Αγγειοπλαστική σε Επαναστενωτικές Βλάβες

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# The Mehran’s Classification for BMS-ISR Prognostic Value

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Need for Repeat Revascularization</th>
</tr>
</thead>
<tbody>
<tr>
<td>I (Focal)</td>
<td>19 %</td>
</tr>
<tr>
<td>II (Diffuse)</td>
<td>35 %</td>
</tr>
<tr>
<td>III (Proliferative)</td>
<td>50%</td>
</tr>
<tr>
<td>IV (Occlusive)</td>
<td>98%</td>
</tr>
</tbody>
</table>


Optimize the Treatment of ISR

1: Operator or Technique Dependent

- Stent undersizing,
- Incomplete lesion coverage,
- Stent under expansion,
- Stent malposition

2: Stent mechanical properties

- Recoil because of loss of radial force,
- Stent fractures, and altering increase in shear stress

3: Patient- and biological conditions

- Metal allergy,
- Local inflammatory response to the drug or the polymer, → rigid scar tissue within the stent or → neoatherosclerosis, which can occur years after stent placement.

4: BMS or DES
Report of a European Society of Cardiology-European Association of Percutaneous Cardiovascular Interventions task force on the evaluation of coronary stents in Europe: executive summary

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Figure 3  Systematic review results: median, interquartile range and cumulative frequency of in-stent late lumen loss. BMS, bare metal stents; DES, drug-eluting stents.
<table>
<thead>
<tr>
<th><strong>BMS - ISR</strong></th>
<th><strong>vs</strong></th>
<th><strong>DES - ISR</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Diffuse</strong></td>
<td><strong>Focal</strong></td>
<td><strong>LLL @ 2-5 y (Early &amp; Late)</strong></td>
</tr>
<tr>
<td><strong>LLL @ 6m</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>DM is Independent Predictor of ISR</strong></td>
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<td></td>
</tr>
<tr>
<td><strong>Easier to Treat</strong></td>
<td><strong>More Challenging to Treat</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Better outcome @ FU</strong></td>
<td><strong>Unsatisfactory Results @ FU</strong></td>
<td></td>
</tr>
</tbody>
</table>
Neoatheromatosis: Presentation & Predictors

- Acute clinical presentation secondary to neoatherosclerotic plaque rupture and thrombus formation.
- Late stent thrombosis is related to neoatheromatosis?

- Younger age
- Longer stent age (≥48 months)
- Sirolimus-eluting stent or Paclitaxel-eluting stent
- Active smoking
- Chronic kidney disease
- Angiotensin-converting enzyme
- LDL-cholesterol levels above 70 mg/dL

Optimize the Treatment of ISR

Attempts Over the Years:

- High-pressure balloons,
- Scoring and cutting balloons,
- Ablative therapy with laser directional, and rotational atherectomy, etc
- Local drug-delivery strategies
- Brachytherapy, restenting with same or different DES, and drug-coated balloons (DCB)
Balloon Angioplasty Versus Elective Sirolimus-Eluting Stenting (RIBS II)

Optimizing Treatment of Drug-Eluting Stent In-Stent Restenosis 4 (ISAR-DESIRE IV trial)

Sirolimus-Eluting Stents versus Vascular Brachytherapy for In-Stent Restenosis Within Bare-Metal Stents (SISR)

Restenosis Intra-stent Balloon Angioplasty Versus Elective Stenting (RIBS I)

TAXUS V ISR

The Restenosis Intra-Stent: Balloon Angioplasty vs Drug-Eluting Stent (RIBS III)

Angioplasty Versus Rotational Atherectomy for Treatment of Diffuse In-Stent Restenosis (ARTIST)

Rotational Atherectomy Versus Balloon Angioplasty for Diffuse In-Stent Restenosis (ROSTER)

Intracoronary Stenting of Angioplasty for Restenosis Reduction-Drug-Eluting Stents for In-Stent Restenosis (ISAR-DESIRE)

Drug-eluting Balloon vs. Everolimus-eluting Stent (RIBS V)

Cutting Balloon Evaluation Trial [RESCUT]
A Meta-analysis on different strategies for the treatment of ISR

- 5,923 patients from 27 trials with a follow-up ranging from 6 to 60 months.
- Primary endpoint: The most effective treatment for % diameter stenosis (QCA) @ angio FU.

**Everolimus-eluting stents difference = −9.0% (95% CI -15.8 to -2.2) diameter stenosis**

vs. **DCB, −9.4% (−17.4 to -1.4)**
vs. **Sirolimus-eluting stents, −10.2% (−18.4 to -2.0)**
vs. **Paclitaxel-eluting stents, −19.2% (−28.2 to -10.4)**
vs. **Brachytherapy, −23.4% (−36.2 to -10.8)**
vs. **BMSs, −24.2% (−32.2 to -16.4)**
vs. **Balloon Angioplasty −31.8% (−44.8 to -18.6) vs. Rotablation.**

### Restenosis

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>DES are recommended for the treatment of in-stent restenosis of BMS or DES.</td>
<td>Class A</td>
</tr>
<tr>
<td>Drug-coated balloons are recommended for the treatment of in-stent restenosis of BMS or DES.</td>
<td>Class A</td>
</tr>
<tr>
<td>In patients with recurrent episodes of diffuse in-stent restenosis, CABG should be considered by the Heart Team over a new PCI attempt.</td>
<td>Class IIa</td>
</tr>
<tr>
<td>IVUS and/or OCT should be considered to detect stent-related mechanical problems leading to restenosis.</td>
<td>Class IIa</td>
</tr>
</tbody>
</table>

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**ESC Myocardial Revascularization 2018**
Optimize the Treatment of ISR

• Rather than focusing on how to improve the treatment of DES-ISR, our efforts should be directed to prevention of DES-ISR.
• Optimal stent deployment, including imaging-guided implantation by intravascular ultrasound or optical coherence tomography and
• Vessel preparation
• Adequate coverage of the lesion
• Verifying stent expansion and apposition to the vessel wall.
• Reducing the strut thickness and eliminating the polymer could further reduce the restenosis rates of DES.
#1: Neoatheromatosis or Late ISR Treated with DES-> CB-DCB + DES

Dec. 2015, W, 45 yo, DM, Previous PCI (2013 - RCA), ACS
#1: Neoatheromatosis or Late ISR Treated with DES→ CB-DCB + DES

DES (BP) 3.0/38 + 2.5/24mm
#1: Neoatheromatosis or Late ISR Treated with DES-> CB-DCB + DES
#1: Neoatheromatosis or Late ISR Treated with DES-> CB-DCB + DES

Oct.2018, UA minimal effort
#1: Neoatheromatosis or Late ISR Treated with DES-> CB-DCB + DES

Pantera DCB 3.0/25, 2.5/30mm + DES (BP) 3.0/22mm
#1: Neoatheromatosis or Late ISR Treated with DES-> CB-DCB + DES

Final Result
#2: Neoatheromatosis Treated with CB + BVS
May 2005, M, 43 (actual age 55) yo, Smoker, Dyslipidemic, ACS
#2: Neoatheromatosis Treated with CB + BVS

2 Cypher Stents 3.5/33mm + 3.0/13mm (Crush Technique)
#2: Neoatheromatosis Treated with CB + BVS

2 Cypher Stents 3.5/33mm + 3.0/13mm (Crush Technique)
#2: Neoatheromatosis Treated with BVS

Final Result (2005)
#2: Neoatheromatosis Treated with CB + BVS

Sept. 2017, UA.
#2: Neoatheromatosis Treated with CB + BVS

3.5/10MM CB PCI
#2: Neoatheromatosis Treated with CB + BVS

Post CB Result
#2: Neoatheromatosis Treated with CB + BVS

MAGMARIS BVS 3.5/20mm
#2: Neoatheromatosis Treated with CB + BVS

Final Result
#2: Neoatheromatosis Treated with CB + BVS

Sept. 2018: Angio FU
# 3: Late ISR Treated with CB + DES

M, 68 yo, DM (oral), stable angina, 2VD, previous (2017) PCI (LAD, RCA crux)
# 3: Late ISR Treated with CB + DES
# 3: Late ISR Treated with CB + DES

3.5/10mm CB,
# 3: Late ISR Treated with CB + DES

3.5/10mm CB, 3.0/24mm (BP) DES
# 3: Late ISR Treated with CB + DES

3.5/10mm CB, 3.0/24mm (BP) DES, Final Kiss
# 3: Late ISR Treated with CB + DES

Final Result
Conclusion

“Treatment of DES in-stent restenosis remains challenging and associated with poorer clinical and angiographic results than treatment of bare-metal stent in-stent restenosis, further studies including more patients and longer follow-up are still warranted in this adverse setting.”

+ In our days personalized treatment modalities can improve acute and hopefully long term results in patients with ISR.

Ευχαριστώ πολύ για την προσοχή σας.