Erectile Dysfunction: A Barometer for Overall Health

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Barometer

- Compares changes in air pressure
- As pressure goes down, storms will arrive
- Similarly, as penile pressure decreases, future storms are more likely
Overview - Epidemiology

- 52% of men age 40-70\textsuperscript{1}
  - Complete:
    - 5% @ 40 yo
    - 15% @ 70 yo
  - Mild / moderate:
    - 17% @ 40 yo
    - 25% @ 70 yo

Overview - Epidemiology

- 4x increase from 40’s to 60’s\(^1\)
- 25.9 cases per 1000 man years
- World-wide projection 322 million cases 2025\(^2\)

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Erectile Dysfunction - Pathophysiology

1 – Neurogenic: no signal

2 - Vasculogenic: endothelial damage (common), inadequate inflow (uncommon)

3 - Venous leak: excessive outflow
Why is ED a barometer of health?
Barometer for Overall Health

ED as a Risk Factor for CVE

• Thompson, et al:¹

• Men aged >55 yrs, randomized to placebo in Prostate Ca Prevention Trial

• Eval q3 mo for ED and CVD

• Controlled for age, BMI, BP, Lipids, DM, FH of MI, race, Tob, activity, QOL

• N=9457, 85% w/ no CVD at entry

• 47% had ED at entry

• Within 5 yrs, 57% of remaining reported ED

Comparison of ED to other Comorbid Conditions

<table>
<thead>
<tr>
<th>Covariates (multivariable)</th>
<th>Hazard Ratio</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (5 yr inc)</td>
<td>1.31 (CVE)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>BMI (5 unit)</td>
<td>1.14 (CVE)</td>
<td>0.02</td>
</tr>
<tr>
<td>Chol (20 mg/dL inc)</td>
<td>1.05 (CVE)</td>
<td>0.07</td>
</tr>
<tr>
<td>Smoking (y/n)</td>
<td>1.57 (CVE)</td>
<td>0.004</td>
</tr>
<tr>
<td>Family history of MI</td>
<td>1.36 (CVE)</td>
<td>0.009</td>
</tr>
<tr>
<td>DM</td>
<td>1.78 (CVE)</td>
<td>0.004</td>
</tr>
<tr>
<td>Using antihypertensives</td>
<td>1.39 (CVE)</td>
<td>0.003</td>
</tr>
<tr>
<td>ED</td>
<td>1.45</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*Thompson IM, et al: 2005 JAMA.*
Relationship of ED (baseline or incident) and CVE - adjusted

<table>
<thead>
<tr>
<th>End Points</th>
<th>Hazard Ratio</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MI</td>
<td>1.50</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Stroke</td>
<td>1.79</td>
<td>0.01</td>
</tr>
<tr>
<td>TIA</td>
<td>1.92</td>
<td>0.02</td>
</tr>
<tr>
<td>First CV event</td>
<td>1.45</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Death of any cause</td>
<td>1.22</td>
<td>0.13</td>
</tr>
</tbody>
</table>

*Thompson IM, et al: 2005 JAMA.*
Graphed Data

% Increased risk of CVE

% Increased risk with ED

Time to CVE since ED Onset

Percentage With Cardiovascular Event vs Time Since Initial Erectile Dysfunction, y

No. at Risk: 2495, 2096, 1551, 776

ED as a Risk Factor for CVE

- Schouten BW, et al:\(^1\)
- Population based study, Netherlands
- 50-75 yo men
- Mean 6.3 year follow-up
- N=1248 w/ no CVD at baseline
- N=258 with reduced erections, 108 with severe ED

\(^1\) – Schouten BW, et al: 2008 IJIR
ED as a Risk Factor for CVE

- Based on Framingham risk stratification
- Higher risk for CVE, erectile function better predictor
- Severity of ED may also independently predict

*Schouten BW, et al: 2008 IJIR.*
ED as a Risk Factor for CVE

ED as a Risk Factor for CVE

- Multiple other studies confirming ED as a major risk factor

- ED predicted MACE – HR 2.1 (p < 0.001)\(^1\)

- DM men – ED independent predictor of coronary heart disease (HR 1.58, p=0.018)\(^2\)

ED in Men with Diabetes with Silent CAD

- Included 291 men with diabetes and silent coronary artery disease
- Followed for an average of 47 months
- 49 men experienced major adverse cardiac event
- ED rates
  - Those with CV events 61%
  - Those with No CV event 36%
  - Those with diabetes & ED have a lower survival rate

ED as a Risk Factor for a CVE

Men with diabetes and ED were 1.74 times more likely to have a CVE

The Temporal Relationship Between ED and Acute Coronary Syndromes

- 300 Consecutive male patients with acute chest pain, asked about ED and when it occurred
  - 2/3 of patient with 1st onset of acute chest pain had ED 39 months prior

ED is an early warning sign of heart disease

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Age of ED Is MOST Important

ED is a greater risk factor at younger age

- 48
- 5.2
- 2.5
- 1.3

Can you think of any other test that is as easy, cheap, and effective at predicting future vascular related events?
Questionnaires

- International Index of Erectile Function (IIEF)
- Not required, but more accurate
- 15 items; erectile function domain questions 1-5, 15
- Scores:
  - 26-30 = no ED
  - 22-25 = mild ED
  - 17-21 = mild to mod ED
  - 11-16 = mod ED
  - <11 = severe ED
The Link Between the Two?
## Shared Risk Factors

<table>
<thead>
<tr>
<th>Coronary artery disease</th>
<th>Erectile Dysfunction</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Age</td>
<td>• Age</td>
</tr>
<tr>
<td>• Dyslipidemia</td>
<td>• Dyslipidemia</td>
</tr>
<tr>
<td>• Hypertension</td>
<td>• Hypertension</td>
</tr>
<tr>
<td>• Diabetes</td>
<td>• Diabetes</td>
</tr>
<tr>
<td>• Smoking</td>
<td>• Smoking</td>
</tr>
<tr>
<td>• Sedentary lifestyle</td>
<td>• Sedentary lifestyle</td>
</tr>
<tr>
<td>• Obesity</td>
<td>• Obesity</td>
</tr>
<tr>
<td>• Depression</td>
<td>• Depression</td>
</tr>
<tr>
<td>• Male gender</td>
<td>• Coronary artery disease, peripheral vascular disease</td>
</tr>
</tbody>
</table>
“Erectile dysfunction is related to diseases of the vascular bed.”

V. Michael, Prague 1973
Vasculogenic Hypothesis

• Earlier ED due to more significant changes in flow from early plaque deposition in the penile arteries (greater relative narrowing)
Problems with Vasculogenic Hypothesis

- Penile U/S demonstrate adequate flow in nearly all men with established CAD
- Higher rate of veno-occlusive dysfunction
- Endothelial dysfunction, calcification, remodeling occur at similar rates between pudendal and cardiac arteries
Problems with Vasculogenic Hypothesis

Compared to carotid and thoracic aorta, pudendal artery:

- Arterial size actually increases
- Pudendal earlier wall calcification
- Pudendal earlier endothelial dysfunction

Nitric Oxide
Summary

• ED – Barometer of health
• ED = early death
• Men with ED are at higher risk for CVE
• ED is an independent predictor for cardio and cerebrovascular events
• Special message for anesthesiologists:
  • Consider ED screening as part of preop assessment
  • In men with premature ED without a clear underlying cause (especially younger than 55), consideration should be given to cardiovascular evaluation
Thank You

Email: frank.igor@mayo.edu

https://youtu.be/OM3_zeWxRsc