Understanding aortic dissection

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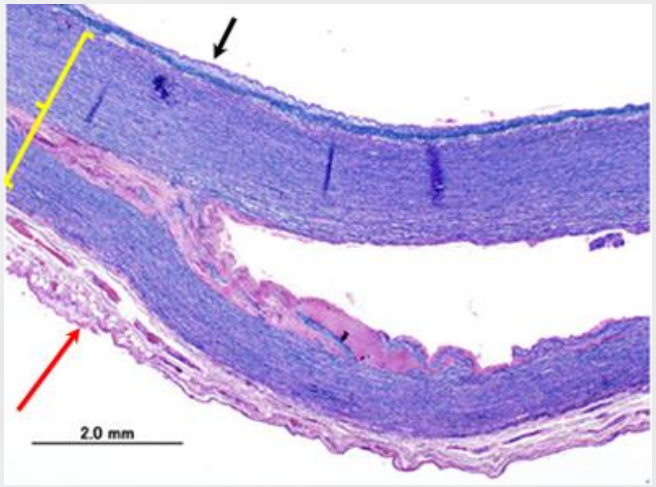
Objectives

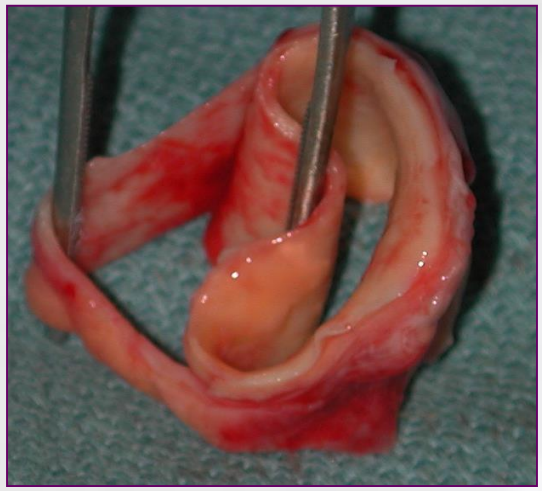
To help you understand

1. What dissection is
2. Who it affects
3. What it does
4. How to treat it

What is aortic dissection

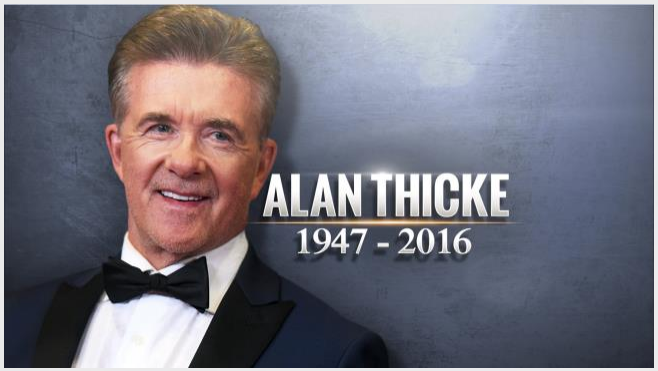
Dissection starts with an intimal tear and extends within the media layer of the aortic wall to create flow through a second lumen called the false lumen

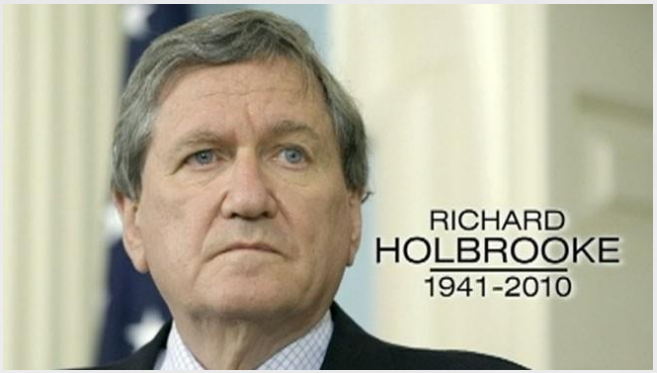




This is not a good thing!

What is aortic dissection

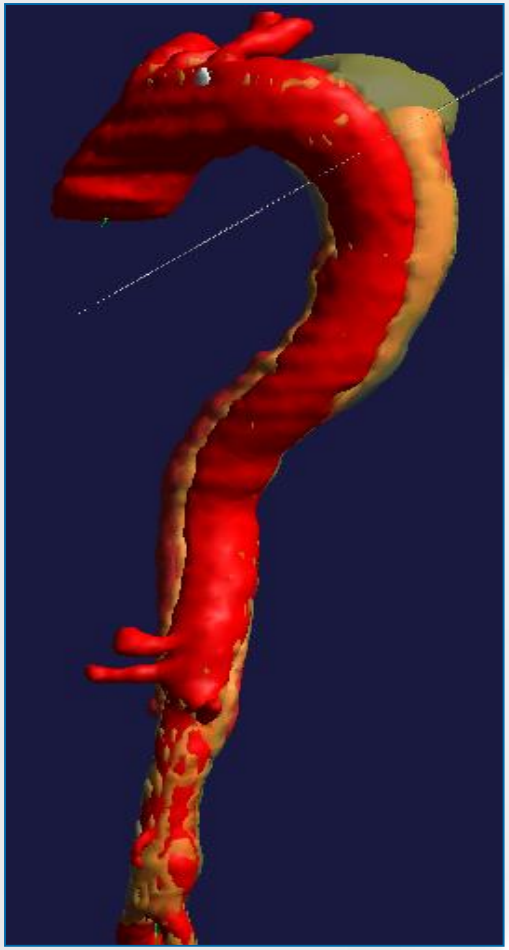




Aortic dissection is lethal

What is aortic dissection

- The most common aortic catastrophe
- Men more frequently 5:1 ratio
- Peak incidence between 50-60 yrs for type A
- Peak incidence between 60-70 yrs for type B



Who does aortic dissection affect?

Any patients with Conditions with increased aortic wall stress

- Hypertension
- Pheochromocytoma
- Illicit drug use
- Weight lifting
- Valsalva maneuver
- Trauma
- Deceleration injury
- Coarctation

Who does aortic dissection affect?

CONDITIONS WITH AORTIC MEDIA ABNORMALITIES

- **Genetic**
  - Marfan Syndrome
  - Ehlers-Danlos Syndrome
  - Loeys-Dietz Syndrome
  - Turner Syndrome
  - Bicuspid aortic valve
  - Familial thoracic dissection syndrome

Inflammatory

- Takayasu arteritis
- Giant Cell arteritis
- Behcet Disease

Other

- Pregnancy
- Polycystic kidney disease
- Chronic corticosteroid
- Chronic immunosuppression
- HIV related arteriopathy

What aortic dissection does

"The great masquerader"

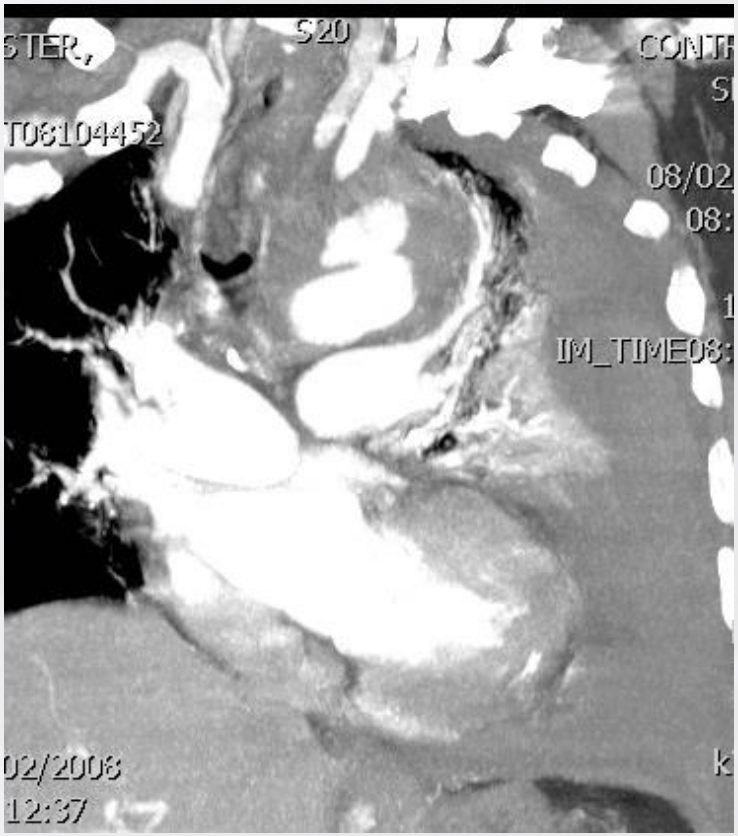
Sir William Osler, 1849-1919

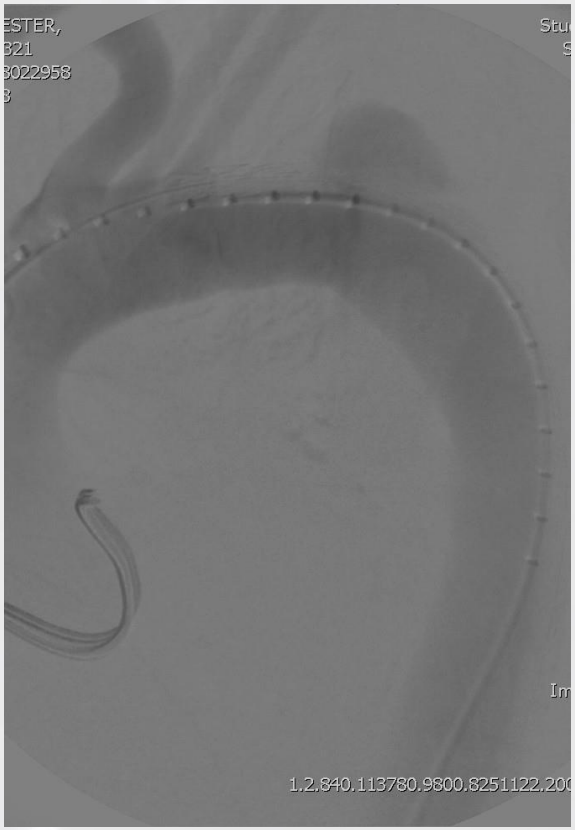
Many diverse clinical manifestations

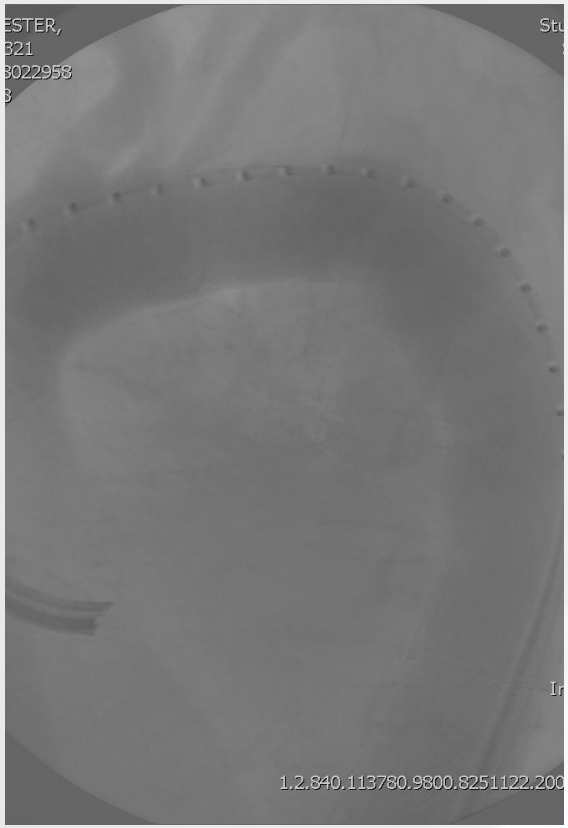
- Aortic rupture, shock
- Cardiac Tamponade
- Aortic valve incompetence
- Myocardial ischemia
- Stroke, Limb ischemia
- Visceral ischemia, renal failure
- Accelerated Hypertension
- Paraplegia, Paraparesis
- Back, chest or abdominal pain

What aortic dissection does

It causes aortic rupture





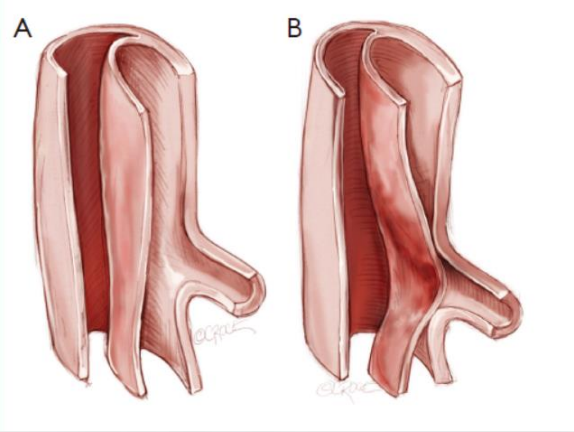


What aortic dissection does

It causes malperfusion

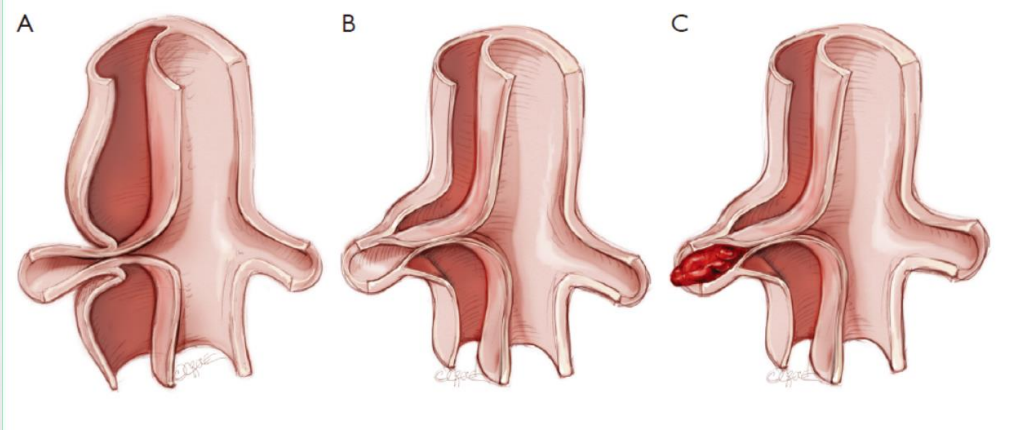
UNDERSTANDING THE MECHANISM OF BRANCH COMPROMISE

Dynamic obstruction



Prolapsed septum into ostium during cardiac cycle

Static obstruction

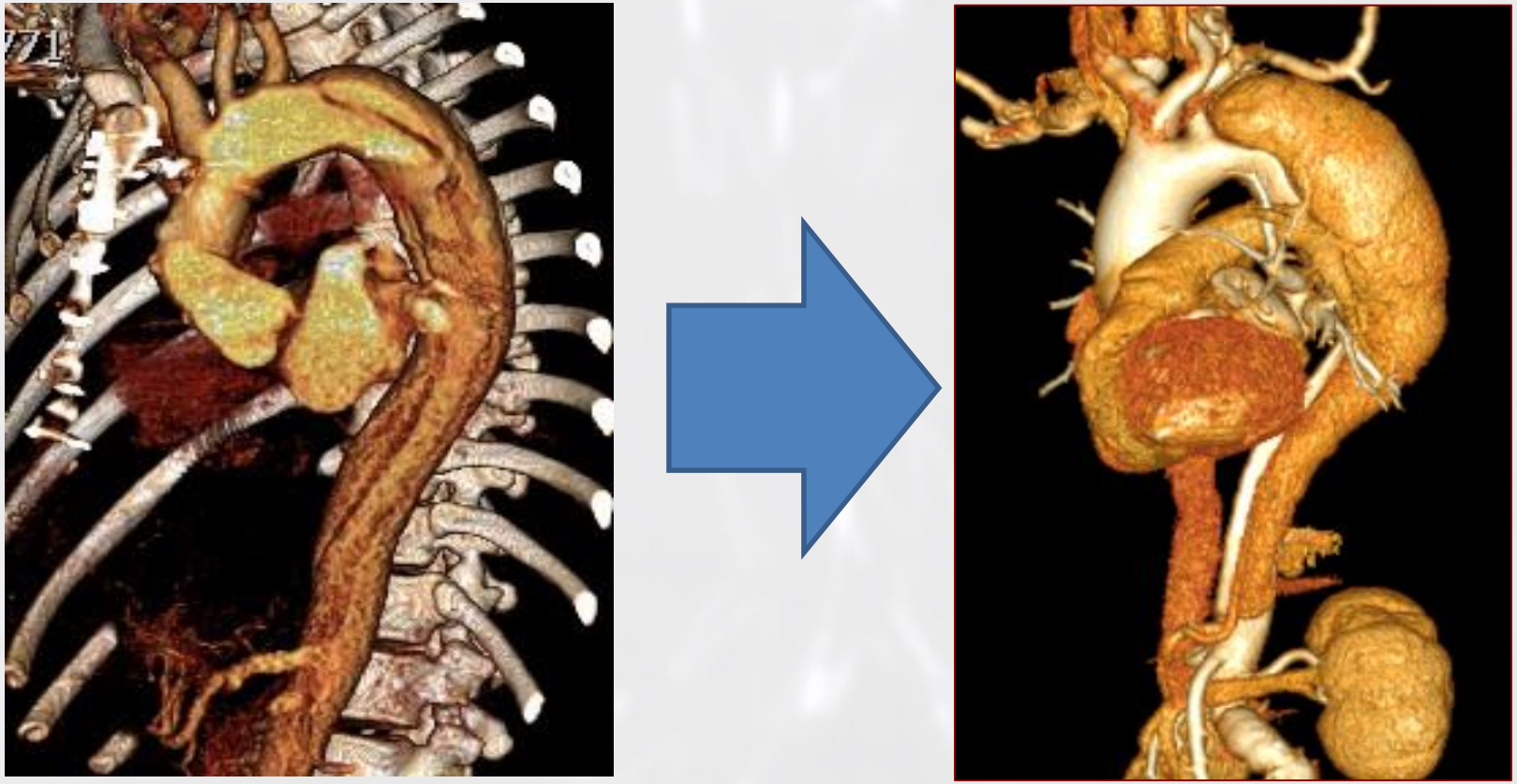


Cleavage plane of dissection extends into ostium

Trimarchi S et al, Ann Cardiothorac Surg 2014;3(4):418-422

What aortic dissection does

It causes aortic dilatation



Aortic dissection evolves into thoracoabdominal aneurysms

What you need to know

Get a good CTA chest / Abdomen / Pelvis

Readily available

Performed rapidly

Highly accurate

Best resolution

Shows the extent

Branch involvement

What you need to know

LEADING ARTICLE

DISSECT: A New Mnemonic-based Approach to the Categorization of Aortic Dissection

M.D. Dake [a,*], M. Thompson [b], M. van Sambeek [c], F. Vermassen [d], J.P. Morales [e], on behalf of the DEFINE Investigators

Objective/Background: Classification systems for aortic dissection provide important guides to clinical decision-making, but the relevance of traditional categorization schemes is being questioned in an era when endovascular techniques are assuming a growing role in the management of this frequently complex and catastrophic entity. In recognition of the expanding range of interventional therapies now used as alternatives to conventional treatment approaches, the Working Group on Aortic Diseases of the DEFINE Project developed a categorization system that features the specific anatomic and clinical manifestations of the disease process that are most relevant to contemporary decision-making.

Methods and results: The DISSECT classification system is a mnemonic-based approach to the evaluation of aortic dissection. It guides clinicians through an assessment of six critical characteristics that facilitate optimal communication of the most salient details that currently influence the selection of a therapeutic option, including those findings that are key when considering an endovascular procedure, but are not taken into account by the DeBakey or Stanford categorization schemes. The six features of aortic dissection include: duration of disease; intimal tear location; size of the dissected aorta; segmental extent of aortic involvement; clinical complications of the dissection, and thrombus within the aortic false lumen.

Conclusion: In current clinical practice, endovascular therapy is increasingly considered as an alternative to medical management or open surgical repair in select cases of type B aortic dissection. Currently, endovascular aortic repair is not used for patients with type A aortic dissection, but catheter-based techniques directed at peripheral branch vessel ischemia that may complicate type A dissection are considered valuable adjunctive interventions, when indicated. The use of a new system for categorization of aortic dissection, DISSECT, addresses the shortcomings of well-known established schemes devised more than 40 years ago, before the introduction of endovascular techniques. It will serve as a guide to support a critical analysis of contemporary therapeutic options and inform management decisions based on specific features of the disease process.

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Keywords: Aortic dissection, Aortic endograft, Dissection type, Classification system

The constellation of cardiovascular pathologies encountered in clinical practice is broad and includes a variety of complex disease processes. No condition, however, is consensually regarded by medical students and experienced clinicians alike as more complicated, ominous, and vexing than aortic dissection. Aortic dissection is a catastrophic event responsible for a wide range of clinical manifestations. In any individual, the particular effects experienced are related to the pattern and extent of aortic and branch vessel involvement that occurs as a consequence of the dissection, and, in the longer term, the ability of the aorta to resist the dilating forces of the circulation.

Originally described by Morgagni in 1761,[1] aortic dissection remained a highly lethal disease for which no effective therapy, including medical treatment, was available until 1955, when surgical repair was introduced.[2] For the first time, there was a treatment that appeared to favorably alter the natural history of the disease. From the early experience gained with operative management, it became apparent that there are distinct differences between patients with dissection involving the ascending aorta, who have a worse immediate prognosis, and those with descending aortic dissection.[3–6] The importance of this differentiation was initially recognized by Hume and Porter,[7] and later emphasized in the two most commonly referenced classification systems—the DeBakey[4] and Stanford[8] systems proposed in 1965 and 1970, respectively (Table 1).

Subsequently, diagnostic imaging with catheter arteriography, echocardiography, computed tomography, and magnetic resonance scans has contributed to our collective understanding of the patterns of anatomic involvement

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DISSECT

Duration:

Intimal Tear:

Size of DSX:

Segmental **E**xtent:

Clinical **C**omplications

Thrombosis:

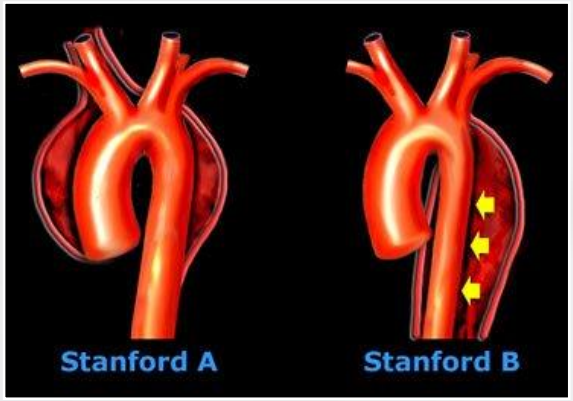
Dake, M.D. et al.,. Eur J of Vasc Endovasc Surgery 2013,46(2): 175-90

What you need to know

Aortic Dissections are Classified by:

Aortic Segment Involvement

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

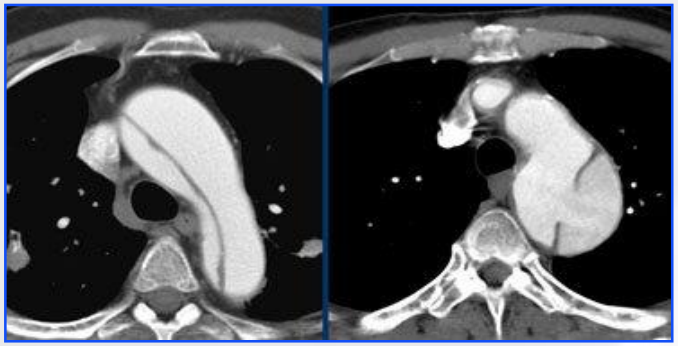


Duration from Clinical Onset

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

Complications (yes/no)

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



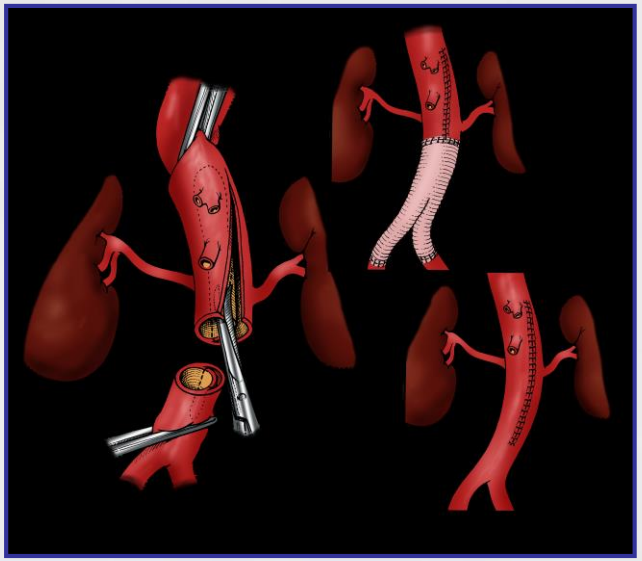
Ascending & Arch **Only the DTA**

How to treat it

There are may treatment strategies

Open Treatment

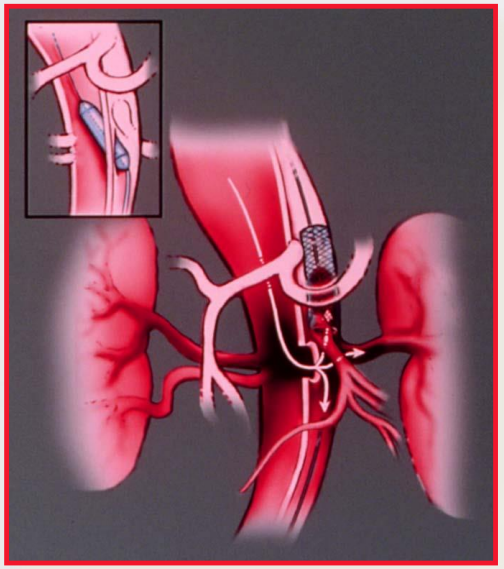
Graft replacement
Extra anatomic bypass
Open fenestration



Endovascular Treatment

Aorta

TEVAR
Fenestration
Stenting



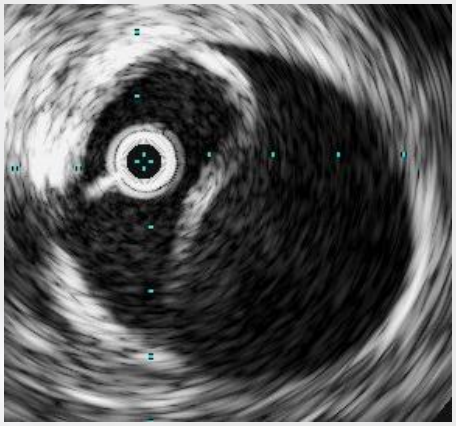
Branch Vessel

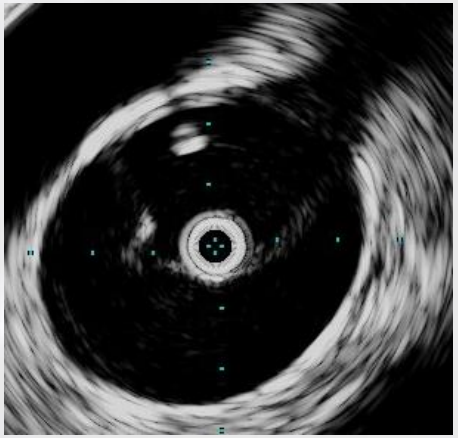
Branch Stenting
Balloon Fenestration

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

How to treat acute dissection

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

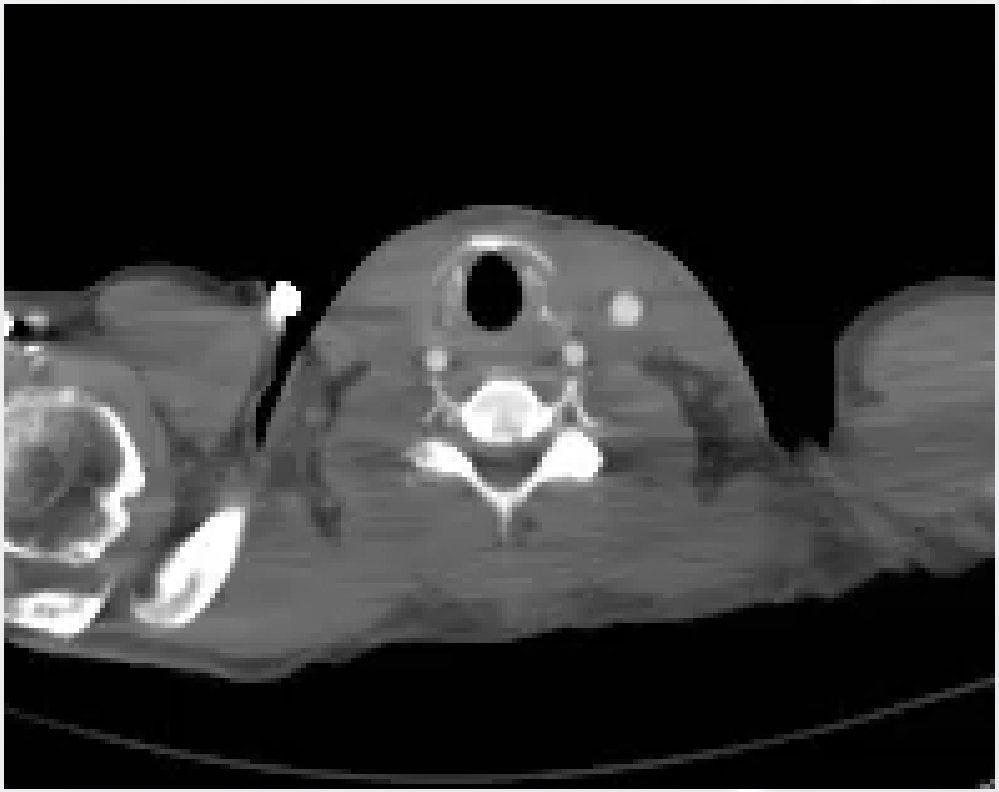


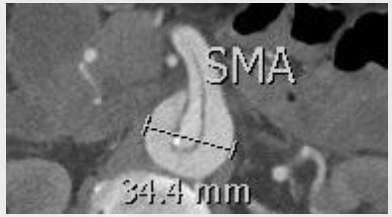


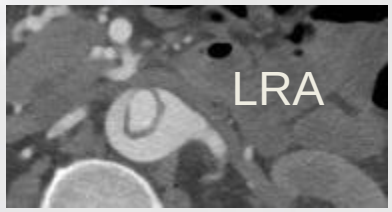
TEVAR covers the entry tear and repressurizes true lumen with malperfusion resolution

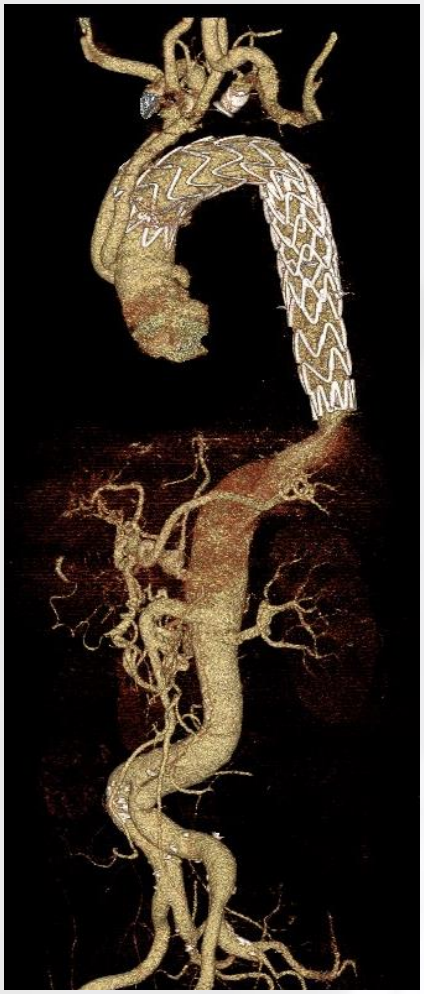
How to treat acute dissection

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



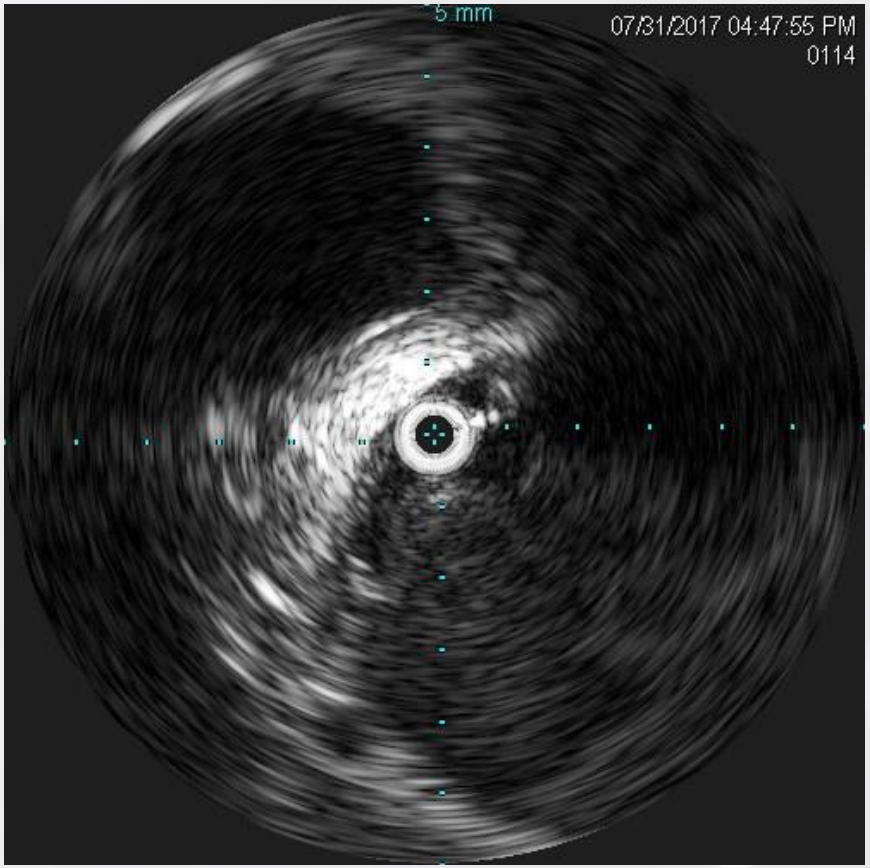




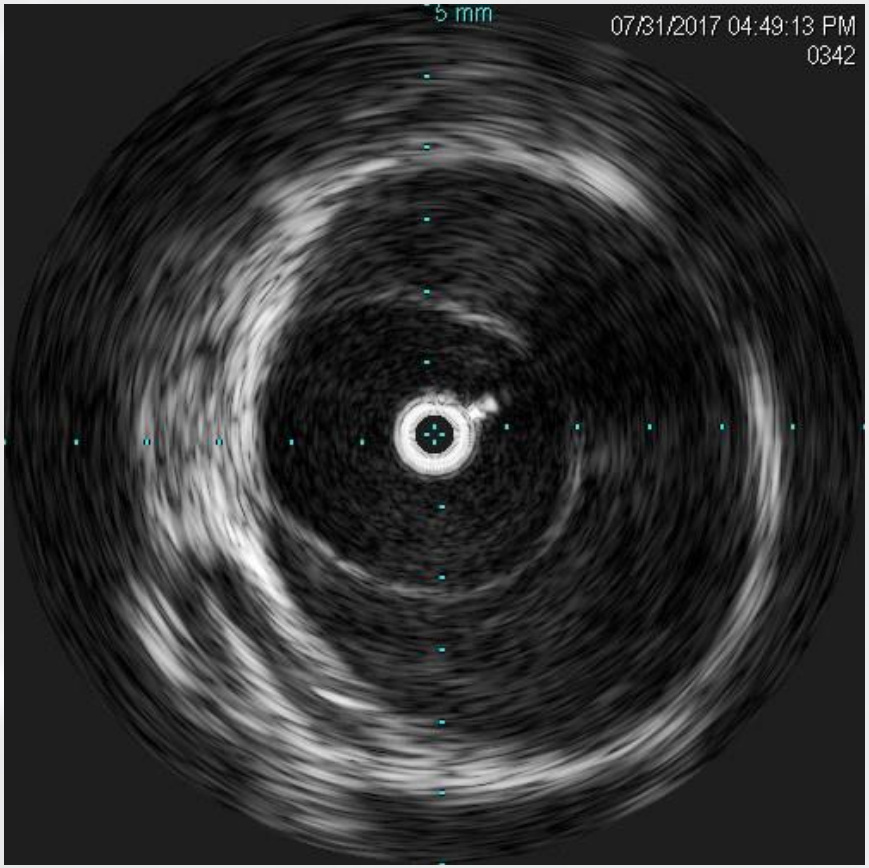


How to treat acute dissection

IVUS before redo TEVAR:
compressed true lumen



IVUS after redo TEVAR:
pressurized & expanded true lumen



How to treat acute dissection

After distal TEVAR extension
Minimal visceral perfusion

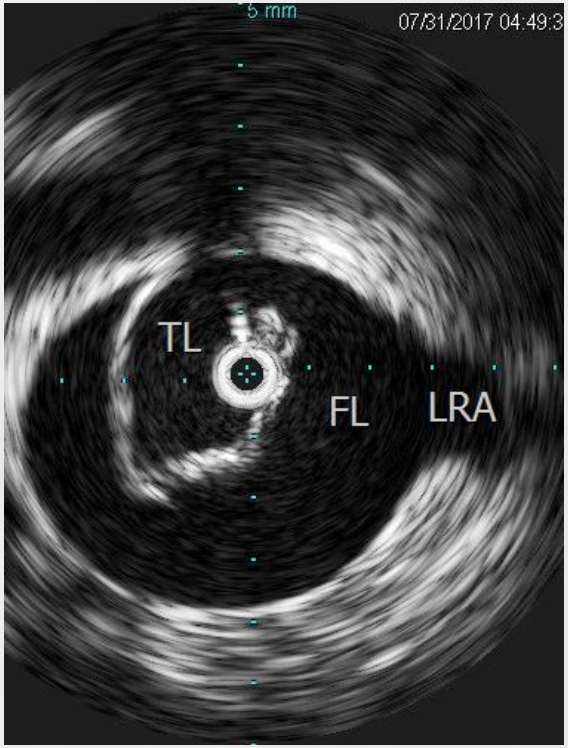
Restoring visceral perfusion with endovascular treatment

Celiac stenting

SMA stenting

How to treat acute dissection

Absent left kidney perfusion with IVUS showing LRA from false lumen

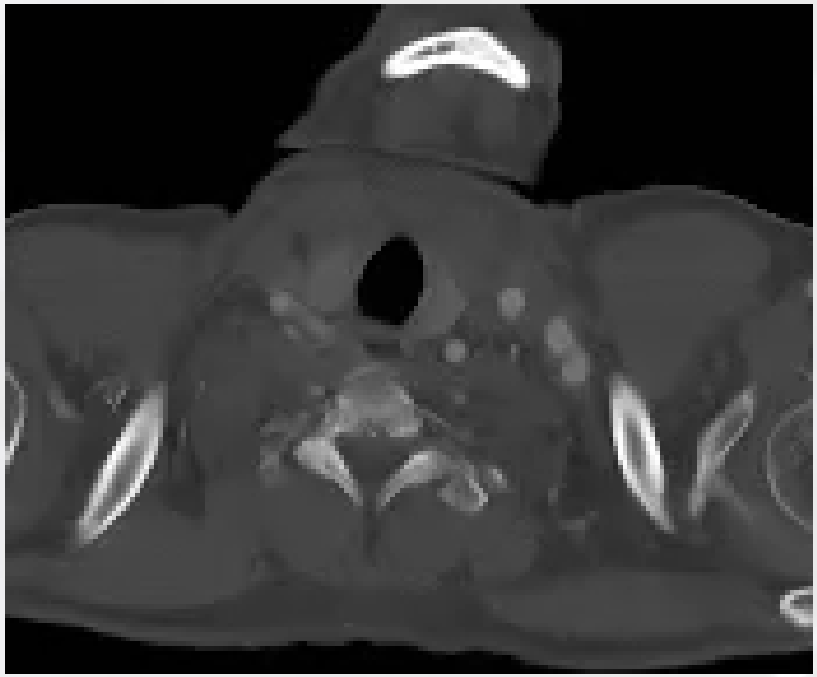


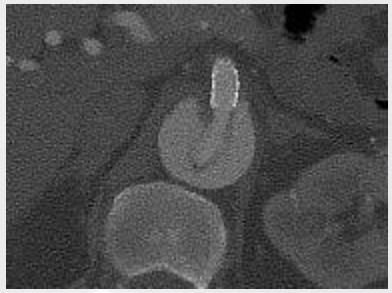
Left Renal stenting

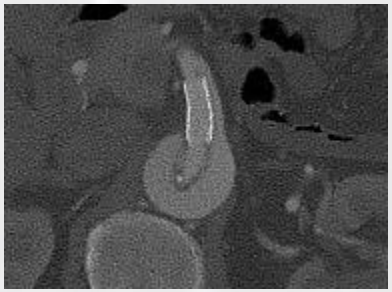
Completion angiogram

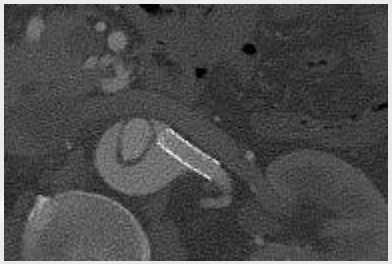
How to treat acute dissection

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









Why treat uncomplicated acute dissection

NATURAL HISTORY OF MED MANAGED acute TBAD


ARTICLE IN PRESS

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, Esrel A. Ergul, MS, Nathan J. Aranson, MD, Virendra I. Patel, MD, MPH, and Mark F. Conrad, MD, MSSc, *Boston, Mass*

Aortic dissection is the most common catastrophic event affecting the aorta, with an incidence exceeding that of ruptured abdominal aortic aneurysm.[1,2] The majority of patients with type B aortic dissection, in which the entry tear originates distal to the left subclavian artery, are initially treated with medical therapy, whereas surgical therapy is reserved for patients presenting with complicating conditions such as rupture and malperfusion syndrome. Medical therapy aimed at lowering the systolic blood pressure and pulse has remained the standard of care for acute type B dissections, with multiple studies showing favorable 1-year survival with medical therapy alone in this population, ranging from 70% to 90%.[3-6]

From the Department of Vascular and Endovascular Surgery, Massachusetts General Hospital.

Author conflict of interest: none.

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However, these good short-term results with medical therapy may be misleading as the principal late complication of aortic dissection, aortic wall degeneration of the outer wall of the false lumen, develops beyond 1 year. The natural history of medically treated acute type B aortic dissection was first reported by DeBakey et al[7] in 1982; nearly 40% of these patients developed aortic wall degeneration over time. Similar results were reported by Juvonen et al[2,8] in 1999; 40% of their medically managed patients experienced aortic wall rupture or progression requiring surgical repair at a mean follow-up of 40 months. This series was small (50 patients), and the story of acute type B dissection has led to a paucity of contemporary natural history data such that the impact of current medical therapy on patient outcomes is unknown. Furthermore, there are few studies available with adequate follow-up to evaluate not only the early complications of medical management but the late ones as well. As such, the long-term outcomes of medically managed acute type B dissections are not well known. With emerging data challenging the current standard of care for acute type B dissections, a current evaluation of its natural history is warranted.[9,10] The goals of this study were to evaluate the natural history of a contemporary series of patients presenting with acute type B aortic dissection who were initially treated with medical therapy alone and to identify predictors of poor outcome with medical management.

1

Mass General Hospital, Boston: 1999 – 2011

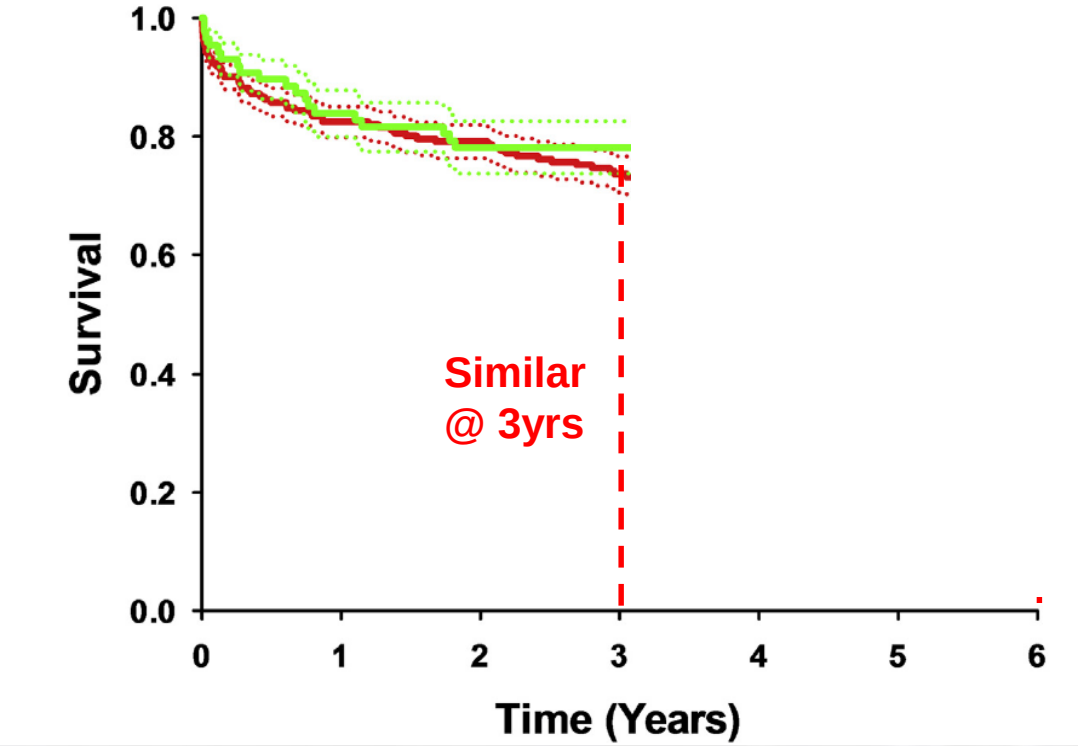
- Acute TBAD patients, <14d from symptoms
- Initial plan of Medical Management alone
- Failure of Med Therapy
  - Death
  - Dissection complication requiring intervention

During 12-year study period

- 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.

Why treat uncomplicated acute dissection



- **Intervention**
- **Med Managed**

Conclusion

- 12% of patients failed Med Therapy within first 15 days
- Less than half (41%) enjoyed intervention-free survival at 6 years

Because Uncomplicated Acute TBAD is not Benign

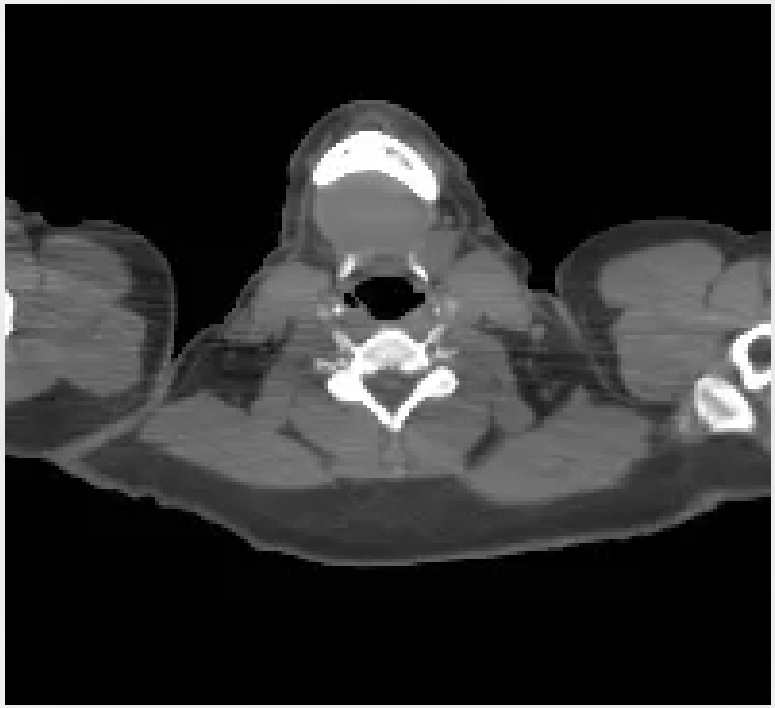
Durham, et al. J Vasc Surg 2015;1-8.

How to treat chronic dissection

2 years after medical management of an uncomplicated acute TBAD

Treated by TEVAR to induce remodeling of the DTA

CTA shows a proximal DTA >5.5cm
Abdominal aorta < 4cm



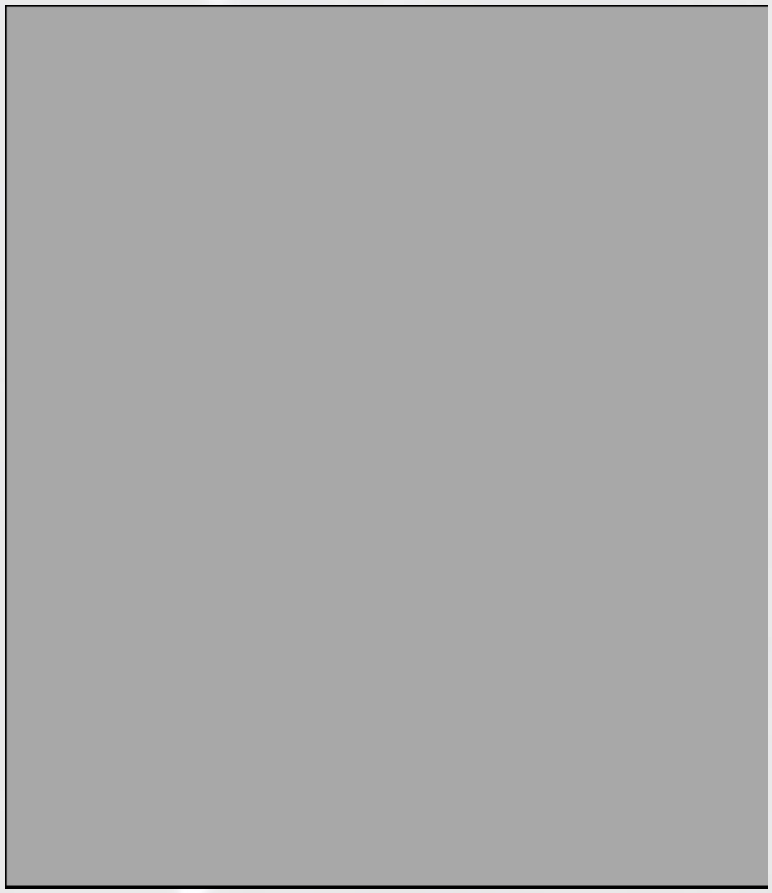
How to treat chronic dissection

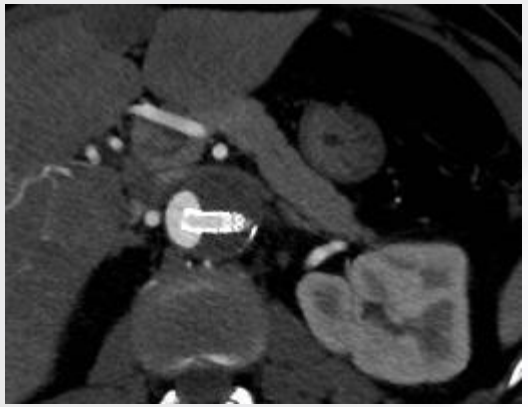
Completion angiogram showing absent left kidney
Malperfusion induced by TEVAR excluding false lumen and visceral branches originating exclusively from the false lumen

How to treat chronic dissection

Finding and stenting LRA back to the true lumen

Completion angiogram with restoration of left renal perfusion



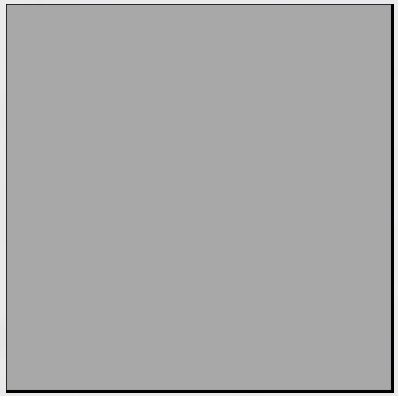


How to treat chronic dissection

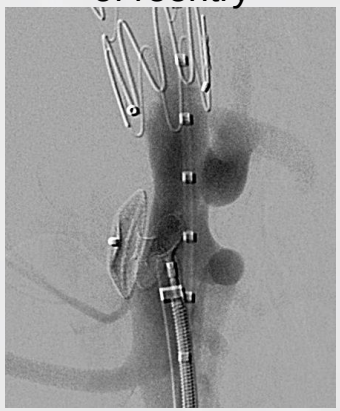
2 years after TEVAR: Treating a TAAA with an 8 Fr sheath with RESET

Symptomatic
8 cm TAAA

2 reentries
identified



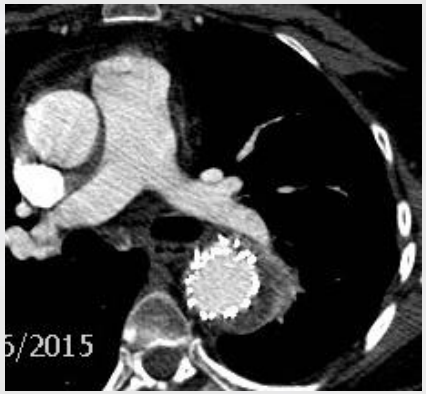
Amplatzer plug
of reentry



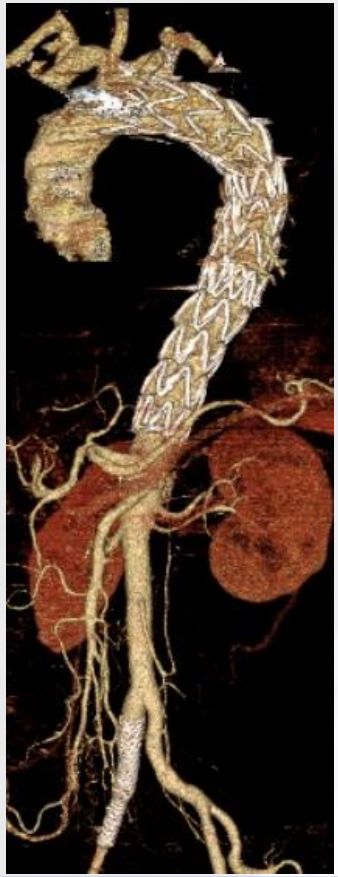
Covered iliac
stent for reentry

8 cm TAAA before
RESET

3 cm TAAA
4 months after RESET



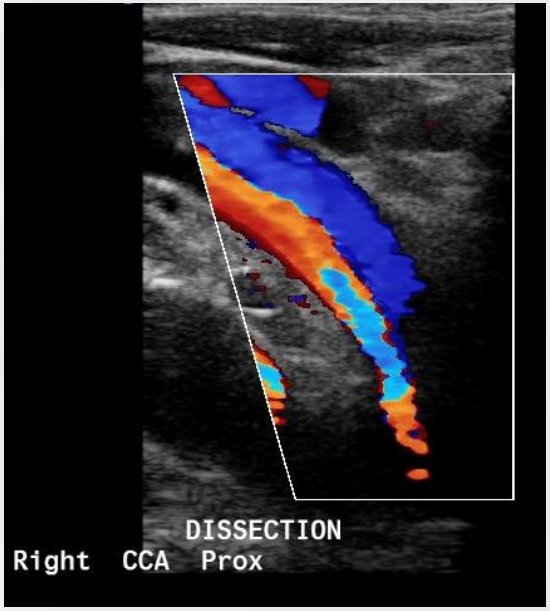
Now @ 3yrs
follow up

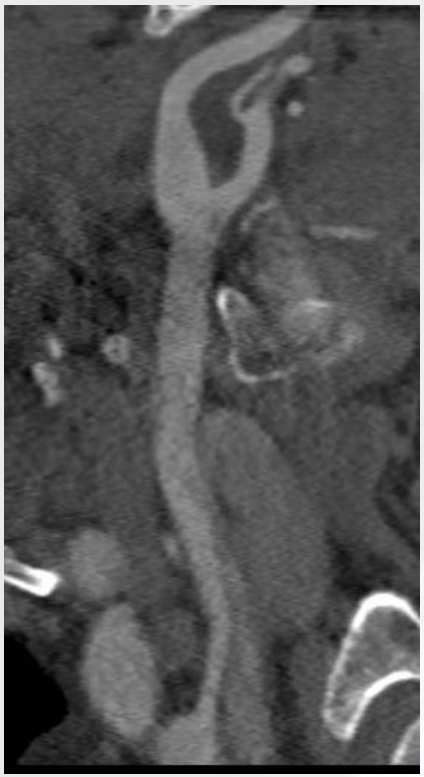


How to treat chronic dissection

71 y.o male patient presenting with 2 small stroke with left hemiparesis & dysarthria
2 months after ascending aortic replacement for acute type A dissection

Residual innominate and right CCA dissection
That is flow limiting and causing right hemispheric deficit





How to treat chronic dissection

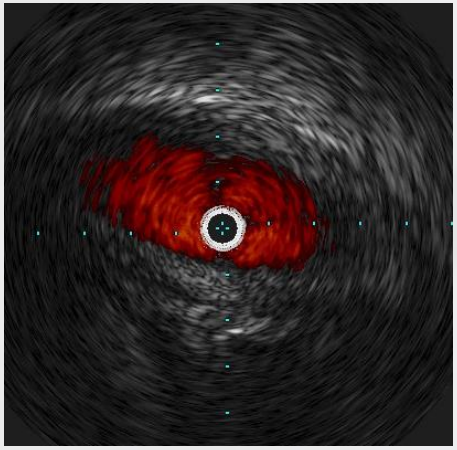
Right CCA to RSA transposition

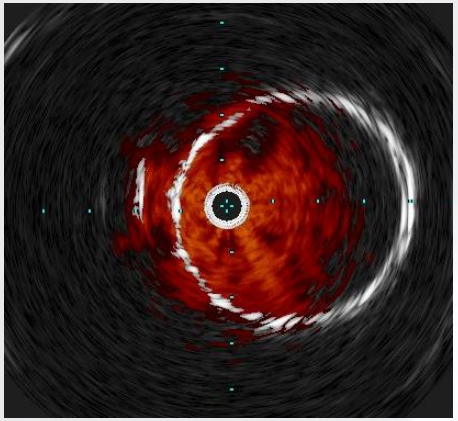
Retrograde access and angiogram of innominate

How to treat chronic dissection

Retrograde angiogram after innominate stenting (VBX 8x39)

IVUS before and after innominate stenting

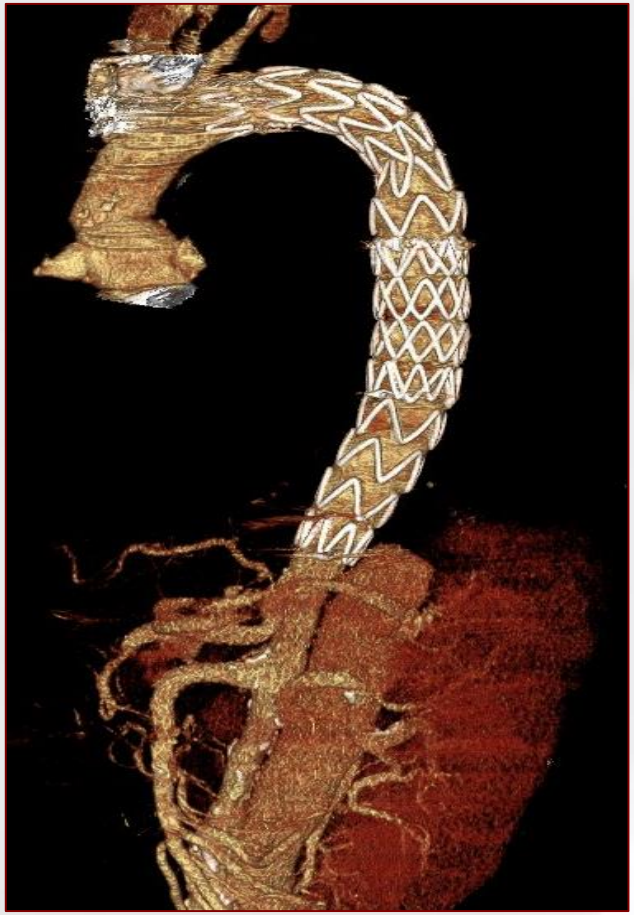




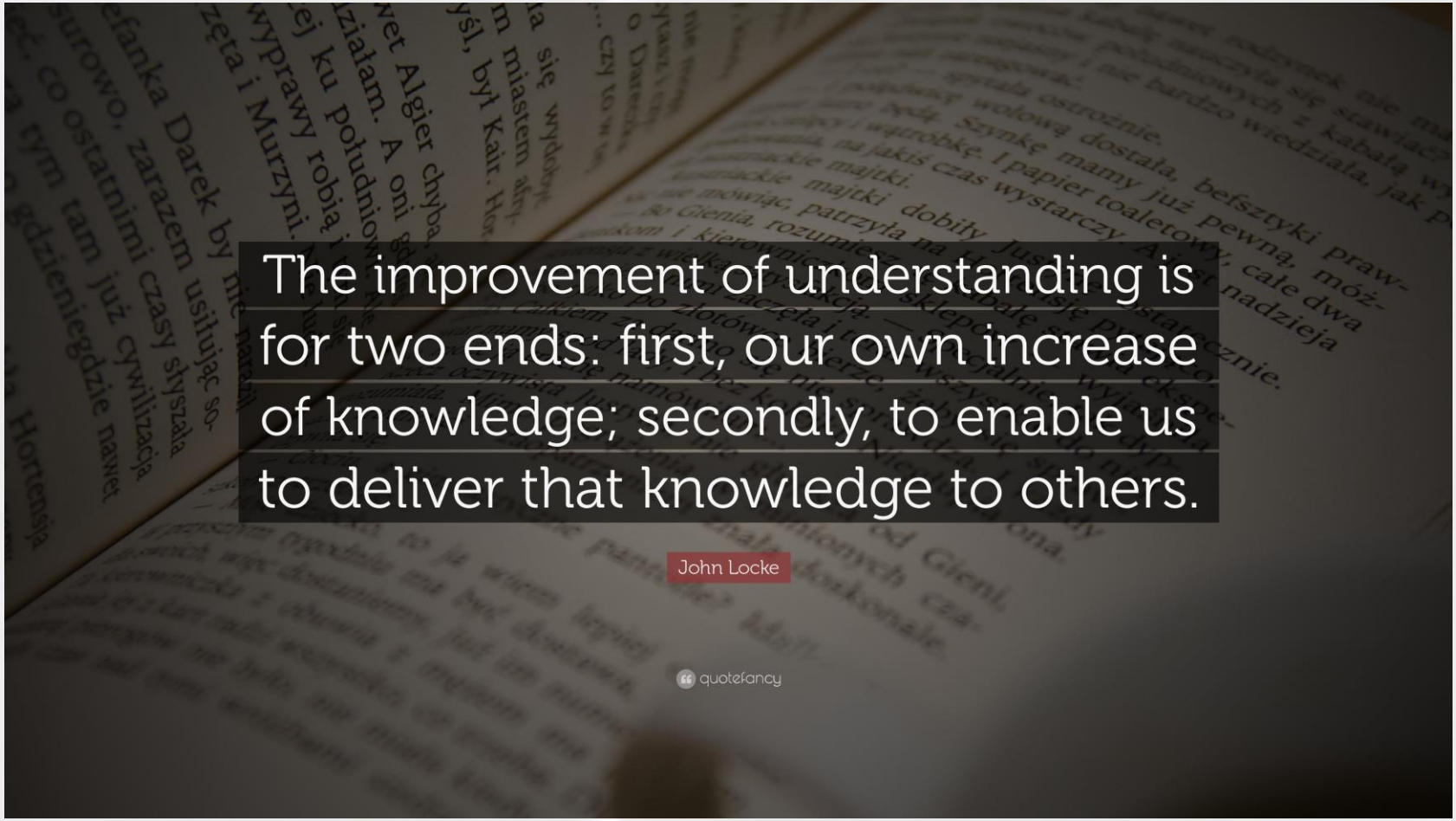
Summary

Understanding which patients are at risk and what the clinical presentations of aortic dissection are will lead to earlier diagnosis, prompt referral to an aortic surgeon and more timely and appropriate management

Understanding that TEVAR is now the main but not the sole treatment for aortic dissection will improve patients outcome



Thank you



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