For Distal 111 Ca1 M, Rotablate single limb then T stent

POST
E. Distal LMS 111 Ca1 S

Non-roto limb is $\geq 90\%$

Initial small balloon dilatation of this limb then roto LMS/calcified limb & T stent
F. Distal LMS 111 Ca2

Rotablate both limbs then T stent

NB with this level of anatomical complexity, use IABP irrespective of LV function – avoidance of hypotension is paramount
The most important classification of LMS Rotablation (or of any complex PCI indication) is not the anatomical one but:

Calcified LMS

Pt has CABG option          Pt has no CABG option

Because:

1. Virtually all mortality is in CABG C/I group (based on independently audited 30 day all cause mortality)
2. Even with optimal procedural results, one cannot avoid a 5%-10% 30 day mortality in these CABG C/I pts
3. LMS Rotablation defines a highly ‘concentrated’ population of CABG C/I patients
High Risk (HR) and Normal Risk (NR) outcomes for Non-Rotablated and Rotablated Unprotected LMS procedures (n = 121 and n = 44, respectively). 

- Non-Rotablated Unprotected LMS (n = 121):
  - HR: 33.9%
  - NR: 66.1%

- Rotablated Unprotected LMS (n = 44):
  - HR: 68.2%
  - NR: 31.8%

Comparison for all PCI over the same period 2000 – 2006 (N = 2710), high risk (CABG C/I) = 10% total.

HR – high risk (CABG C/I)
NR – normal risk (CABG possible)
Unprotected LMS Rotablation Series (N = 44)

Age 73 ± 8 yrs, range 51 – 86 yrs
23% of pts 80 + yrs

High risk (CABG C/I) 30 pts
Normal risk (CABG is an option) 14 pts

EF 10% - 65% mean EF 35%
36 distal LMS 6 ostial 2 body
DES – 34 pts (all pts since mid 2003)
Non DES – 9 pts POBA – 1 pt
Unprotected LMS Rotablation Series (N = 44)

In-Lab procedural success (< 20% residual without MACE) - 43/44 pts (98%)
One pt – unable to fully deploy LMS stent despite RA
One other pt: perforation in angulated Ca LAD beyond LMS, tamponade successfully managed conservatively

30 day all cause mortality – 2 pts (4.5%)
- Ventricular rupture day 3 post-procedure in pt with EF 20% & recent MI
- Cardiogenic shock ppt by AF day 1 post-procedure in pt with EF 10%
Unprotected LMS Rotablation series (N = 44)

6 month follow up angiography (DES group)

19 pts to date

LMS restenosis ($\geq 50\%$) Nil

Ostial LAD restenosis 1 pt

Ostial Cx restenosis 1 pt
Conclusions

1. In this era of increasingly advanced PCI, rotational atherectomy expands the potential for safe and effective percutaneous treatment of the unprotected LMS, having applicability in up to 25-30% of cases.

2. The device is indicated particularly in high risk pts turned down for CABG, in whom a number of the same comorbidities that preclude surgery also predispose to LMS calcification.

3. There may also be longer term benefits in reducing restenosis – improved stent deployment, reduced adventitial plaque, reduced plaque shift. Await final results of ROCCSTAR, LMS Rotablation Series.