Highlights of new SVS Guidelines for TEVAR

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I have no financial disclosures

Collective work
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SVS Grading of Recommendations

<table>
<thead>
<tr>
<th>Quality of evidence</th>
<th>Rating</th>
<th>Description</th>
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<tbody>
<tr>
<td>High</td>
<td>A</td>
<td>Further research unlikely to change confidence in estimate of effect</td>
</tr>
<tr>
<td>Moderate</td>
<td>B</td>
<td>Further research likely to impact confidence in estimate of effect and may change estimate</td>
</tr>
<tr>
<td>Low</td>
<td>C</td>
<td>Further research very likely to impact confidence in estimate of effect and likely to change estimate</td>
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</tbody>
</table>

The strength of recommendation is categorized as:
Grade 1 (strong) “We recommend”
Grade 2 (weak) “We suggest”

Use of TEVAR vs. Open for TAA/TAAA

- Recommend TEVAR over open repair for suitable TAA
  Grade 1, Level A
Indications for repair – TAA/TAAA
- Untreated 6.0cm TAA have 5 year survival of 54%
- Rupture risk is 3.7%/year
- Risk of death is 12%/year
- TAA(A) grow ~10mm/year (7mm ascending, 19mm descending)

Indications for repair –
- We recommend TEVAR for asymptomatic TAA when the maximum aneurysm diameter exceeds 5.5 cm, or if they have rapid expansion (>5 mm in 6 months)
  Grade 1, Level B
- We suggest a larger diameter threshold for patients with a high surgical risk or short expected lifespan
  Grade 2, Level B

Indications for repair – Acute, “Complicated” TBAD
- “Complicated” TBAD = rupture, clinical malperfusion, and acute expansion, while also including failed maximal medical management of refractory pain and uncontrollable HTN
- TEVAR has promising outcomes with 30-day/in-hospital mortality of 7.3%

Indications for repair – Acute, “Complicated” TBAD
- We recommend TEVAR over open surgical or conservative management for acute, complicated TBAD
  Grade 1, Level B

Indications for repair – Acute, uncomplicated TBAD
- Despite INSTEAD XL and ADSORB’s improved late aortic remodeling, and potential survival benefits (IRAD), more risk/benefit/cost data needs to be collected prior to recommending universal TEVAR for uncomplicated TBAD
  Grade 2, Level B

Indications for repair – Acute, uncomplicated TBAD
- High-risk criteria may exist: Initial aortic diameter (>35-44 mm), false lumen >22mm, large entry tear (>10 mm), TLV/FLV ratio of <0.8, age <60 etc
- We suggest TEVAR over open surgical or conservative management for selected cases of acute, uncomplicated TBAD considered to be at high risk for progression or rupture
  Grade 2, Level B
Indications for repair – BTAI

- BTAI classification and devices are evolving.
- Modern TEVAR is superior to open management.
- All patients should undergo anti-impulse therapy
- Low-grade injuries can resolve ~6 weeks.
- Progression of PSA to rupture is not immediate in most cases

- We recommend TEVAR over open surgical or conservative management for ruptured BTAI
  Grade 1, Level A
- We recommend TEVAR over open surgical or conservative management for pseudoaneurysms from BTAI
  Grade 1, Level B

Indications for repair – BTAI

- TEVAR may be delayed in selected pseudoaneurysms when concomitant medical/surgical conditions need to be managed more acutely
  Grade 2, Level B

- TEVAR for intramural hematomas should be individualized and consideration given to: the perceived risk of rupture (size/growth/effusion), compliance with medical therapy, ability for subsequent imaging and concomitant medical conditions
  Grade 2, Level B

Indications for repair – BTAI

- We recommend conservative management with serial imaging over open surgical repair or TEVAR for intimal injuries from BTAI
  Grade 1, Level B

- Anticoagulation at the time of TEVAR for BTAI should be tailored to the patients' bleeding risk. Expeditious TEVAR without anticoagulation may be considered by experienced teams for selected cases
  Grade 2, Level C

Indications for repair – Mycotic TAA

- TEVAR for infected aneurysms has mixed outcomes relative to the etiology, but generally better short-term outcomes compared to open
- Antimicrobial adjuncts (topical/regional) may help longevity
- However, endografts commonly re-infect and require explant and open reconstruction
Indications for repair – Mycotic TAA
– We suggest TEVAR over open repair for mycotic aortic aneurysms as a bridge to definitive management for unstable patients
  Grade 2, Level C

Celiac Artery Management
• Coverage is required in 4%-6% of cases
• Gains 1-2.5cm seal zone
• Complications range from non-significant to deadly
• CTA evaluation of collateral flow has low sensitivity
• Balloon occlusion and angiography are not 100% sensitive or specific

Celiac Artery Management
Prior to CA coverage, we suggest:
– Dedicated mesenteric angiography
– Pre-emptive SMA stenting for >50% stenosis and/or open revascularization, or fenestration in concerning cases
– High index of suspicion for mesenteric ischemia should follow CA coverage
  Grade 1, Level C
– Avoid pre-emptive CA embolization prior to TEVAR
  Grade 2, Level B

Spinal Cord Prophylaxis
– We recommend the use of some prophylactic SCI measure for all high-risk patients
  Grade B, Level 1

– We recommend a high index of suspicion in the immediate post-operative period to allow for early rescue intervention
  Grade A, Level 1

Spinal Cord Prophylaxis
• Some recommend routine vs. selective CSF drain
• SCI risk may be higher in TEVAR >10cm, or previous aortic surgery
• Systematic review suggests drains offer no difference in SCI
• CSF drainage can reverse paralysis.
• Institutional outcomes and protocols for drains vary tremendously (Lowest risk in Zone 3)
• Other adjuncts have been suggested (high SBP, spinal cord cooling or infusions, staged coverage etc)

Left Subclavian Artery Management
• LSA coverage is needed in 26-40%
• 2009 SVS Guidelines suggested routine LSA revascularization
• EUROSTAR, MOTHER, meta-analysis and many institutions report LSA revascularization lower the risk of SCI
• However, BTAI has the lowest risk overall (arm ischemia)
• Highest risk after LSA coverage include CABG, incomplete or diseased vertebrals
• LSA revascularization has complications <6% (most minor)
• Revascularization has high patency
Left Subclavian Artery Management

- We continue to recommend routine, prophylactic LSA revascularization for all elective TEVAR and high-risk patients  
  Grade B, Level 1
- In emergent TEVAR, LSA revascularization should be considered, but individualized  
  Grade C, Level 2

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Thank you!
Guillermo A. Escobar

Reporting standards – Not all TEVAR are equal

- Complications vary from exceedingly low to exceedingly severe
- These are relative to the etiology, length and aortic zone treated
- Publications interchange TAA and TAAA
- It is critical that we standardize reporting to better compare our outcomes for future reviews

We recommend that publications and reports regarding TEVAR should always include:
  - Identification and separation of the etiology treated by TEVAR
  - Classification of the extent/type of aneurysm or dissection
  - The grade of BTAI
  - The aortic zones and length ultimately treated
(Level of recommendation: 1)

Training and Competence

- Low volume centers tend to perform worse than higher volume centers
- Previous SVS position paper stated: A board-certified surgeon and endovascular expert must be involved, 10 hours of CME specifically devoted to endovascular repair of TAA within 2 years. 10+ TEVAR/2 years to maintain an active TEVAR program

We encourage our members to review and suggest accreditation recommendations - now and prior to publication when it is will be open for comments

Training and Competence

TEVAR requires or may require:
  - Excellent understanding of 2D and 3D imaging
  - Advanced endovascular skills
  - Immediate access to open surgical skills
  - Understanding of the very morbid/mortal complications
  - Up-to-date knowledge of new data and devices
Marfan’s syndrome should have annual aortic imaging (more often if ≥ 4.5 cm or rapid growth) (Grade B, Level 1)

Loeys-Dietz, TGFB1R1, TGFB1R2, FBN1, ACTA2, MYH11 should undergo complete aortic imaging (Grade C, Level 1)

Thoracic Aortic Screening

1. 11% - 19% of TAA and TAAD patients have 1st degree relatives with aortic disease

Aortic imaging is recommended for first-degree relatives of patients with TAAD or TAA (Grade 1, Level C)

Imaging of second-degree relatives is suggested if there is a first-degree family member is discovered to have a familial syndrome (Grade 2, Level C)

Indications for repair – PAU

• Natural history is elusive, but PAU may grow 1.2 mm deeper/year and 2 mm in diameter/year

• Pleural effusions, pain, IMH may increase risk of growth and unstable rupture

• Data supporting the treatment for PAU in aortic diameters < 5.5 cm is poorly studied

Indications for repair – PAU

– We recommend TEVAR over open surgical or conservative management for PAU with maximal aortic diameters of 5.5 cm, symptomatic PAU, those with IMH or pleural effusions concerning for contained rupture (Grade 1, Level B)

– We suggest TEVAR over open surgical or conservative management for asymptomatic PAU > 10 mm deep and > 20 mm in diameter (Grade 2, Level C)

BTAI classification and devices are evolving.

Modern TEVAR is superior to open management.

All patients should undergo anti-impulse therapy.

Low-grade injuries can resolve ~6 weeks.

Progression of PSA to rupture is not immediate in most cases.