Management Decisions in Type B Dissection: Medical, Endovascular and Surgical Timing

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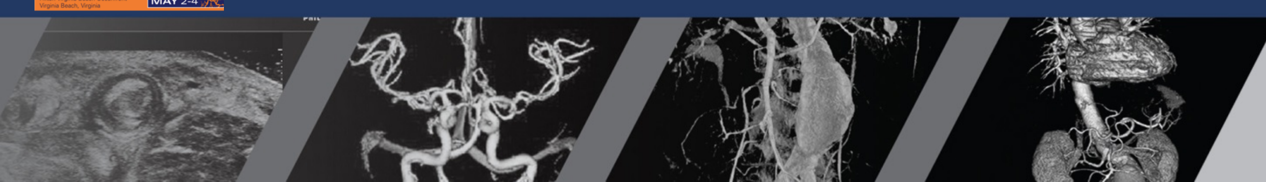
Disclosures

Consultant: Cook Medical, Getinge, Medtronic Inc, Terumo Aortic, Philips Volcano, WL Gore
Speakers' Bureau: Medtronic Inc., Terumo Aortic, WL Gore
Advisory Board: Medtronic Inc., Mellon Medical



Objectives

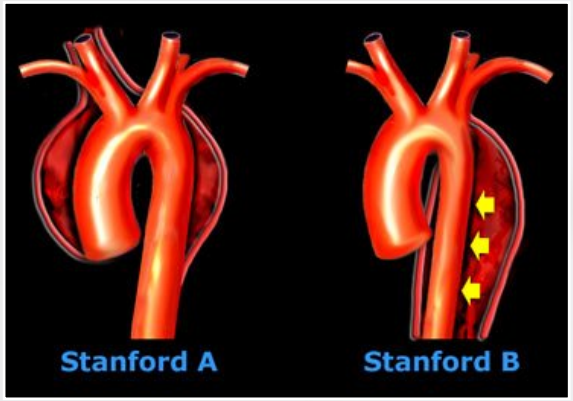
1. To illustrate the management decisions in type B dissection with Case Studies
2. To discuss the timing for endovascular or surgical interventions

What we need to know to decide what to do

Aortic Dissections are Classified by:

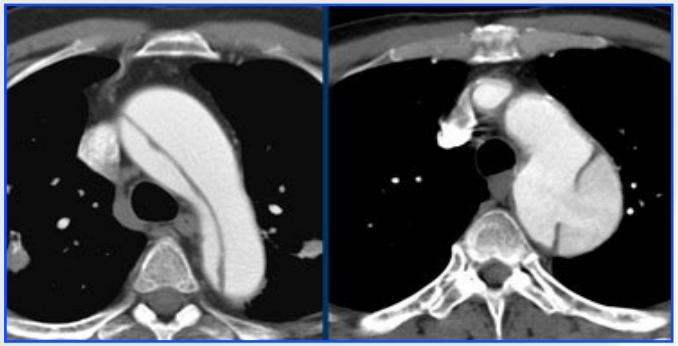
Aortic Segment Involvement

- **Type A:** Ascending aorta involvement
- **Type B:** Ascending not involved



Duration from Clinical Onset

- **Acute:** Within first 14 days
- **SubAcute:** Between 14 days and 3 months
- **Chronic:** Greater than 3 months



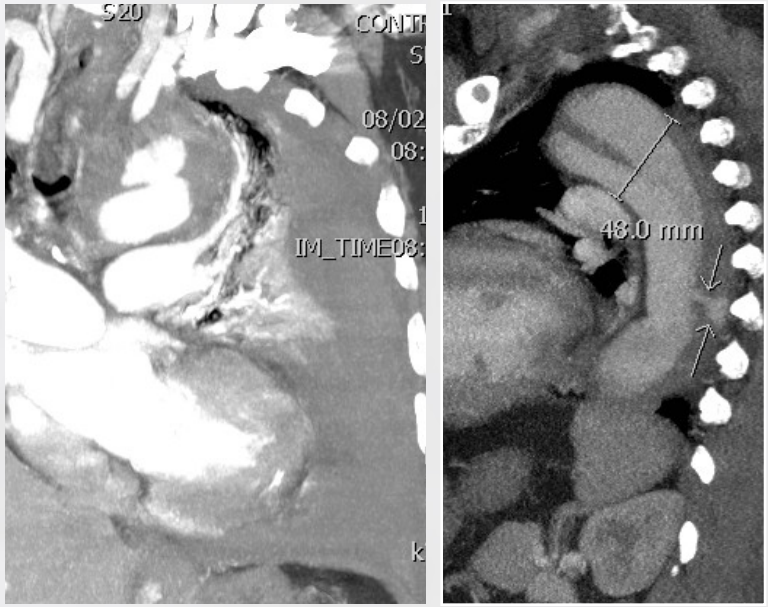
Ascending & Arch **Only the DTA**

Complications (yes/no)

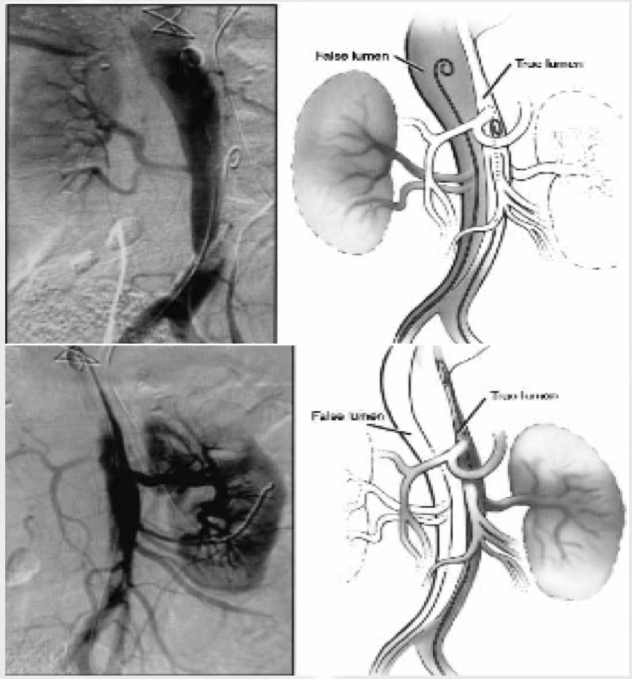
- **Uncomplicated**
- **Complicated**

What is a complicated TBAD ?

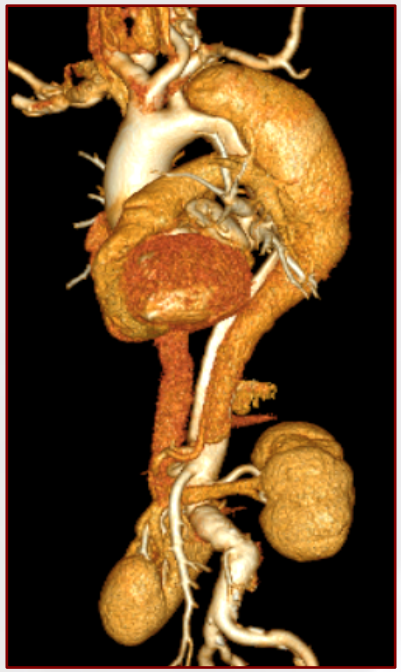
Aortic Rupture



Malperfusion



Aortic Aneurysms



Panneton JM et al, J Vasc Surg 2000;32:711-21

Management Decision for Uncomplicated Acute Type B

52 years old female patient with a history of hypertension
Presenting to the ED with severe acute back and abdominal pain

IMH of proximal thoracic aorta
TBAD of distal DTA & Abdominal
No malperfusion
Maximum diameter < 30mm

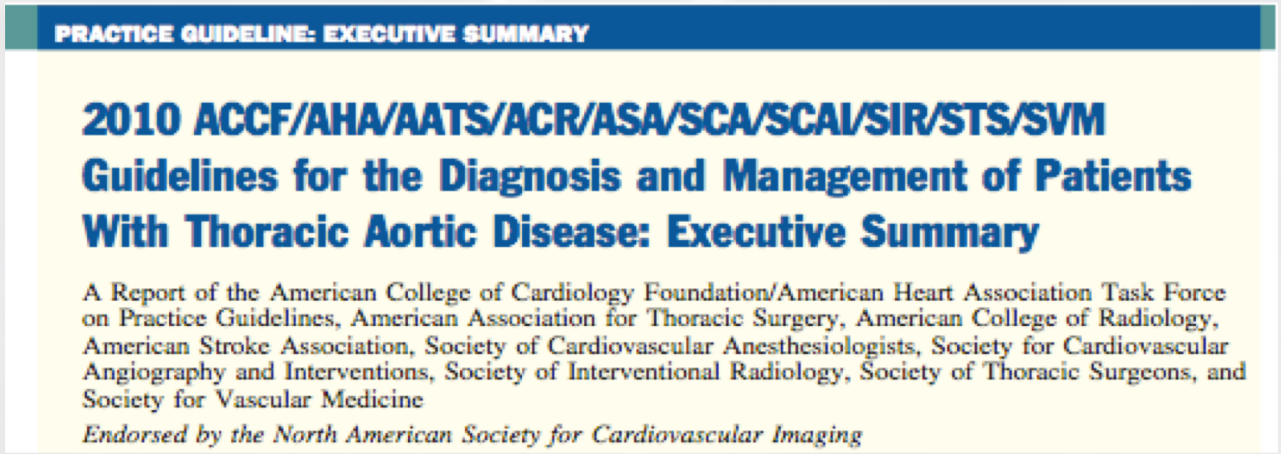
No indication for intervention

Medical Therapy

Uneventful hospital stay

Return in 1 & 3 months with repeat CTAs

Management Decision for Uncomplicated Acute Type B



PRACTICE GUIDELINE: EXECUTIVE SUMMARY

2010 ACCF/AHA/AATS/ACR/ASA/SCA/SCAI/SIR/STS/SVM Guidelines for the Diagnosis and Management of Patients With Thoracic Aortic Disease: Executive Summary

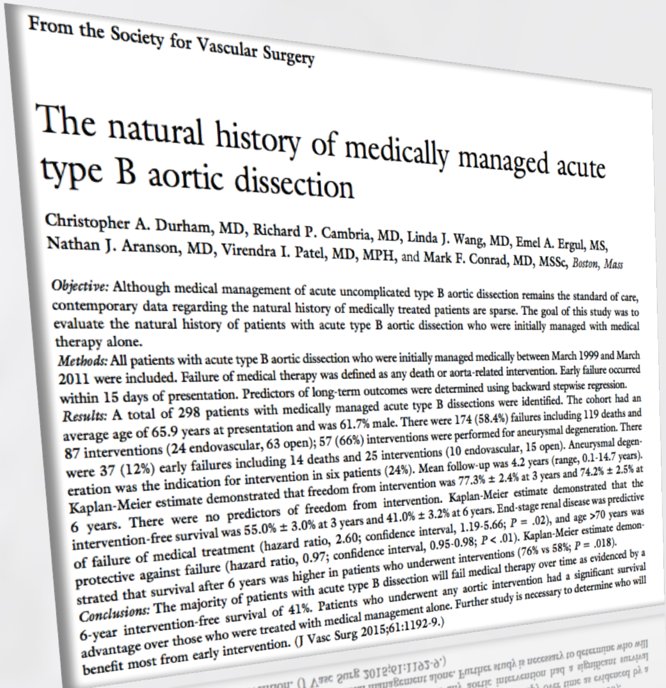
A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines, American Association for Thoracic Surgery, American College of Radiology, American Stroke Association, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society of Interventional Radiology, Society of Thoracic Surgeons, and Society for Vascular Medicine

Endorsed by the North American Society for Cardiovascular Imaging

1. Lower Blood Pressure
2. Reduce the left ventricle ejection force (dP/dt)
3. Transfer to Aortic Center

Does medical management work ?

Does medical management work ?


From the Society for Vascular Surgery

The natural history of medically managed acute type B aortic dissection

Christopher A. Durham, MD, Richard P. Cambria, MD, Linda J. Wang, MD, Emel A. Ergul, MS, Nathan J. Aranson, MD, Virendra I. Patel, MD, MPH, and Mark F. Conrad, MD, MSSc, *Boston, Mass*

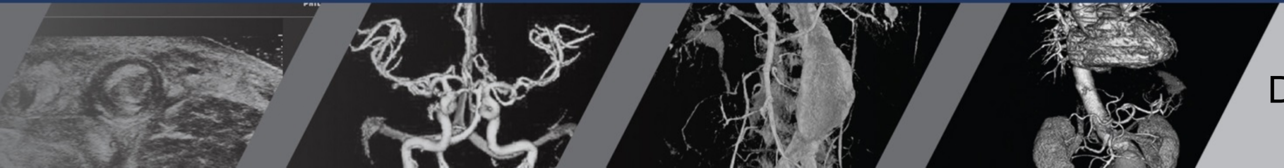
Objective: Although medical management of acute uncomplicated type B aortic dissection remains the standard of care, contemporary data regarding the natural history of medically treated patients are sparse. The goal of this study was to evaluate the natural history of patients with acute type B aortic dissection who were initially managed with medical therapy alone.
Methods: All patients with acute type B aortic dissection who were initially managed medically between March 1999 and March 2011 were included. Failure of medical therapy was defined as any death or aorta-related intervention. Early failure occurred within 15 days of presentation. Predictors of long-term outcomes were determined using backward stepwise regression. The cohort had an
Results: A total of 298 patients with medically managed acute type B dissections were identified. The cohort had an average age of 65.9 years at presentation and was 61.7% male. There were 174 (58.4%) failures including 119 deaths and 87 interventions (24 endovascular, 63 open); 57 (66%) interventions were performed for aneurysmal degeneration. There were 37 (12%) early failures including 14 deaths and 25 interventions (10 endovascular, 15 open). Aneurysmal degeneration was the indication for intervention in six patients (24%). Mean follow-up was 4.2 years (range, 0.1-14.7 years). Kaplan-Meier estimate demonstrated that freedom from intervention was 77.3% ± 2.4% at 3 years and 74.2% ± 2.5% at 6 years. There were no predictors of freedom from intervention. Kaplan-Meier estimate demonstrated that the intervention-free survival was 55.0% ± 3.0% at 3 years and 41.0% ± 3.2% at 6 years. End-stage renal disease was predictive of failure of medical treatment (hazard ratio, 2.60; confidence interval, 1.19-5.66; $P = .02$), and age >70 years was protective against failure (hazard ratio, 0.97; confidence interval, 0.95-0.98; $P < .01$). Kaplan-Meier estimate demonstrated that survival after 6 years was higher in patients who underwent interventions (76% vs 58%; $P = .018$).
Conclusions: The majority of patients with acute type B dissection will fail medical therapy over time as evidenced by a 6-year intervention-free survival of 41%. Patients who underwent any aortic intervention had a significant survival advantage over those who were treated with medical management alone. Further study is necessary to determine who will benefit most from early intervention. (J Vasc Surg 2015;61:1192-9.)

<u>Mass General Hospital, Boston: 1999 – 2011</u>

- Acute TBAD patients, <14d from symptoms
- Initial plan of Medical Management alone
- Failure of Med Therapy
  - Death
  - Dissection complication requiring intervention

<u>During 12-year study period</u>

- 826 patients presented with symptoms of AAS
- 451 (55%) Type A's excluded
- 77 (9%) acute complicated TBAD excluded
- **298 patients with aTBAD initially treated with Medical Therapy alone**



Durham, et al. J Vasc Surg 2015;1-8.

Does medical management work ?

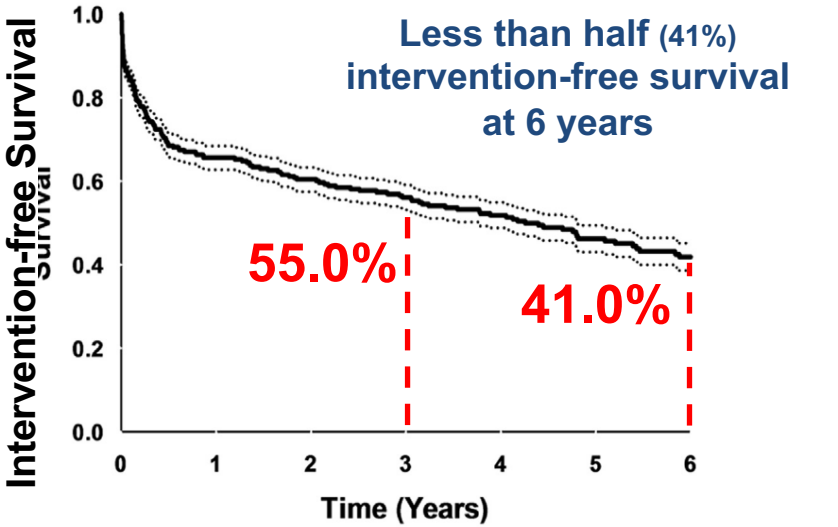
Mean Follow-up of 4.3 ± 3.5 years

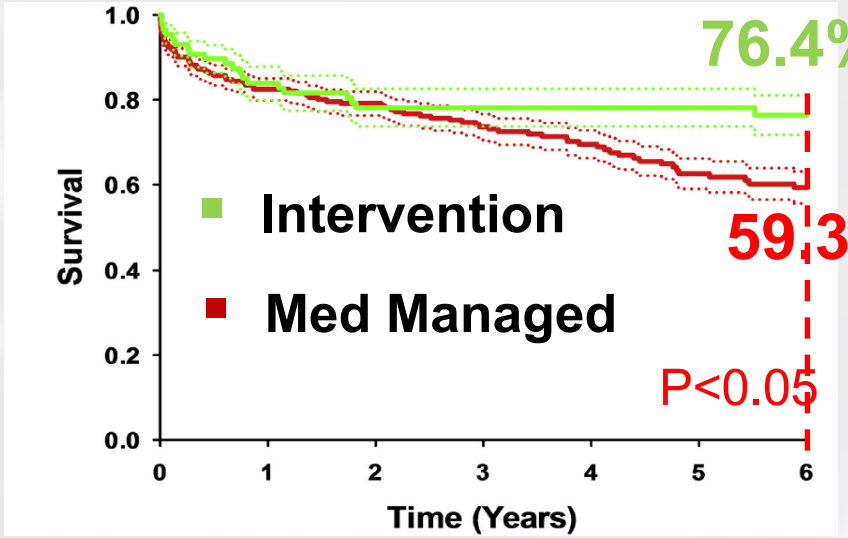
Failure of Med Therapy in 174 pts (58.4%)

87 (29.2%) aorta-related reinterventions

119 (38.3%) deaths

*Those who ultimately required intervention **had significant survival advantage***



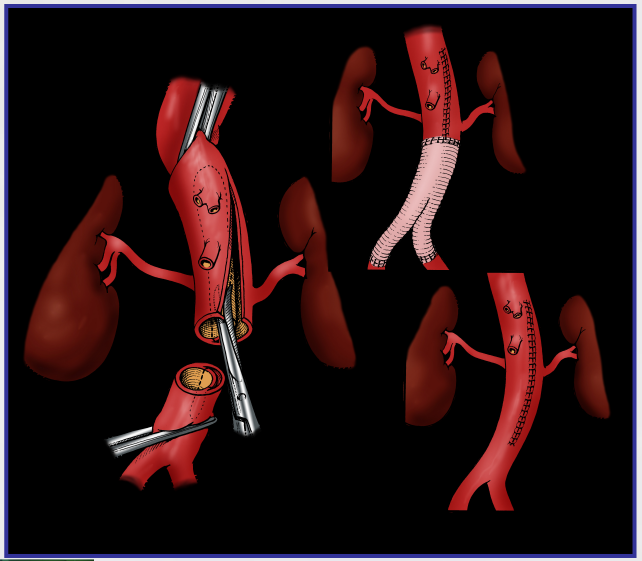


Durham, et al. J Vasc Surg 2015;1-8.

If medical management fails in the majority of patients, then what procedure should you do?

Open Treatment

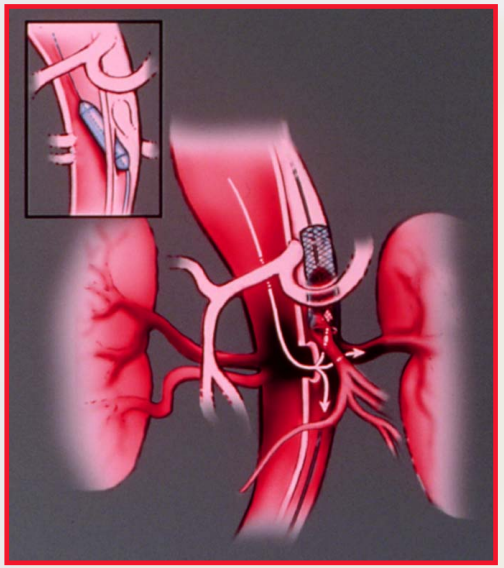
Graft replacement
Extra anatomic bypass
Open fenestration



Endovascular Treatment

Aorta

TEVAR
Fenestration
Stenting

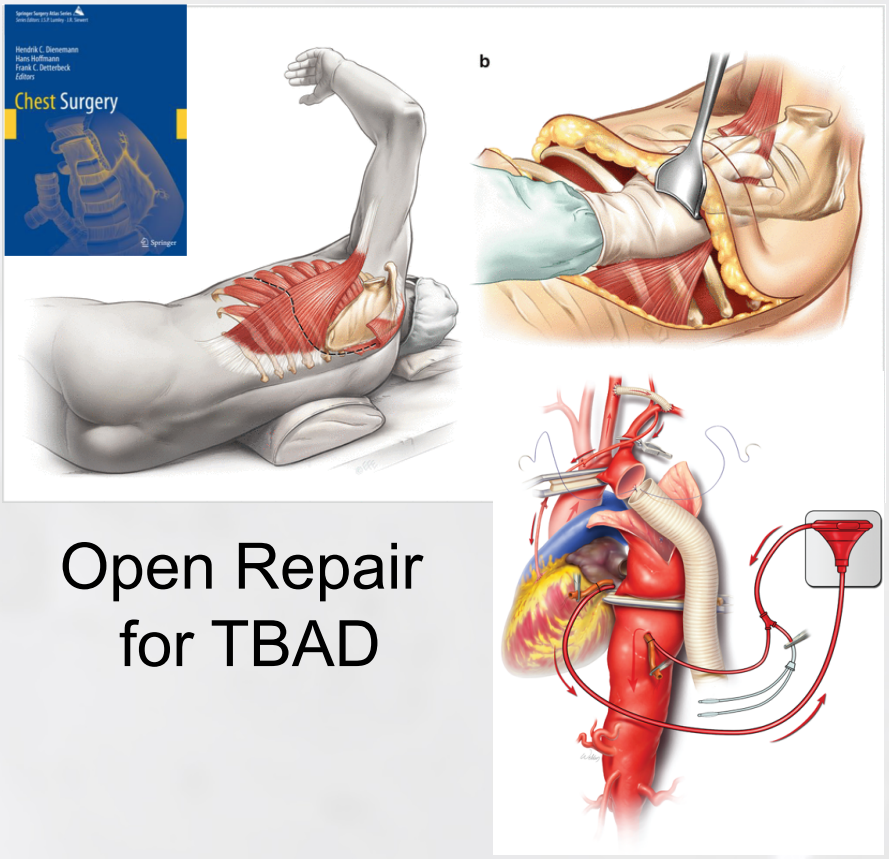


Branch Vessel

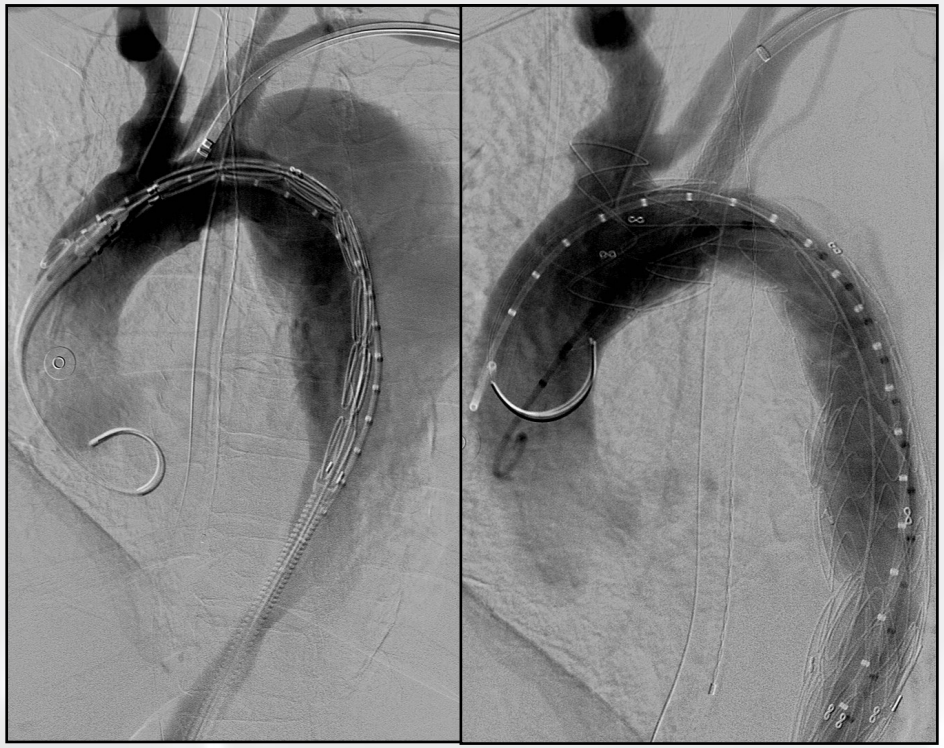
Branch Stenting
Balloon Fenestration

Panneton JM et al J Vasc Surg 2000;32:711-21

Open repair vs TEVAR ?



Open Repair for TBAD



TEVAR for ruptured acute TBAD

Open repair vs TEVAR ?

Thoracic endovascular aortic repair for acute complicated type B aortic dissection: Superiority relative to conventional open surgical and medical therapy

Ahmad Zeeshan, MBBS,[a] Edward Y. Woo, MD,[b] Joseph E. Bavaria, MD,[a] Ronald M. Fairman, MD,[b] Nimesh D. Desai, MD,[a] Alberto Pochettino, MD,[a] and Wilson Y. Szeto, MD[a]

77 patients with complicated acute type B aortic dissection, 45 patients underwent TEVAR (group A) and 32 patients underwent conventional surgical and medical therapies (group B)

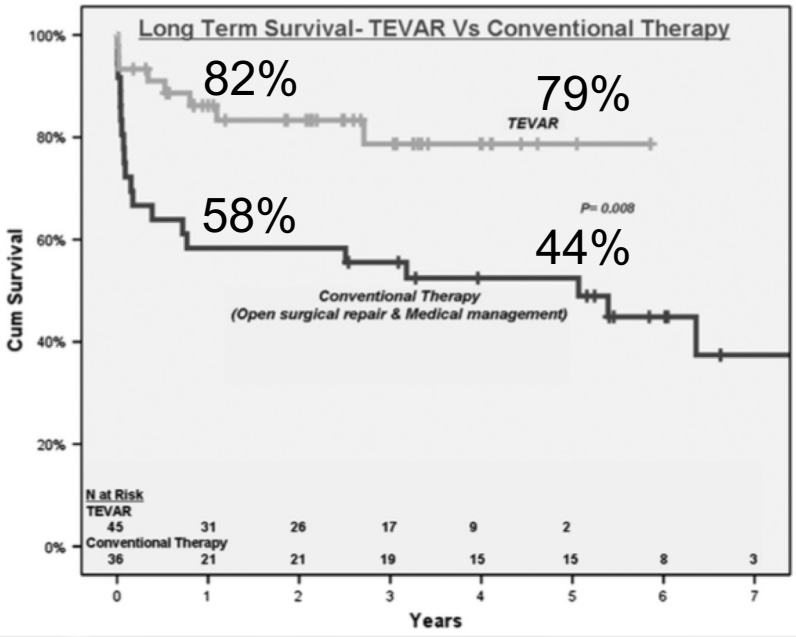


TABLE 2. Mortality, hospital stay, and postoperative complications after thoracic endovascular aortic repair and conventional treatment

	Group A	Group B		
	TEVAR	Open surgical repair	Medical management	*P* value*
Mortality and hospital stay				
Mortality at 30 d	2 (4%)	8 (40%)	4 (33%)	.006

TEVAR offers an early and late survival advantage over open repair in patients with acute complicated TBAD

Thorac Cardiovasc Surg 2010;140:S109-15

Open repair vs TEVAR ?

Interdisciplinary Expert Consensus Document on Management of Type B Aortic Dissection

Rossella Fattori, MD,* Piergiorgio Cao, MD,† Paola De Rango, MD,‡ Martin Czerny, MD,§ Arturo Evangelista, MD,‖ Christoph Nienaber, MD,¶ Hervé Rousseau, MD,# Marc Schepens, MD**

Pesaro, Rome, and Perugia, Italy; Berne, Switzerland; Barcelona, Spain; Rostock, Germany; Toulouse, France; and Brugge, Belgium

Table 3 Result Summary for Open Surgery in Type B Aortic Dissection*

Author and Year (Ref. #)	n	Pathology	Early Mortality n (%)	Early CVA n (%)	Early SCI n (%)	Mean Follow-Up (months)	Survival Rate (%)	Aortic Event Freedom Rate (%)
Case series								
Estrera 2007 (11)	23	Acute complicated	4 (17.4)	NA	NA	20 (0–67)	NA	NA
Bozinovski 2008 (64)	76	Acute complicated	17 (22.4)	5 (6.6)	5 (6.6)	NA	NA	NA
Shimokawa 2008 (65)	24	Acute complicated	2 (8.3)	NA (0)	1 (4.2)	28.1 ± 14.8 (10.3–68.1)	5 yrs (82.6)	Reintervention, aortic death free: 1 yr (95.2) 5 yrs (68.0)
Zeeshan 2010 (47)	20	Acute complicated	8 (40)	0	2 (10.0)	37 (	1 yr (58.0)	NA
Murashita 2012 (66)	31	Acute complicated	6 (19.4)	2 (6.5)	2 (6.5)			
Registries								
Trimarchi, IRAD 2006 (22)	82	Acute complicated	24 (29.3)	8 (9.8)	4 (4.9)			
Administrative†								
Brunt NIS† 2011 (27)	991	Acute emergent	173 (17.5)	61 (6.2)	25 (2.5)			
Brunt NIS† 2011 (27)	282	Acute elective	16 (5.6)	5 (1.8)	0			
Cumulative acute		1,529		17.5%	5.9%			
Chronic dissection								

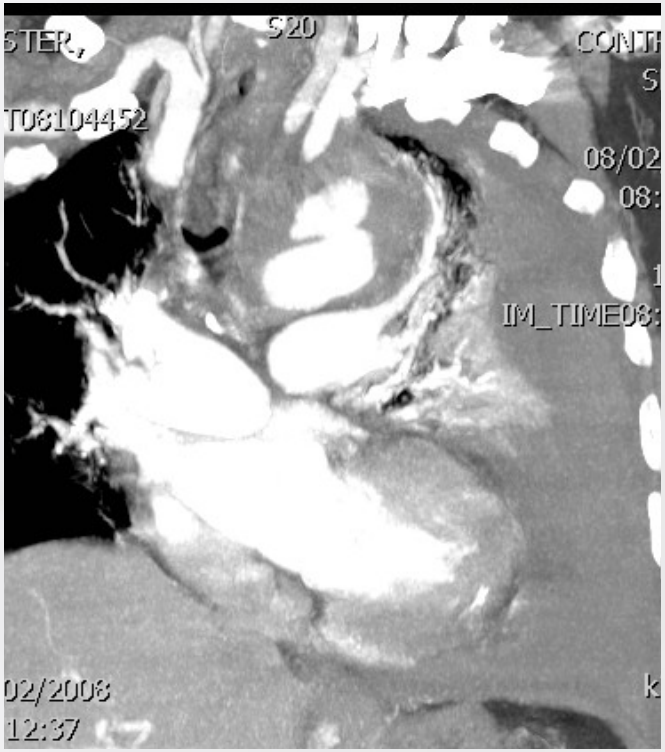
Early mortality

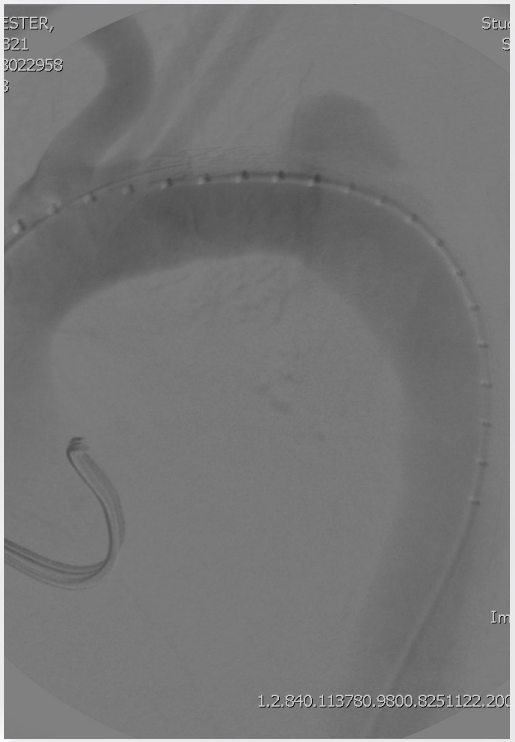
- Open: 17.5%
- TEVAR: 10%

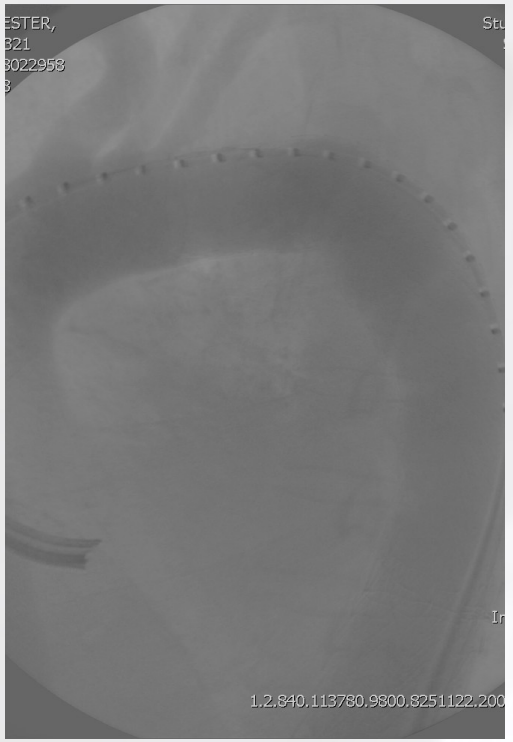
J Am Coll Cardiol 2013; 61:1661-78

When should you do decide to do a TEVAR for Acute TBAD?

Aortic rupture treated with TEVAR

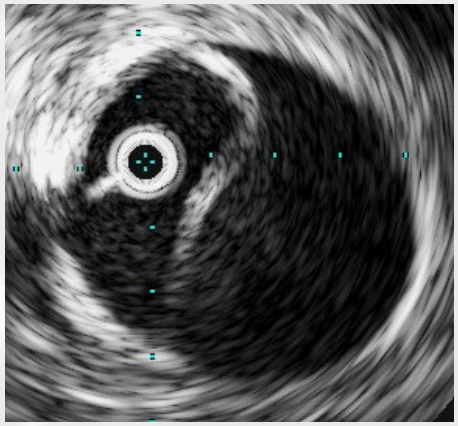


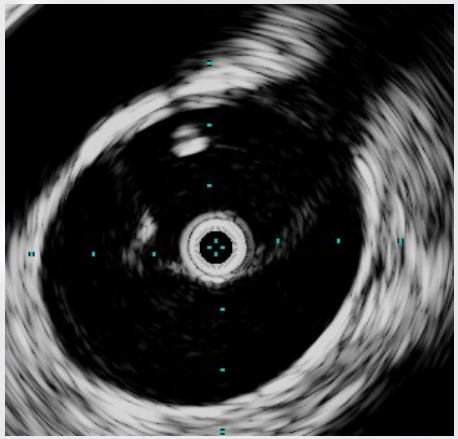




When should you do decide to do a TEVAR for Acute TBAD?

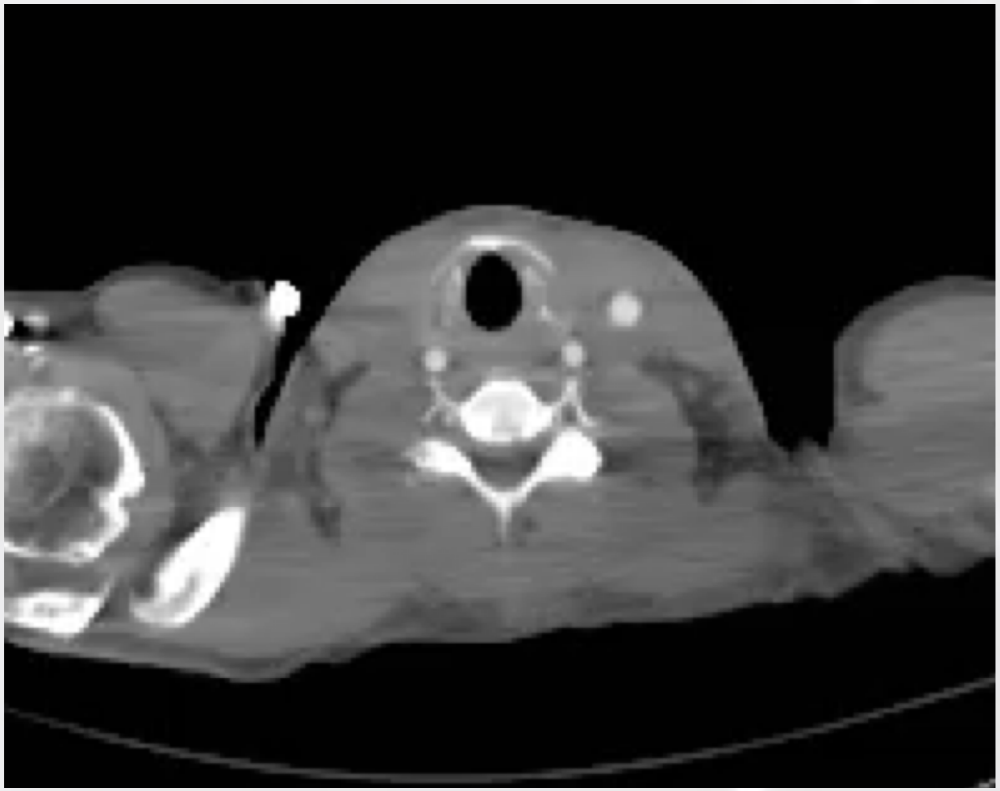
Acute TBAD with visceral and spinal cord malperfusion from compressed true lumen

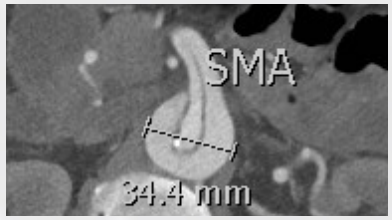


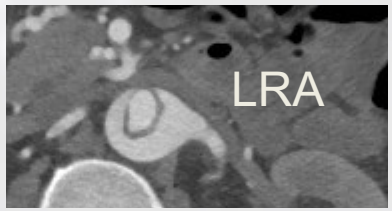


How to treat acute dissection with malperfusion

Subacute TAAD after ascending replacement and TEVAR done in Portland, presenting with recurrent pain and visceral & renal malperfusion

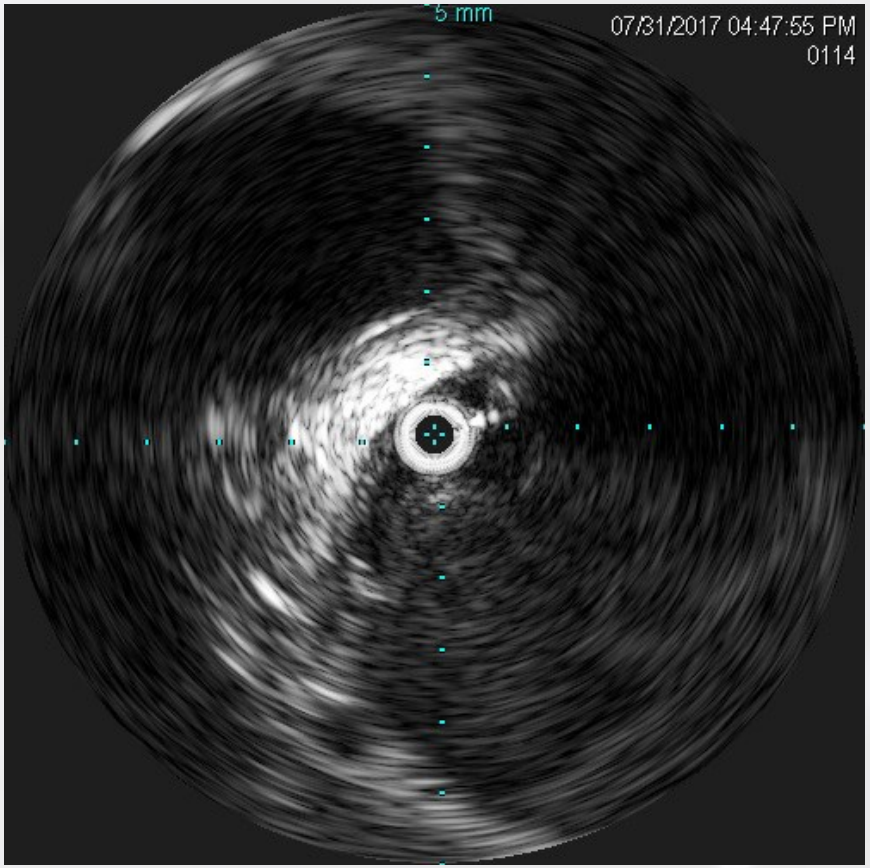




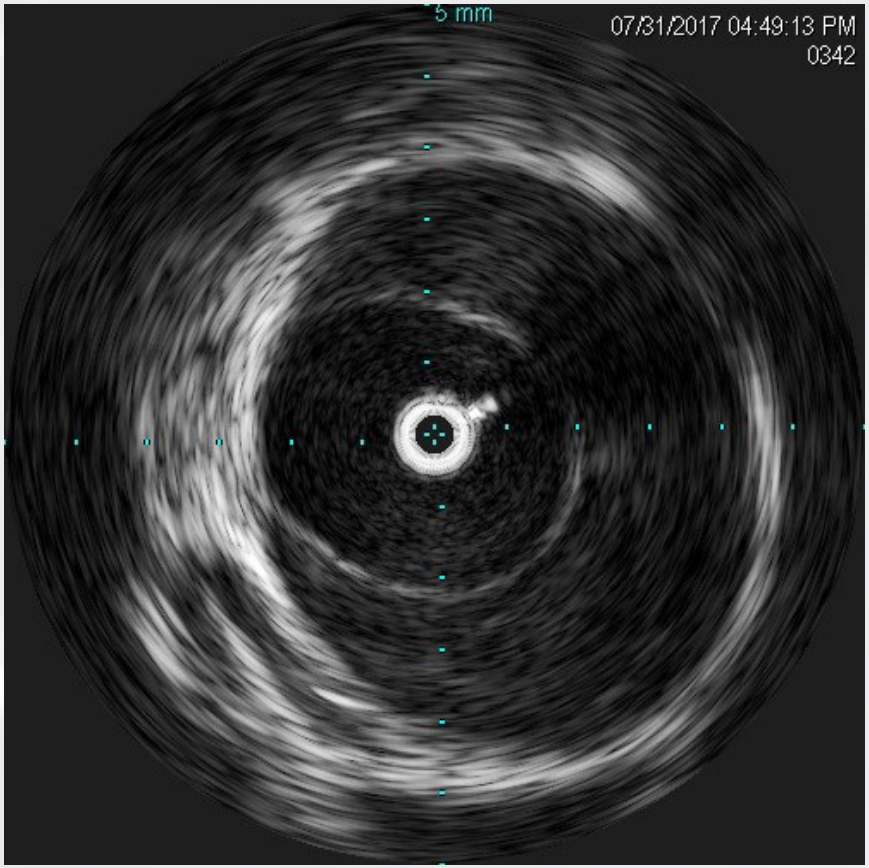


How to treat acute dissection with malperfusion

IVUS before redo TEVAR:
compressed true lumen



IVUS after redo TEVAR:
pressurized & expanded true lumen



How to treat acute dissection with malperfusion

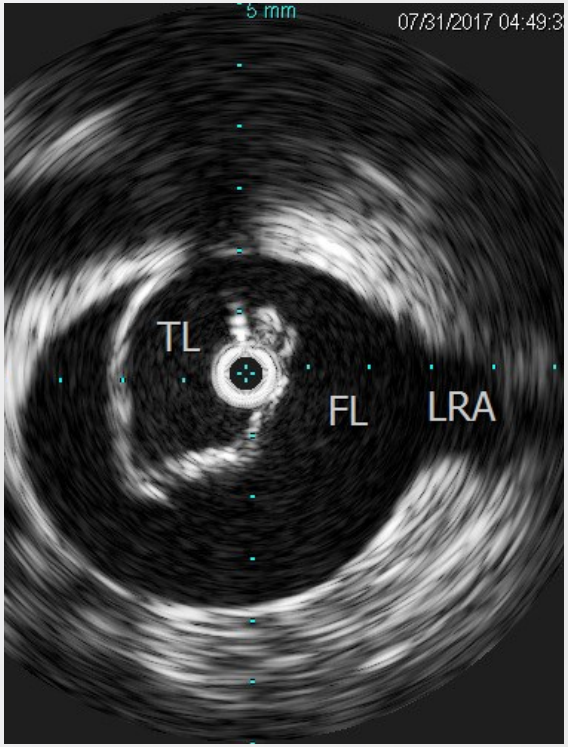
After distal TEVAR extension
Minimal visceral perfusion

Restoring visceral perfusion with endovascular treatment
Celiac stenting

SMA stenting

How to treat acute dissection with malperfusion

Absent left kidney perfusion with IVUS showing LRA from false lumen

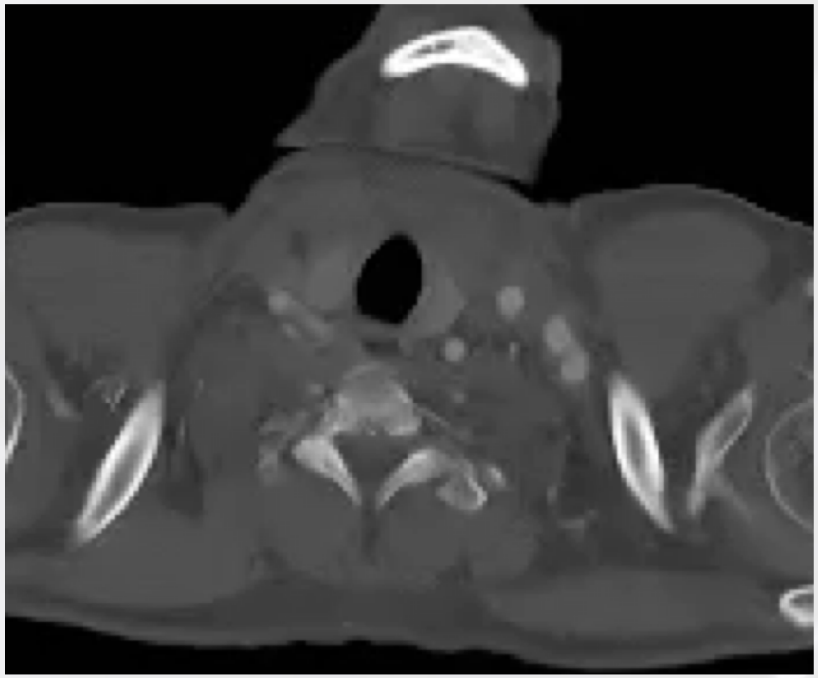


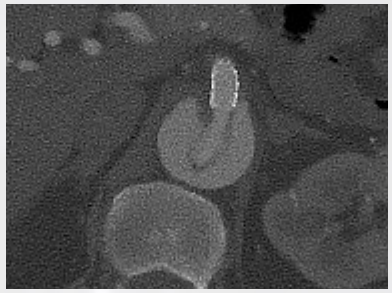
Left Renal stenting

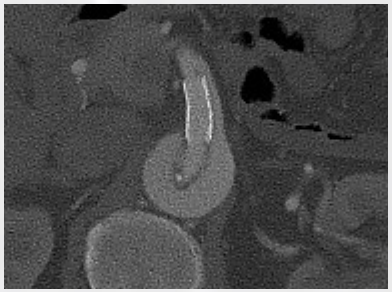
Completion angiogram

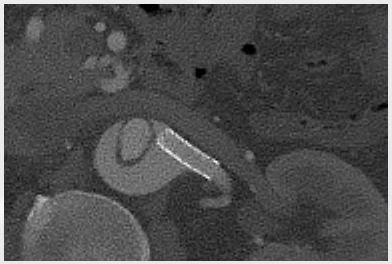
How to treat acute dissection with malperfusion

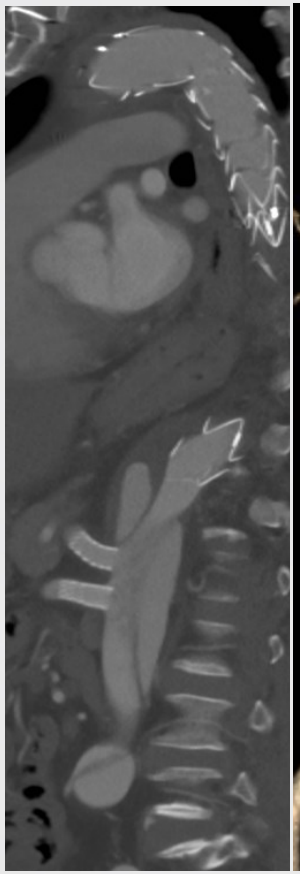
CTA @ 3 months showing excellent thoracic aortic remodeling and visceral and renal perfusion



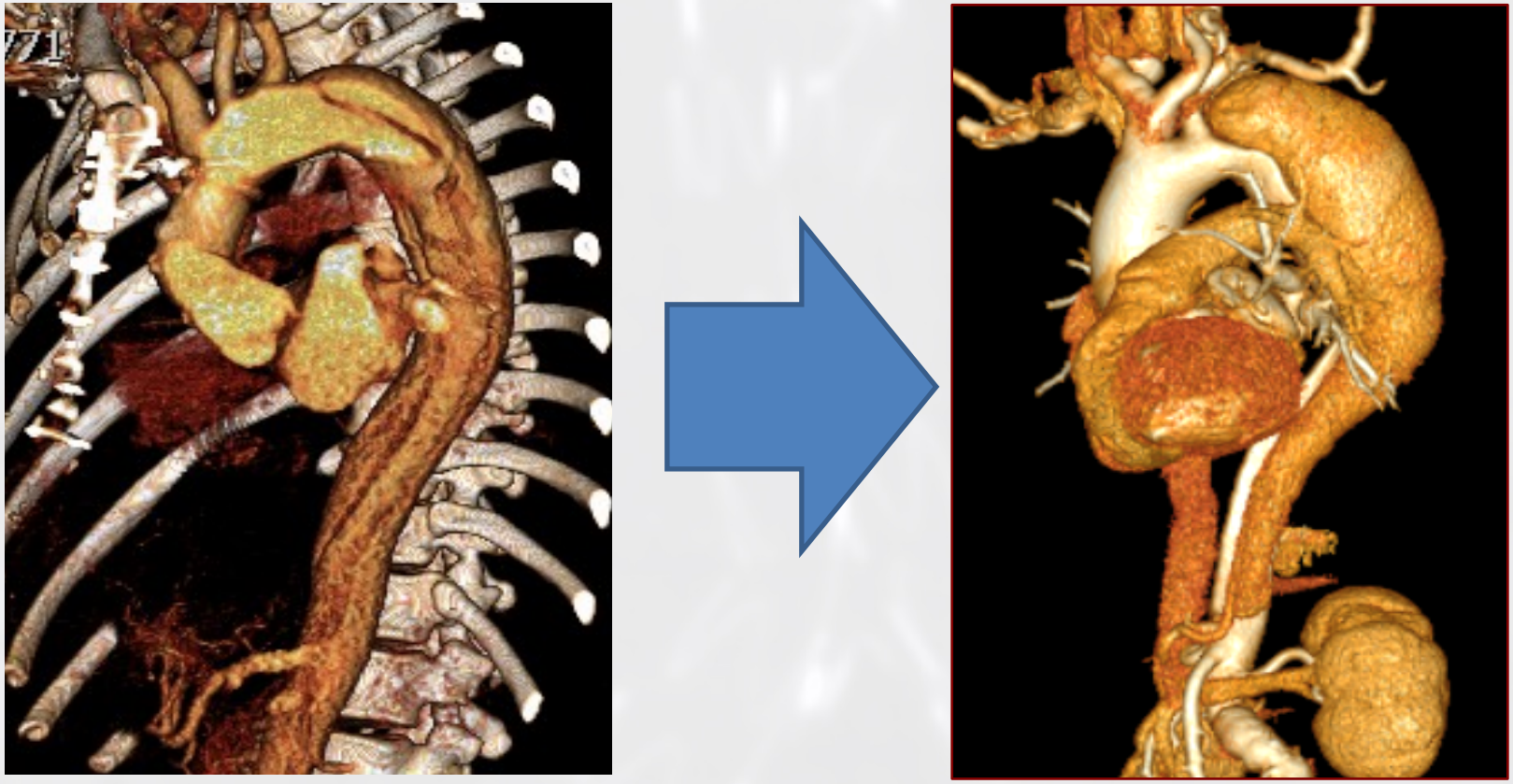








Why should you decide to do a TEVAR in uncomplicated dissection



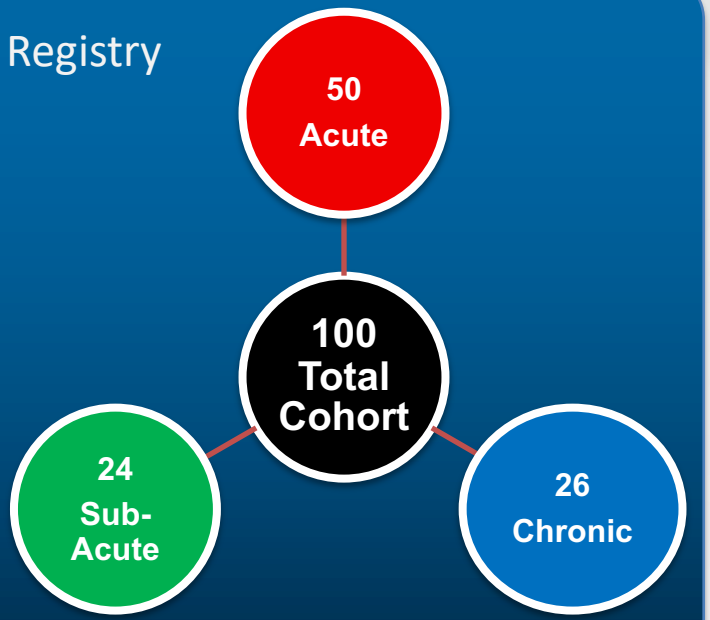
Aortic dissection evolves into thoracoabdominal aneurysms

When should you do decide to do a TEVAR for Uncomplicated Acute TBAD?

VIRTUE REGISTRY

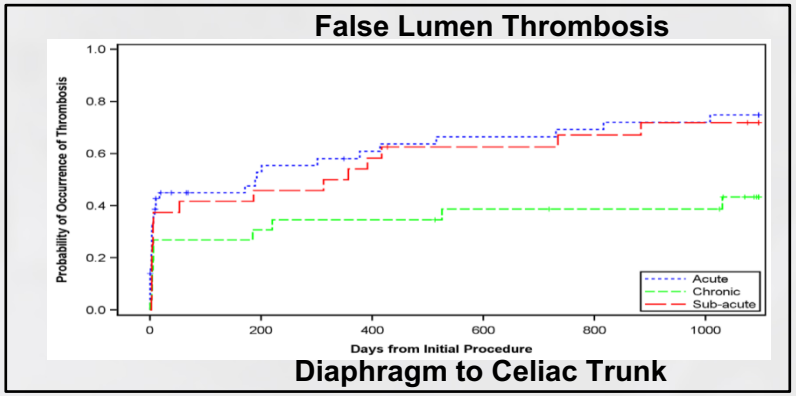
Characterizing Temporal Outcomes in TEVAR for TBAD

- Prospective, single-arm, multi-center European Registry
- N = 100 subjects. 3 year follow-up
- Outcomes based on duration of dissection
  - Acute: <15 days from first dissection
  - Sub-acute: 15 – 92 days
  - Chronic: >92 days
- Inform on clinical and morphological outcomes
- 1° Endpoint: All-cause mortality at 12 months



VIRTUE REGISTRY- 3-YEAR MID-TERM KEY RESULTS

3-Year Outcomes	Acute (n=50)	Sub-Acute (n=24)	Chronic (n=26)
Deaths	**18.0%** (9)	**4.2%** (1)	**23.1%** (6)
RTAD	**4.0%** (2)	**0.0%**	**0.0%**
FF All-Cause Mortality	**81.7%**	**95.8%**	**75.7%**
FF Secondary Procedures	**71.7%**	**68.8%**	**57.2%**



- Chronic clinical group had significantly lower false lumen thrombosis vs. sub-acute or acute groups (p=0.035)

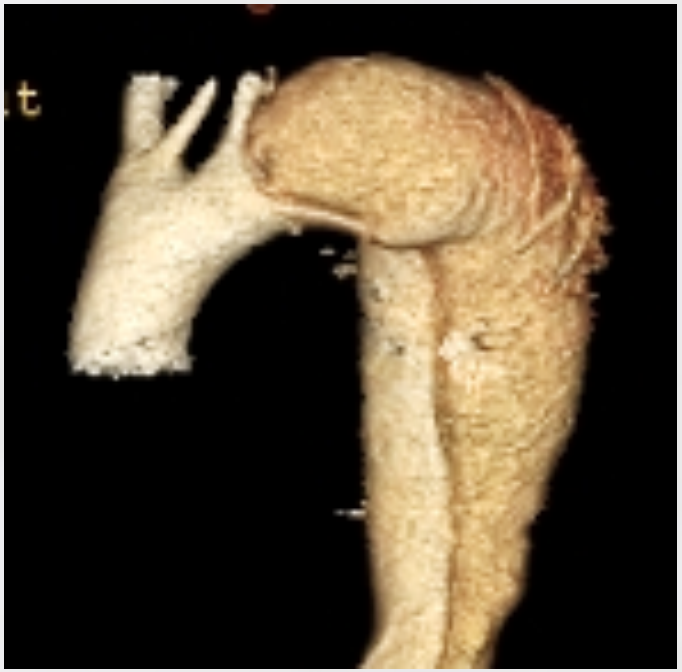
When should you do decide to do a TEVAR for Uncomplicated Acute TBAD?

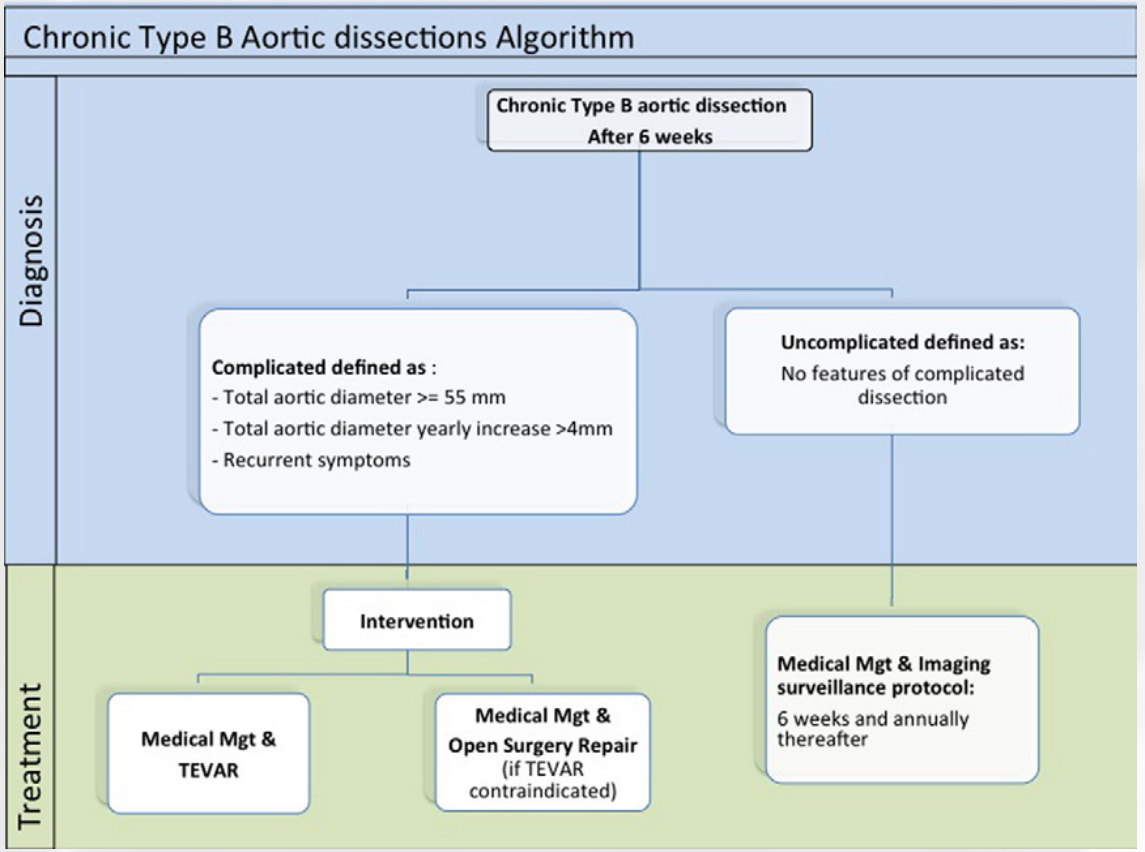
VIRTUE REGISTRY: Conclusions

- **Mid-term analysis demonstrated patients with sub-acute dissections showed aortic remodeling analogous to acute group**
- **Retention of aortic plasticity in sub-acute group lengthens therapeutic window for treatment of TBAD (15 – 92 days)**

When should you do decide to do a TEVAR for Chronic TBAD?

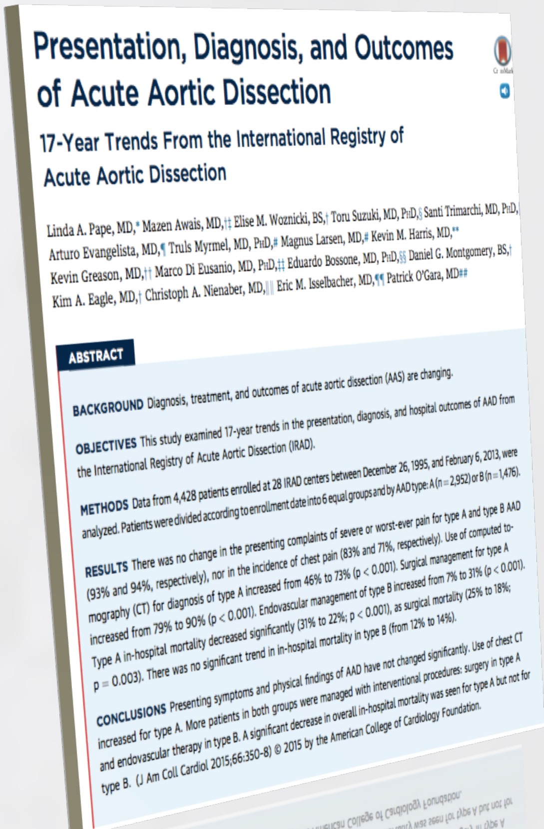
TAD is 55 mm or greater
TAD is increasing by > 4 mm





JACC 2013 Apr 23;61(16): 1661-78

Recent trends in Management Decisions



Presentation, Diagnosis, and Outcomes of Acute Aortic Dissection

17-Year Trends From the International Registry of Acute Aortic Dissection

Linda A. Pape, MD,* Mazen Awais, MD,†‡ Elise M. Woznicki, BS,† Toru Suzuki, MD, PhD,§ Santi Trimarchi, MD, PhD,
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ABSTRACT

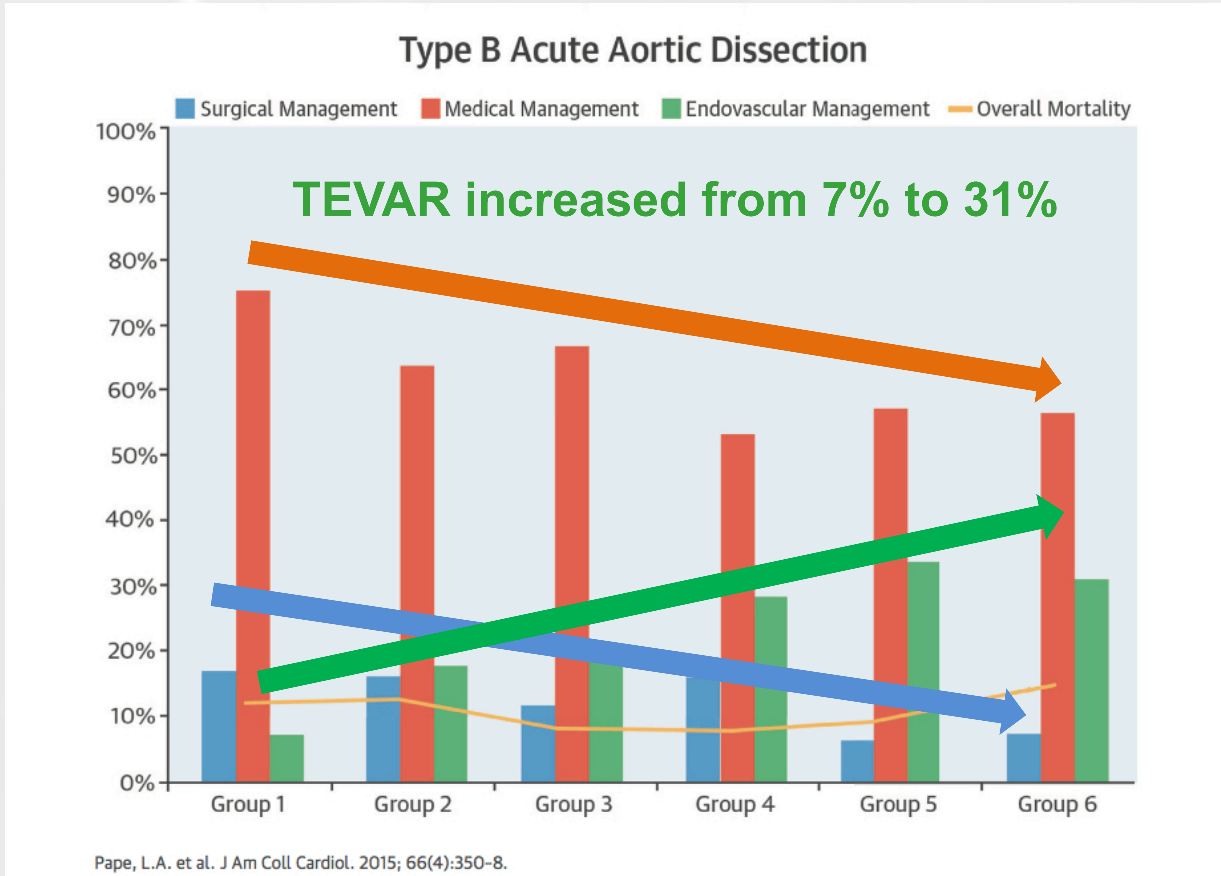
BACKGROUND Diagnosis, treatment, and outcomes of acute aortic dissection (AAS) are changing.

OBJECTIVES This study examined 17-year trends in the presentation, diagnosis, and hospital outcomes of AAD from the International Registry of Acute Aortic Dissection (IRAD).

METHODS Data from 4,428 patients enrolled at 28 IRAD centers between December 26, 1995, and February 6, 2013, were analyzed. Patients were divided according to enrollment date into 6 equal groups and by AAD type: A (n = 2,952) or B (n = 1,476).

RESULTS There was no change in the presenting complaints of severe or worst-ever pain for type A and type B AAD (93% and 94%, respectively), nor in the incidence of chest pain (83% and 71%, respectively). Use of computed to-mography (CT) for diagnosis of type A increased from 46% to 73% ($p < 0.001$). Surgical management for type A increased from 79% to 90% ($p < 0.001$). Endovascular management of type B increased from 7% to 31% ($p < 0.001$). Type A in-hospital mortality decreased significantly (31% to 22%; $p < 0.001$), as surgical mortality (25% to 18%; $p = 0.003$). There was no significant trend in in-hospital mortality in type B (from 12% to 14%).

CONCLUSIONS Presenting symptoms and physical findings of AAD have not changed significantly. Use of chest CT increased for type A. More patients in both groups were managed with interventional procedures: surgery in type A and endovascular therapy in type B. A significant decrease in overall in-hospital mortality was seen for type A but not for type B. (J Am Coll Cardiol 2015;66:350-8) © 2015 by the American College of Cardiology Foundation.



J Am Coll Cardiol 2015;66:350–8

Summary

TEVAR is now the first line therapy for acute Type B aortic dissection with rupture or malperfusion

Medical Management of uncomplicated acute TBAD has a high failure rate and delayed TEVAR will be needed in the majority of patients