URGENZE DELL'AORTA TORACICA

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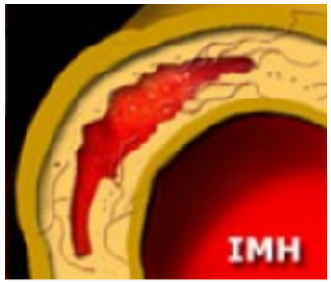
Patologia aortica

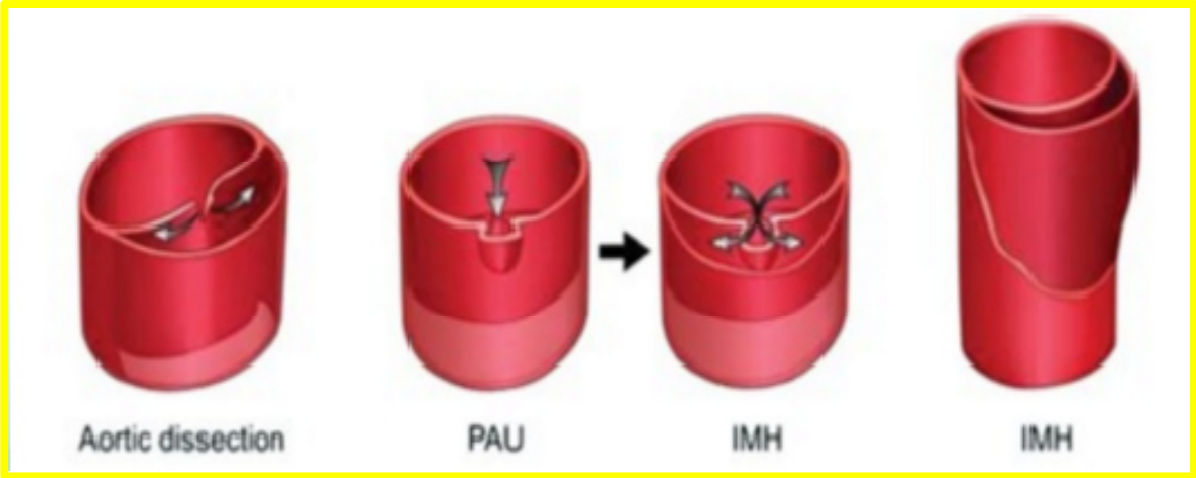
- Aneurismi
- ***Sindromi aortiche acute*** → Dissezione (AD) / Ematoma Intramurale (IMH) / Ulcera aortica penetrante (PAU)
- ***Lesioni di natura traumatica (TAI)***
- Malattia infiammatoria
- Malattie congenite (es. coartazione dell'aorta)



Sindromi aortiche acute

- Ulcere penetranti dell'aorta (PAU)
- Ematomi intramurali (IMH)
- Dissezione aortica acuta (AAD)
- Lesioni traumatiche
- Rottura di aneurismi

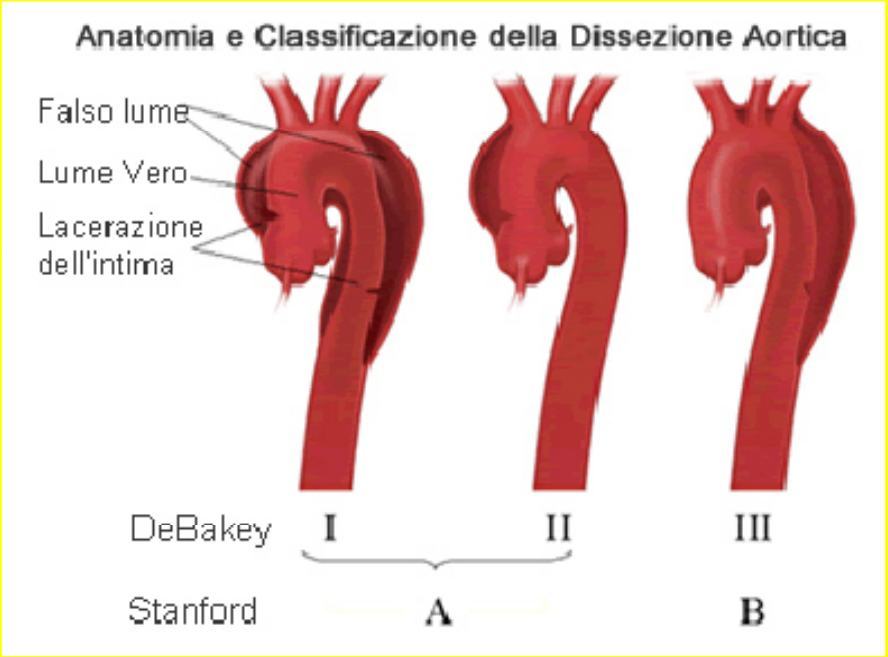
Il denominatore comune nelle Sindromi Aortiche Acute (AAS) è la penetrazione di sangue nella media (ulcera/sanguinamento)



CA. Nienaber, Janet T. Powell. Management of acute aortic syndrome. European Heart Journal (2012) 33,26-35

Classificazione AAS

- *Entità strettamente correlate tra loro sia come presentazione clinica che come strategie di management ed evoluzione.*
- *La storia naturale e il trattamento sono correlati con la localizzazione aortica*



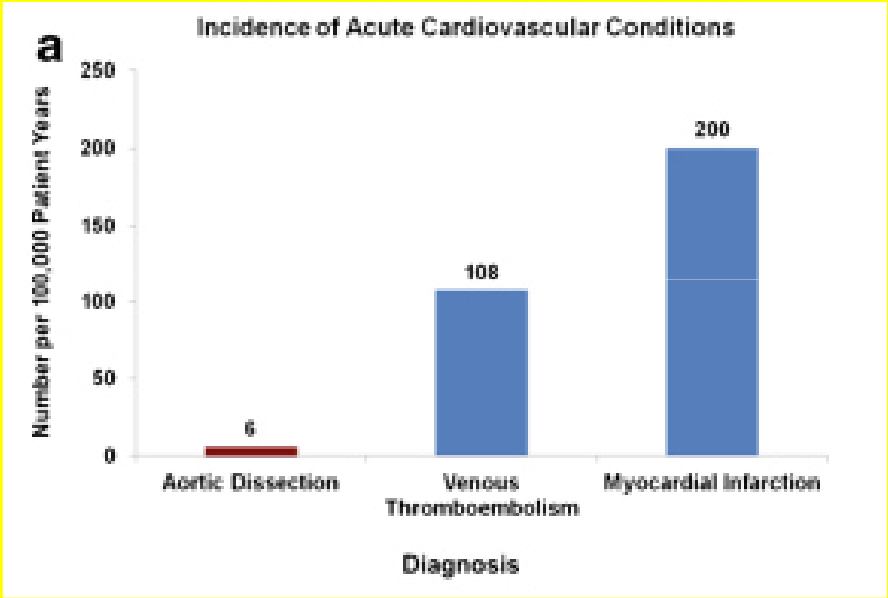
Utilizzate anche per classificazione di IMH e PAU

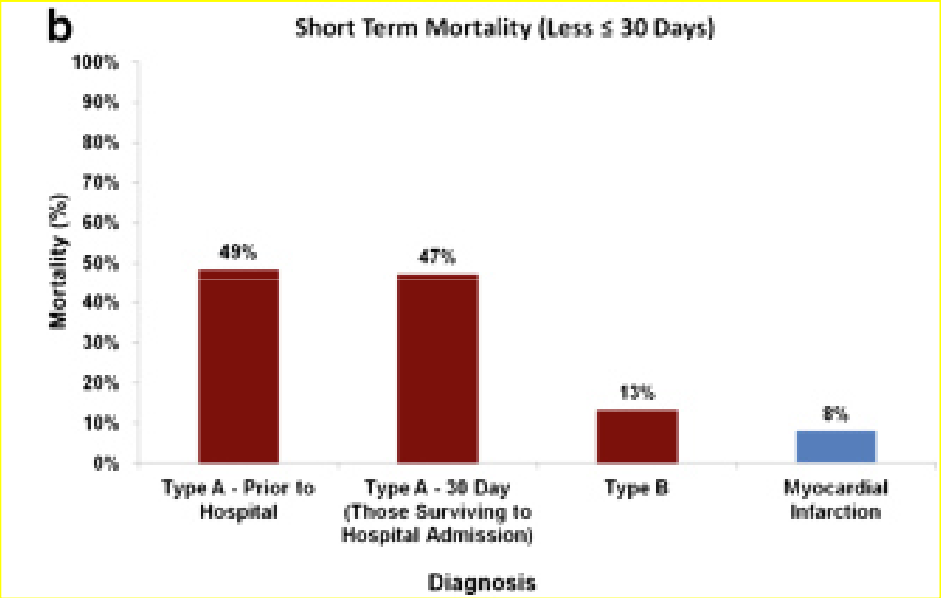
De Bakey	Stanford
Type I – Originates in the ascending aorta and propagates into and often beyond the arch	**Type A** – All dissections involving the ascending aorta regardless of the site of origin
Type II – Originates in and is confined to the ascending aorta	
Type III – Originates in the descending aorta extending distally or rarely retrograde into the arch	**Type B** – All dissections with no ascending aortic involvement

❖ Tsai TT. et al (2006). Circulation 114:2226–2231

Sindromi aortiche acute

Difficoltà di diagnosi e management





❖ *Heart disease and stroke statistics – 2013 update - Go AS et al. 2013;127*

❖ *The international registry of Acute Aortic Dissection (IRAD) – Hagan PG et al.*

Incidenza AAS:
3-16 casi per 100000 pers. /anno

❖ *Marc P. Bonaca & Patrick T. O'Gara Curr Cardiol Rep (2014) 16:536*

Sindromi aortiche acute

- DOLORE
  - acuto, intenso, lacerante, squarciante, migrante o pulsatile
  - trafittivo, pungente
- «the patients will frequently volunteer the information that it fells as is 'something as broken loose' in the chest» (1958)
- riflette il sito dell'iniziale rottura intimale e come la dissezione può migrare

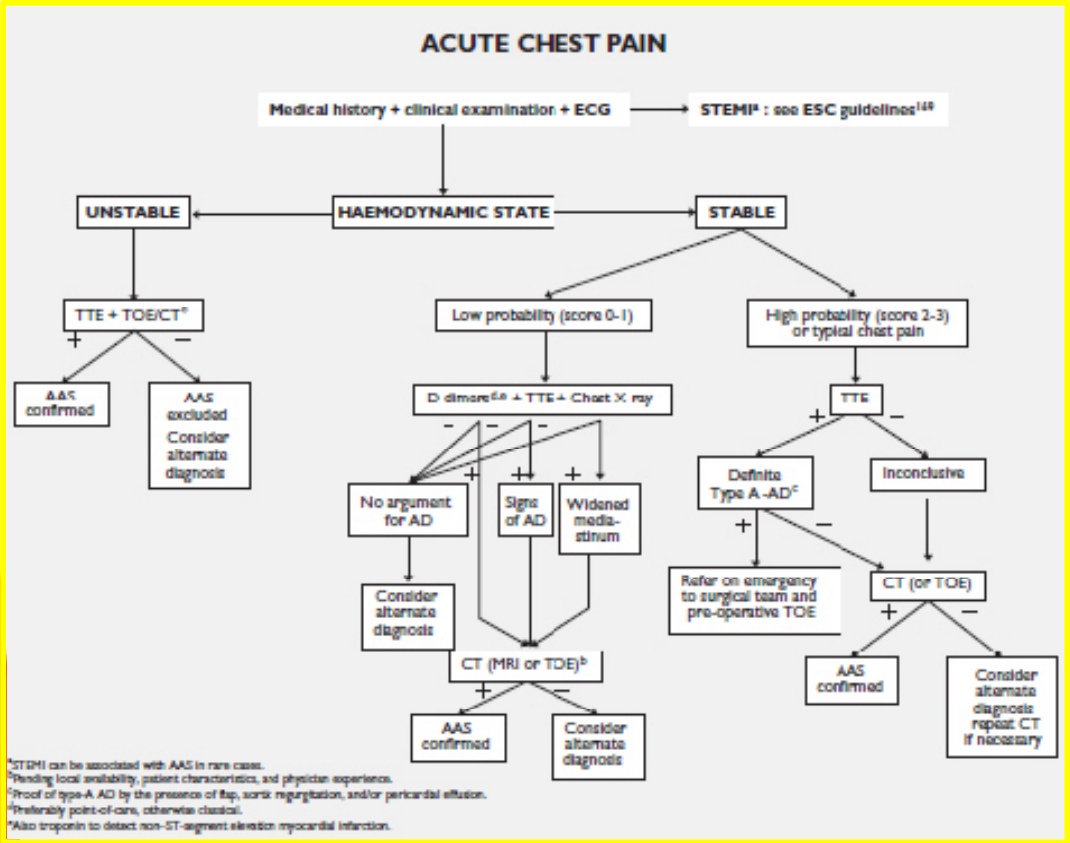
Acute syndrome arising from
Type A dissection
Type B dissection
Leaking thoracic aneurysm
Intramural haematoma
Penetrating ulcer
Traumatic dissection or rupture

Table 2 Aortic dissection: presenting signs and symptoms

Symptoms/signs	Frequency	Note
Chest pain	Type A 79 % Type B 63 %	Sudden and severe
Back pain	Type A 47 % Type B 64 %	Sudden and severe
Abdominal pain	Type A 43 % Type B 22 %	Associated with higher mortality and delay in diagnosis [74]
Hypertension (at presentation)	Type A 36 % Type B 70 %	More common in type B
Syncope	13 % Overall	May indicate development of a dangerous complication (e.g., tamponade) [28]. Associated with increased in-hospital mortality (34 % with syncope, 23 % without)
Pulse deficit	Type A 19–30 % Type B 9–21 %	Associated with increased in-hospital mortality
Neurologic deficit	17 % Overall [5]	May be more frequent with type A (29 %)
No pain	4.5 % Overall	Associated with increased mortality
Aortic regurgitation murmur	Type A 45 %	

❖ *Marc P. Bonaca & Patrick T. O'Gara Curr Cardiol Rep (2014) 16:536*

Algoritmo diagnostico AAS



Madian time to diagnosis: 4,3h (1,5 to 24h)

✓Esame Obiettivo

- **Anomalie dei polsi**
- **segni di ischemia cerebrale (stroke nel 10% dei casi)**
- **segni di ischemia midollare (paraplegia nel 2% - 5%)**
- **segni di ischemia renale (oligo-anuria)**
- **segni di ischemia agli arti (solitamente arto inferiore sinistro)**
- **segni di ischemia viscerale**

➢ Storia clinica e anamnesi familiare

➢ Test di Laboratorio

D-dimer > 500 ng/ml (sens 96% spec 56%)
sELAF
Troponin

➢ Imaging

TTE/TEE (sens 95% spec 95%)
Angio-TC
Angio-RM

❖ *2014 ESC Guidelines on the diagnosis and treatment of aortic diseases*

Imaging

Obiettivi

- *Conferma del sospetto clinico*
- *Classificazione della dissezione*
- *Localizzazione dell'ulcera intimale*
- *Identificazione possibili complicanze*

Rapidità

Lesion	TTE	TEO	CT	MRI
Ascendig aortic dissection	++	+++	+++	+++
Aortic arch dissection	+	+	+++	+++
Descending aortic dissection	+	+++	+++	+++
Size	++	+++	+++	+++
Mural thrombus	+	+++	+++	+++
Intramural haematoma	+	+++	+++	+++
Penetrating aortic ulcer	++	++	+++	+++
Involvement of aortic branches	+*	(+)	+++	+++

*Can be improved when combined by vascular ultrasound (carotid, subclavian, vertebral, celiac, mesenteric and renal arteries).
+ + + = excellent; + + = moderate; + = poor; (+) = poor and incostant; CT = computed tomography; MRI = magnetic resonance imaging; TOE = transoesophageal echocardiography; TTE = transthoracic echocardiography

2014 ESC Guidelines on the diagnosis and treatment of aortic diseases

Ecocardiografia (TTE-TEE)

Vantaggi

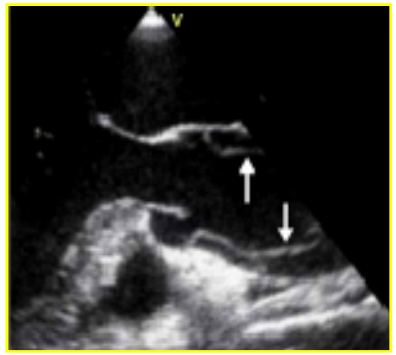
- Elevata disponibilità
- Possibilità di esecuzione a letto
- Valvola e radice aortica

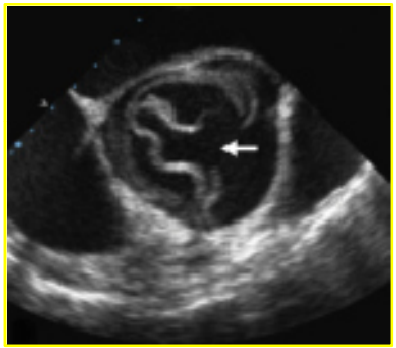
Svantaggi

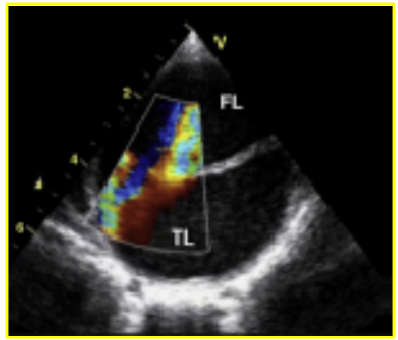
- Arco aortico
- Operatore-dipendente
- Metodica invasiva - sedazione
- Artefatti

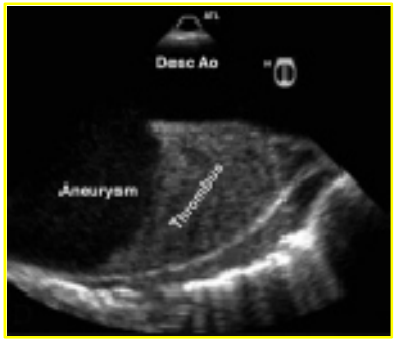
	Sens	Spec
TTE	59-83%	63-93%
TEE	99%	89%

- Identificazione flap intimale
- IMH - PAU
- Valvola aortica e STJ
- Coinvolgimento coronarie
- Versamento pericardico
- Color-doppler (porte)









❖ Ragavendra R et al. The role of imaging in aortic dissection and relate syndromes – JACC:cardiovascular imaging vol.7,4 2014

MDTC

Vantaggi

- Elevata disponibilità
- Rapidità esecuzione
- Panoramicità

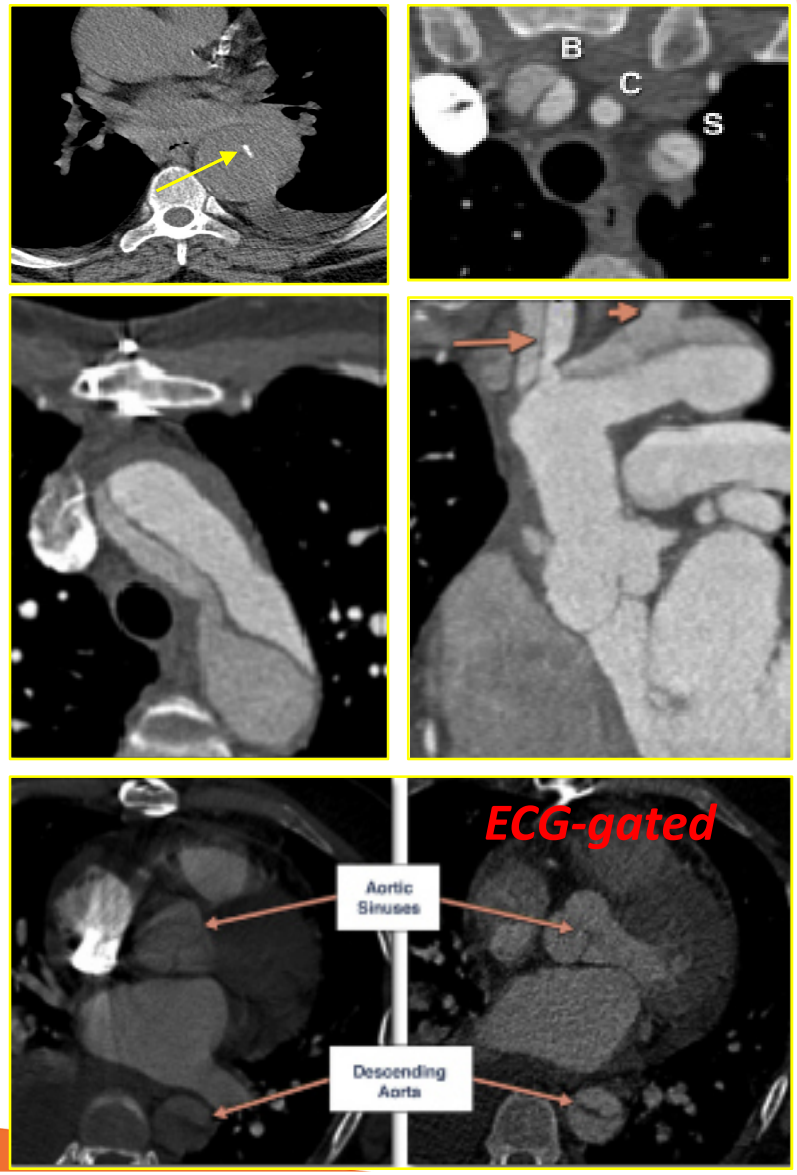
Svantaggi

- RX
- MdC

Sens – Spec: 95-98%

Table 6 Details required from imaging in acute aortic dissection

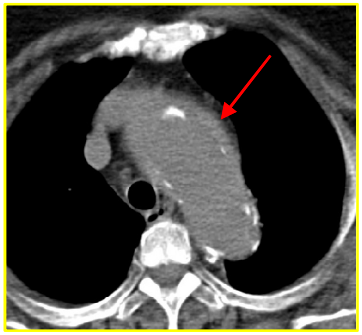
Aortic dissection
Visualizzation of *intimal flap*
Extent of the disease according to the aortic anatomic segmentation
Identification of *the false and true lumens* (if present)
Localization of *entry and re-entry tears* (if present)
Identification of antegrade and/or retrograde aortic dissection
Identification grading, and mechanism of aortic valve regurgitation
Involvement of side branches
Detection of *malperfusion* (low flow or no flow)
Detection of *organ ischaemia* (brain, myocardium, bowels, kidneys, etc.)
Detection of *pericardial effusion* and its severity
Detection and extent of pleural effusion
Detection of *peri-aortic bleeding*
Signs of mediastinal bleeding

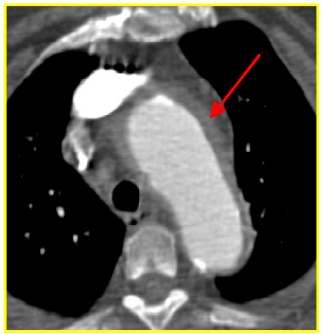


❖ *2014 ESC Guidelines on the diagnosis and treatment of aortic diseases*

MDTC

Intramural haematoma
Localization and extent of aortic wall thickening
Co-existence of atheromatous disease (calcium shift)
Presence of small intimal tears





Penetrating aortic ulcer
Localization of the lesion (lenght and depth)
Co-existence of intramural haematoma
Involvement of the peri-aortic tissue and bleeding
Thickness of the residual wall

[a]Class of recommendation.
[b]Level of evidence.

Recommendations	Class[a]	Level[b]
It is recommended that diameters be measured at pre-specified anatomical landmarks, perpendicular to the longitudinal axis.	I	C
In the case of repetitive imaging of the aorta over time, to assess change in diameter, it is recommended that the imaging modality with the lowest iatrogenic risk be used.	I	C
In the case of repetitive imaging of the aorta over time to assess change in diameter, it is recommended that the same imaging modality be used, with a similar method of measurement.	I	C
It is recommended that all relevant aortic diameters and abnormalities be reported according to the aortic segmentation.	I	C
It is recommended that renal function, pregnancy, and history of allergy to contrast media be assessed, in order to select the optimal imaging modality of the aorta with minimal radiation exposure, except for emergency cases.	I	C
The risk of radiation exposure should be assessed, especially in younger adults and in those undergoing repetitive imaging.	IIa	B
Aortic diameters may be indexed to the body surface area, especially for the outliers in body size.	IIb	B

❖ *2014 ESC Guidelines on the diagnosis and treatment of aortic diseases*

MRI

Sens: 95-98%
Spec: 94-98%

Vantaggi

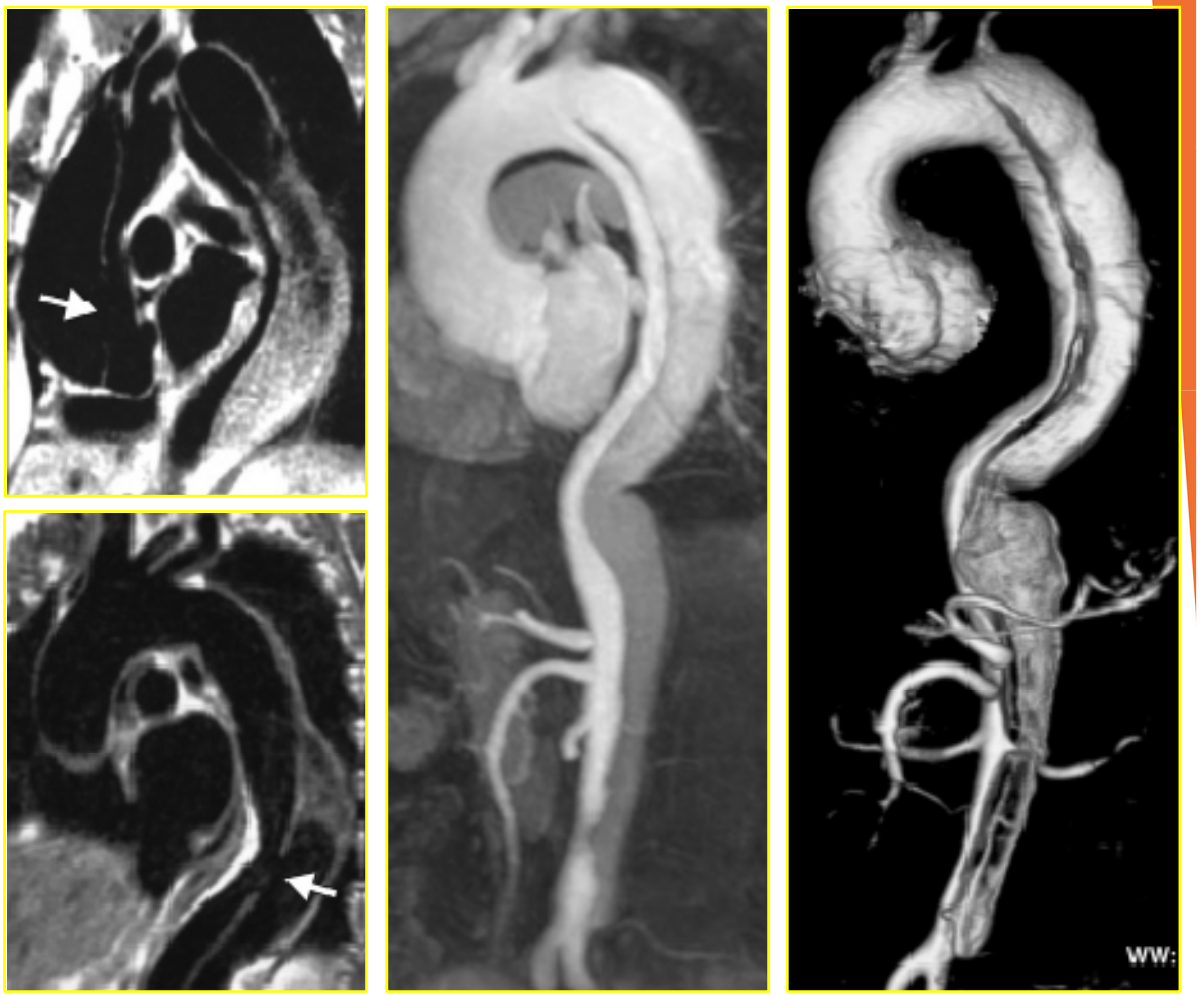
- No RX
- No iodinated MdC
- Panoramicità
- Sequenze dinamiche

Svantaggi

- < disponibilità
- Durata dell'esame
- Devices e accessibilità
- Gadolinio

- Non utilizzata in urgenza
- Grandi potenzialità nel follow-up

- Se dubbio TC in IMH e PAU



❖ Ragavendra R et al. The role of imaging in aortic dissection and relate syndromes – JACC:cardiovascular imaging vol.7,4 2014

Valutazione Aortica

Raccomendations	Class	Level
Historyand clinical assessment		
In all patients with suspected AAS, **pre-test probability** assessment is racommended, acording to the patient's condition, symptoms, and clinical features.	I	B
Laboratory testing		
In case of suspicion of AAS, the interpretation of biomarkers should always be considered along with the pre-test clinical probability	IIa	C
In case of low clinical probability of AAS, negative D-dimer levels shoul be considered as ruling out the diagnosis	IIa	B
In case of intermediate clinical probability of AASwith a positive (point-of-care) D-dimer test, further imaging tests should be considered	IIa	B
In patientes with high probability (risk score 2 or 3) of AD, testing of D-dimer is not racommended	III	C

Raccomendations	Class	Level
Imaging		
TTE is racommended as an initial imaging investigation	I	C

Recomendations	Class	Level
In stable patients with a suspicion of AAS, the following imaging modalities are recommended (or shoul be considered) according to local availability and expertise:		
• **CT**	I	C
• **MRI**	I	C
• **TOE**	IIa	C
In case of initially negative imaging with persistence of suspicion of AAS, **repetitive imaging (CT or MRI) is recommended.**	I	C
Chest X-ray may be considered in cases of low clinical probability of AAS.	IIb	C
In case of uncomplicated Type B AD treated medically, **repeated imaging (CT or MRI) during the first days** is recommended	I	C

❖ *2014 ESC Guidelines on the diagnosis and treatment of aortic diseases*

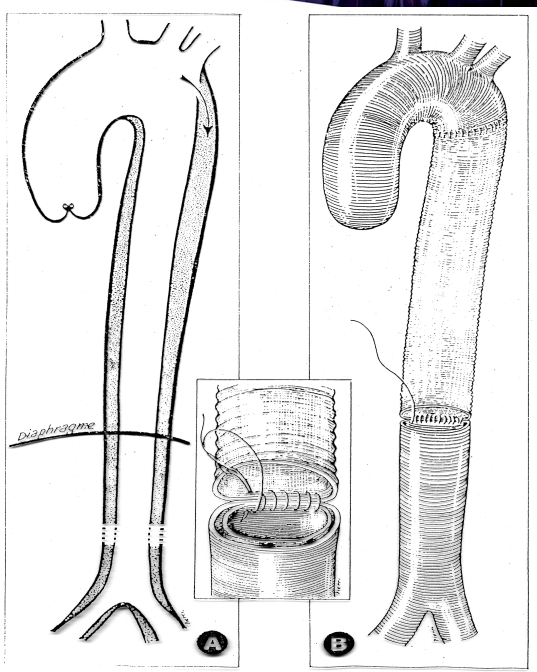
- ✓ *mortalità 1-2% per ogni 48*
- ✓ *50% nelle prime 48h*

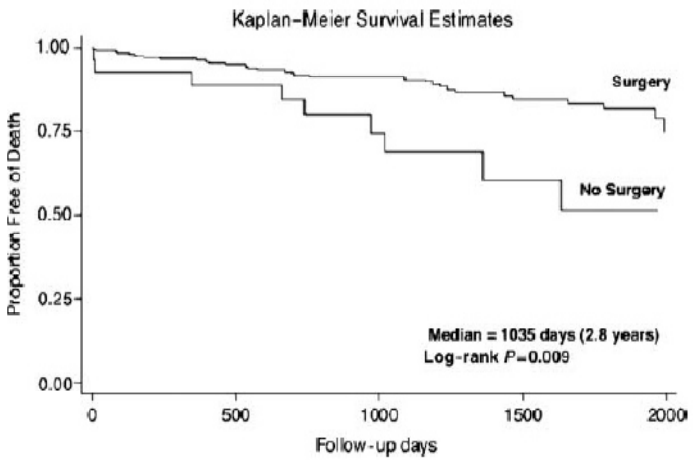
Trattamento

*Dissezione Aortica tipo **A***

Trattamento chirurgico in urgenza

- *Obiettivi: trattamento e prevenzione di complicanze letali:*
  - ✓ *Rottura aortica*
  - ✓ *Stroke / ischemia viscerale*
  - ✓ *Coinvolgimento coronarie*
  - ✓ *Insufficienza valvolare aortica*
- *Mortalità perioperatoria (25%) e complicanze neurologiche (18%) rimangono alte*
- *la mortalità intra-ospedaliera è molto più bassa per i pazienti operati piuttosto che quelli trattati con terapia medica (anche in presenza di importanti comorbilità) - IRAD*





- ❖ Chiappini B. et al. Early and late outcomes of acute type A dissection: analysis of risk factors in 487 consecutive patients. Eur Heart J 2005; **26**: 180-186
- ❖ Internetional Registry of Acute Aortic Dissection (IRAD)j Thorac Cardiovasc Surg 2010

Trattamento

AD tipo B non complicata

La ***terapia medica*** deve essere iniziata prontamente in tutti i pz anche durante la fase diagnostica

- ✓ Beta-bloccanti ⬇ 100-120 mmHg – 60-80 bpm
- ✓ Vasodilatatori ⬇ Pressione sanguigna
- ✓ Antidolorifici ⬇ Rilascio di catecolamine

Stretto monitoraggio dei parametri vitali
I Pz con AAS possono sviluppare complicanze e ipoperfusione d'organo

Buoni risultati in caso di AD(B) non complicate
- ✓ Sopravvivenza fase acuta 85%
- ✓ Mortalità a 30 giorni <10%

Recommendations for treatment of aortic dissection

Recommendetions	Class	Level
In all patients with AD, medical therapy including pain relief and blood pressure i recommended.	I	C
In patients with type A AD urgen surgery is recommended.	I	B
In patients with acute type A AD and organ malperfusion a hybrid approch (i.e. ascending aorta and/or arch replacement asociated with any percutaneus aortic or branch artry procedure) should be considered.	IIa	B
In uncomplicated type B AD, medical therapy should always be recommended.	I	C
In uncomplicated type B AD, Tevar should be cnsidered.	IIa	B
In complicated type B AD, TEVAR is recommended.	I	C
In complicated type B AD, surgery may be considered.	IIb	C

INSTEAD: medical care vs TEVAR
2Y surv: 95,6% vs 88,9%

- *INSTEAD trial Nienaber CA et al circulation 2009*
- *Winnerkvist A E et al (2006) Eur J Vasc Endovasc Surg*
- *Linee guida ICIR 2015*

Trattamento

AD tipo B complicata

- ***Organ malperfusion***
- ***Progressive dissection***
- ***Impending rupture***
- ***Intractable pain***
- ***Uncontrolled hypertension***

Terapia Chirurgica

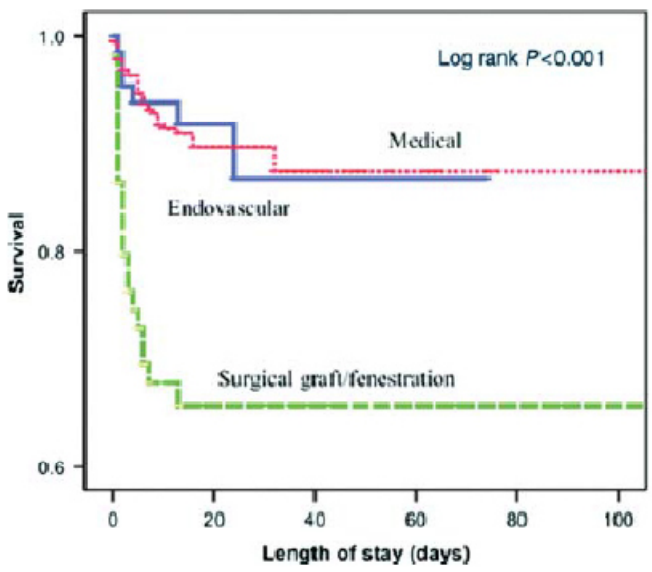
- ✓ Nei casi di dissezione tipo B complicata
- ✓ Sindrome di Marfan
- ✓ In casi di rottura in organi vitali

Terapia Endovascolare

- ✓ Ha come razionale l'esclusione dal circolo del FL, promuovendone la trombosi
- ✓ Rispetto alla chirurgia open, è riportato un minor tasso di mortalità e morbilità specialmente per complicanze correlate all'ischemia midollare (no randomized trials)
- ✓ Fenestrazione/stenting

Ulteriori Indicazioni TEVAR:

1. ***Dissezioni croniche tipo A dopo che siano state trattate chirurgicamente, quando è ancora pervio un FL a livello dell'aorta toracica discendente che durante il FU aumenta di dimensioni***
2. ***Dissezioni subacute o croniche tipo B con progressivo aumento di dimensioni della sacca (>55 mm o >4mm/y)***



- ❖ Linee Guida ICIR 2015
- ❖ Dake MD et al 1994 N Engl J Med 331:1729–1734
- ❖ Fattori R et 2006 J Thorac Cardiovasc Surg 132:332–332

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the guidelines

STATE-OF-THE-ART PAPER

Interdisciplinary Expert Consensus Document on Management of Type B Aortic Dissection

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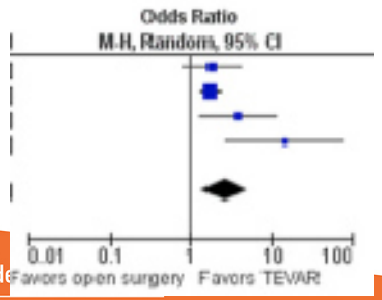
Pesaro, Rome, and Perugia, Italy; Berne, Switzerland; Barcelona, Spain; Rostock, Germany; Toulouse, France; and Brugge, Belgium

2006-2012 meta-analysis (63 studi)

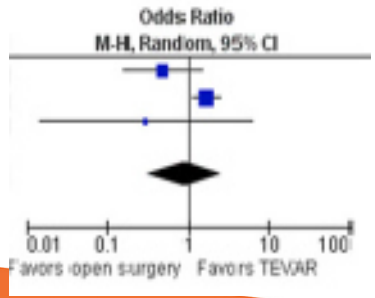
1548 pz medical treatment
3457 pz TEVAR
1706 pz open surgery

Early death	5Y surv
6,4%	70,2-89%
10,2%	56,3-87%
17,5%	44-64,8%

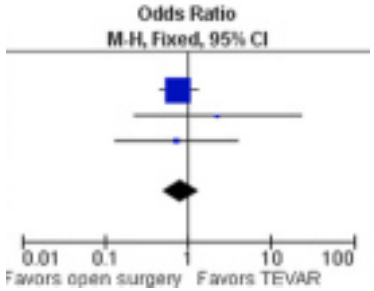
Early death



Early Stroke



Early spinal ischemia



Trattamento

Recommendations	Class	Level
In all patients with IMH, **medical therapy** including pain relief and blood presure control is recommended	I	C
In cases of **type A** IMH, urgent **surgery** is indicated.	I	C
In cases of type B IMH, initial medical therapy under careful surveillance is recommended.	I	C
In uncomplicated type B IMH, repetitive imaging (MRI or CT) is indicated	I	C
In **complicated type B IMH**, **TEVAR** should be considered	IIa	C
In complicated type B IMH, surgery may be considered	IIb	C

❖ ESC Guidelines 2014

Trattamento

Ulcera Aortica Penetrante (PAU)

2-7 % delle SAA

Evoluzione

- ✓ ***Regressione***
- ✓ ***Pseudoaneurisma***
- ✓ ***IMH***
- ✓ ***AD***
- ✓ ***Rottura***

mortalità precoce 4-21%
regressione a 1 anno 85%

❖ Quin LE et al. Radiology 2011; 218:719-23

Recommendations	Class[a]	Level[b]
In all patients with PAU, medical therapy including pain relief and blood pressure control is recommended.	I	C
In the case of Type A PAU, surgery should be considered.	IIa	C
In the case of Type B PAU, initial medical therapy under careful surveillance is recommended.	I	C
In uncomplicated Type B PAU, repetitive imaging (MRI or CT) is indicated.	I	C
In complicated Type B PAU, TEVAR should be considered.	IIa	C
In complicated Type B PAU, surgery may be considered.	IIb	C

❖ ESC Guidelines 2014

- ✓ Dolore e ipertensione
- ✓ Diametro aortico> 55mm
- ✓ Incremento diametro PAU>10mm/y

❖ *Marc P. Bonaca & Patrick T. O'Gara Curr Cardiol Rep (2014) 16:536*

Trattamento

DANNO AORTICO TRAUMATICO (TAI)

- Senza un trattamento adeguato, più del 50% dei pazienti muore entro le prime 72h

Recommendations	Class[a]	Level[b]
In case of suspicion of TAI, CT is recommended.	I	C
If CT is not available, TOE should be considered	IIa	C
In cases of TAI with suitable anatomy requiring intervention, TEVAR should be preferred to surgery.	IIa	C

TERAPIA MEDICA

- ✓ Mantenimento della Pr. Art.<80mm/Hg
- ✓ No somministrazione di liquidi

TERAPIA CHIRURGICA

- ✓ Toracotomia laterale sn
- ✓ Rischio di mortalità e paraplegia del 16-31% e 5-19%
- ✓ Da considerare l'uso di CEC

TERAPIA ENDOVASCOLARE

- ✓ TEVAR come trattamento di scelta
- ✓ tasso di mortalità TEVAR vs chirurgia open **9% vs 19%**; P<0,01
- ✓ Il tasso di Leak e di collasso della protesi 5,2% - 2,5%

- *Gillen JR J Vasc Surg. 2015 Mar;61(3):596-603*
- *ESC Guidelines 2014*
- *Murad Mh et al. J Vasc Surg 2011;53:p193–199 e1–e21.*
- *Demetriades D et al J Trauma 2008;64:561–70; 570–571*

TEVAR

Aspetti Tecnici

Selezione della protesi

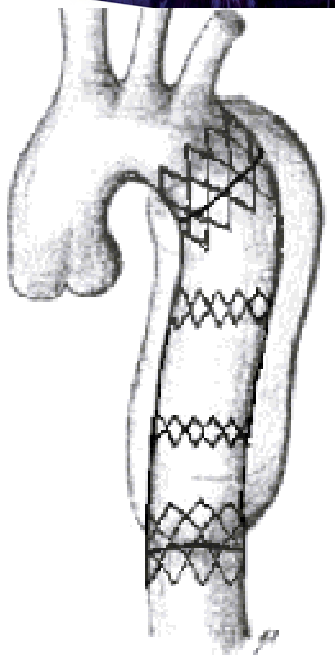
- ✓ *La scelta della protesi deve essere fatta solo dopo **plurime misurazioni**, soprattutto considerando il diametro dell'aorta sana a monte della dissezione*
- ✓ *Va fatto un **sovradimensionamento minimo** (<2mm) o nullo della protesi, in caso di **dissezione acuta**, utilizzando il tratto medio dell'arco, non dissecato, come target della misurazione*
- ✓ *Altro parametro da considerare è la lunghezza della protesi, bilanciando sempre il rischio di **ischemia midollare** e la necessità di drenaggio liquorale*
- ✓ *Se viene posizionata più di un'endoprotesi, al fine di evitare una disconnessione degli elementi protesici, specialmente nelle aorte tortuose, la **sovrapposizione** tra le due deve essere **>5 cm***

- ❖ Linee Guida ICIR 2015
- ❖ Fattori R al (2006) J Thorac Cardiovasc Surg 132:332–332
- ❖ Hausegger KA et al (2001) J Endovasc Ther 8(5):472–476

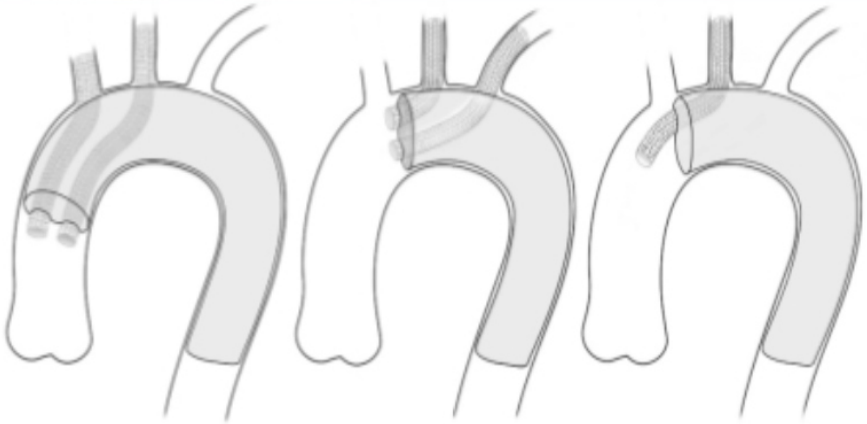
TEVAR

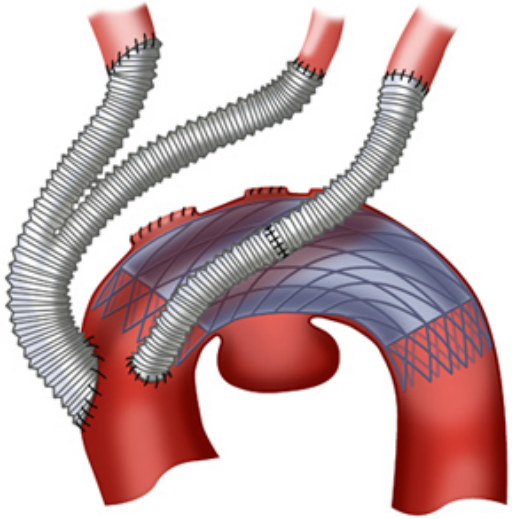
Aspetti Tecnici

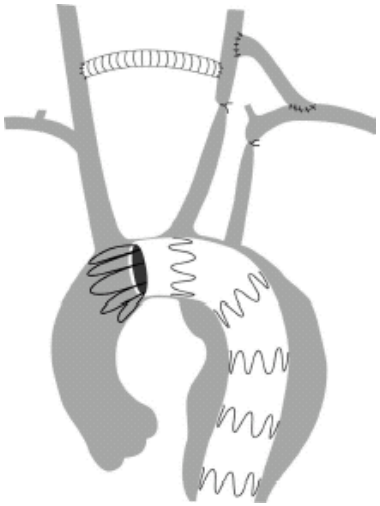
- ✓ Anatomia dell'istmo aortico
- ✓ Lunghezza landing zone prossimale prossimale



- **Debranching parziale (by-pass carotido-succlavio)**
- **Debranching totale dei TSA**
- **Chymney**





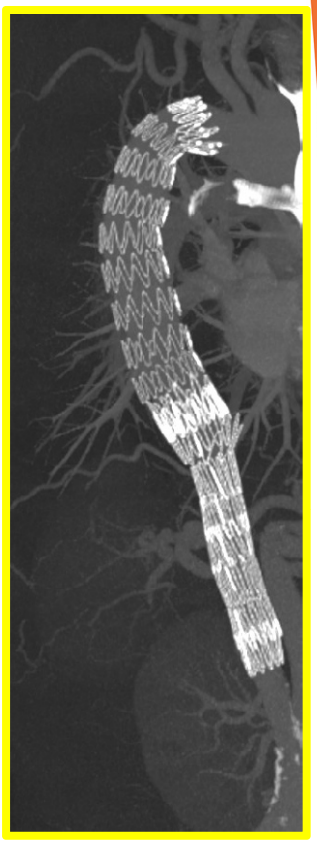


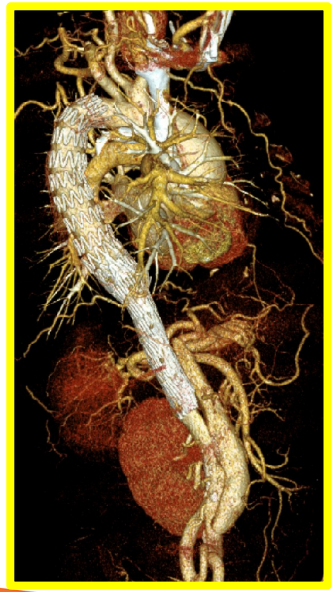
Follow-up

Follow-up

- *Poiché è una metodica considerata ancora «giovane» i pazienti che si sottopongono a TEVAR dovrebbero seguire uno stretto follow-up*

- *L'**Angio-TC** è la metodica gold-standard per lo studio di questi pazienti*





- Angio-TC alla dimissione o 1 mese dall'impianto
- Dopo 3-6-12
- Annualmente

Se possibile utilizzare la stessa metodica e nello stesso centro diagnostico (calss IIa – LOE C)

Cosa ricercare?

Follow-up post-TEVAR
Dimensioni dell'aorta (VL+FL)
Caratteristiche della protesi
Presenza di endoleak

❖ Linee Guida ICIR 2015

Conclusioni

- *AngioTC esame di prima istanza in urgenza*
- *RM potrebbe ricoprire un ruolo fondamentale nel follow-up*
- *Chirurgia per patologie dell'aorta ascendente*
- *Trattamento medico e monitoraggio nelle patologie dell'aorta discendente non complicate*
- *TEVAR preferita alla chirurgia nelle sindromi complicate dell'aorta toracica discendente*
- *Necessità di studi e follow-up a lungo termine*

Grazie per la vostra attenzione