Διαδερμική Στεφανιαία Επαναιμάτωση σε Υπερήλικες

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The Aging Population

- In 2040 the proportion of the population >80 is expected to increase X5
- >80% have coronary artery disease
- Age is a strong predictor of mortality
- 66% of all CVD deaths occur in people >75y

Anderson et al, Health Aff 2000;19:191-198
Greece and the Elderly 1st in EU 5th in WD

14% of the total population is above 75
100,000 increase every 5 years

Greek Elders

- 25% take more than 5 medication
- 70% have more than 1 disease
- 25% of total annual days of hospitalization
- 50% of total hospital beds 25% of acute

Population Ageing Global Rankings

- Japan
- South Korea
- Spain
- Portugal
- Greece

Hospital Admissions in the elderly

- Surgical 40%
- 60%
Issues in the management of the elderly patient with CAD

- Rapidly growing cohort
- 20% of PCI treated in real world
- Greater ischemic burden suggesting that greater scope of benefit with revascularization strategies.
- However, less diagnostic testing, reluctance of physicians to perform PCI with perceptions of disappointing outcomes, low success, and high complication rates.
- Tendency to present late, atypical symptoms, or non-diagnostic ECG, reservations regarding procedural risk to benefit ratio, due to shorter life expectancy, presence of comorbidities, and increased bleeding risk.

J Geriatr Cardiol 2015;12:174-84
Effect of Aging on Anatomical and Functional Characteristics of the Heart

- Calcified lesions
- Tortuous lesions
- Ostial lesions
- MVD and LM disease

- ↓ diastolic filling ↑ LVEDP
- ↑ afterload (arterial stiffening)
- ↑ myocardial thickness
- Filling more dependent on atrial kick
- Prolonged time of relaxation
- Lower EF
- Lower cardiac output

This combination of factors translates into higher procedural complications and long term adverse events
Bleeding is associated with Death and Ischemic Events

HR 5.37 (3.97-7.26)  N=34,146
OASIS Registry, OASIS 2, CURE trials

HR 4.44 (3.16-6.24)

HR 6.46 (3.54-11.79)

Death  MI  Stroke

## Coagulation proteins

<table>
<thead>
<tr>
<th>Protein</th>
<th>Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fibrinogen</td>
<td>↑</td>
</tr>
<tr>
<td>Factor V</td>
<td>↑</td>
</tr>
<tr>
<td>Factor VII</td>
<td>↑</td>
</tr>
<tr>
<td>Factor VIII</td>
<td>↑</td>
</tr>
<tr>
<td>Factor IX</td>
<td>↑</td>
</tr>
<tr>
<td>Factor XIII</td>
<td>↑</td>
</tr>
<tr>
<td>High molecular weight kininogen</td>
<td>↑</td>
</tr>
<tr>
<td>Prekallikrein levels</td>
<td>↑</td>
</tr>
</tbody>
</table>

## Anticoagulant proteins

<table>
<thead>
<tr>
<th>Protein</th>
<th>Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antithrombin III</td>
<td>↓m ↑ f</td>
</tr>
<tr>
<td>Protein C</td>
<td>= m ↑ f</td>
</tr>
<tr>
<td>Protein S</td>
<td>= m ↑ f</td>
</tr>
<tr>
<td>Tissue factor pathway inhibitor</td>
<td>↓m ↑ f</td>
</tr>
</tbody>
</table>

## Fibrinolytic proteins

<table>
<thead>
<tr>
<th>Protein</th>
<th>Direction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasmin</td>
<td>↓</td>
</tr>
<tr>
<td>Plasminogen activator inhibitor-1</td>
<td>↑</td>
</tr>
<tr>
<td>D-dimer</td>
<td>↑</td>
</tr>
</tbody>
</table>

### Increased platelet reactivity

### Vessel wall degeneration

### Endothelial dysfunction

### The elderly experience a shift towards increased clotting and decreased fibrinolysis

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Franchini et al. *Crit Rev Oncol Hematol* 2006;60:144-51
**Bleeding in the Elderly**

Concurrent therapy for AF

Higher likelihood of requiring non-cardiac surgery in the future

Increased risk of falls

Individual patient assessment (comorbid state, Cr clearance, weight adjusted doses)

Higher bleeding risk

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### HAS-BLED

<table>
<thead>
<tr>
<th>Letter</th>
<th>Clinical Characteristic</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>Hypertension</td>
<td>1</td>
</tr>
<tr>
<td>A</td>
<td>Abnormal Liver or Renal Function</td>
<td>1 or 2</td>
</tr>
<tr>
<td>S</td>
<td>Stroke</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>Bleeding</td>
<td>1</td>
</tr>
<tr>
<td>L</td>
<td>Labile INR</td>
<td>1</td>
</tr>
<tr>
<td>E</td>
<td>Elderly (age &gt; 65)</td>
<td>1</td>
</tr>
<tr>
<td>D</td>
<td>Drugs or Alcohol</td>
<td>1 or 2</td>
</tr>
</tbody>
</table>

**Maximum Score** 9

### HEMORR$_2$HAGES

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<tr>
<th>Letter</th>
<th>Clinical Characteristic</th>
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</tr>
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<tbody>
<tr>
<td>H</td>
<td>Hepatic or Renal Disease</td>
<td>1</td>
</tr>
<tr>
<td>E</td>
<td>Alcohol Abuse</td>
<td>1</td>
</tr>
<tr>
<td>M</td>
<td>Malignancy</td>
<td>1</td>
</tr>
<tr>
<td>O</td>
<td>Older Age</td>
<td>1</td>
</tr>
<tr>
<td>R</td>
<td>Reduced Platelet Count or Function</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>Rebleeding Risk</td>
<td>2</td>
</tr>
<tr>
<td>H</td>
<td>Hypertension</td>
<td>1</td>
</tr>
<tr>
<td>A</td>
<td>Anemia</td>
<td>1</td>
</tr>
<tr>
<td>G</td>
<td>Genetic Factors</td>
<td>1</td>
</tr>
<tr>
<td>E</td>
<td>Excessive Fall Risk</td>
<td>1</td>
</tr>
<tr>
<td>S</td>
<td>Stroke</td>
<td>1</td>
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</tbody>
</table>

**Maximum Score** 12
Bleeding outcomes; N=2.8 million PCIs at 1381 sites

Prior Meta-analysis of 23 RCTs of Radial vs. Femoral (N=7030)


DES or BMS?

SENIOR Trial design
Randomized (1:1), single blind trial
1,200 patients aged 75 years and above
Tailored DAPT: 1 mo in stable and 6 mo in ACS pts
Prespecified by the investigator prior to randomization

DES Vs. BMS

Primary End Point 1y: all-cause mortality, non-fatal MI, stroke, IDTLR
Secondary End Points 1y: Bleeding BARC 2-5/3-5, stent thrombosis

Log-rank test
P=0.77

MACCE Components

Varenne et al, Lancet 2018;391:41-50
ZEUS Trial

828 pts with High Bleeding Risk criteria (HBR)
- Advanced age
- Oral anticoagulants
- History of bleeding
- Known anemia

Ariotti et al, JACC Cardiovasc Interv 2016;9:426-436
Overall 1-y Mortality Stratified by Treatment Strategies in STEMI pts

Zimmerman et al Clin Cardiol 2009;32:87-93
NSTEMI and the Elderly

Invasive vs Medical

In-hospital mortality

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Invasive</th>
<th>Medical</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>70-80</td>
<td>4.3%</td>
<td>6.2%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>&gt;80</td>
<td>7%</td>
<td>11%</td>
<td>0.001</td>
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Mortality @ 6m

<table>
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<tr>
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<th>Invasive</th>
<th>Medical</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>70-80</td>
<td>7%</td>
<td>13%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>&gt;80</td>
<td>17%</td>
<td>25%</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

TACTICS TIMI-18 early invasive vs conservative

2220 pts 962 > 65

In-hospital mortality

<table>
<thead>
<tr>
<th>Duration</th>
<th>Invasive</th>
<th>Medical</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 d</td>
<td>5.7%</td>
<td>9.8%</td>
<td>0.019</td>
</tr>
<tr>
<td>@6m</td>
<td>8.8%</td>
<td>13.6%</td>
<td>0.018</td>
</tr>
</tbody>
</table>

NEW YORK registry 968.542 octogenarians

In-hospital mortality

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References:

Devlin et al, Eur Heart J 2008;29:1275-1282
Bach et al, Ann Intern Med 2004;141:186-195
Randomized Trial of Invasive vs Medical Therapy >75 with Stable Angina

Event free survival

Invasive
Optimum medical

P<0.0001

Time to death and MI

Invasive
Optimum medical

P=0.93

Time Investigators, Lancet 2001;358:951-57
Comparison of MACCE

Non-elective

<80 years

>80 years

Elective

Overall MACCE

1-y Survival in STEMI and NSTEMI

Rajani et al, Brit J Cardiol 2011;18:73-76

Results from the FAST-MI study
Revascularization appears to improve outcomes in elderly patients with stable angina (PCI or CABG), ACS (PCI or CABG) and STEMI (PCI).

Complications of PCI and CABG are greatly increased as age increases (bleeding, renal failure, CHF, CVA, Stroke).

Early revascularization in stable patients may be more beneficial than intervention at the time of unstable symptoms.

Important non-cardiac considerations to consider include baseline mental status, nutritional status, and coexisting renal, cerebral, pulmonary, and vascular diseases.

Conclusions-PCI in the Elderly
Conclusions-PCI in the Elderly

Select patients most likely to benefit

Use strategies to avoid CVA and renal failure

Radial access 4all to reduce bleeding

Tailor antithrombotic treatment based on individual risk assessment
Thank you