Lo screening dell'aorta addominale durante eco standard

Francesco Natale

Lo screening dell'aneurisma dell'aorta addominale?

O valutazione opportunistica dell'aorta addominale durante eco standard ?

È utile fare uno screening?
Chi deve fare lo screening?
Come fare lo screening?
È fattibile ed utile lo studio dell'aorta addominale durante ecocardiogramma ?
Di quanto allunga l'esame
Come si fa?

Domande

È utile fare uno screening?

Chi deve fare lo screening?

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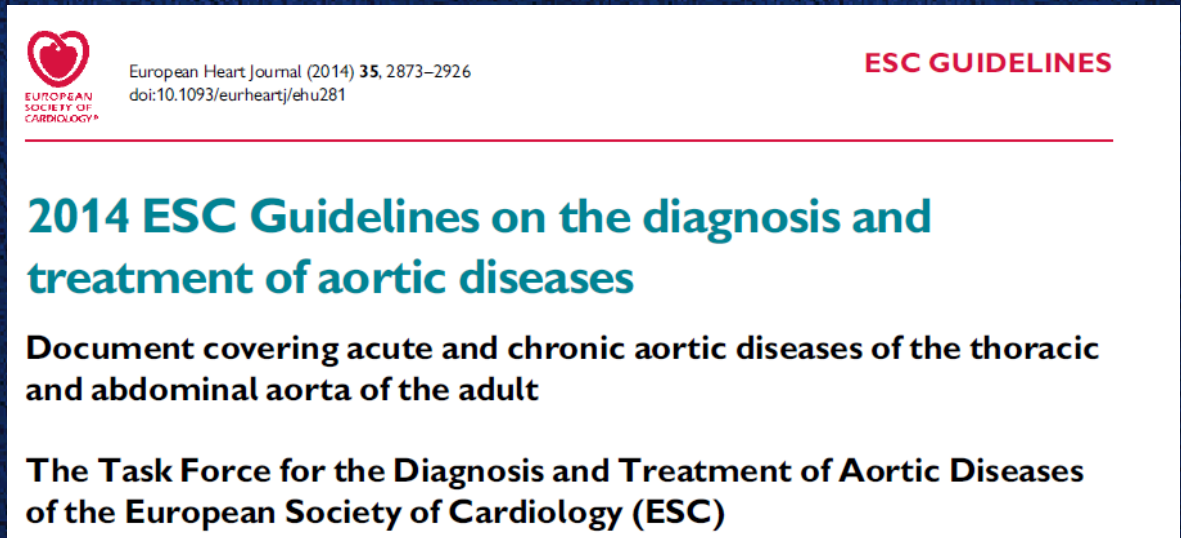
Di quanto allunga l'esame

Come si fa?

Screening abdominal aortic aneurysm in high-risk populations

The *grim prognosis* of ruptured AAA (mortality .60–70%) contrasts with the *excellent survival rate* (.95%) after planned AAA operation. This observation, along with the silent course of AAA and the possibility of detecting it easily with ultrasound, led to the consideration of mass screening in subgroups at risk.



European Heart Journal (2014) **35**, 2873–2926
doi:10.1093/eurheartj/ehu281

ESC GUIDELINES

2014 ESC Guidelines on the diagnosis and treatment of aortic diseases

Document covering acute and chronic aortic diseases of the thoracic and abdominal aorta of the adult

The Task Force for the Diagnosis and Treatment of Aortic Diseases of the European Society of Cardiology (ESC)

TABLE 4

Number of patients who need to be screened in order to prevent one disease-specific death

	NNS*	Time period
Fecal occult blood test	808	8.5 years
Colonoscopy	862	13 years
Mammography (women aged 50 to 69 years)	Approx 2000	10 years
Ultrasound of the abdominal aorta (men aged 65 to 80 years)	350	7–15 years

* numbers needed to screen (24, 25)

(i.e. men ≥65 years, smokers and those with a family history of AAA).

. U.S. Preventive services Task Force: Screening for abdominal aortic aneurysm: recommendation statement. Ann Int Med 2005; 142: 198–202.

. Rembold CM: Number needed to screen: development of a statistic for disease screening. BMJ 1998; 317: 307–12.

Domande

È utile fare uno screening?

Chi deve fare lo screening?

Come fare lo screening?

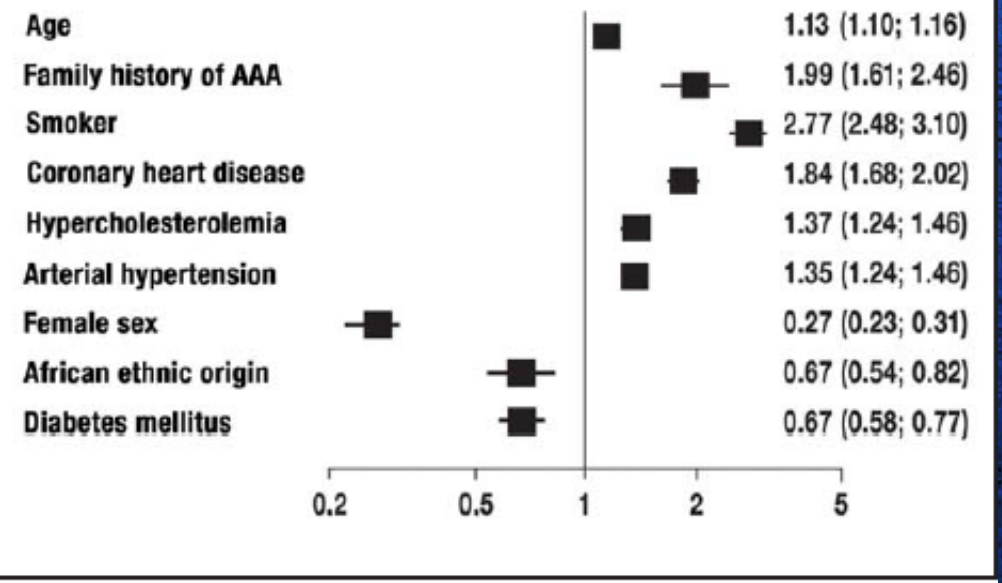
È fattibile lo studio dell'aorta addominale durante ecocardiogramma ?

Di quanto allunga l'esame

Come si fa?

Fattori di rischio per aneurisma aorta addominale

FIGURE 2



Clinical risk factors for the development of an abdominal aortic aneurysm. Evaluation of eight different population-based studies including more than 110 000 probands (8)

European Heart Journal (2014) 35, 2873–2926
doi:10.1093/eurheartj/ehu281

ESC GUIDELINES

2014 ESC Guidelines on the diagnosis and treatment of aortic diseases

Document covering acute and chronic aortic diseases of the thoracic and abdominal aorta of the adult

The Task Force for the Diagnosis and Treatment of Aortic Diseases of the European Society of Cardiology (ESC)

Ultrasonographic Screening for the Detection of Abdominal Aortic Aneurysms

Hans-Henning Eckstein, Dittmar Böckler, Ingo Flessenkämper, Thomas Schmitz-Rixen, Sebastian Debus, Werner Lang

Fattori di rischio per malattie cardiovascolari

Age,
male gender,
personal history of atherosclerotic cardiovascular disease,
Smoking,
Hypertension
LDL cholesterol level, high-density lipoprotein (HDL) cholesterol level, triglyceride level,
Presence or absence of type 2 diabetes mellitus
body-mass index glucose and insulin levels

I FATTORI DI RISCHIO PER MALATTIE CARDIOVASCOLARI SI SOVRAPPONGONO A QUELLI PER ANEURISMA DELL'AORTA ADDOMINALE...E SONO GLI STESSI CHE RITOVIAMO NEI PAZIENTI CHE GIUNGONO AL LABORATORIO DI ECOCARDIOGRAFIA

Domande
È utile fare uno screening?
Chi deve fare lo screening?

Come fare lo screening?

È fattibile lo studio dell'aorta addominale durante ecocardiogramma ?
Di quanto allunga l'esame
Come si fa?

Ultrasonography

is an excellent tool for screening and surveillance, without risk and at lowcost. Diameter measurements should be performed in the plane perpendicular to the arterial axis, to avoid any overestimation of the actual diameter

Sensitivity and specificity of 98%

Lindholt JS, Vammen S, Juul S, Henneberg EW, Fasting H: The val - idity of ultrasonographic scanning as screening method for abdominal aortic aneurysm. Eur J Vasc Endovasc Surg 1999; 17: 472–5.

International Variations in AAA Screening CME

P.W. Stather [a,d], N. Dattani [a,d], M.J. Bown [a,d], J.J. Earnshaw [b,d], T.A. Lees [c,*,d]

[a] Vascular Surgery Group, Department of Cardiovascular Sciences, University of Leicester, Leicester LE2 7LX, UK
[b] Department of Vascular Surgery, Gloucestershire Royal Hospital, Great Western Road, Gloucester GL1 3NN, UK
[c] Department of Vascular Surgery, The Freeman Hospital, Newcastle University, Newcastle upon Tyne NE7 7DN, UK

Table 1. Comparison of aneurysm screening programmes and trials worldwide.

Country	Start date trial	End date trial	National screening implemented	Population screened in trial	Population covered by screening programme	Total screened thus far	Age group invited	Gender
Western Australia	1996	1998	No	12 203	N/A	12 203	65—79 years	Male
Denmark (2 trials)	1994 2008	1995 2010	No	4843 25 000	N/A	29 843	65—74 years	Male
England (2 trials)	1997 1988	1999 1994	Yes started 2009	27 147 5394	51 000 000	52 000	65th year (65—74 years in trial)	Male
Finland*	N/A	N/A	No	N/A	N/A	N/A	N/A	N/A
Norway	2011	2029	Oslo only	N/A	2000/year	1116	65 years	Male
New Zealand	2012	Ongoing	No	2000	300 000	250	High cardiovascular risk	Male and Female
Scotland	N/A	N/A	Yes started July 2012	N/A	5 200 000	Unknown	65th year	Male
Sweden	N/A	N/A	Yes started 2006	N/A	8 100 000	Attendance rate 85%	65 years (65—74 years in trial)	Male
Italy	2007	Ongoing	No	8234	N/A	8234	65 years and over	Male and Female
Wales	N/A	N/A	Due to start 2012	N/A	2 900 000	N/A	65th year	Male
Northern Ireland	N/A	N/A	Yes started July 2012	N/A	1 800 000	Unknown	65th year	Male
USA (Society for Vascular Surgery guidelines)	2007	2008	Recommends if ever smoked >100 cigarettes	2918	311 000 000	Unknown	60—85 years Male 60—85 years Female with cardiovascular risk Over 50 if family history	Male and Female

* Finland evaluated the cost-effectiveness of screening, but have not yet begun national screening.

Table 2. Worldwide surveillance intervals for population aneurysm screening.

Country	What diameter is considered an aneurysm	What size is referred for consideration of surgery	Prevalence of AAA in subjects undergoing screening	Surveillance interval	Mortality from repair of screen-detected aneurysms
Western Australia	≥30 mm	≥50 mm	≥30 mm 7% ≥ 55 mm 2.5%	6–12 monthly	65–74 year men 2.5%
Denmark	≥30 mm	≥50 mm (but not considered for surgery until 55 mm)	3.3%	Annually (2–4 times annually if +55 mm)	1.5%
England	≥30 mm	≥55 mm	1.7%	30–44 mm yearly 45–54 mm 3 monthly	0.77%
Norway	≥30 mm	≥55 mm	3.4%	25–29 mm after 5 years 30–40 mm every 2 years 40–45 mm yearly >45 mm every 3–6 months	0%
New Zealand	≥30 mm	≥55 mm	Pilot 8.9% in high cardiovascular risk males >65 years	Annually	Unknown
Scotland	≥30 mm	≥55 mm	Unknown	30–44 mm yearly 45–54 mm 3 monthly	Unknown
Sweden	≥30 mm however many counties offer a 5 year follow up scan if 25–29 mm	≥55 mm	1.7% + 0.5% already known outside of programme	25–29 mm after 5 years 30–39 mm every 2 years 40–44 mm yearly 45–50 mm 6 monthly 50–55 mm 3 monthly	0%
Italy	≥30 mm	≥50 mm	6.2%	6 monthly	0.61%
Wales	≥30 mm	≥55 mm	Unknown	30–44 mm yearly 45–54 mm 3 monthly	Unknown
Northern Ireland	≥30 mm	≥55 mm	Unknown	30–44 mm yearly 45–54 mm 3 monthly	Unknown
USA	≥30 mm	≥50 mm	Unknown	26–29 mm 5 yearly 30–34 mm 3 yearly 35–44 mm 12 monthly 45–54 mm 6 monthly	Unknown

Screening criteria

All countries perform screening for men, with the USA, New Zealand and Italy also screening women. All countries screen individuals in their 65th year or older, with New Zealand only screening subjects with high cardiovascular risk, and the USA only screening ever smokers.

International Variations in AAA Screening CME

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TABLE 2

Overview of the randomized studies of ultrasound screening for abdominal aortic aneurysms (AAA) (1)

	MASS (UK)	Western Australia	Viborg (Denmark)	Chichester (UK), men	Chichester (UK), women
Age (years)	65–74	65–83	65–73	65–80	65–80
Sex	Men	Men	Men	Men	Women
Randomized	67 800	38 704	12 658	6433	9342
Follow-up (years)	7	3.6	9.6	15	5
Screening achieved	80%	63%	77%	73%	65%
Prevalence of AAA >3 cm	4.9%	7.2%	4.0%	7.6%	1.3%

E' UTILE?

Risultati a medio e lungo termine dei programmi di screening

Middle- and long-term effects of ultrasound screening*[1]

Follow-up at 3–5 years	Screening, n = 62 729	Control, n = 62 847	Odds ratio (95% CI)	P
AAA-related deaths	102	182	0.56 (0.44–0.72)	< 0.0001
Overall deaths	7 453	7 953	0.94 (0.86–1.02)	0.14
Elective AAA operations	505	162	3.27 (2.15–5.00)	< 0.0001
Emergency operations	55	101	0.55 (0.39–0.76)	0.0003
Follow-up at 7–15 years	**Screening, n = 43 167**	**Control, n = 43 312**	**Odds ratio (95% CI)**	**P**
AAA-related deaths	123	245	0.47 (0.25–0.90)	0.02
Overall deaths*[2]	14 922	15 568	0.94 (0.91–0.97)	< 0.0001
Elective AAA operations	567	204	2.81 (2.40–3.30)	< 0.0001
Emergency operations	77	172	0.48 (0.28–0.83)	0.009

A number of factors

such as

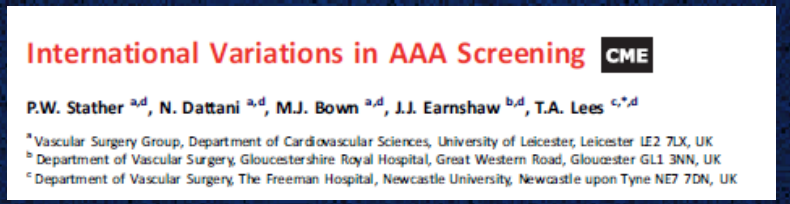
up-front costs

ultrasonographer training,

database development,

geographical distribution of ultrasonographers

are **significant barriers** to the introduction of national AAA screening.



International Variations in AAA Screening CME

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Domande

È utile fare uno screening?

Chi deve fare lo screening?

Come fare lo screening?

È fattibile ed utile lo studio dell'aorta addominale durante ecocardiogramma ?

Di quanto allunga l'esame

Come si fa?

Table 1 Feasibility of abdominal aorta imaging in different series of transthoracic echocardiography. Literature review.

First author, year [study reference]	Aorta imaging success rate (%)	Reported imaging duration
Eisenberg et al., 1995 [12]	82	≤ 5 minutes
Schwartz et al., 1996 [18]	86	NA
Spittell et al., 1997 [20]	96	Average 7.7 minutes (1–20)
Jaussi et al., 1999 [14]	> 95	≤ 5 minutes
Bernard et al., 2002 [11]	87	1–5 minutes
Giaconi et al., 2003 [13]	91	< 2 minutes
Bekkers et al., 2005 [10]	93	NA
Ruggiero et al., 2006 [17]	95	33.8 ± 18.6 seconds
Roshanali et al., 2007 [16]	91	Average 2.2 minutes (1.1–4.4)

NA: not available.

REVIEW

Screening abdominal aorta aneurysm during echocardiography: Literature review and proposal for a French nationwide study

REVIEW

Screening abdominal aorta aneurysm during echocardiography: Literature review and proposal for a French nationwide study

Table 2 Prevalence of abdominal aorta aneurysm in different series of transthoracic echocardiography.

First author, year [study reference]	*N*	Selection	Age (years)	AAA definition	Aorta segment	Prevalence (men/women)	Comments
Eisenberg et al., 1995 [12]	323	Unselected	57	> 25 mm	Distal aorta not always visualized	2.0% (8.5/2.5)	
Schwartz et al., 1996 [18]	250	Unselected	–	> 30 mm	?	6.0%	
Spittell et al., 1997 [20]	209	Age > 50 years with HTN	71.3	> 30 mm	Abdominal aorta	6.5% (8.4/4.3)	
Jaussi et al., 1999 [14]	297	Unselected	58.6	> 30 mm	Infra-renal	5.7% (8.2/1.7)	
Seelig et al., 2000 [19]	14,876	Unselected, age > 50 years	68.5	> 30 mm	Not stated	0.8% (1.3/0.2)	Seven false positive cases (93.5% specificity)
Bernard et al., 2002 [11]	1106	Unselected	61	> 35 mm	Infra-renal	1.0%	
Giaconi et al., 2003 [13]	181	Unselected (?) men	61	≥ 30 mm	?	3.8% (3.8/–)	
Bekkers et al., 2005 [10]	742	Unselected	60.5	> 30 mm	Infra-renal	5.7%	81% unknown cases. Prevalence up to 19% in men aged > 70 years. Ten patients with AAA > 5 cm; five underwent abdominal CT scan: diameters correlated well ($r^2 = 0.9$).
Ruggiero et al., 2006 [17]	1107	Selected and unselected	–	–	?	5.6%	Only those with history of surgery for AAA excluded
Roshanali et al., 2007 [16]	1285	Unselected	40.7	> 40 mm	Supra-renal only	3.8% (4.5/3.6)	> 3 cm, 4.9%; > 5 cm, 0.5%

AAA: abdominal aorta aneurysm; CT: computed tomography; HTN: hypertension.

Domande

È utile fare uno screening?

Chi deve fare lo screening?

Come fare lo screening?

È fattibile ed utile lo studio dell'aorta addominale durante ecocardiogramma ?

Di quanto allunga l'esame

Come si fa?

Aorta Addominale: Studio US

- **Esplorazione:**
  Dall'emergenza del tripode celiaco sino alla biforcazione iliaca
- **Profondità:**
  Compresa tra 5 e 10 cm
- **Trasduttori:**
  Sonde settoriali o convex da 3.0-5.0 MHz
- **Pz. a digiuno:**
  In decubito supino o laterale

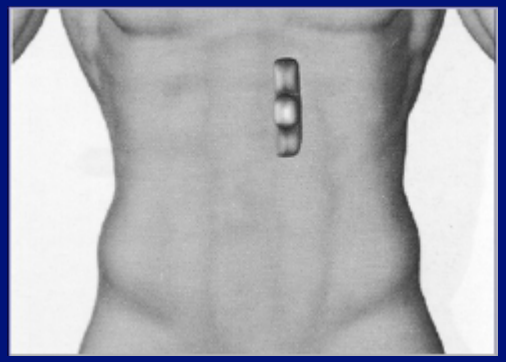
Aorta Addominale: Parametri US

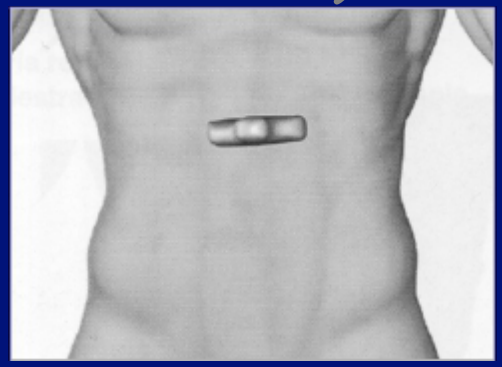
Diametro (scansione trasversa e longitudinale)

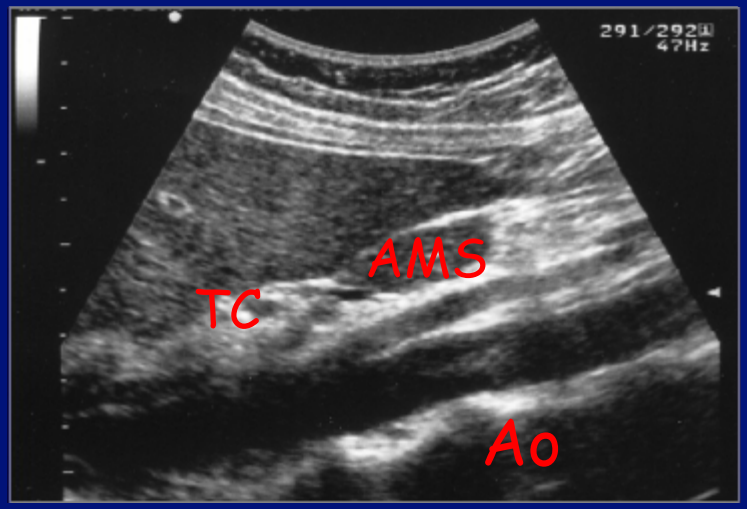
Profilo parietale (ectasia, dissezione, stenosi)

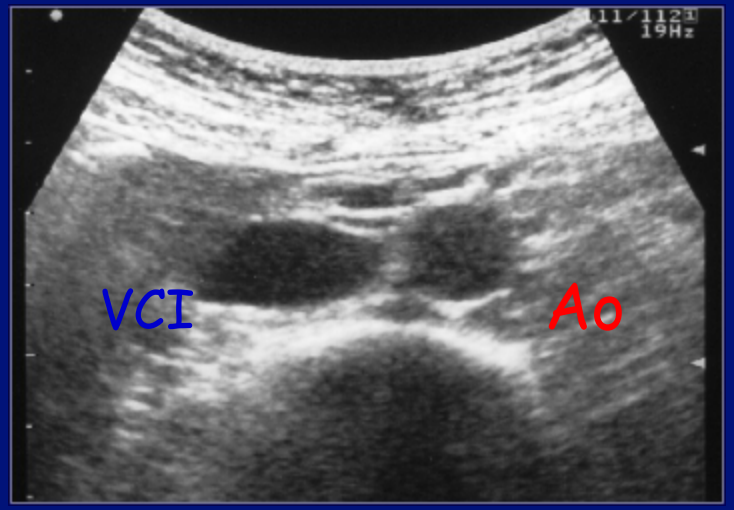
Caratteristiche del flusso

Aorta Addominale (Eco B-Mode)





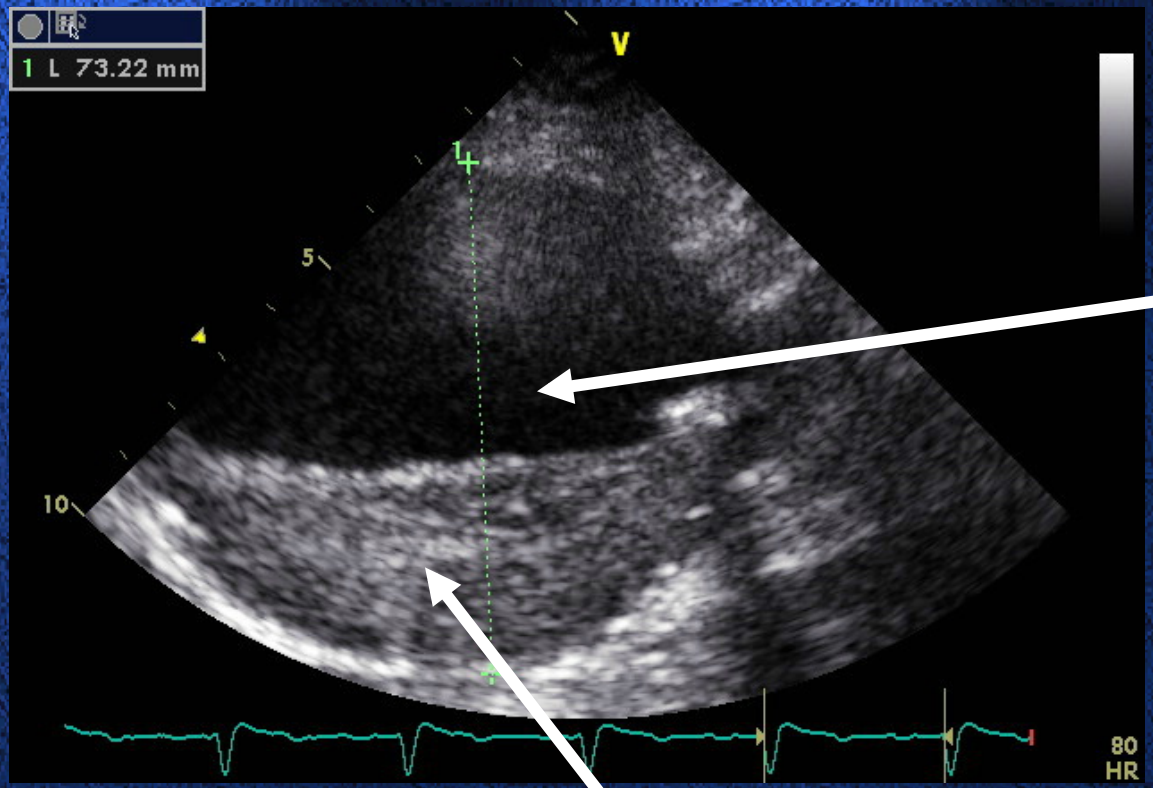




- Struttura anecogena:
  tubulare (scansione longitudinale)
  circolare (scansione trasversa)
- Pareti: iperecogene, profilo regolare

spessore di 1.5-2 mm

- Pulsatilità sisto-diastolica

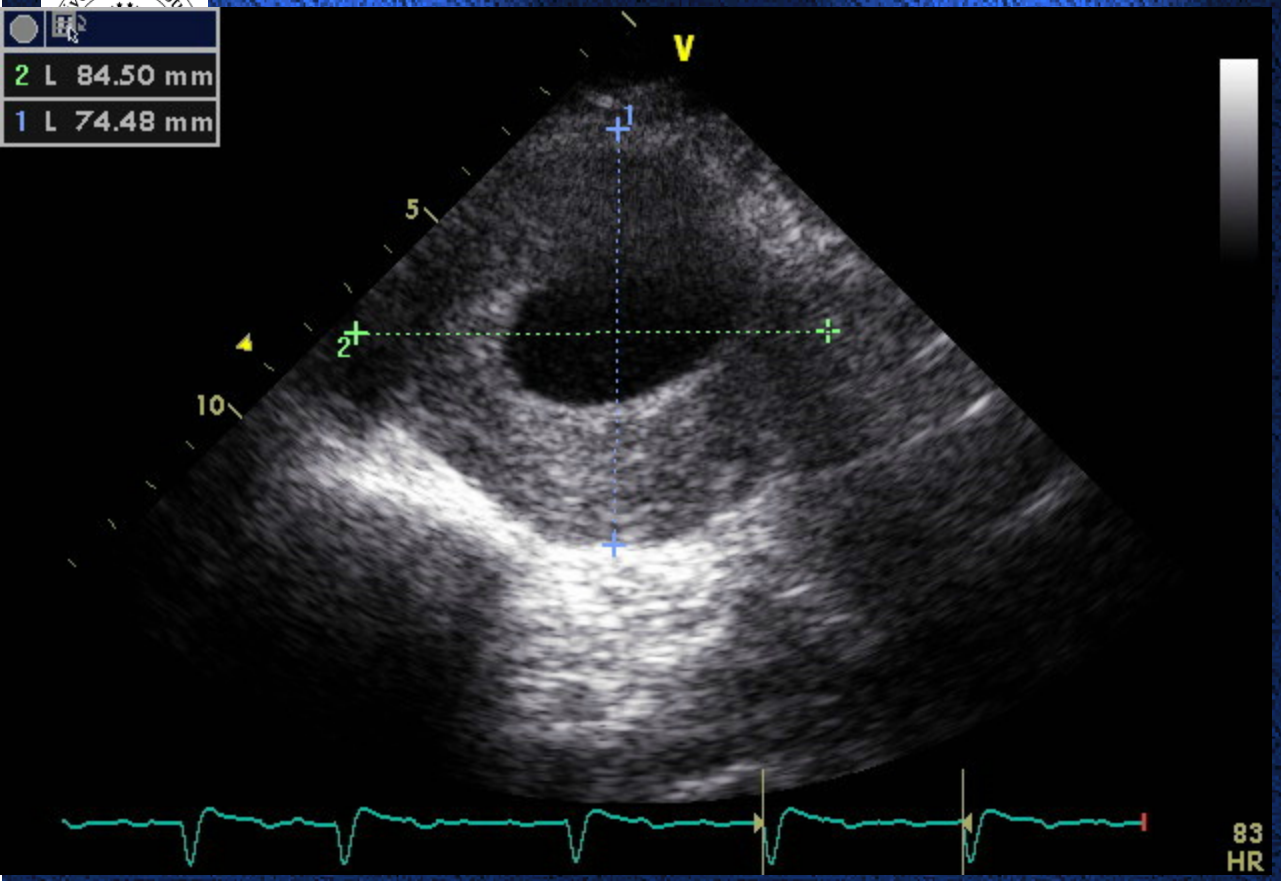


Lume

Aneurisma trombizzato

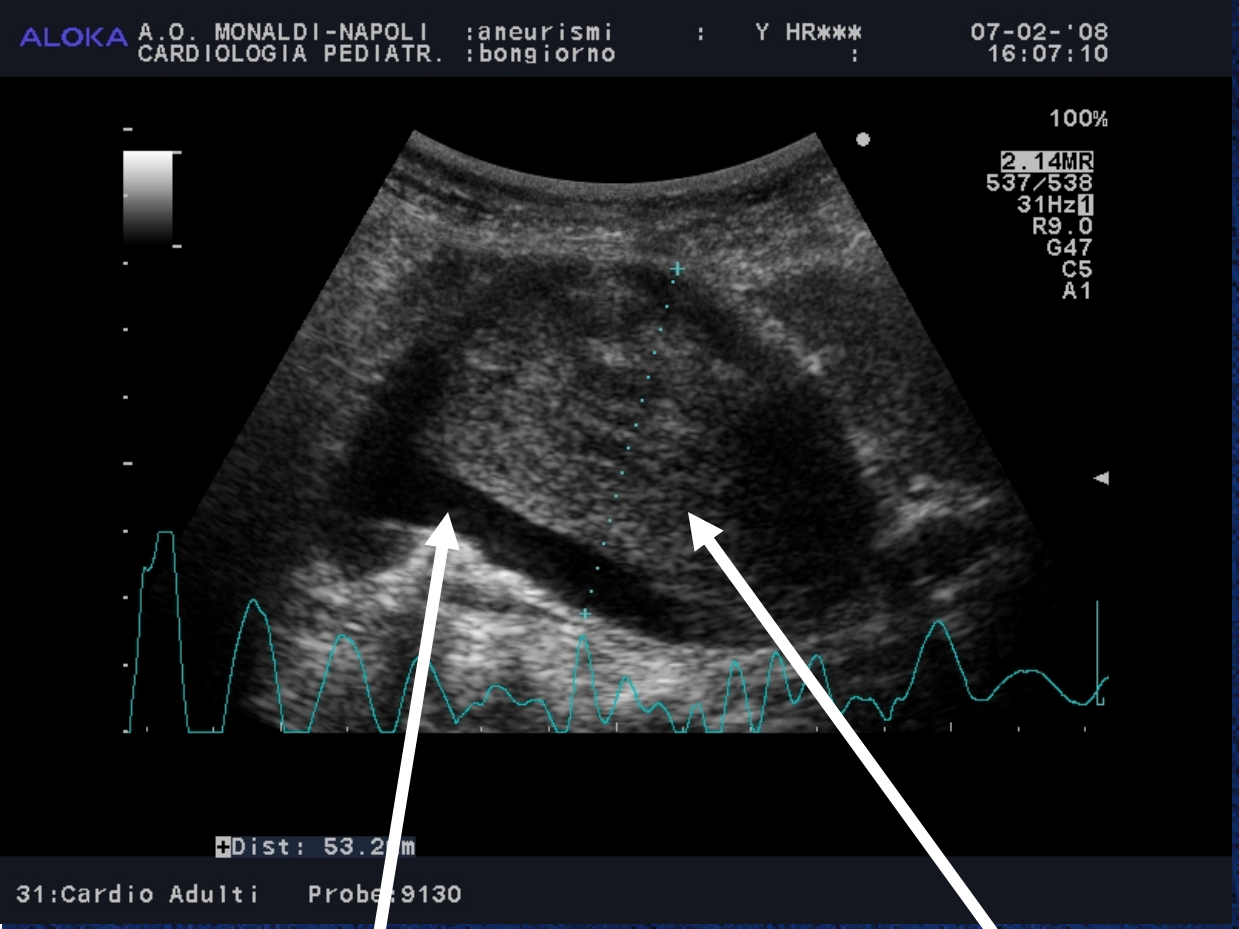
Proiezione asse longitudinale

Sonda da 2.5 MHz (cardiologica)



Proiezione asse trasverso

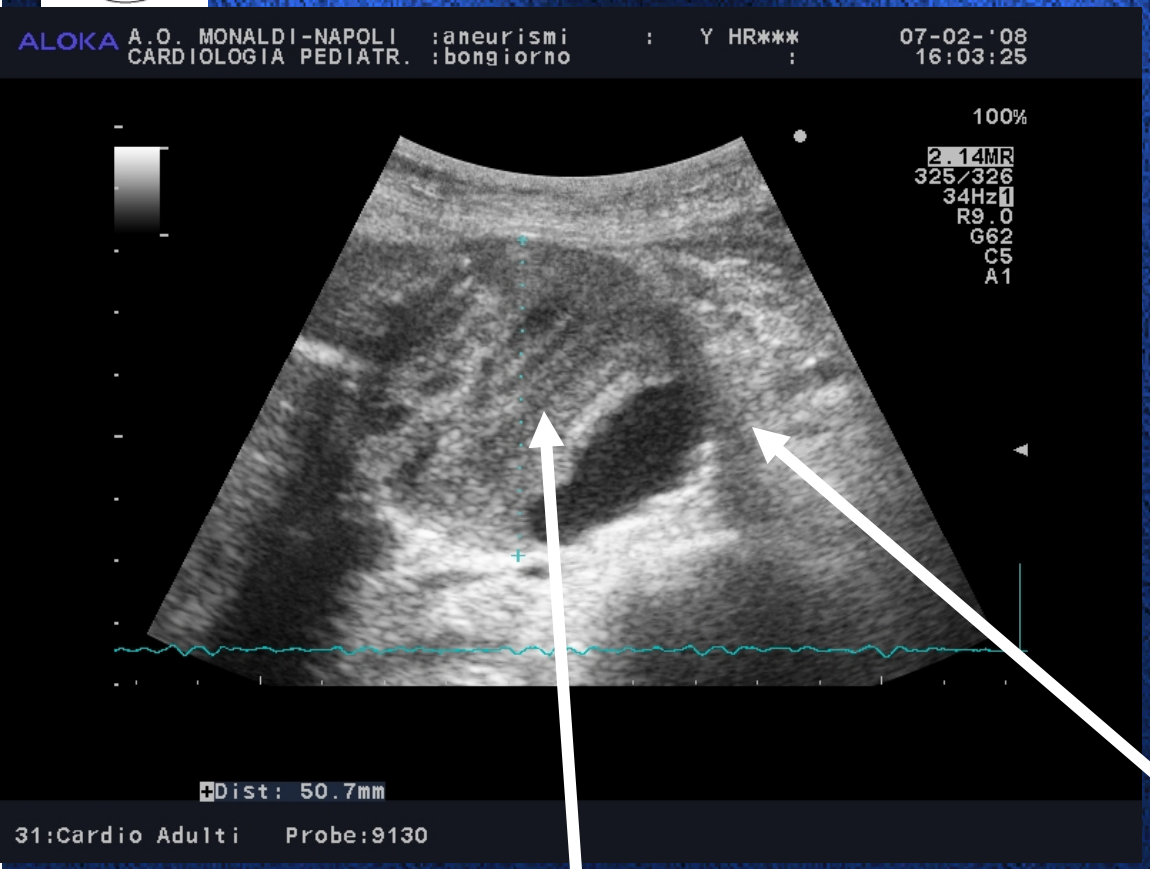
Sonda da 2.5 MHz (cardiologica)



Proiezione: asse longitudinale

Trombo che riduce il lume del vaso dell'80% circa

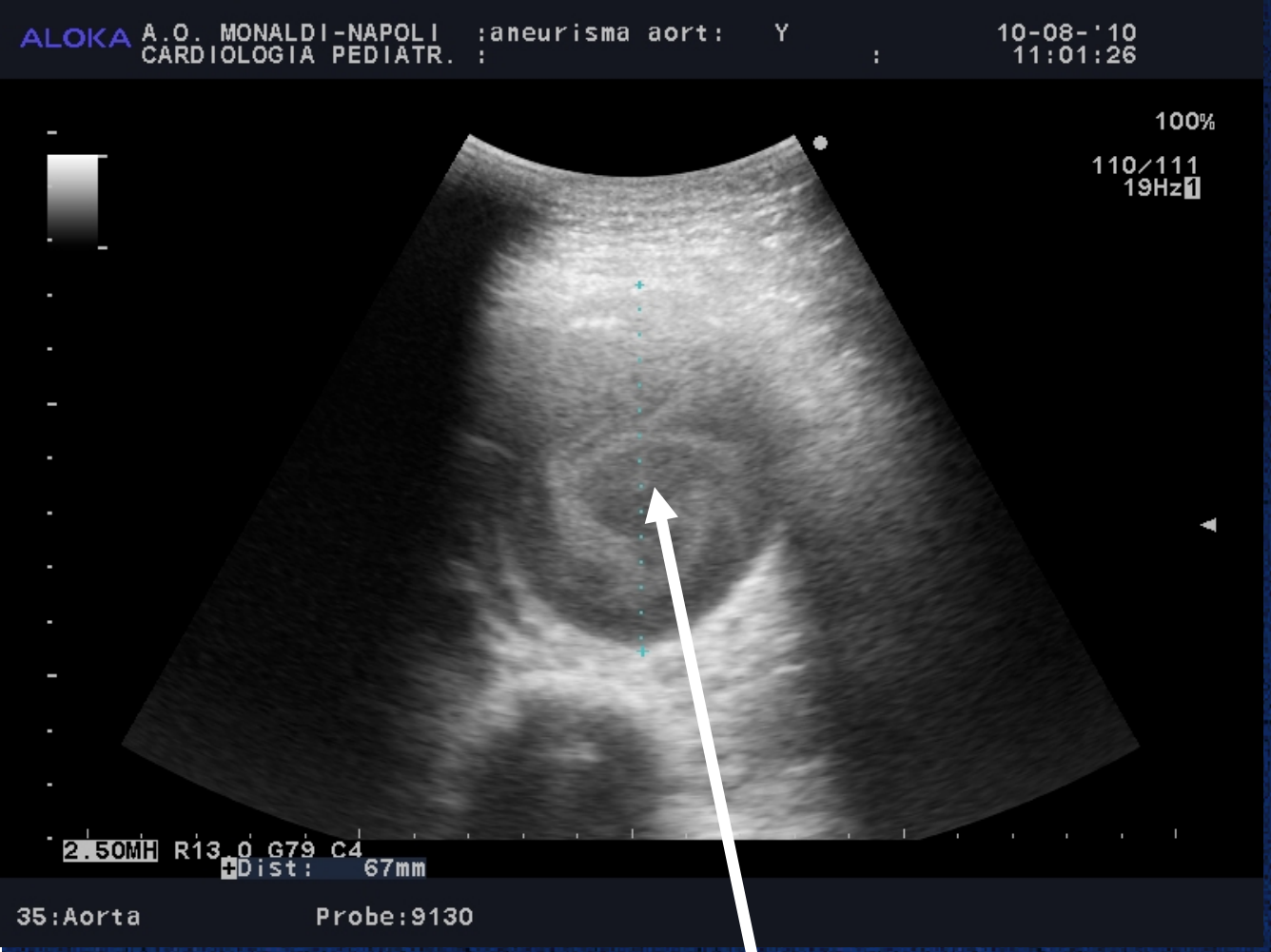
Lume residuo



Proiezione: asse trasverso

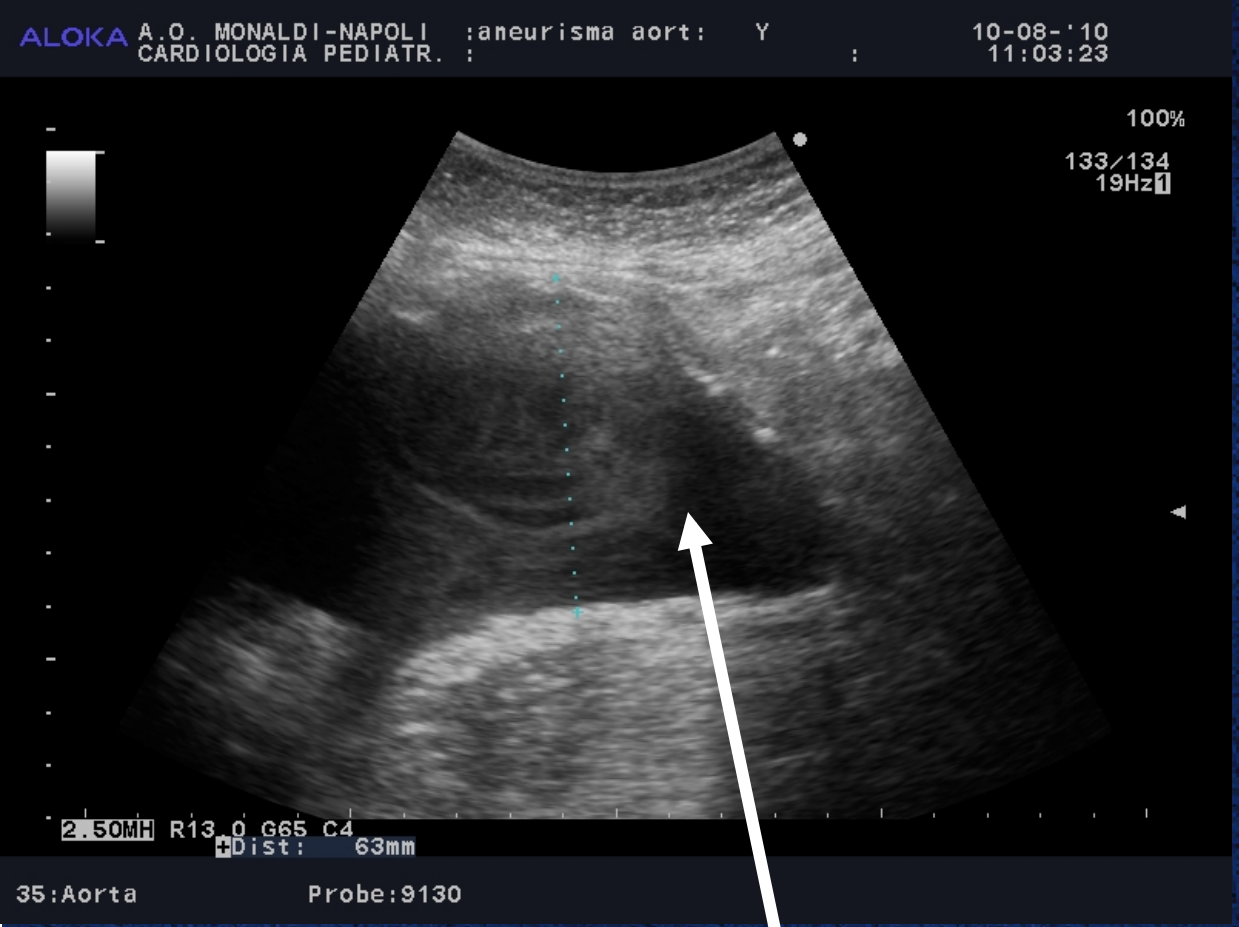
Trombo che riduce il lume del vaso dell'80% circa

Lume residuo



Proiezione: asse trasverso

Importante rallentamento del flusso con evidenza di “ecocontrasto spontaneo”



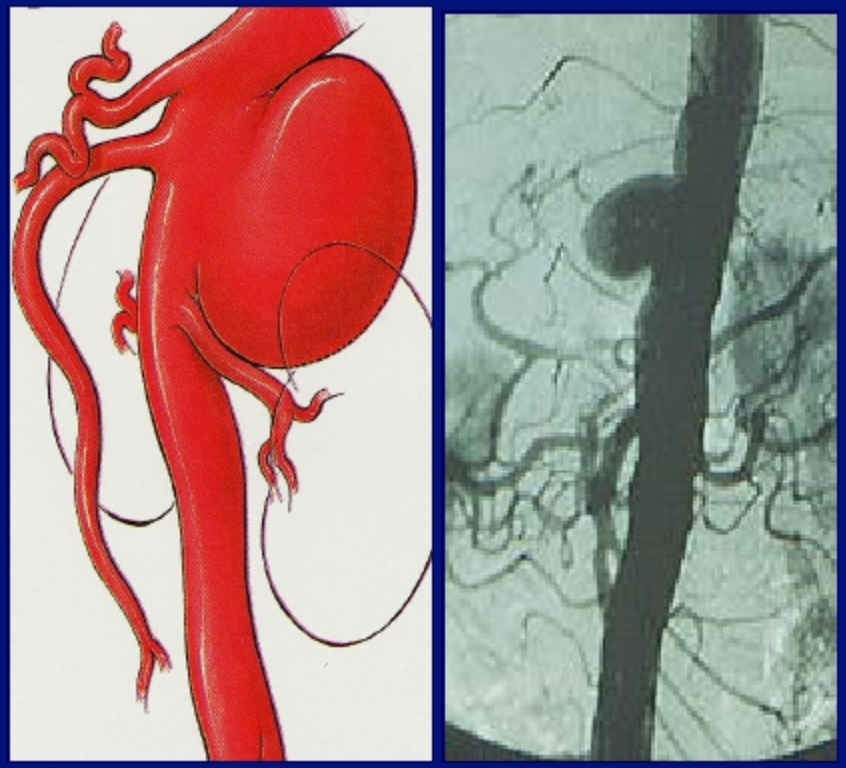
Proiezione: asse longitudinale

Importante rallentamento del flusso con evidenza di “ecocontrasto spontaneo”

Aneurisma dell'aorta addominale

Morfologia

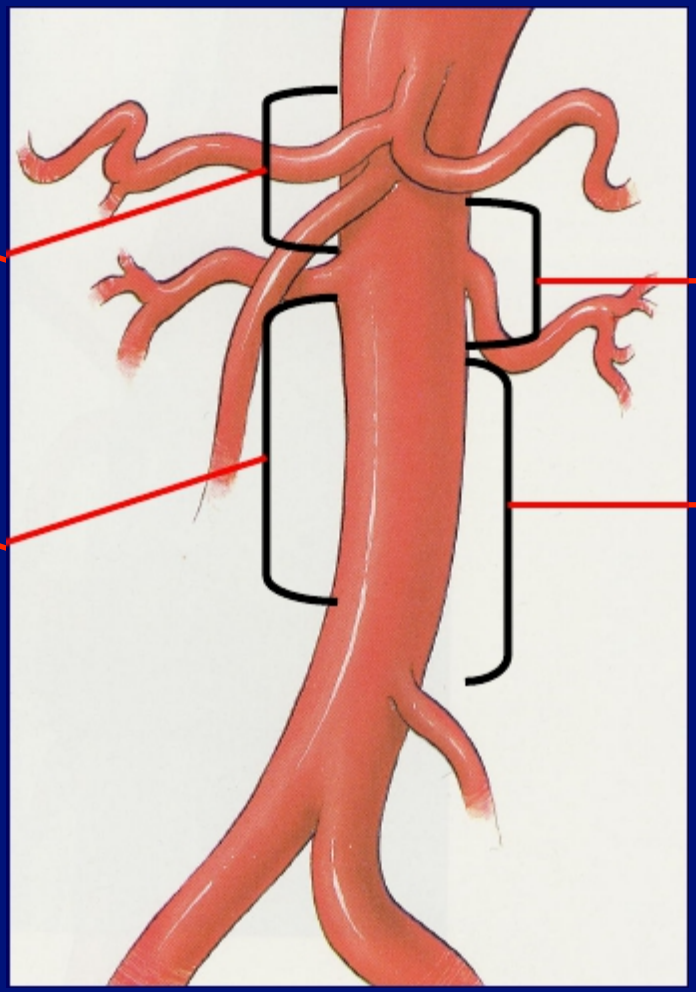
Fusiforme



Sacciforme

Aneurisma dell'aorta addominale - Sede

Classificazione anatomica



Sovrarenale

Iuxtarenale

Pararenale

Sottorenale
(90%, posto a 2 o più cm dall'origine delle aa. renali)

VALORE AGGIUNTO

Fattori di rischio dopo valutazione ecocardiografica

Table 3 Risk factors for abdominal aorta aneurysm in different series of transthoracic echocardiography.

Risk factor	Study reference							
	[18]	[20]	[14]	[19]	[11]	[10]	[17]	[16]
Clinical factors								
Age	×	×	×	×	×	×	×	×
Male sex	×	×	×	×	×	×	×	
Smoking	×	×	×					
Hypertension	×		×					
Family history		×						
Atherosclerotic disease				×			×	
Echocardiographic findings								
Left ventricular hypertrophy						×		×
Left ventricular dilation						×		×
Low LVEF						×		

LVEF: left ventricular ejection fraction.

MESSAGGI DA PORTARE A CASA

Il "detection rate" raggiunge per l'ecografista esperto il 100% e per questo motivo la metodica può essere adottata come accurato *gold standard* per la diagnosi degli aneurismi aortici. Dopo una fisiologica curva di apprendimento, è possibile arrivare ad un'accuratezza diagnostica del 100% così come viene riportato in letteratura.

In un esame di screening iniziale, anche la sola segnalazione di presenza/assenza di aneurisma nel paziente esaminato è di notevole rilevanza clinica.

MESSAGGI DA PORTARE A CASA

E’possibile quindi effettuare al termine dell’esame ecocardiografico tradizionale tale screening diagnostico dell’aorta addominale con un incremento del tempo necessario aggiuntivo rispetto all’esame clinico in media di circa **45 s.**

CONCLUSIONI

Promuovere valutazione del diametro aorta addominale per:

1.eventuale follow-up chirurgico

2.stratificazione rischio cardiovascolare (le linee guida **NCEP ATP III** per la prima volta hanno inserito l'aneurisma dell'aorta addominale fra le condizioni di rischio equivalente).