OPEN REOPERATIONS FOR COMPLICATIONS OF ENDOVASCULAR AORTIC PROCEDURES: TIP OF THE ICEBERG?

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NO DISCLOSURES
BACKGROUND

• RATE OF THORACIC ENDOVASCULAR AORTIC_REPAIR (TEVAR) HAS INCREASED DRAMATICALLY OVER THE PAST TWO DECADES
PREVALENCE OF OPEN SURGERY AND TEVAR FOR THORACIC ANEURYSM AND DISSECTION

Wang et al. JVascSurg 2018; 67: 16-49
SECONDARY OPEN AORTIC PROCEDURES (SOAP)

BACKGROUND

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• TEVAR CHARACTERIZED BY SUBSTANTIAL NEED FOR REINTERVENTIONS (11-15% IN RECENT SERIES)
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• OPEN REOPERATION INDICATED WHEN ENDOVASCULAR OPTIONS NOT FEASIBLE

• NUMBER OF SECONDARY OPEN AORTIC OPERATIONS (SOAP) LIKELY TO INCREASE OVER TIME
COMPLICATIONS FOLLOWING TEVAR THAT REQUIRE OPEN OPERATION

- ENDOLEAK
- ANEURYSM EXPANSION OR RUPTURE
- RETROGRADE AORTIC DISSECTION
- FISTULA FORMATION
- STENT GRAFT INFECTION
- STENT GRAFT FRACTURE, COLLAPSE, MIGRATION OR EROSION
META-ANALYSIS OF SECONDARY OPEN AORTIC PROCEDURES FOLLOWING TEVAR

Gambardella et al. J. Am heart Assoc 2017;13:1-20

15 PUBLICATIONS SUITABLE FOR ANALYSIS (2004-2016)

330 SECONDARY OPEN PROCEDURES
  • MEAN AGE 62 YEARS
  • 61% MALE
  • 35% PROCEDURES NON-ELECTIVE
  • MEAN INTERVAL BETWEEN TEVAR AND SOAP = 20 MONTHS (.3-62 MONTHS)
<table>
<thead>
<tr>
<th>OPERATIVE OUTCOMES</th>
<th>NUMBER OF STUDIES WITH AVAILABLE DATA (TOTAL = 15)</th>
<th>NUMBER OF PATIENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>EARLY MORTALITY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.6% (4%-20%)</td>
<td>14</td>
<td>305</td>
</tr>
<tr>
<td><strong>MORBIDITY</strong></td>
<td></td>
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</tr>
<tr>
<td>• STROKE 5.1%</td>
<td>12</td>
<td>268</td>
</tr>
<tr>
<td>• PARAPLEGIA 8.3%</td>
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<td></td>
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<tr>
<td>• PULMONARY 19.0%</td>
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<tr>
<td>• RENAL 15.8%</td>
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<td></td>
</tr>
<tr>
<td>• CARDIAC 5.7%</td>
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<tr>
<td>• BLEEDING 5.0%</td>
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J. Am heart Assoc 2017;13:1-20
EARLY MORTALITY ACCORDING TO PATHOLOGY AT INDEX TEVAR

- Aneurysm: 8.50% (N=71)
- Dissection: 1% (N=108)
- Fistula: 40% (N=5)
- Aortic transection: 33% (N=9)

J. Am heart Assoc 2017;13:1-20
EARLY MORTALITY ACCORDING TO INDICATION FOR SOAP

- **ENDOLEAK**: 2% (n=93)
- **UNSTABLE ANEURYSM**: 1% (n=70)
- **RTAD**: 3.50% (n=53)
- **INFECTION**: 4% (n=23)
- **FISTULA**: 15% (n=27)
- **MISC**: 33% (n=6)

J. Am heart Assoc 2017;13:1-20
Aftermath of SOAP

Early outcomes
- Mortality 10.6%
- Neurological Morbidity 13.4%
- Stroke 5.1%
- Paraplegia 8.3%

2-Year Outcomes
- Post-Discharge Mortality: 20.4%
- Non-Aortic Death: 12.7%
- Aortic Adverse Event: 14.9%
- TOAP: 7.4%
- Aortic Death: 7.7%

Pre & Post-Discharge Mortality at 2-Year FU
- 31%
Open Descending Thoracic or Thoracoabdominal Aortic Approaches for Complications of Endovascular Aortic Procedures: 19-year Experience

(Spiliotopoulos, Coselli et al. JTCVS 2018;155:10 – 18)

45 PATIENTS AFTER TEVAR*
• MEAN AGE; 54 years
• 61% MALE
• 67% CHRONIC DISSECTION
• 38% MARFAN OR LOEYS-DIETZ SYNDROME
• MEDIAN INTERVAL BETWEEN TEVAR AND SOAP = 11 MONTHS (2-33 MONTHS)

57% HAD SOAP > 1 YEAR AFTER TEVAR

* PATIENTS WITH RETROGRADE AORTIC DISSECTION NOT INCLUDED
INCREASE IN NUMBER OF OPEN REPAIRS AFTER ENDOVASCULAR AORTIC REPAIR

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Number of Patients</th>
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<tr>
<td>1996-2000</td>
<td>2</td>
</tr>
<tr>
<td>2001-2005</td>
<td>9</td>
</tr>
<tr>
<td>2006-2010</td>
<td>21</td>
</tr>
<tr>
<td>2011-2015</td>
<td>35</td>
</tr>
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</table>
SOAP AFTER TEVAR

OPERATIVE OUTCOMES

**EARLY MORTALITY**

6.7%

**MORBIDITY**

- **STROKE** 0
- **SPINAL CORD INJURY** 7%
- **PULMONARY** 22%
- **RENAL** 4%
- **CARDIAC** 13%

**LATE MORTALITY***

33%

64% IN PATIENTS WITH INFECTION

* MEDIAN FOLLOW-UP=36 MONTHS

JTCVS 2018;155:10 – 18
TEVAR IN PATIENTS WITH MARFAN SYNDROME

(BÖCKLER ET AL, GEFÄSSCHIRURGIE 2017;22: S51-57)

7 PUBLICATIONS SUITABLE FOR ANALYSIS

72 PATIENTS
- 4% EARLY MORTALITY
- 20% SUBSEQUENT ENDOVASCULAR PROCEDURE
- 22% SUBSEQUENT OPEN AORTIC PROCEDURE
- 15% LATE MORTALITY AT MEAN FOLLOW-UP OF 32 MONTHS
Conclusions

• AS THE NUMBER OF TEVAR PROCEDURES INCREASES, THE NUMBER OF SECONDARY OPEN AORTIC PROCEDURES WILL LIKELY INCREASE.
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• ALTHOUGH < 20% OF PATIENTS UNDERGOING TEVAR HAVE CHRONIC AORTIC DISSECTION, IT IS THE MOST PREVALENT UNDERLYING PATHOLOGIC CONDITION REQUIRING SECONDARY OPEN AORTIC SURGERY (>50-60% OF PROCEDURES)
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• THE PERCENTAGE OF PATIENTS WITH MARFAN SYNDROME UNDERGOING SOAP (31% & 38% IN 2 SERIES) IS ALSO INORDINATELY HIGHER THAN THE PERCENTAGE OF PATIENTS WHO UNDERGO TEVAR
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• SOAP FOR PATIENTS WITH AORTIC DISSECTION IS ASSOCIATED WITH THE LOWEST EARLY MORTALITY (1%); INFECTION AND/OR FISTULA WITH THE HIGHEST (30-40%)
Conclusions

- As the number of TEVAR procedures increases, the number of secondary open aortic procedures will likely increase.
- Although < 20% of patients undergoing TEVAR have chronic aortic dissection, it is the most prevalent underlying pathologic condition requiring secondary open aortic surgery (>50-60% of procedures).
- The percentage of patients with Marfan syndrome undergoing SOAP (31% & 38% in 2 series) is also inordinately higher than the percentage of patients who undergo TEVAR.
- SOAP for patients with aortic dissection is associated with the lowest early mortality (1%); infection and/or fistula with the highest (30-40%).
- The 2- to 3-year total mortality after SOAP is approximately 30%, and ½ of deaths are aortic related.
Conclusions

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• THE 2 TO 3 YEAR TOTAL MORTALITY AFTER SOAP IS APPROXIMATELY 30%, AND ½ OF DEATHS ARE AORTIC RELATED

• SOAP IS PERFORMED MORE THAN ONE YEAR AFTER TEVAR IN 50% OF PATIENTS; STRINGENT LONG TERM FOLLOWUP IS ESSENTIAL