Endovascular Management of Uncomplicated Type B Aortic Dissection: It's Time to Think Differently?

Han Cheol Lee, MD. PhD
Pusan National University Hospital,
Busan, South Korea
CASE

- 74 years old male
- CC: Chest pain & back pain
- CV risk: HTN (untreated)
- V/S at ER: 220/120 mmHg & 66 bpm
- CT at ER: aortic dissection, stanford type B compromised right renal artery from false lumen
CASE : CT at ER
CASE

- CT at ER: aortic dissection, stanford type B compromised right renal artery from flase lumen

- Lab: Cr 2.0, Hb 14

- Right renal stenting and Medical treatment with labetalol, nitroprusside
CASE : Right Renal Artery Stenting
CASE : Right Renal Artery Stenting
CASE: Right Renal Artery Stenting
CASE : Right Renal Artery Stenting
CASE

: I will show the result at the end.
Who’s a Candidate for TEVAR in Type B AD

STABLE 1 Trial : 2 Year Data

- Prospective multicenter clinical trial on the endovascular treatment of complicated type B aortic dissection
- Acute / Chronic
- 86 pts
- 30 day mortality : 4.7%
- Positive aortic remodelling

STABLE 1 Trial: 2 Year Data

Acute phase Treatment (0-14 days)

- Highest stroke rates
- Retrograde dissection
- Aortic dilatation

Chronic phase Treatment (>14 days)

- No stroke reported
- Positive aortic remodelling

Who’s a Candidate for TEVAR in Type B AD

- Rupture
- Malperfusion
- Aneurysm
- Persistent pain
- Refractory HT
TEVAR in Uncomplicated Type B AD ?

- Induced aortic remodelling after stent graft
TEVAR in Uncomplicated Type B AD?

Short-Term Outcomes in IRAD

Kaplan-Meier Survival Curve
Dissection Type: B

Log Rank Chi-Sq p<0.001 between management types

Survival

Time from Symptom Onset (days)

0 1 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60

0-24 hours (hyperacute)
2-7 days (acute)
8-30 days (subacute)
greater than 30 days (chronic)

Endovascular Management
Medical Management
Surgical Management

IRAD unpublished
TEVAR in Uncomplicated Type B AD? : Long-Term Outcomes in IRAD

Fattori et al, AHA 2010
ADSORB : 1 Year Mortality (GORE TAG)

Uncomplicated Type B AD by TEVAR

ADSORB trial

No need for SG in first 2 weeks of uncomplicated type B dissection
INSTEAD Study
: 2 yr Outcomes of Uncomplicated Type B AD by TEVAR

INSTEAD Study
: 2 yr Outcomes of Uncomplicated Type B AD by TEVAR

Primary endpoint
- All-cause mortality at 2 years

Secondary endpoints
- Thrombosis of False Lumen
- Degree of Aortic Expansion
- Cardiovascular morbidity
- Quality of life
- Length of ICU and hospital stay
- Crossover

INSTEAD Study
: 2 yr Outcomes of Uncomplicated Type B AD by TEVAR

INSTEAD-XR

: 5 yrs Outcomes after TEVAR in Chronic Dissection

Mortality (1st EP)

Overall

HR=0.52 (0.22 - 1.24)
p=0.14

HR=3.96 (0.64 - 18.6)
p=0.082

p(Log-Rank) <0.001

HR=3.45 (0.72 - 16.61)
p=0.122

HR=0.075 (0.01 - 0.577)
p=0.013

p(Log-Rank)=0.09

HR=0.329 (0.12 - 0.91)
p=0.031

Nienaber CA et al Circulation CV Inv 2013
INSTEAD-XR
: 5 yrs Outcomes after TEVAR in Chronic Dissection

CV death (2nd EP)

Nienaber CA et al Circulation CV Inv 2013
Uncomplicated type B dissection is not stable and medical management is not safe

Isolation of the false lumen leads to remodeling

Successful remodeling (usually completed after 2 years) ensures long-term stability

Preemptive TEVAR in initially uncomplicated type B dissection enables remodeling and is a therapeutic option.
Is Uncomplicated Type B AD a Candidate for TEVAR?

- **INSTEAD 2 Yr**: Random Study → Fail
- **ADSORB 1 Yr**: Random Study → Fail

- **INSTEAD-XL**: Extended Study of Follow up
- **IRAD-LT**: Extended Study of Follow up

Registry Data

→ Favorable Results, Good aortic remodelling
Risk for Late Reoperation in Type B AD

- **Aorta > 4cm**
  Onitsuka, et al. ATS 2004 (Japan)
  Winnerkvist, et al. EurJEVS 2006 (Sweden)

- **False Lumen > 22mm**
  Song, et al. JACC 2007

- **Partially Thrombosed False Lumen**
  Tsai, et al. NEJM 2007
Is Uncomplicated Type B AD a Candidate for TEVAR? : Unsolved Problem

- Intima tear site is usually near left subclavian artery.
Is Uncomplicated Type B AD a Candidate for TEVAR? : Unsolved Problem

- Birdbeak → Retrograde aortic dissection
Is Uncomplicated Type B AD a Candidate for TEVAR? 
: Unsolved Problem

➢ Birdbeak ➔ Retrograde AD
Is Uncomplicated Type B AD a Candidate for TEVAR? Unsolved Problem

- Paraplesia

- Stroke

*Especially sacrifice of left SCA*

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Conventional</th>
<th>Stent</th>
<th>( p ) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length of intervention (min)</td>
<td>320 ± 94</td>
<td>150 ± 28</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Mean length of intensive care unit stay (days)</td>
<td>13 ± 15</td>
<td>4 ± 2</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Mean hospital stay (days)</td>
<td>10 ± 3</td>
<td>6 ± 1</td>
<td>&lt; 0.05</td>
</tr>
<tr>
<td>Spinal cord injury (%)</td>
<td>12</td>
<td>0</td>
<td>NS</td>
</tr>
<tr>
<td>Operative mortality (%)</td>
<td>31</td>
<td>10</td>
<td>NS</td>
</tr>
</tbody>
</table>

*Values are mean ± standard deviation.
NS = not significant.*
Is Uncomplicated Type B AD a Candidate for TEVAR?

: Unsolved Problem

- Stent graft migration, Stent fracture, Fabric tear during long term follow up

Benedikt et al Curr Prob Diag Rad 2004 Dec
SUMMARY

- No well designed randomized study
- No long term data more than 10 years
- Birdbeak appearance of stent graft: retrograde AD
- Good remodeling of aorta
Are We going to Endovascular Management of Uncomplicated Type B Aortic Dissection?

It is too early to do TEVAR in all cases.

But, we can extend TEVAR indication in uncomplicated type B AD near future.
SUMMARY

- Acute complicated distal dissections: TEVAR
- Acute high-risk uncomplicated: Consider delayed TEVAR
- Acute low-risk uncomplicated: medical
- Chronic with aneurysmal change: TEVAR
CASE : Admission day #5

- V/S : 183/81 mmHg & 56 bpm

- Numbness and Pulse deficits at lower extrimities
Follow up CT (day 5)
Aortic Stent Graft for Malperfusion
Aortic Stent Graft for Malperfusion
Check Left Vertebral Artery
Aortic Stent Graft for Malperfusion
Aortic Stent Graft for Malperfusion
Aortic Stent Graft for Malperfusion
Aortic Stent Graft for Malperfusion
Aortic Stent Graft for Malperfusion
Aortic Stent Graft for Malperfusion
Aortic Stent Graft for Malperfusion
Right Iliac Stenting for Malperfusion
Aortic Stent Graft for Malperfusion
Right Iliac Stenting for Malperfusion
Right Iliac Stenting for Malperfusion
Chimney Aortic Stent Graft with Renal, Iliac Artery Stenting for Malperfusion Syndrome
**Endovascular Treatment for complicated type B aortic dissection with malperfusion syndrome**

: Pusan National University Data

<table>
<thead>
<tr>
<th>Table 1. Clinical outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient No.</strong></td>
</tr>
<tr>
<td><strong>Male Gender</strong></td>
</tr>
<tr>
<td><strong>Mean age</strong></td>
</tr>
<tr>
<td><strong>Technical success</strong></td>
</tr>
<tr>
<td><strong>Mortality</strong></td>
</tr>
<tr>
<td><strong>Neurologic complication</strong></td>
</tr>
<tr>
<td><strong>Procedure related complication</strong></td>
</tr>
<tr>
<td><strong>Aortic dissection type</strong></td>
</tr>
<tr>
<td>AD type A</td>
</tr>
<tr>
<td>AD type B</td>
</tr>
<tr>
<td>Intramural hematoma, type B</td>
</tr>
<tr>
<td><strong>Treating lesion (N=19)</strong></td>
</tr>
<tr>
<td>Celiac artery stenting</td>
</tr>
<tr>
<td>Renal artery stenting</td>
</tr>
<tr>
<td>Iliac artery stenting</td>
</tr>
<tr>
<td>Common carotid artery stenting</td>
</tr>
<tr>
<td>Left subclavian artery stenting</td>
</tr>
<tr>
<td>Distal abdominal aorta stenting</td>
</tr>
</tbody>
</table>

**Malperfusion syndrome involved in**
- celiac artery 4
- superior mesenteric artery 1
- renal artery 6
- iliac artery 6
- common carotid artery 2
- left subclavian artery 1

**Management**
- **aortic stent graft 7**
- **selective stenting 19 arteries**
- fenestration 1

Technical success : 100%(15/15).
Mortality rate : 6.6%(1/15)
Follow up duration: 17.2 (0.4-37.7 mon)
Endovascular Treatment in Ruptured Type B AD:

Pusan National University Data

<table>
<thead>
<tr>
<th>Clinical outcomes for Ruptured aortic dissection, n=7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical success</td>
</tr>
<tr>
<td>Cumulative events</td>
</tr>
<tr>
<td>Death</td>
</tr>
<tr>
<td>Aorta related death</td>
</tr>
<tr>
<td>Secondary intervention</td>
</tr>
<tr>
<td>Major stroke/Paraplesia</td>
</tr>
<tr>
<td>Secondary endoleak</td>
</tr>
</tbody>
</table>
Thank you for your attention