Impact of glycosylated hemoglobin on surgical site infection / occurrence

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Background

Glycosylated Hemoglobin (HbA1c)
Background

Glycosylated Hemoglobin (HbA1c)
What is the optimal level?

Hgb A1c / Hga1c Predicts Survival

Excellent

Probability of Living Ten Years

Blood Glucose (mmol/L)

5.4  7.0  8.6  10.2  11.8  13.4  14.9  16.5

5%  7%  8%  9%  10%  11%  12%  20%

Poor
Background

Glycosylated Hemoglobin (HbA1c)

What is the optimal level?

1645 diabetic patients undergoing TJA:

HbA1c >7.7: 0.8 vs 5.4% joint infection; OR 1.5

2130 patients undergoing CABG:

HbA1c >8.6: highest risk of sternal infection (20.6 v 4.6%)
HbA1c >7: higher risk of infection (10.6 v 3.9%; OR 2)

229 general / vascular cases:

HbA1c >7: 17.2 v 8.4%; OR 2.3 (80% CI)

Tarabichi M, J Arthroplasty 2017
Gatti G, Circ J 2016
Showen A, Am Surg 2017
Background

Glycosylated Hemoglobin (HbA1c)

No hernia specific studies to date

Ventral Hernia Management

Expert Consensus Guided by Systematic Review

Recommend intervention if HbA1c >6.5 (Grade B)
Recommend avoiding elective VHR if HbA1c >8 (Grade B)

Endara - 79 pts; OR 3.5 for wound dehiscence if >6.5
Halkos - 3200 CABG pts; reduced 5yr survival if >7
Dronge - 647 pts non-cardiac sx; >7 = higher SSI (20 v 12%; OR 2.1)
O’Sullivan - 165 vascular pts (43 DM); 21<7; 22>7 - 59 v 19% all-cause 30d morbidity
Gustafsson - 120 colorectal pts; “postoperative complications” higher >6 (OR 2.9)
Stenberg - 12,850 bariatric pts NOT treated for DM; >5.7 higher complications (anastomotic leak, abscess, cardiovasc, pulm, SBO/ileus (OR 1.26 v <6.5, OR 1.65 >6.5)

Methods

AHSQC repairs* 41264

Diabetes Mellitus not reported as a comorbidity 35549

Inguinal repair 1012

Active infection 122

Study population 4581

*As of 2019-11-01

Results
• HbA1c reported in 1903 (41.5%) patients.

• 172 surgeons from 132 sites contributed data.
  85% academic / affiliated
  15% private

Results
<table>
<thead>
<tr>
<th>BMI</th>
<th>AS</th>
<th>Age</th>
<th>Sex</th>
<th>Race</th>
<th>White</th>
<th>Black</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 ± 7kg/m²</td>
<td>1</td>
<td>60 ± 11</td>
<td>Female</td>
<td>49%</td>
<td>82%</td>
<td>11%</td>
<td>7%</td>
</tr>
<tr>
<td>(75% &gt; 30)</td>
<td>2</td>
<td></td>
<td>Male</td>
<td>51%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;1%</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21%</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Comorbidities

<table>
<thead>
<tr>
<th>Condition</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immunosuppressed</td>
<td>7.9%</td>
</tr>
<tr>
<td>Current smoker</td>
<td>13.1%</td>
</tr>
<tr>
<td>HTN</td>
<td>74.8%</td>
</tr>
<tr>
<td>COPD</td>
<td>9.1%</td>
</tr>
<tr>
<td>H/o SSI</td>
<td>13.4%</td>
</tr>
<tr>
<td>Recurrent hernia</td>
<td>34.1%</td>
</tr>
</tbody>
</table>

### Operative Details

<table>
<thead>
<tr>
<th>Wound class</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>85%</td>
</tr>
<tr>
<td>2</td>
<td>10%</td>
</tr>
<tr>
<td>3</td>
<td>4%</td>
</tr>
<tr>
<td>4</td>
<td>1%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operative time</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-119 min</td>
<td>40%</td>
</tr>
<tr>
<td>120-239 min</td>
<td>38%</td>
</tr>
<tr>
<td>&gt;240 min</td>
<td>22%</td>
</tr>
</tbody>
</table>
### Operative Details

- Concurrent procedure: 24.6%
- Hernia width: 8 ± 7 cm
- Mesh used: 91%
  - Perm synthetic: 92%
  - Absorb synthetic: 3%
  - Biologic: 5%
- Mesh location:
  - Onlay: 4%
  - Inlay: 2%
  - Sublay: 93%
- Fascia closed: 90%
<table>
<thead>
<tr>
<th>Outcomes</th>
<th>SSO</th>
<th>Seroma</th>
<th>Non-healing wound</th>
<th>Ischemia / necrosis</th>
<th>Cellulitis</th>
<th>SSI PI</th>
<th>Wound opening</th>
<th>Perc drainage</th>
<th>Partial explant</th>
<th>Complete explant</th>
</tr>
</thead>
<tbody>
<tr>
<td>SSI</td>
<td>11.3%</td>
<td>1.2%</td>
<td>4.5%</td>
<td>1.1%</td>
<td>1.3%</td>
<td>1.5%</td>
<td>2.1%</td>
<td>1.1%</td>
<td>0.05%</td>
<td>0.15%</td>
</tr>
<tr>
<td>SSI PI</td>
<td>4.3%</td>
<td>2.7%</td>
<td>1.6%</td>
<td>0.1%</td>
<td>3.2%</td>
<td>0.5%</td>
<td>0.1%</td>
<td>0.3%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Inconclusive effect of HbA1c on risk of SSO or SSI

Limited by sample size / low incidence of SSI
Power Calculation

Limited on time-frame of follow-up (30d)

Impact on other outcomes?