CITY CLINIC

Endovascular treatment of the Aorta

I.Petrov, MD, PhD, FESC, FACC

Department cardiology, angiology and electrophysiology

City Clinic - Sofia

CITY CLINIC

BACKGROUND

Aortic Dissection:

Incidence: 13 cases / 100 000 population / year 1.
Evolution: Mortality 36-72% within 48hs and 62-91%within one week 2.
The number of death exceeds the deaths due to AAA rupture 3.

1 Acta Chir Scand 1964;128:644. Am Surg 1976;42:395.
2 Am J Cardiol 1972;30:263.
3 N Engl J Med 1997;336:1876.

BACKGROUND

Aortic Dissection:

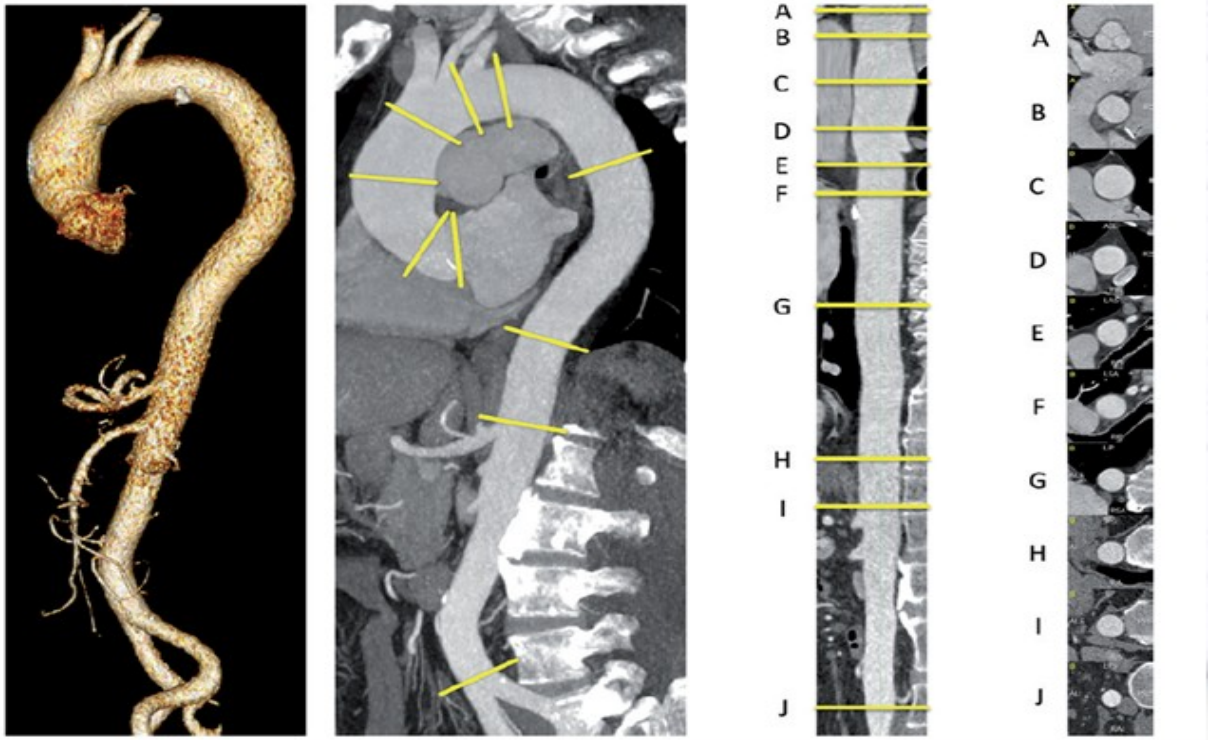
First ever medical report of aortic dissection

- *The aorta was dilated and showed a transverse fissure an inch and a half long, through which some blood had lately passed under the external coat and formed an elevated ecchymosis…*

1761 - Post mortem exam of the king George IInd of England

2014 ESC Guidelines on the Diagnosis and Treatment of Aortic Diseases
Breakthrough due to Imaging followed by new Treatment Options

Thoracic and abdominal aorta in a three-dimensional reconstruction (left lateral image), parasagital multiplanar reconstruction (MPR) along the centreline (left middle part), straightened-MPR along the centreline with given landmarks (A – J) (right side), orthogonal to the centreline orientated cross-sections at the landmarks (A – J)



Landmarks for Imaging the Aorta

CITY CLINIC

2014 ESC Guidelines on the Diagnosis and Treatment of Aortic Diseases
- Recommendations for Imaging -

Recommendations for imaging the aorta		
	Class[a]	Level[b]
It is recommended to measure diameters at pre-specified anatomical landmarks, perpendicular to the longitudinal axis.	I	C
In case of repetitive imaging of the aorta over time to assess change in diameter, it is recommended to use the imaging modality with the lowest iatrogenic risk.	I	C
In case of repetitive imaging of the aorta over time to assess change in diameter, it is recommended to use the same imaging modality with a similar method of measurement.	I	C
It is recommended to report all relevant aortic diameters and abnormalities according to the aortic segmentation.	I	C
It is recommended to assess renal function, pregnancy, and history of allergy to contrast media 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

CITY CLINIC

TEVAR for Acute Aortic Syndromes

Indications for TEVAR

Recommendations for treatment of aortic dissection	Class[a]	Level[b]
In all patients with AD, medical therapy including pain relief and blood pressure control is recommended.	I	C
In patients with type-A AD, urgent surgery is recommended.	I	B
In patients with acute type-A AD and organ malperfusion, a hybrid approach (i.e. ascending aorta and/or arch replacement associated with any percutaneous aortic or branch artery 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 considered.	IIa	B
In complicated type-B AD, TEVAR is recommended.	I	C
In complicated type-B AD, surgery may be considered.	IIb	C

Recommendations for treatment of aortic dissection	Class[a]	Level[b]
In all patients with AD, medical therapy including pain relief and blood pressure control is recommended.	I	C
In patients with type-A AD, urgent surgery is recommended.	I	B
In patients with acute type-A AD and organ malperfusion, a hybrid approach (i.e. ascending aorta and/or arch replacement associated with any percutaneous aortic or branch artery 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 considered.	IIa	B
In complicated type-B AD, TEVAR is recommended.	I	C
In complicated type-B AD, surgery may be considered.	IIb	C

Recommendations for (contained) rupture in the thoracic aortic aneurysm	Class[a]	Level[b]
In patients with suspected rupture of the TAA, urgent CT angiography for diagnosis confirmation is recommended.	I	C
In patients with acute contained rupture of TAA, urgent repair is recommended.	I	C
If the anatomy is favourable and the expertise available, endovascular repair (TEVAR) should be preferred over open surgery.	I	C

Recommendations for (contained) rupture in the thoracic aortic aneurysm	Class[a]	Level[b]
In patients with suspected rupture of the TAA, urgent CT angiography for diagnosis confirmation is recommended.	I	C
In patients with acute contained rupture of TAA, urgent repair is recommended.	I	C
If the anatomy is favourable and the expertise available, endovascular repair (TEVAR) should be preferred over open surgery.	I	C

CITY CLINIC

Indications for TEVAR

Recommend	Class[a]	Level[b]
In all patients with AD, medical therapy including pain relief and blood pressure control is recommended.	I	C
In patients with type-A AD, urgent surgery is recommended.	I	B
In patients with acute type-A AD and organ malperfusion, a hybrid approach (i.e. ascending aorta and/or arch replacement associated with any percutaneous aortic or branch artery 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 considered.	IIa	B
In complicated type-B AD, TEVAR is recommended.	I	C
In complicated type-B AD, surgery may be considered.	IIb	C

Recommendation for management of intramural haematoma(IMH)

Recommendations for diagnostic work-up of intramural haematoma (IMH)	Class[a]	Level[b]
In all patients with IMH, medical therapy including pain relief and blood pressure control is recommended.	I	C
In case of type-A IMH, urgent surgery is indicated.	I	C
In the case 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

Recommendations for management of penetrating aortic ulcer (PAU)	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

Recommendations for traumatic aortic injury	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 case of TAI with suitable anatomy requiring intervention, TEVAR should be preferred to surgery.	IIa	C

	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 case of TAI with suitable anatomy requiring intervention, TEVAR should be preferred to surgery.	IIa	C

CITY CLINIC

Intervention for descending aorta aneurysms

Recommendations for diagnostic work-up of thoracic aortic aneurysm (TAA)		
Interventions on descending aortic aneurysms		
TEVAR should be considered rather than surgery when anatomy is suitable.	**IIa**	**C**
TEVAR should be considered in patients who have descending aortic aneurysm with maximal diameter ≥55 mm.	**IIa**	**C**
When TEVAR is not technically possible, surgery should be considered in patients who have descending aortic aneurysm with maximal diameter ≥60 mm.	**IIa**	**C**
When intervention is indicated, in case of Marfan syndrome or other elastopathies, surgery should be indicated rather than TEVAR.	**IIa**	**C**

CITY CLINIC

Symptomatic

Δ Δ Δ

Recommendations on management of patients with symptomatic abdominal aortic aneurysm (AAA)		
	Class[a]	Level[b]
In patients with suspected rupture of AAA, immediate abdominal ultrasound or CT is recommended.	I	C
In case of ruptured AAA, emergency repair is indicated.	I	C
In case of symptomatic but non-ruptured AAA, urgent repair is indicated.	I	C
In case of symptomatic AAA anatomically suitable for EVAR, either open or endovascular aortic repair is recommended.[c]	I	A

1986- in ex USSR, an Ukranian vascular surgeon Nikolai Volodos did the first endovascular repair of thoracic aorta aneurism …ever

Volodos NL, Karpovich IP et al.. A case of distant transfemoral endoprosthesis of the thoracic artery using a self-fixing synthetic prosthesis in traumatic aneurysm. Grudn Khir. 1988;(6):84-6.

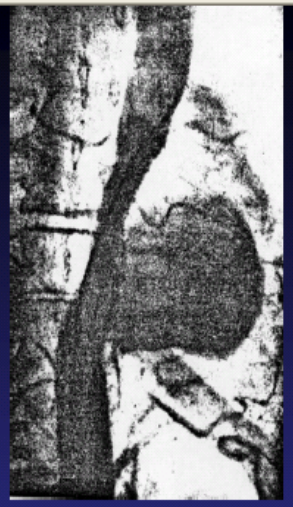
Acrobat Reader - [Nenabel.pdf]

File Edit Document View Window Help

125%

Bookmarks Thumbnails

First endovascular repair of an aortic aneurysm...ever !



УДК 616.132-007.64-001.5-089.819.5

Н. Л. Володось, И. П. Карпович, В. Е. Шеханин, В. И. Троян, Л. Ф. Яковенко, Л. С. Керемет, А. С. Неонета, В. И. Кулеба, А. И. Саньков, Г. И. Гавриков

СЛУЧАЙ ДИСТАНЦИОННОГО ЧРЕЗБЕДРЕННОГО ЭНДОПРОТЕЗИРОВАНИЯ ГРУДНОЙ АОРТЫ САМОФИКСИРУЮЩИМСЯ СИНТЕТИЧЕСКИМ ПРОТЕЗОМ ПРИ ТРАВМАТИЧЕСКОЙ АНЕВРИЗМЕ

Харьковский НИИ общей и неотложной хирургии (дир. — проф. В. Т. Зайцев)

Операции протезирования грудной аорты относятся к одним из травматичных в сердечно-сосудистой хирургии. В настоящее время с точки зрения снижения травматичности этого типа операций оптимальным методом, оправдавшим себя в клинической практике, является интраоперационное применение эндопротезов с двойными кольцами (Durcau G. и соавт., 1978). Для осуществления фиксации необходимо выполнение торакотомии, выделение аорты выше и ниже аневризмы, пережатие ее на время введения эндопротеза. Вследствие этого указанный метод не может считаться хорошо решенной альтернативой классическим методам протезирования грудной аорты с применением ИК, временных шунтов или гипотермии, так как сохраняется большая травматичность операции.

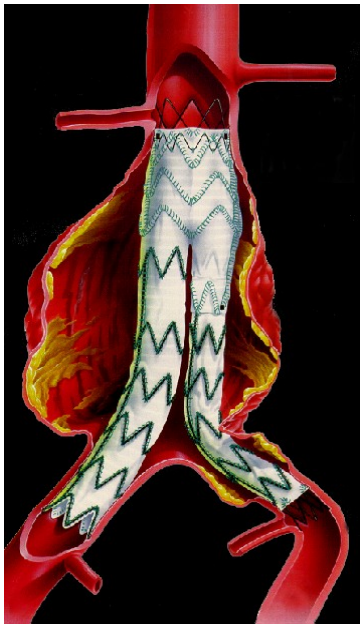
Принципально новым подходом к снижению травматичности при протезировании грудной аорты является дистанционное эндопротезирование, при котором не осуществляются доступ к пораженному сосуду, его выделение и пережатие. И хотя блестящая идея такого протезирования была выдвинута Ch. T. Dotter в 1969 г., в клинике она не была реализована в последующие 15 лет.

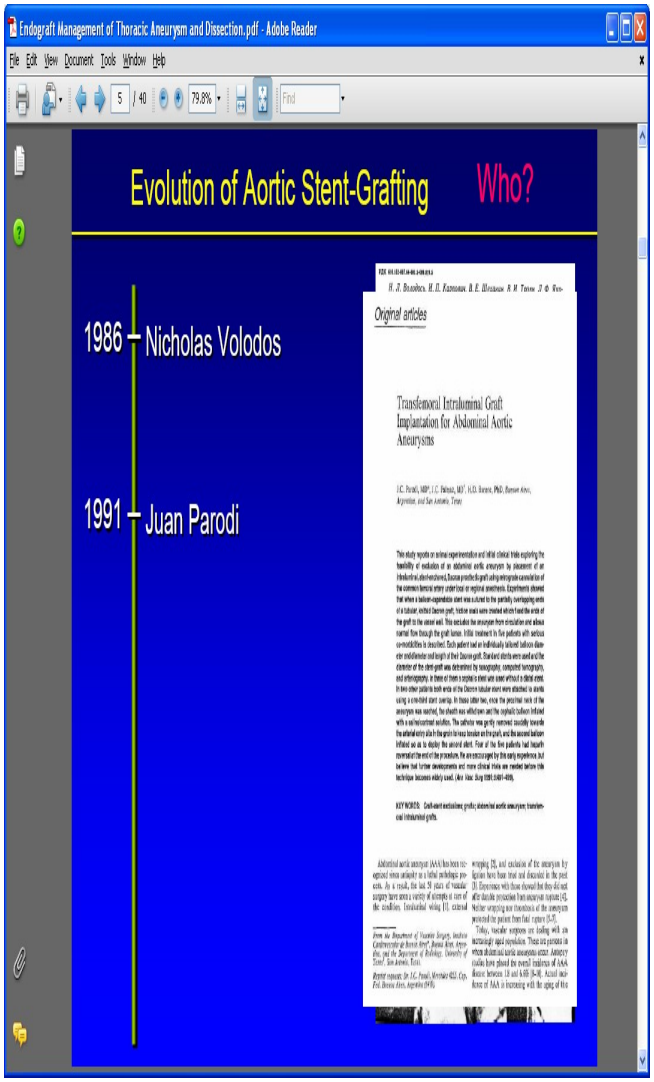
Описания случаев выполнения в клинике дистанционного эндопротезирования грудной аорты синтетическим протезом в доступной литературе мы не нашли. В связи с этим считаем целесообразным сообщить о первом клиническом наблюдении дистанционного эндопротезирования грудной аорты при ее травматичной аневризме с помощью самофиксирующегося синтетического протеза.

Больной Б., 53 лет, поступил в сосудистое отделение с жалобами на боли в грудной клетке, общую слабость, одышку при физической нагрузке. Из анамнеза известно, что в 1959 г. больной получил компрессионный перелом XII грудного позвонка вследствие сдавления между автомашинами. Имели место нижняя параплегия, нарушение функции тазовых органов. В 1966 г. во время флюорографического диспансерного обследования у больного выявлена опухоль заднего средостения. 15 апреля 1986 г. больному произведена левосторонняя торакотомия в торакальном от-

3 of 22 9,97 x 7,47 in

1990- Juan Carlos Parodi (Buenos Aires) first abdominal aortic stent-graft implantation1



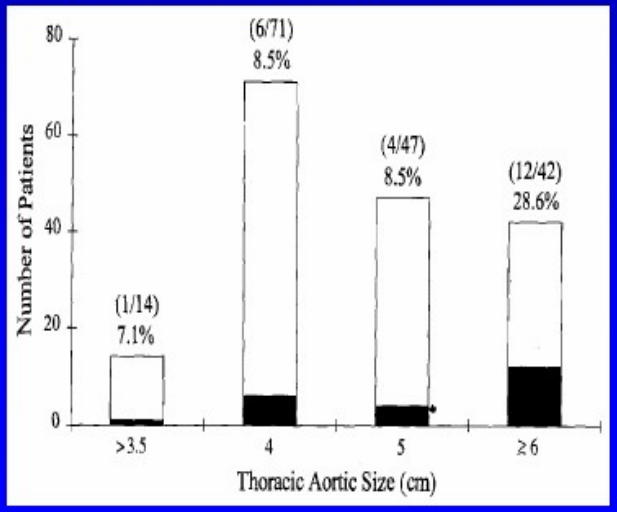


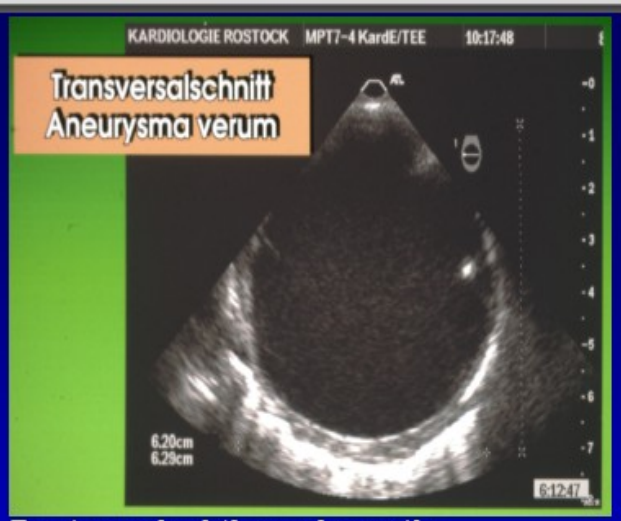
Parodi JC, Palmaz JC, Barone HD.. Transfemoral intraluminal graft implantation for abdominal aortic aneurysms. Ann Vasc Surg. 1991;5:491-9.

Relation between TAA diameter and rate of rupture!

Law of La Place

Ruptur rate vs. Diameter in TAA





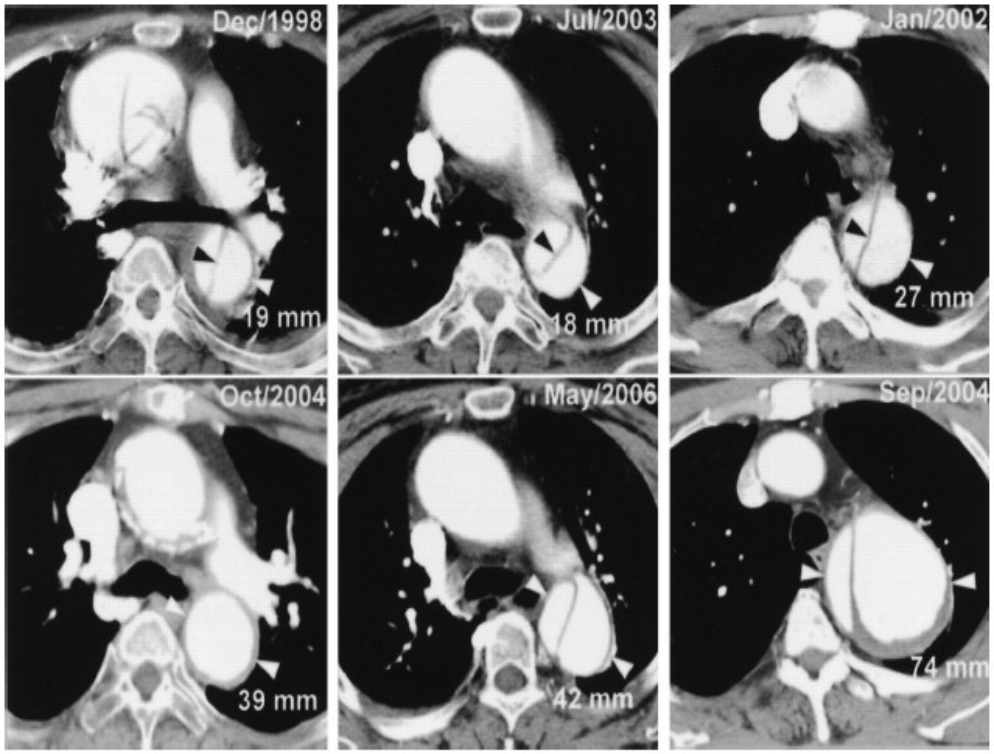
Post surgical thoracic aortic aneurysm (post coarctation surgery)

Stent graft in TAA

Ince H, Nienaber CA, et al., CIRCULATION 2003; 108:2967-2970

20 YEARS OF INNOVATION TCT2008

Three Representative Examples of Long-Term Outcomes

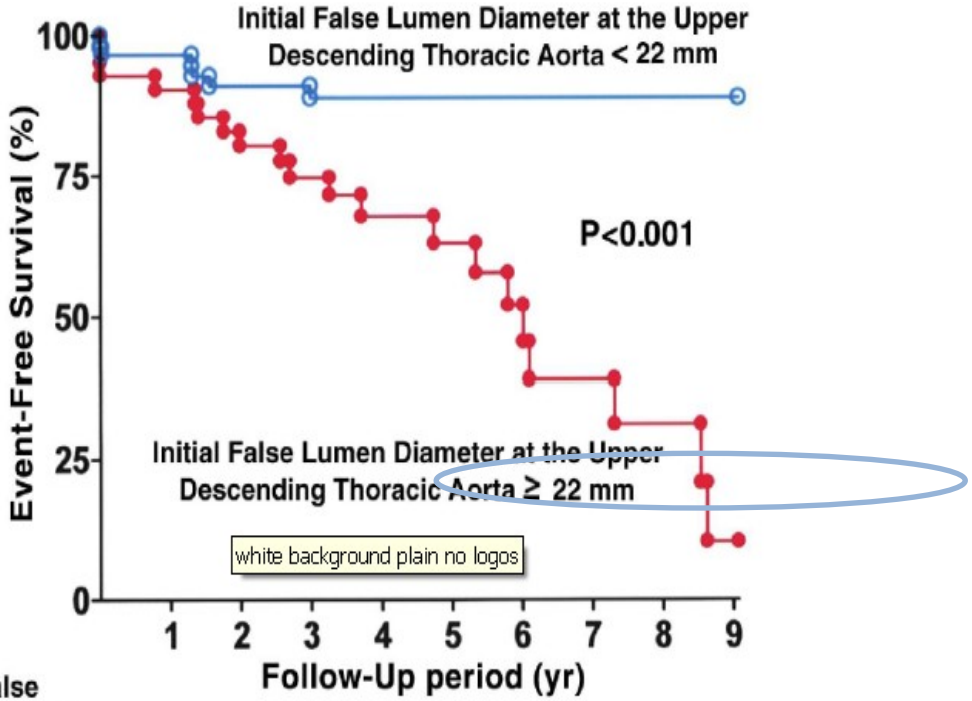


Song, J.-M. et al. J Am Coll Cardiol 2007;0:j.jacc.2007.03.064v1-13090

CARDIOVASCULAR RESEARCH FOUNDATION

20 YEARS OF INNOVATION TCT2008

Event-Free Survival Curves

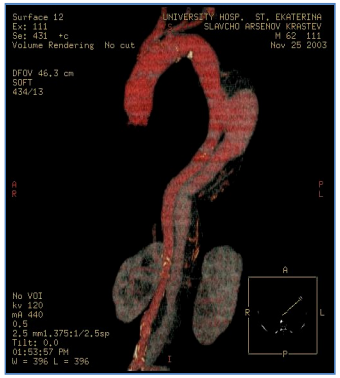


Initial False Lumen Diameter	Patients at Risk				
< 22 mm	58	48	30	11	2
≥ 22 mm	42	32	17	8	3

Song, J.-M. et al. J Am Coll Cardiol 2007;0:j.jacc.2007.03.064v1-13090

CARDIOVASCULAR RESEARCH FOUNDATION

CITY CLINIC



Thoracic aorta endografting
AIMS:

- Cover and seal the entry point/s
- Decompress and re-establish the flow in the true lumen
- Reestablish the end-organ perfusion
- Induce false lumen thrombosis
- Stabilize dissected aortic wall and prevent rupture

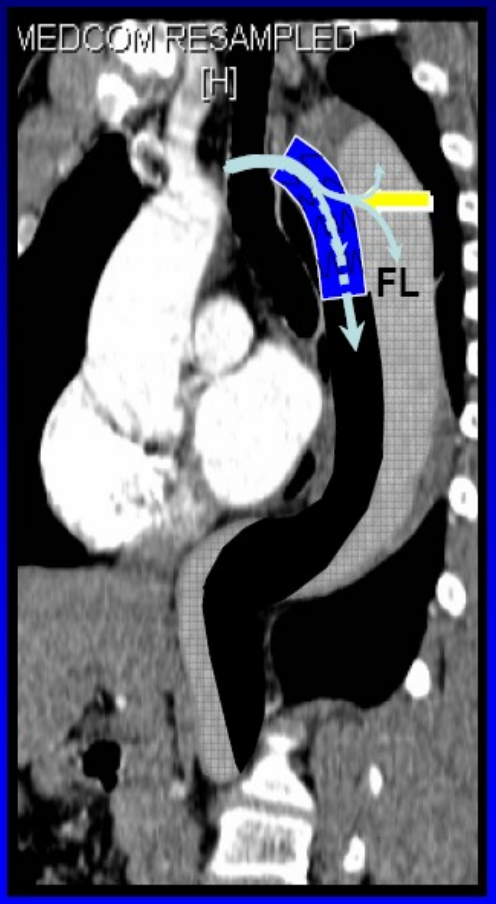
CITY CLINIC

Endograft Management of Thoracic Aneurysm and Dissection.pdf - Adobe Reader

File Edit View Document Tools Window Help

16 / 40 79.8% Find

Concept of Endovascular Repair in Aortic Dissection



- Closure of the proximal entry tear
- Depressurization of the false lumen
- Thrombosis of FL
- Redirection of blood flow towards TL
- Induction of „aortic remodeling“

CITY CLINIC

INSTEAD

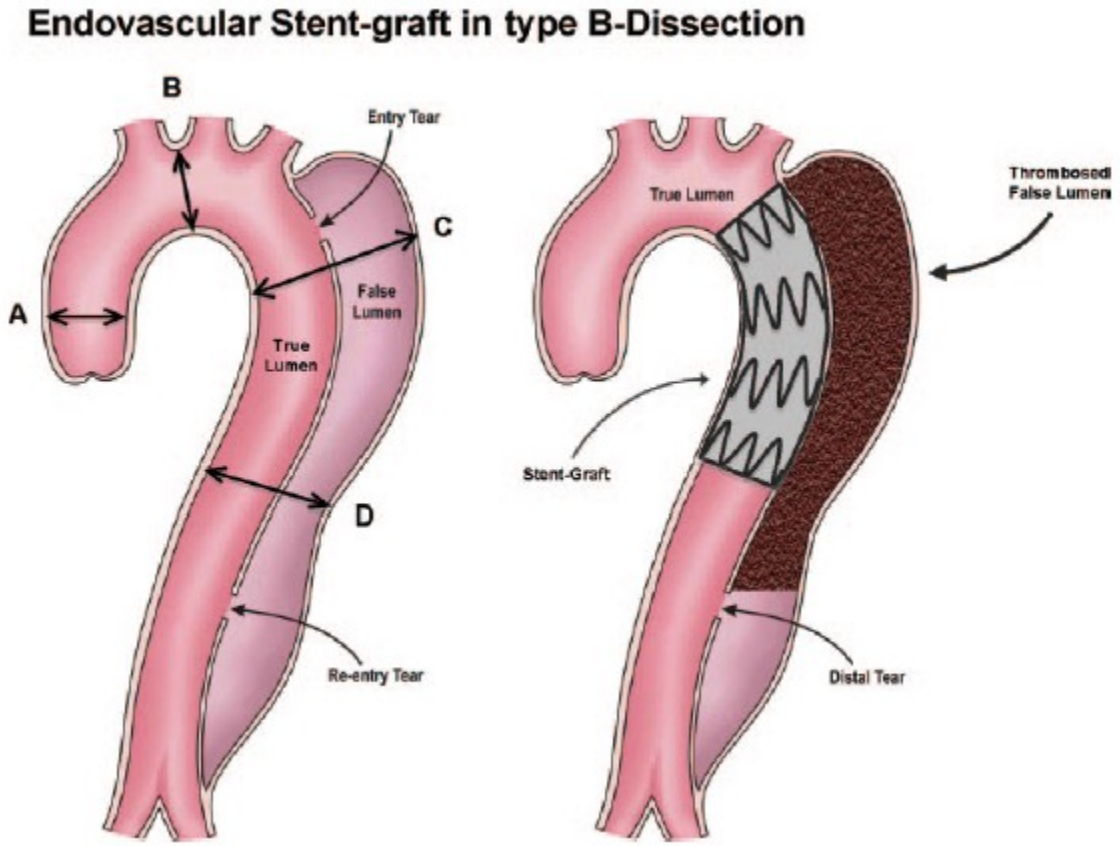


Figure 2. Endovascular stent graft in type B dissection. Cartoon demonstrating the typical features of type B dissection with flow in both the true and the expanded false lumen resulting from a major proximal entry tear (left); planes A to D were followed up longitudinally in every patient. A stent graft was placed to scaffold the dissected aorta and to seal the entry to the false lumen, resulting in reconstruction of the true lumen with subsequent false-lumen thrombosis (right). Levels were defined as (A) at the sinotubular junction, (B) at the center of the arch between truncus brachiocephalicus and left common carotid artery, (C) at the level of the maximum aortic diameter, and (D) at the hiatus.

CITY CLINIC

INSTEAD OMT v.s OMT+ TEVAR

Characteristics	OMT (n=68)	OMT+TEVAR (n=72)	*P*
Baseline type B dissection			
Maximum aortic diameter	43.6±9.2*	44.1±9.6	0.65
True-lumen diameter at level C	20.3±9.3	19.4±8.0*	0.55
False-lumen diameter at level C	27.7±11.6	29.3±12.4*	0.65
True-lumen diameter at level D	17.3±8.7	17.4±10.7*	0.91
False-lumen diameter at level D	24.0±10.4	26.9±10.9*	0.13
3-Month follow-up			
Maximum aortic diameter	46.2±11.1	44.7±8.3	0.75
True-lumen diameter at level C	21.9±8.8	30.6±6.0	<0.001
False-lumen diameter at level C	29.4±15.0	14.0±14.2†	<0.001
True-lumen diameter at level D	17.1±8.8	25.7±6.7	<0.001
False-lumen diameter at level D	27.4±12.9	17.2±13.7†	<0.001

Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
doi: 10.1161/CIRCULATIONAHA.109.886408 *Circulation. 2009;120:2519-2528; originally published online December 7, 2009;*

1-Year follow-up			
Maximum aortic diameter	45.5±7.9	44.7±11.9	0.37
True-lumen diameter at level C	23.9±9.9	31.8±5.9	<0.001
False-lumen diameter at level C	24.7±15.5	13.1±18.9	<0.001
True-lumen diameter at level D	19.3±9.0	27.1±7.0	<0.001
False-lumen diameter at level D	24.8±11.5	14.6±14.7	<0.001
2-Year follow-up			
Maximum aortic diameter	48.3±13.1	43.8±12.5	0.31
True-lumen diameter at level C	22.7±10.9	32.3±6.4	<0.001
False-lumen diameter at level C	26.8±9.4	12.5±16.7	<0.001
True-lumen diameter at level D	18.3±7.8	27.0±7.3	<0.001
False-lumen diameter at level D	26.9±10.3	13.8±14.9	<0.001
False-lumen thrombosis at 2 y, n (%)‡			
Complete	13 (19.4)	63 (91.3)	<0.001
Incomplete	6 (9.1)	6 (8.7)	0.79

Circulation is published by the American Heart Association, 7272 Greenville Avenue, Dallas, TX 75231
doi: 10.1161/CIRCULATIONAHA.109.886408 *Circulation. 2009;120:2519-2528; originally published online December 7, 2009;*

Pre-procedural planning is essential for a successful TEVAR procedure.

- Contrast-enhanced CT represents the imaging modality of choice for planning TEVAR, taking,3 mm ‘slices’ of the proximal supra-aortic branches down to the femoral arteries.
- The diameter (<40 mm*) and length (≥ 20 mm) of the healthy prox- imal and distal landing zones
- Assessment of the length of the lesion and its re-lationship to side branches and the iliofemoral access route
- * We have two cases of implanting prosthesis in patients with aortic diameter over 40 mm with custom prosthesis.

CITY CLINIC

Individual experience T/EVAR (2002- 05.2014)

	TAA	AAA	
2003	8	0	
2004	12	5	
2005	16	4	
2006	1	1	
2007	3	1	
2008	1	2	
2009	10	4	
2010	6	11	
2011	7	8	
2012	5	6	
2013	12	18	
2014	10	13	
	91	73	164

CITY CLINIC

Individual experience T/EVAR (2002- 05.2014)

164 patients (113 males, 51 females)

Mean age	67.7 y
Mortality	2.43% (4 pts)
Proximal redissecation	1.2% (2 pts)
Stent migration	1.2% (2 pts)
Cardiatis multilayer	3.04% (5pts)
Hybrid repair	1.82% (3 pts)

CITY CLINIC

Case Report

- Year 2002: D.S. 54 -year- old male
- Clinical history:
- ✓ 10-year history of arterial hypertension
- ✓ Smoker
- ✓ 6- year history of Diabetes mellitus

- ✓ Admitted in critical clinical condition (hypotensive, anuric, unconscious, in pulmonary edema)
- ✓ Acute De Bakey type I aortic dissection and AoReg III degr. was diagnosed

Urgent surgical resection of the ascending aorta with Unigraft No30 implantation was done

CITY CLINIC

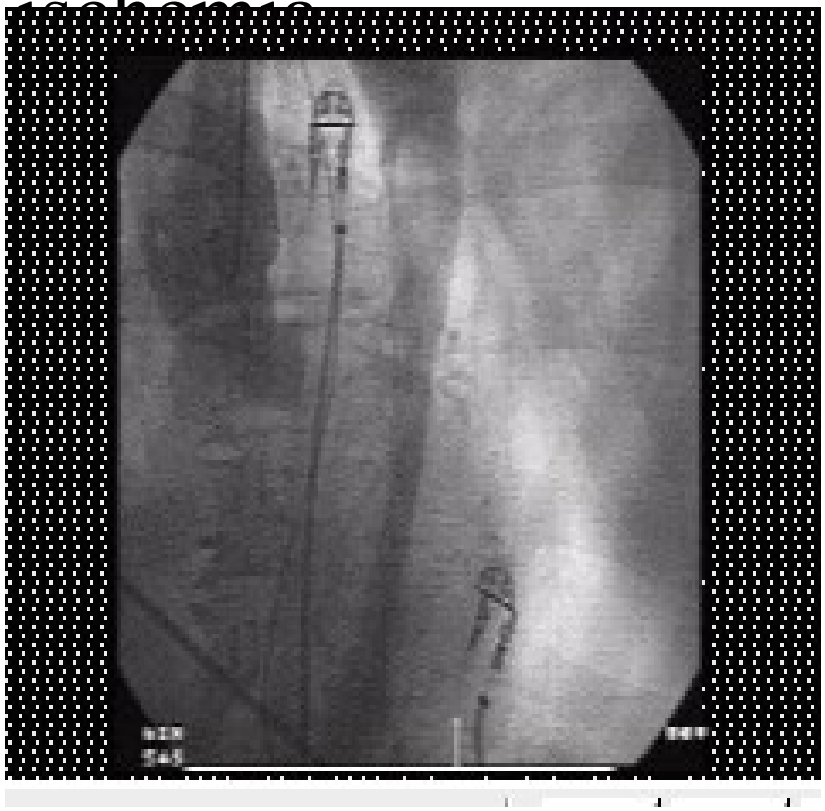
2002

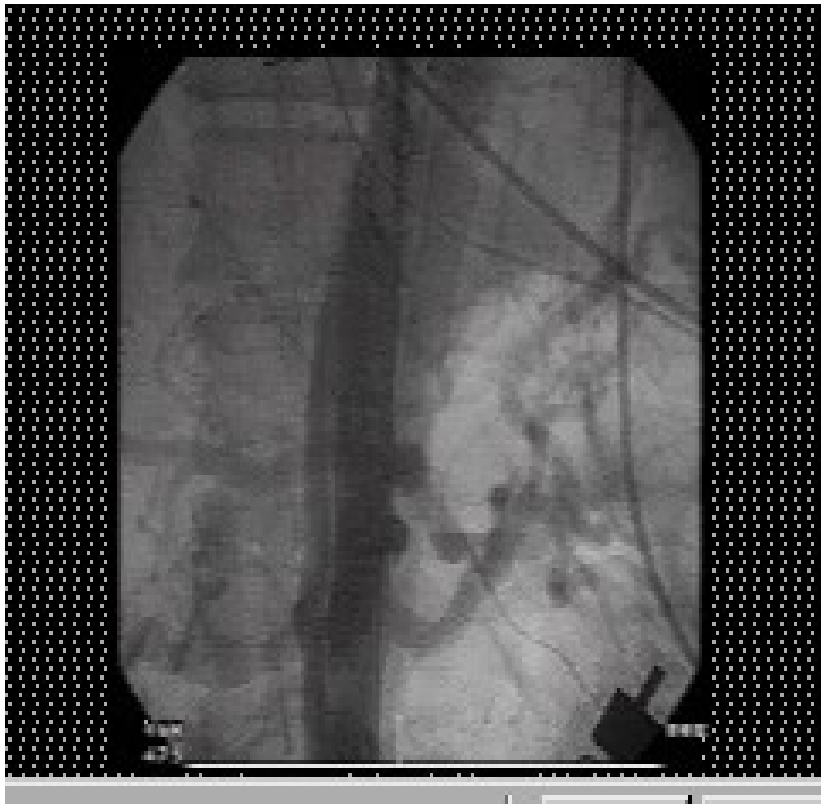
CLINICAL COURSE:

In the immediate post operative period the patient remained in critical condition and was detected life threatening ischaemia of the abdominal Ao branches manifested by anuria, subileus, inferior paraparesis, livedo reticularis of the lumbal area and lower extremities.

Aortography (left radial approach)(July 2002):

- Multiple additional tears in the toracoabdominal aorta causing false lumen expansion and true lumen compression resulting in life threatening end organ ischemia





CITY CLINIC

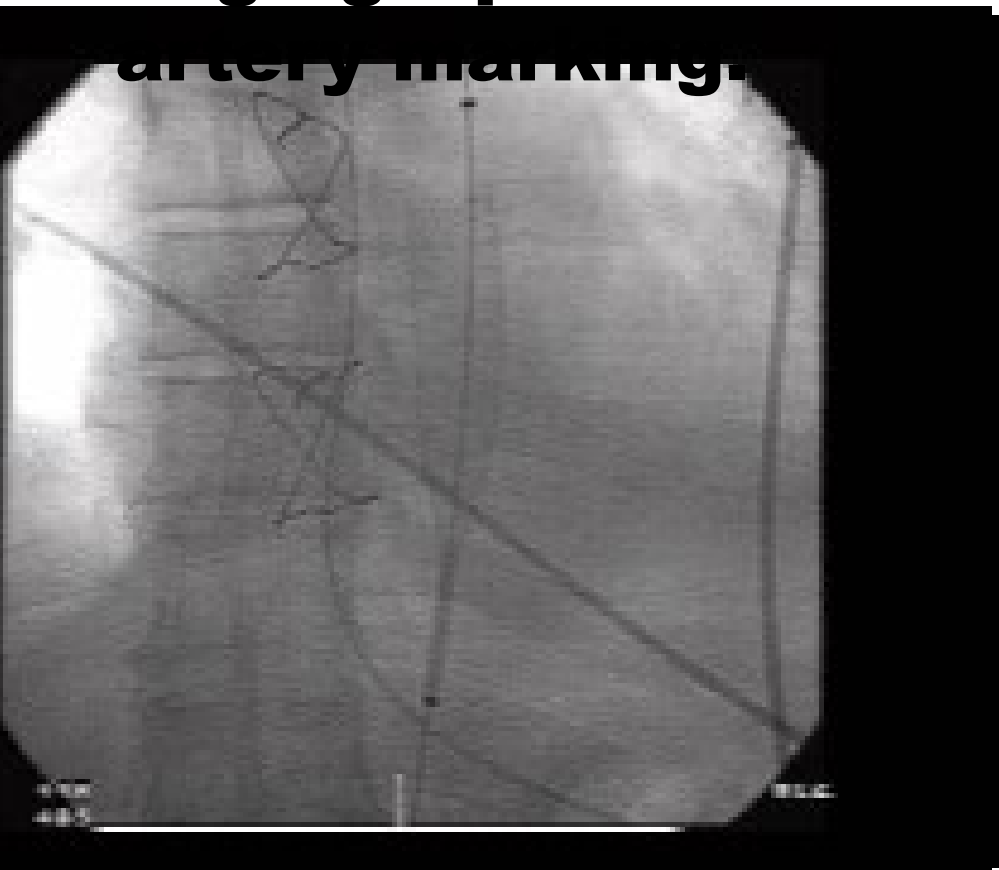
ENDOVASCULAR TREATMENT

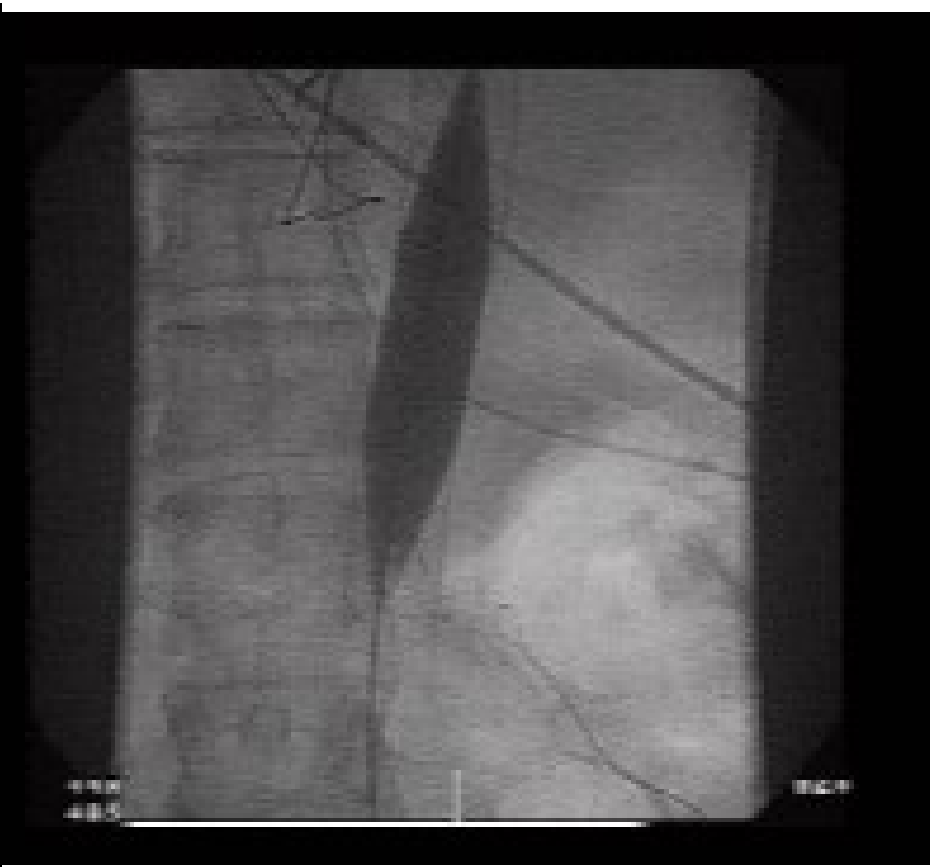
- **Implantation of two Wallstents 20x55мм, followed by postdilation with balloon Symmetry 18x40мм, 6 atm.**

- **Femoral approach was used to deliver the stents and left radial approach for angiographic control and left subclavian artery marking.**

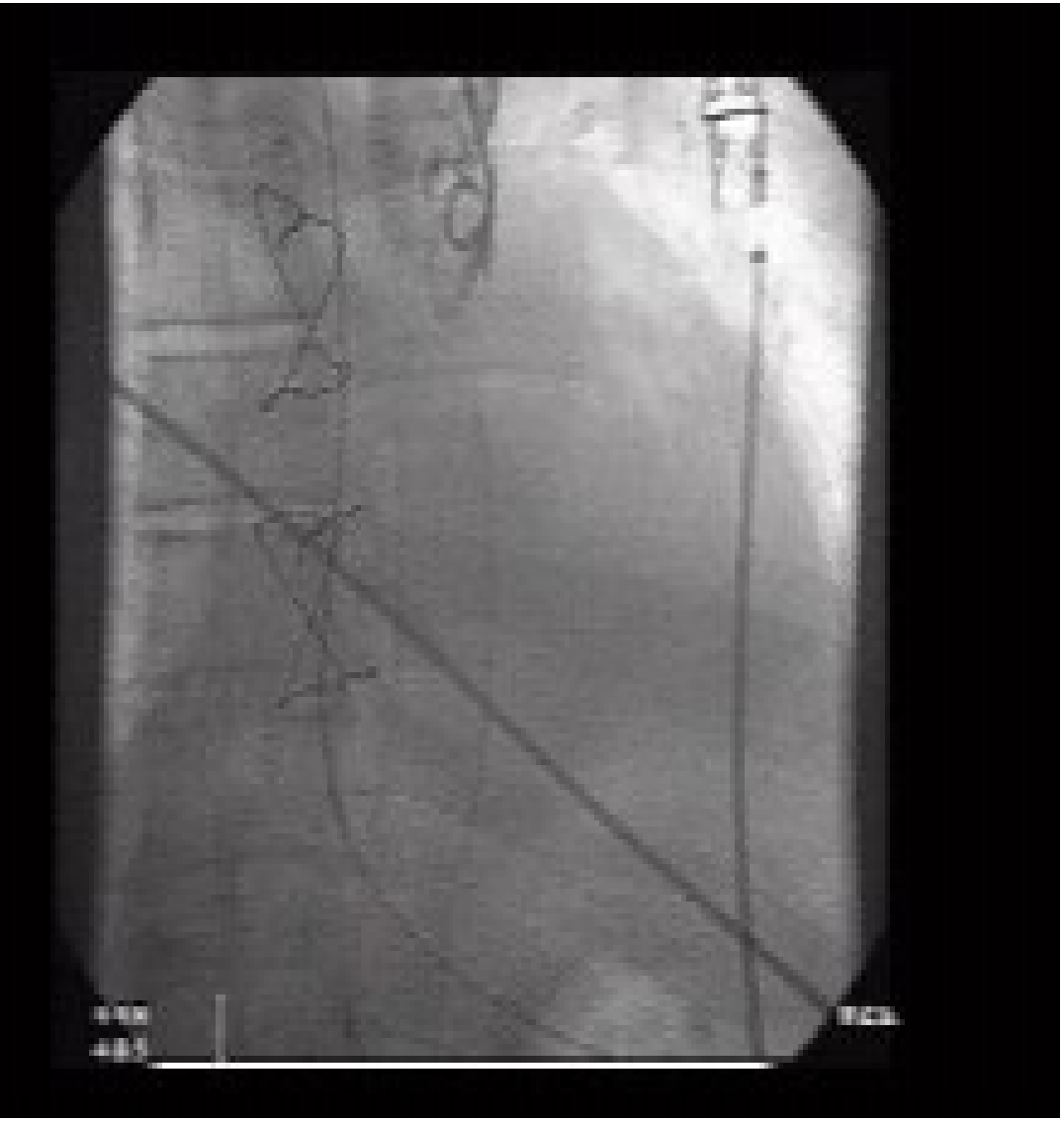
CITY CLINIC

- Implantation of two Wallstents 20x55мм, followed by postdilation with balloon Symmetry 18x40мм, 6 atm.
- Femoral approach was used to deliver the stents and left radial approach for angiographic control and left subclavian artery marking.





CITY CLINIC



Final result

- Restored and centralized true lumen flow
- Restored abdominal branches flow
- Decreased flow in the false lumen

CITY CLINIC

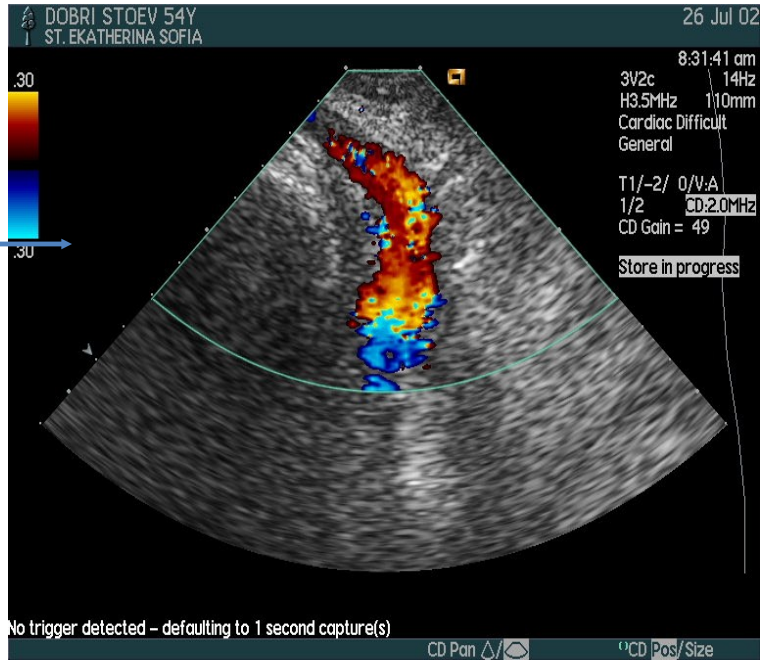
CLINICAL COURSE

1. **Immediate hemodynamic stabilization**
2. **Recovery of renal function immediately after the procedure with a diuresis of 1500 ml for the first hour.**
3. **Gradual recovery of the bowel function.**
4. **Complete recovery of the lower extremities, pulses bilaterally and resolving of the livedo reticularis.**
5. **Discharged on the 13th post-procedural day after rehabilitation and complete functional recovery.**

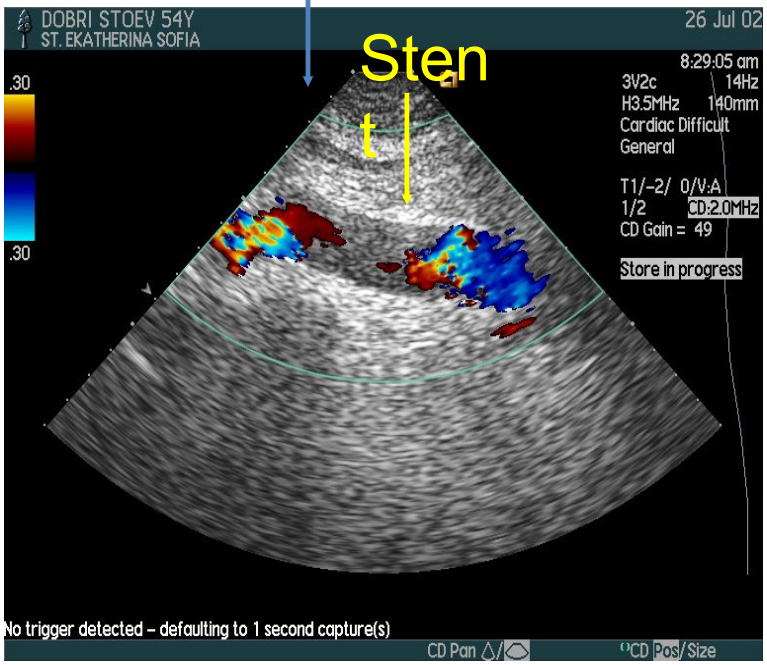
CITY CLINIC

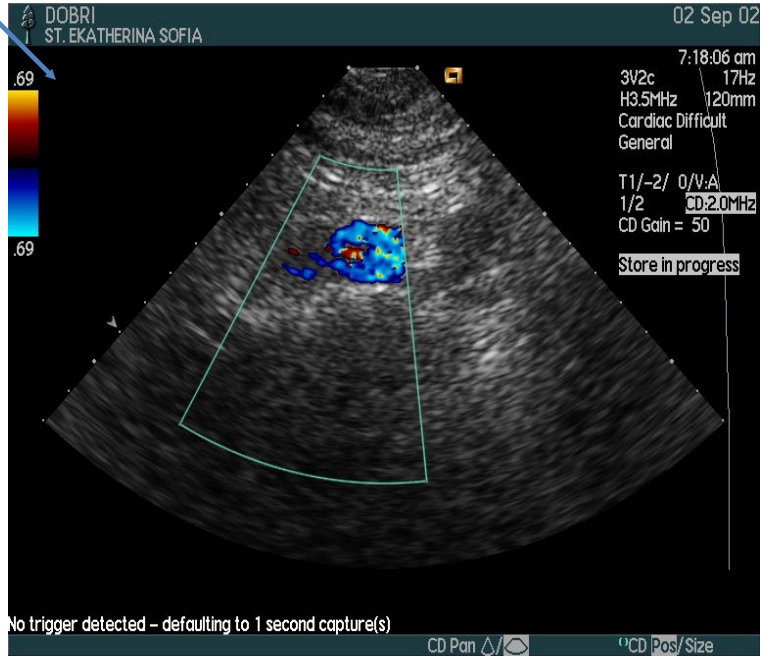
Next day Follow up ultrasound

Thoracic Ao



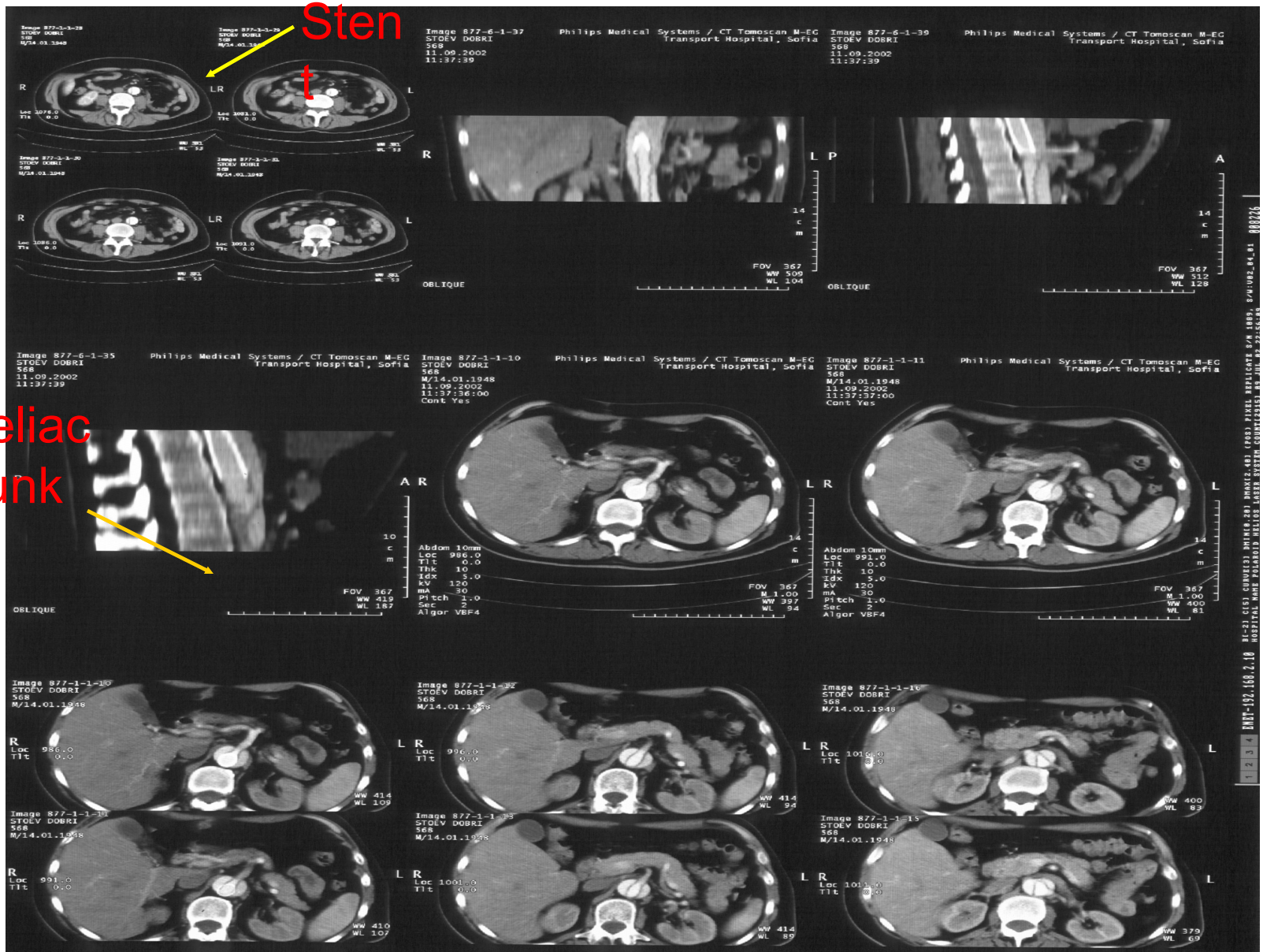
Abdominal Ao





CITY CLINIC

Abdominal Ao CT-scan



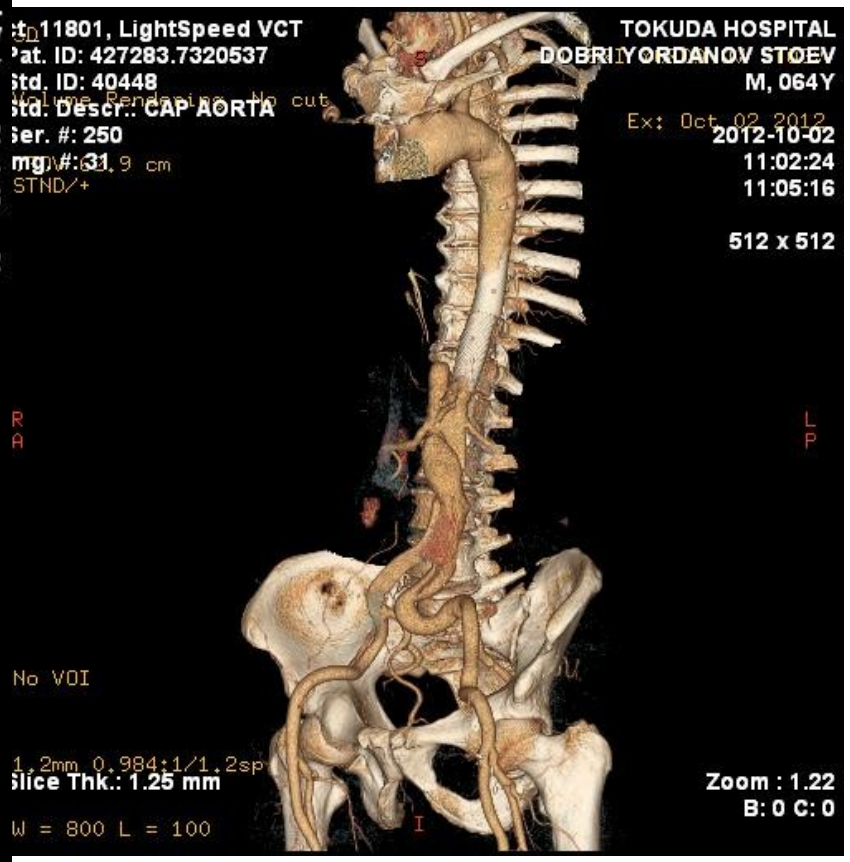
CITY CLINIC

……10 years later:

- 2012: Uneventful 10 years follow-up,
- Normal renal function
- Normal ABI, the patient 66 y of age still working

CITY CLINIC

10 years MSCT- angio follow up



CITY CLINIC

Case Report

- P.I 57 -year- old female
- Clinical history:
  - ✓ 10-year history of arterial hypertension
  - ✓ 2009

Acute De Bakey type I aortic dissection was diagnosed

Urgent surgical of the Albograft No 26 implantation

- ✓ In last 6 months , admitted with dramatic chest pain and shortness of breath
- ✓ Contrast MSCT- ThAo disecation aneurysm with 9 cm diameter, entry after tr. Brachio cephalicus end compression of the true lumen

CITY CLINIC

CT- aortography

CITY CLINIC

Aortography

CITY CLINIC

Repair solution

1.Hybrid repair with surgical debranching and implantation of the stent-graft

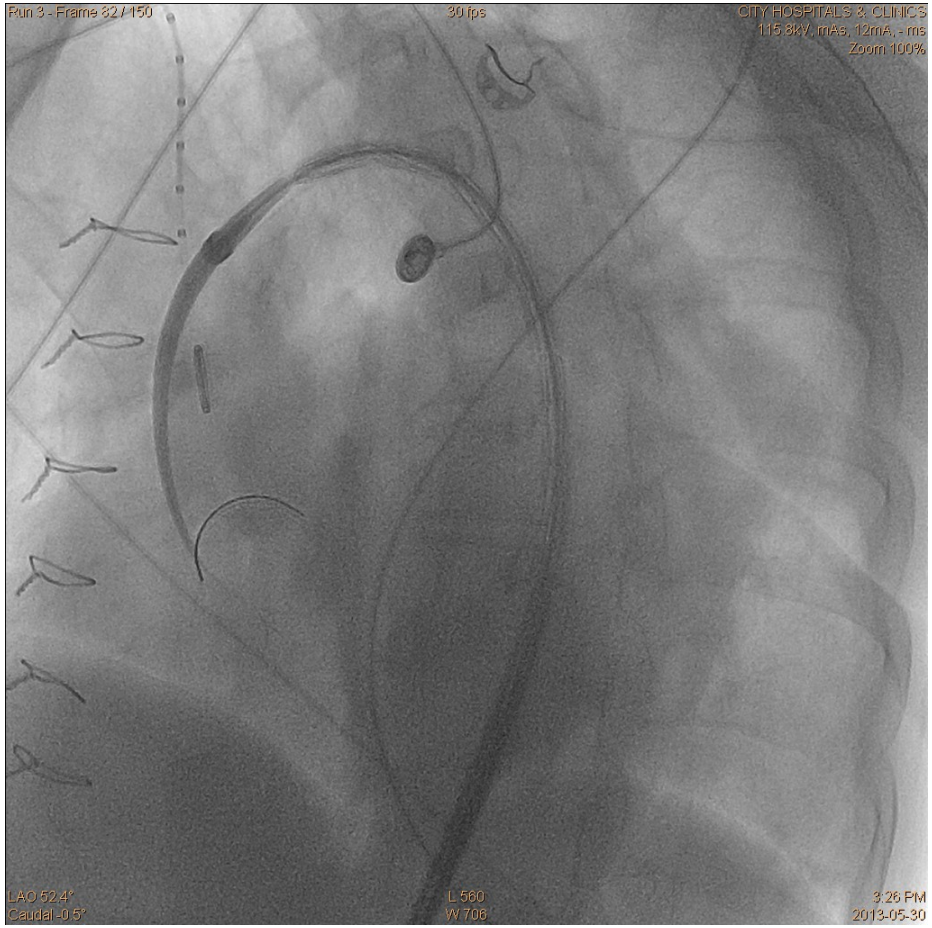
2 . Implantation of the uncovered stent ? ? ?

Implantation of an uncovered stent

- Decompression of the true lumen
- Centralization of the blood
- Reduce the pressure in the aneurysm
- Patent side branches

CITY CLINIC

Implantation
Zenith Dissection 36mm/123mm open cell thoracic stent

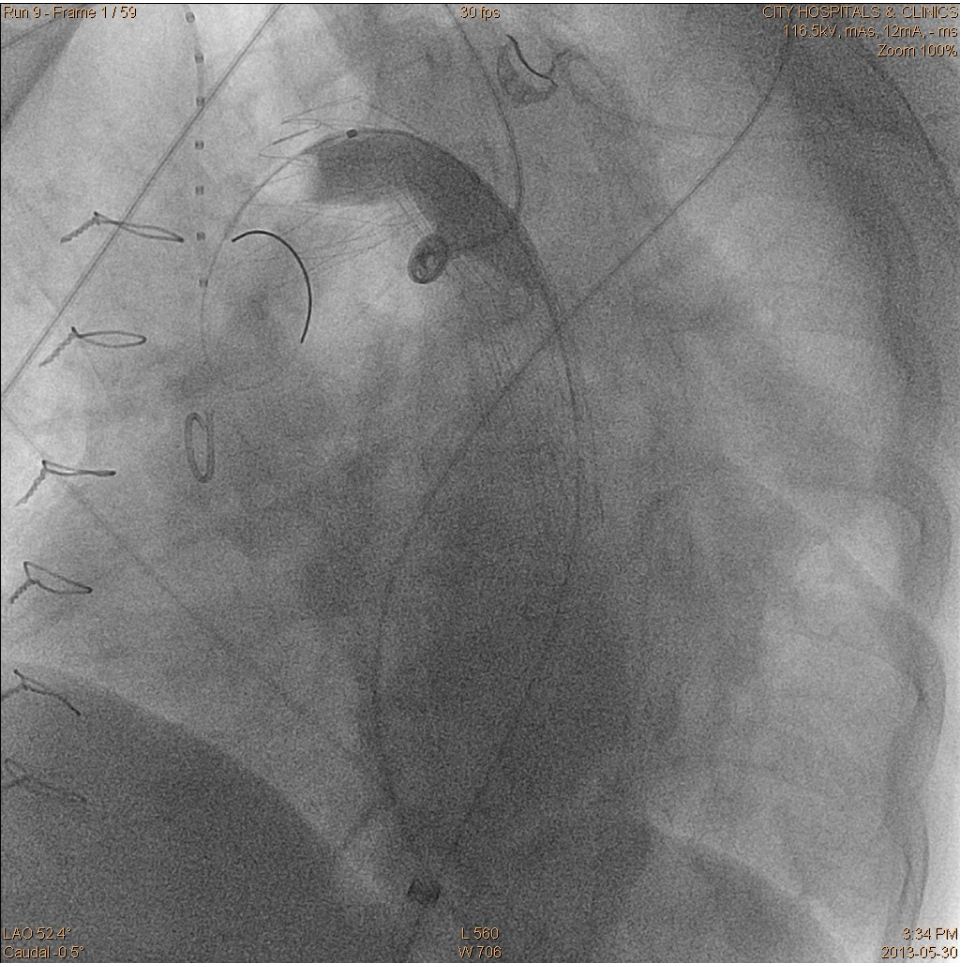


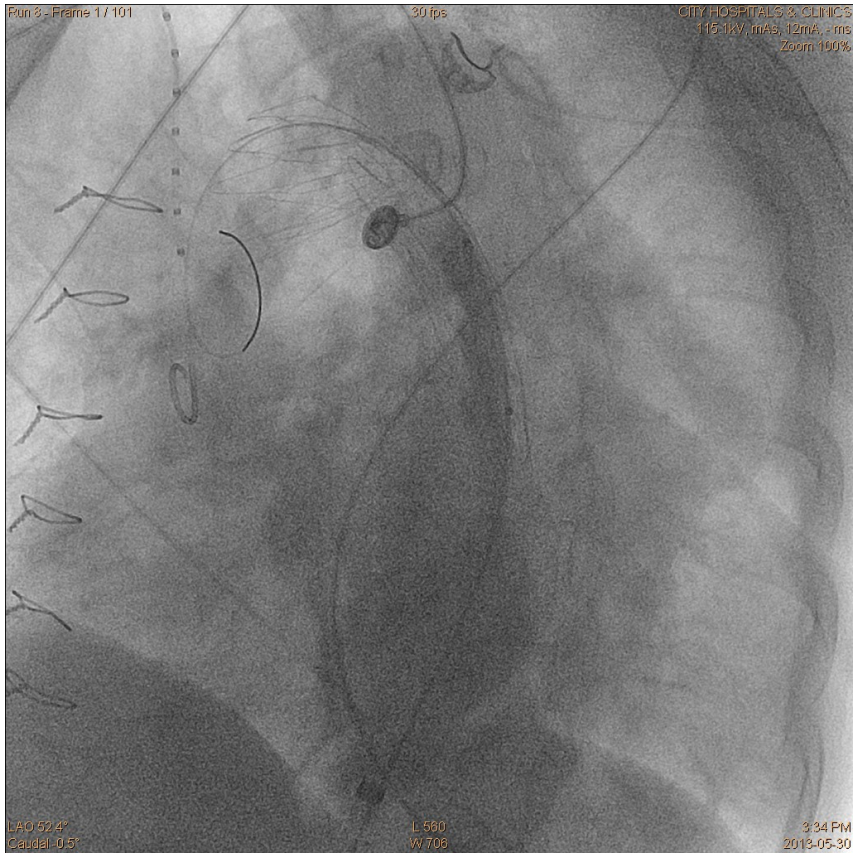
CITY CLINIC

Zenith dissection implantation

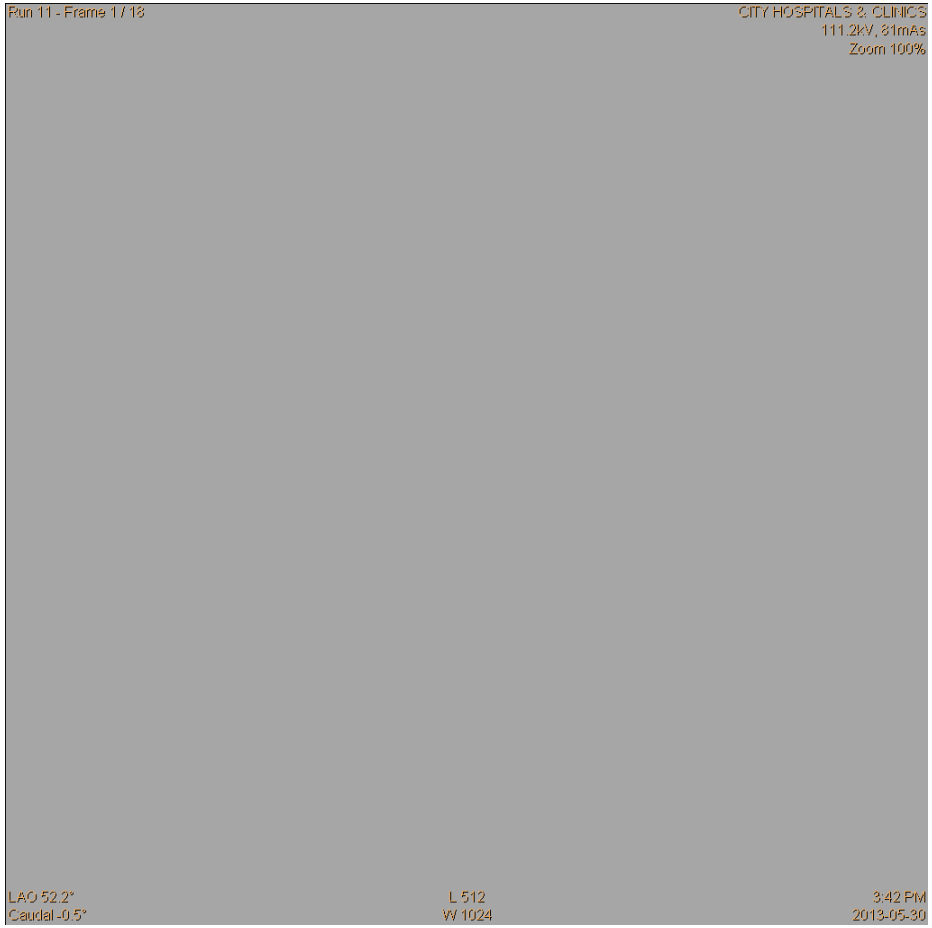
CITY CLINIC

Post dilatation





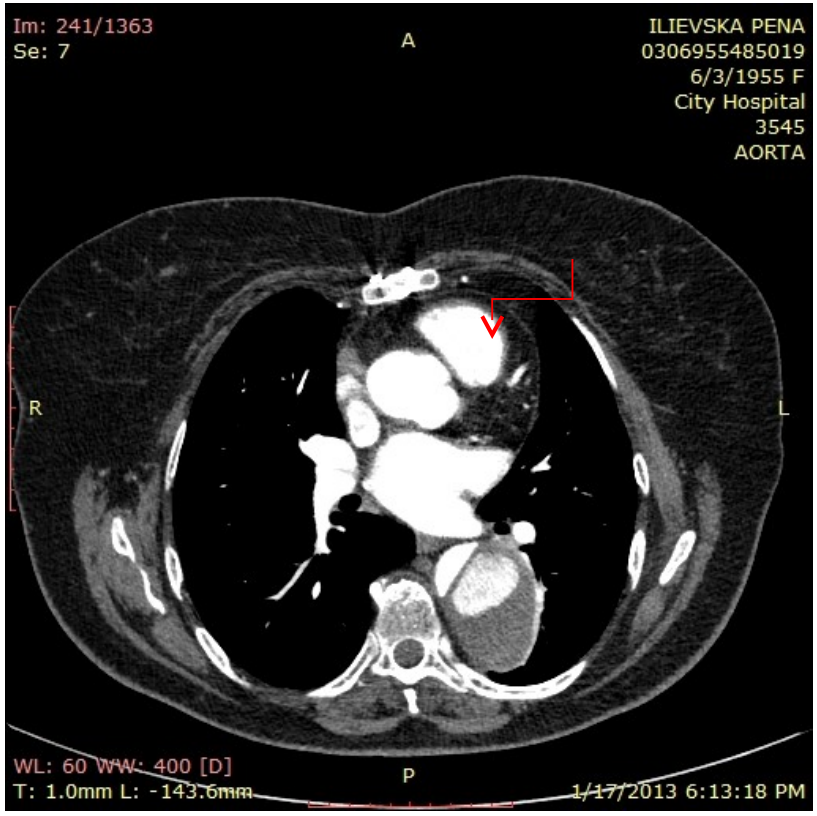
CITY CLINIC


Run 11 - Frame 1 / 18
CITY HOSPITALS & CLINICS
111.2kV, 81mAs
Zoom 100%
LAO 52.2°
Caudal -0.5°
L 512
W 1024
3:42 PM
2013-05-30

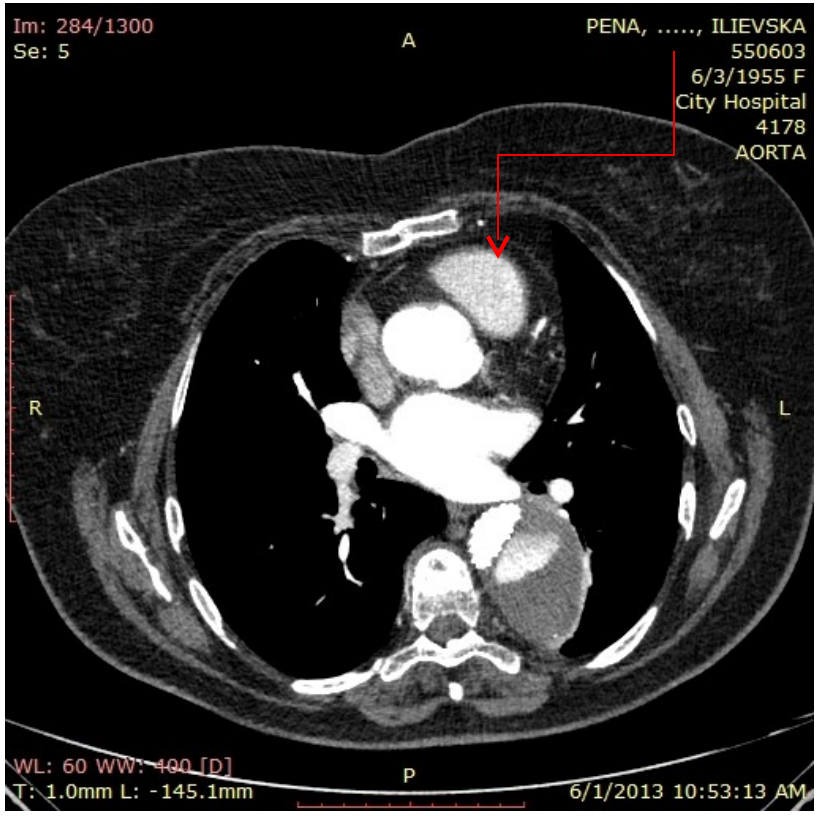
CITY CLINIC

Result

- Before

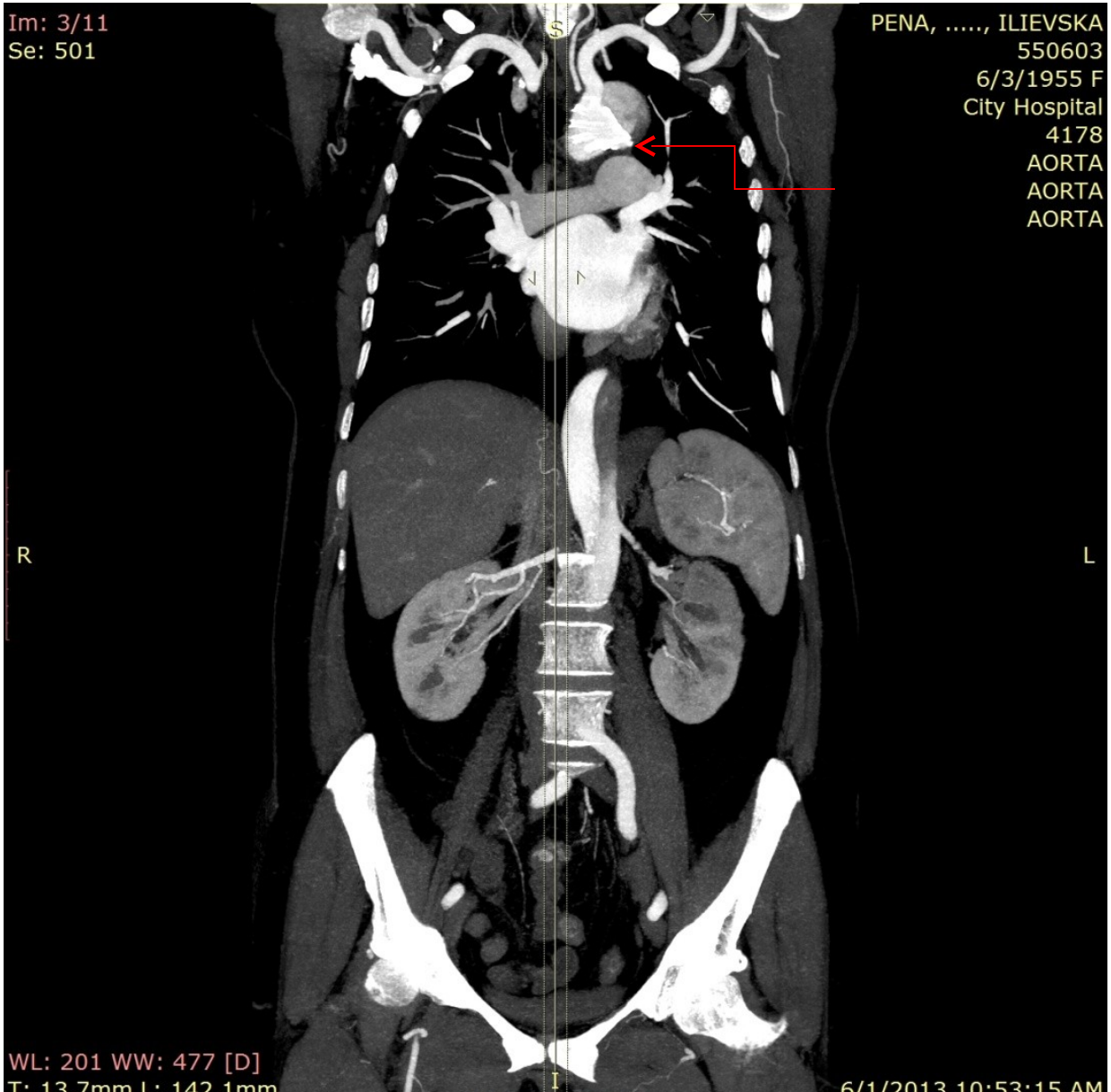


- 1 months f-up

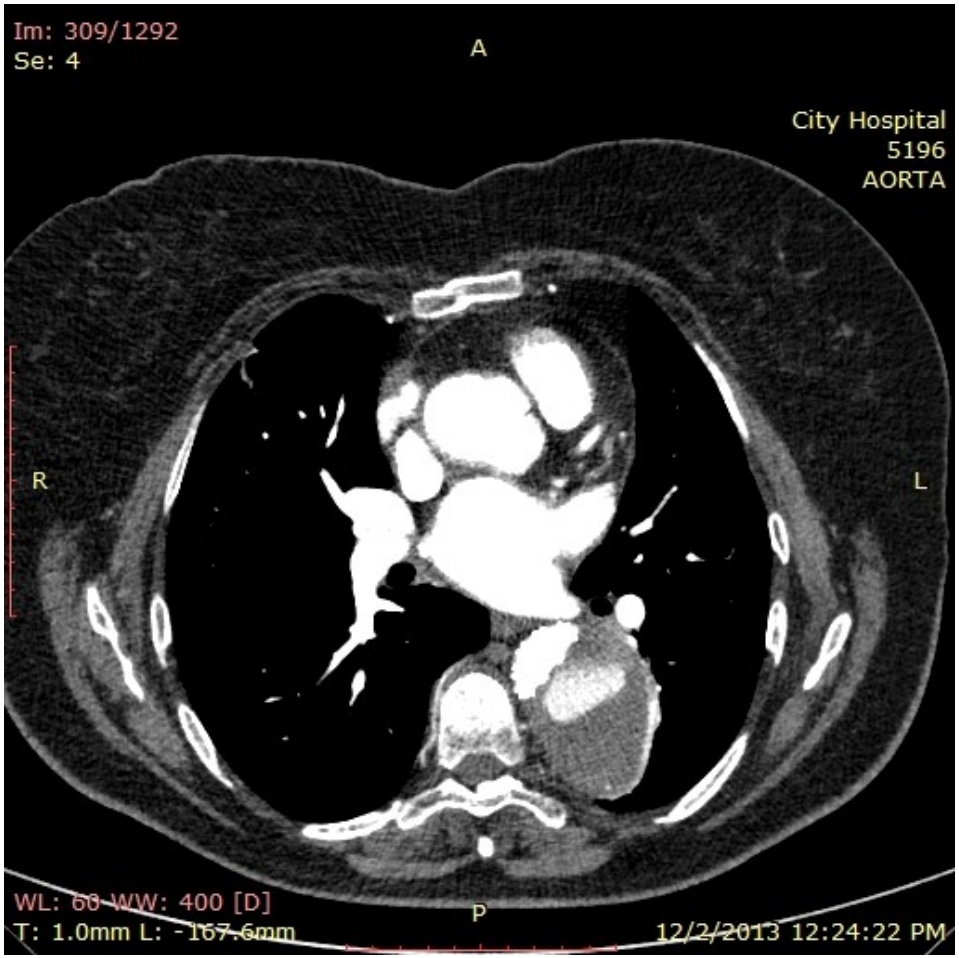


CITY CLINIC

1 months f-up



CITY CLINIC


Im: 309/1292
Se: 4
A
City Hospital
5196
AORTA
R
L
P
WL: 60 WW: 400 [D]
T: 1.0mm L: -167.6mm
12/2/2013 12:24:22 PM

CITY CLINIC

- Before

- **After**

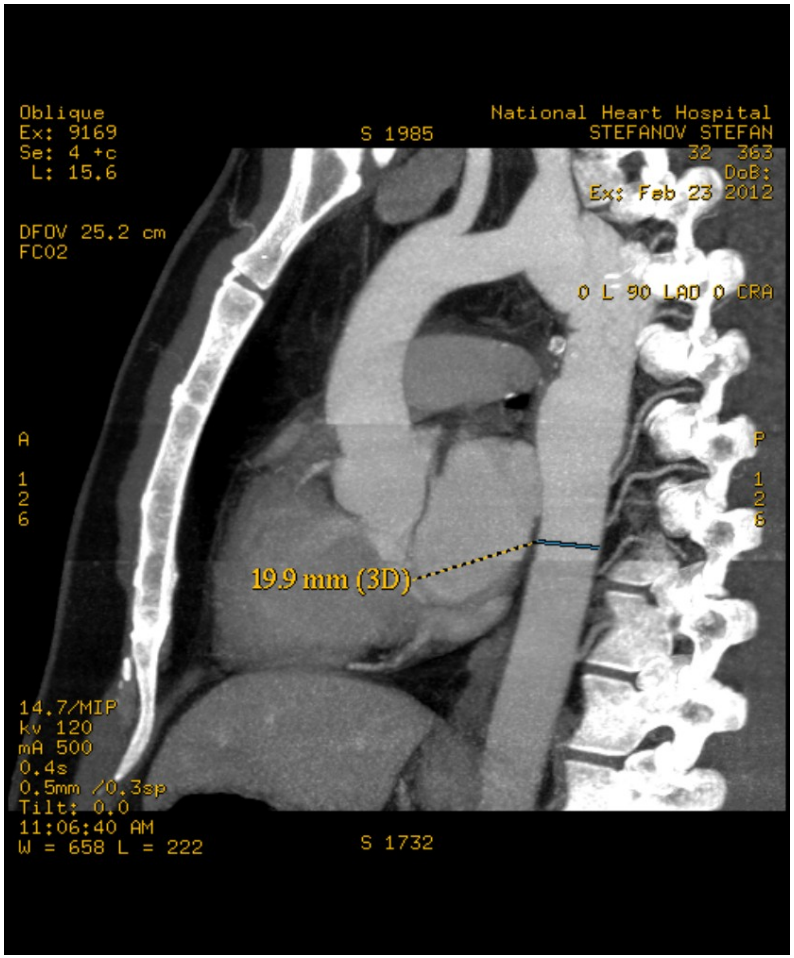
CITY CLINIC

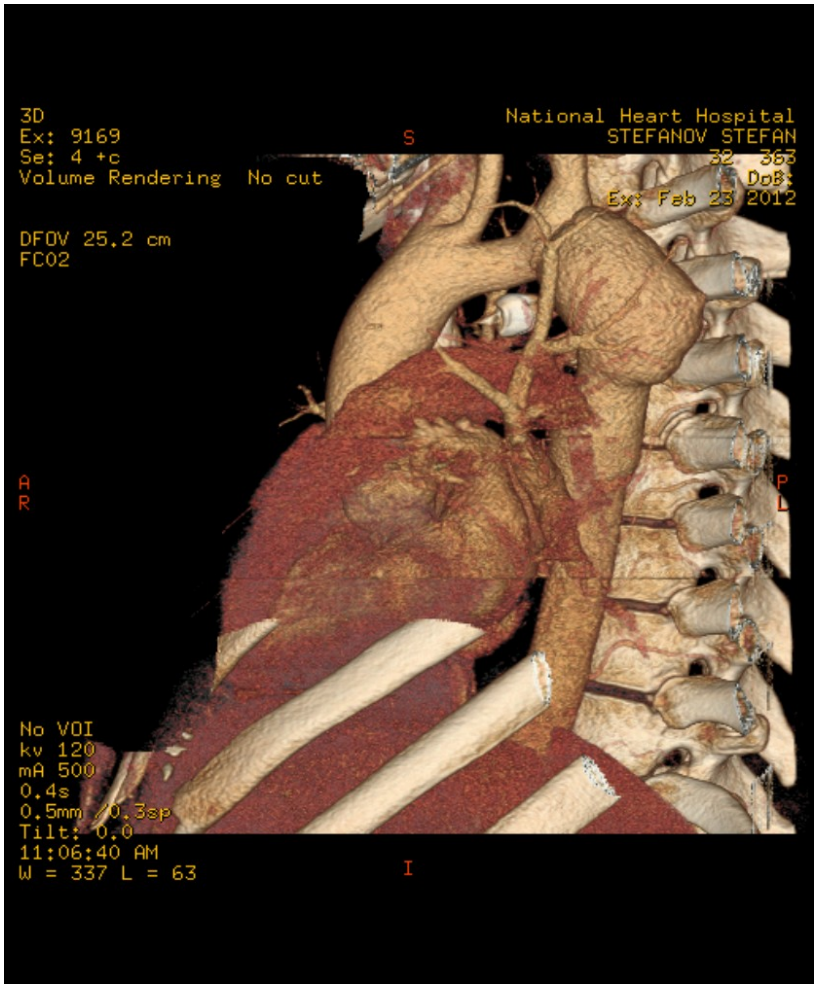
Case report

- A 31 years old man, admitted with TAA
- History of Ao coarctation
- CT show Aneurism of thoracic aorta involving left subclavian artery

CITY CLINIC

Diagnostic CT



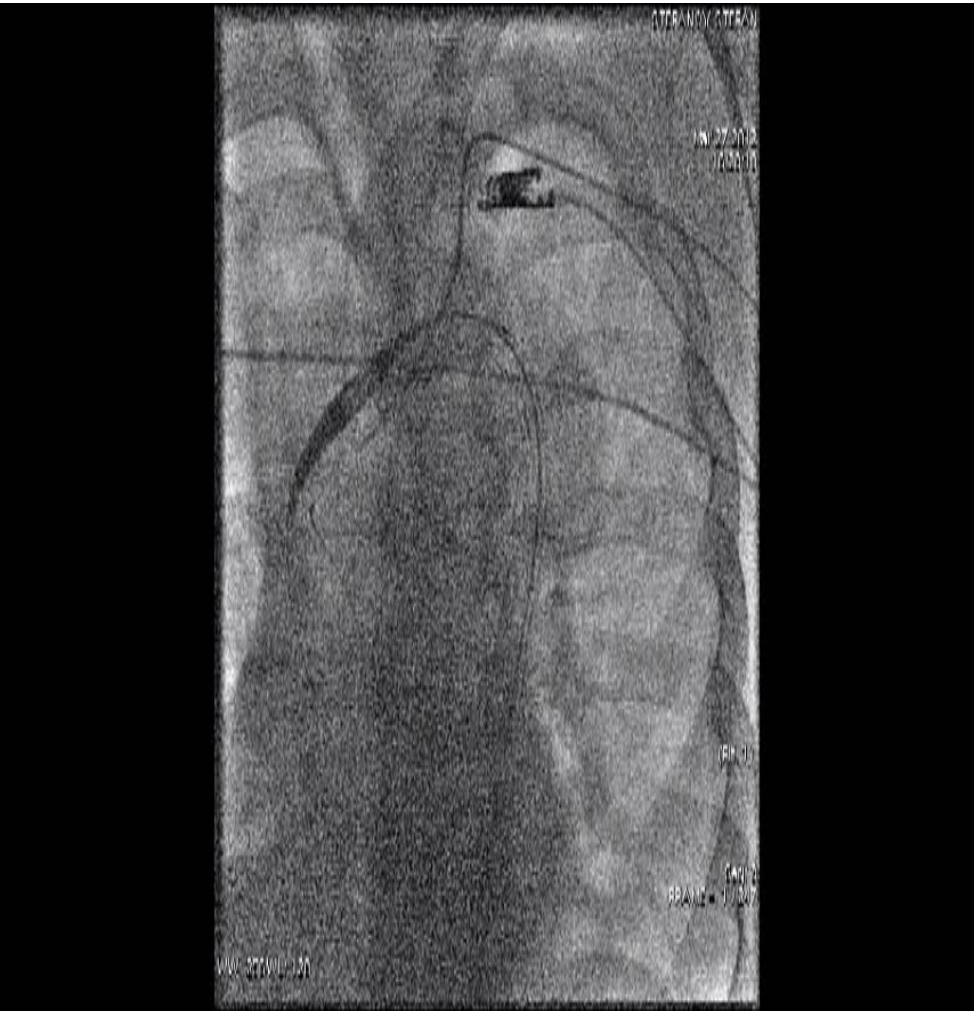


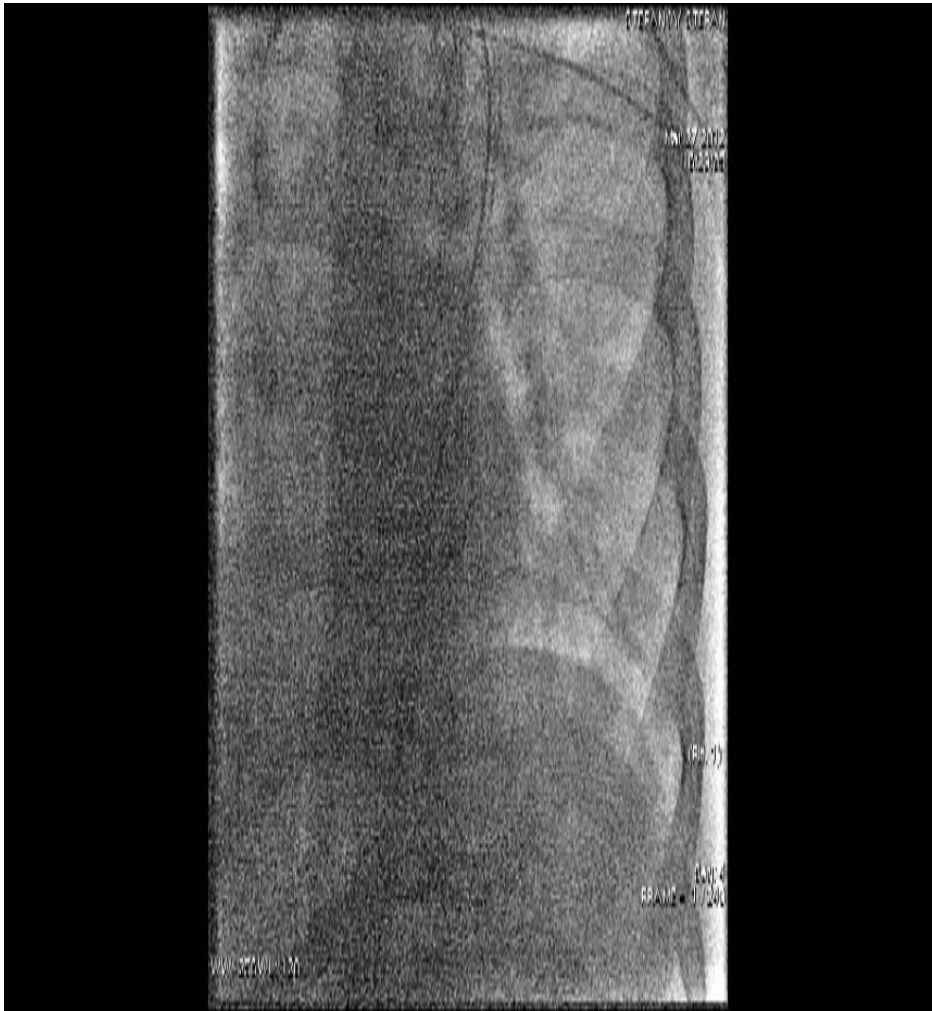
CITY CLINIC

Diagnostic Ao graphy

CITY CLINIC

Placement of endograft



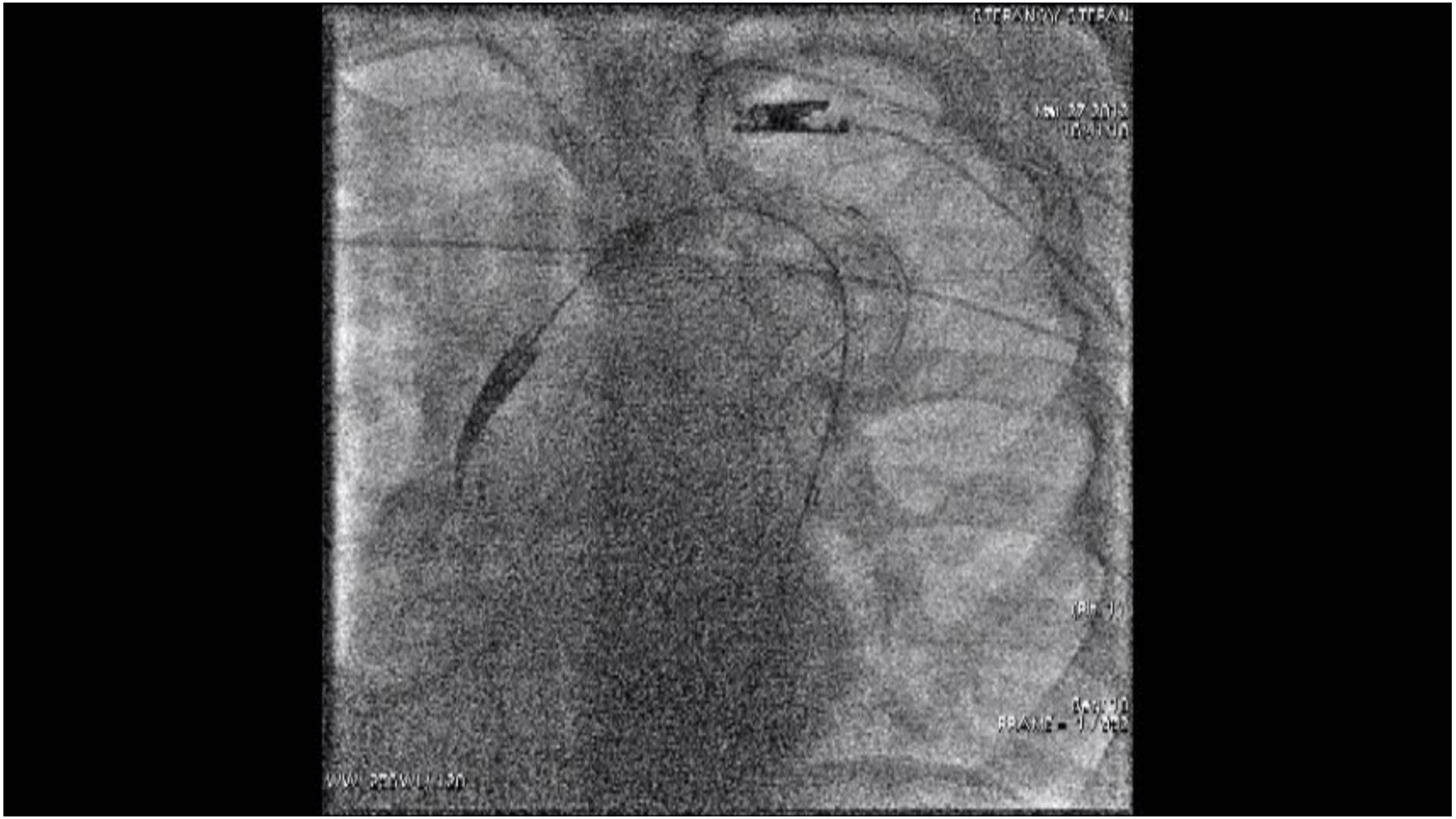


CITY CLINIC

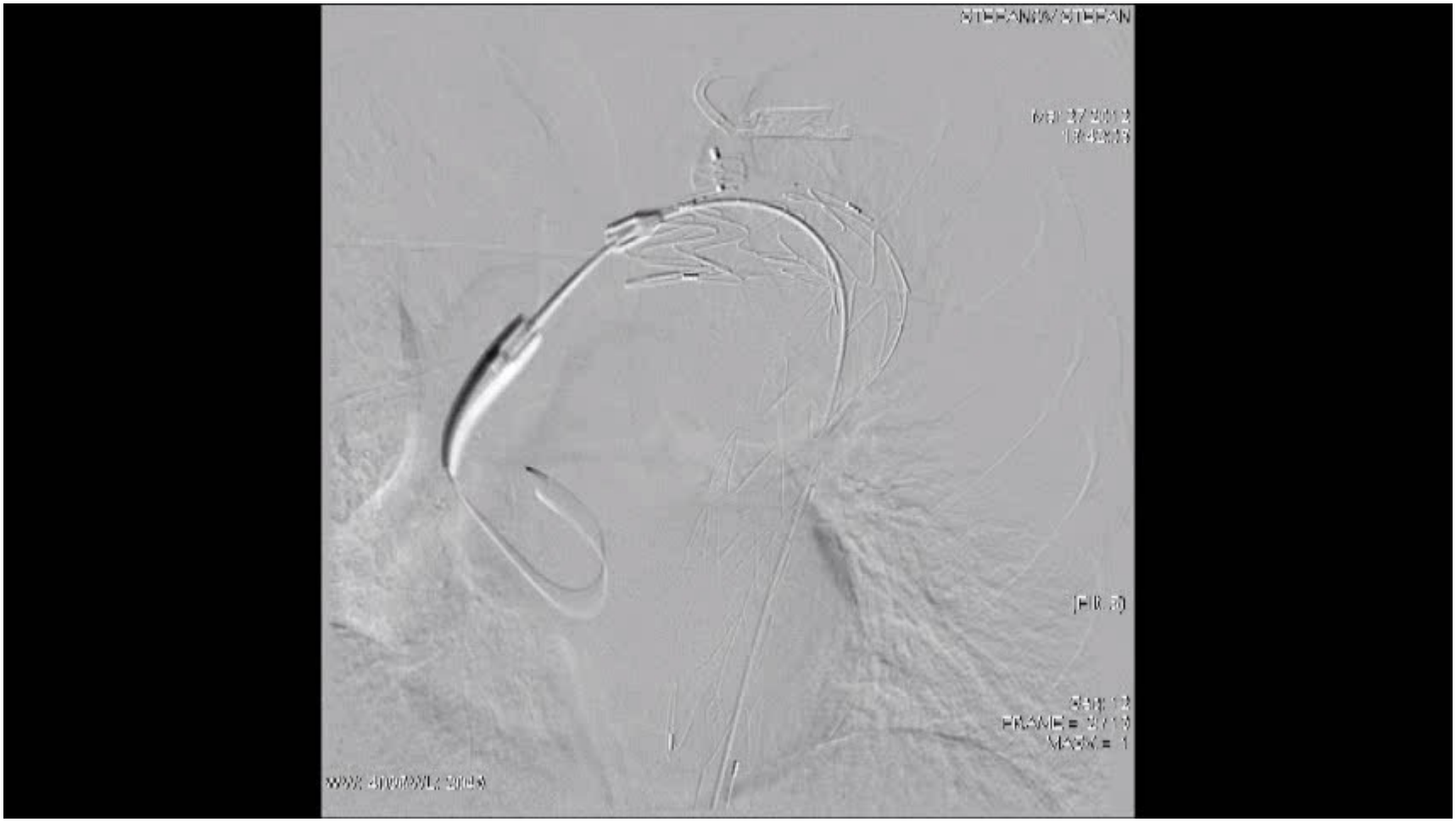
Leak

CITY CLINIC

Amplatzer Vascular Plug 12/40 implantation

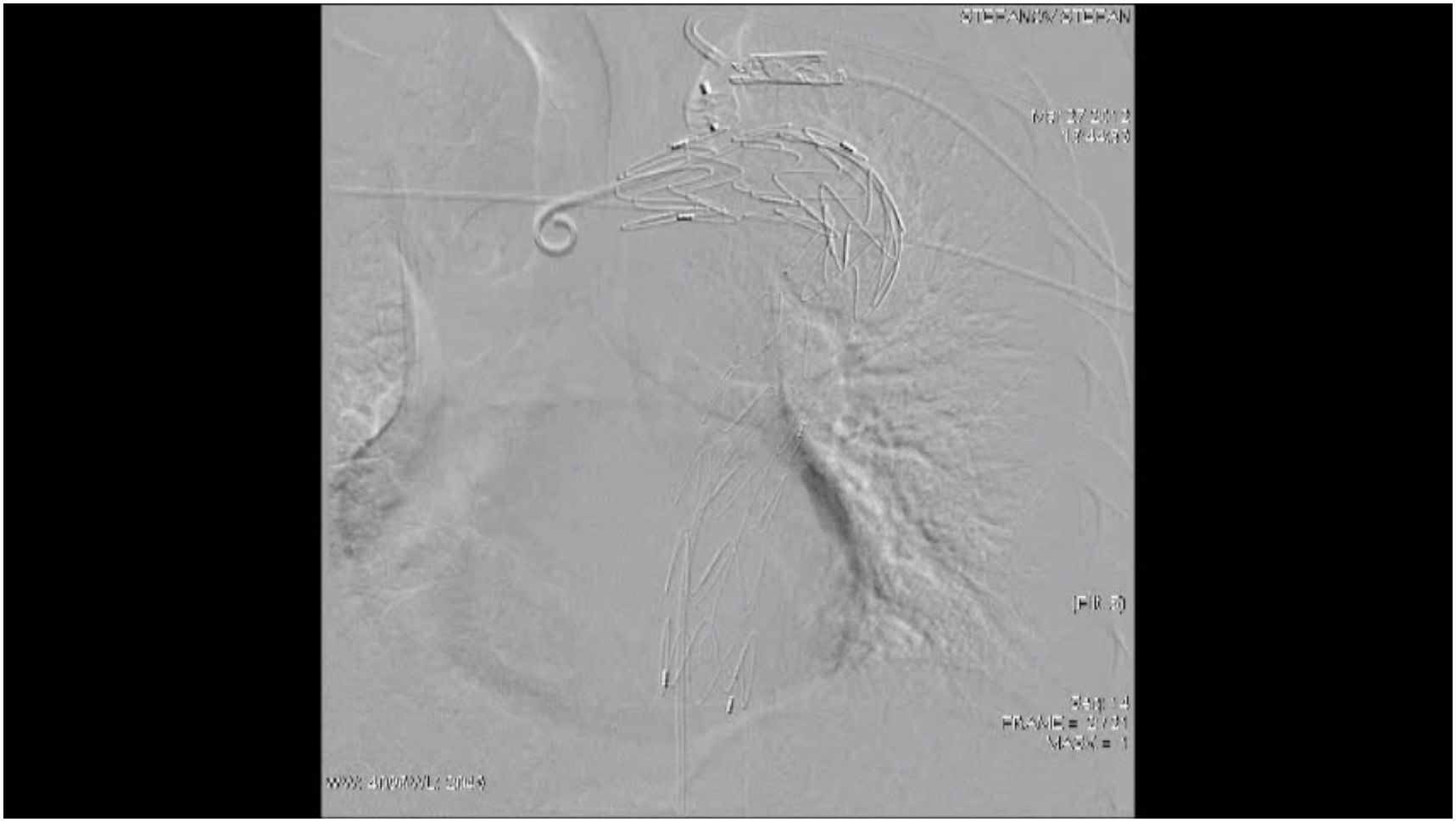


CITY CLINIC



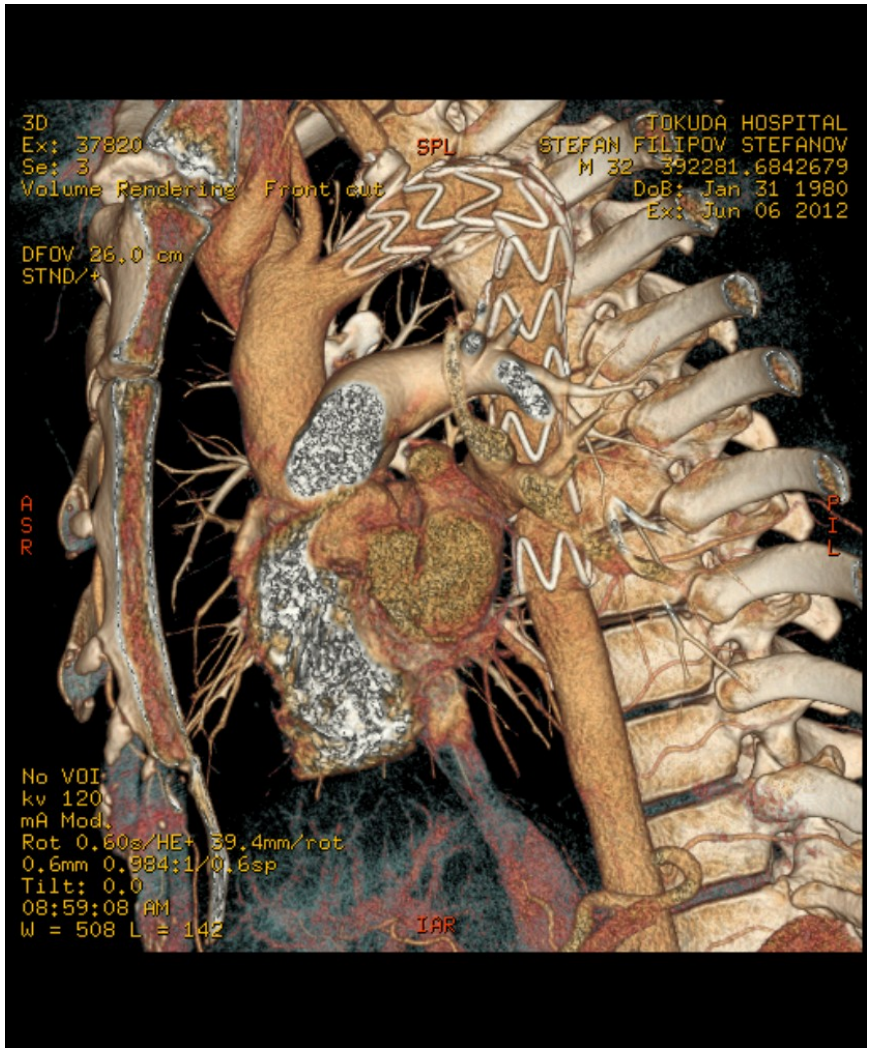
CITY CLINIC

Final



CITY CLINIC

One month follow up



CITY CLINIC

Case presentation

- 74 y, male
- Comorbidities- CoAD-2VD. PCI +stents/ICS/ in RD1. /2004/ Arterial hypertension , Operation due to Ca recti
- Diagnosed with an asymptomatic thoracic aortic aneurysm / descending aorta/ , which was treated successfully in 2004 with a stent graft.

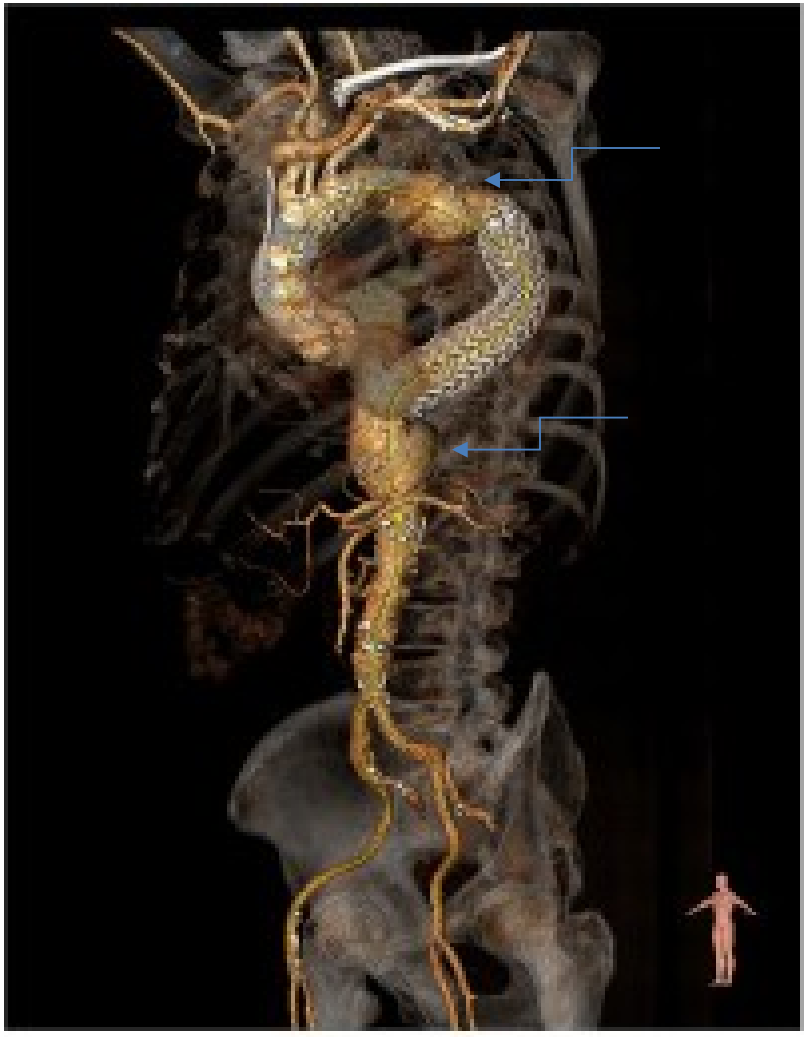
CITY CLINIC

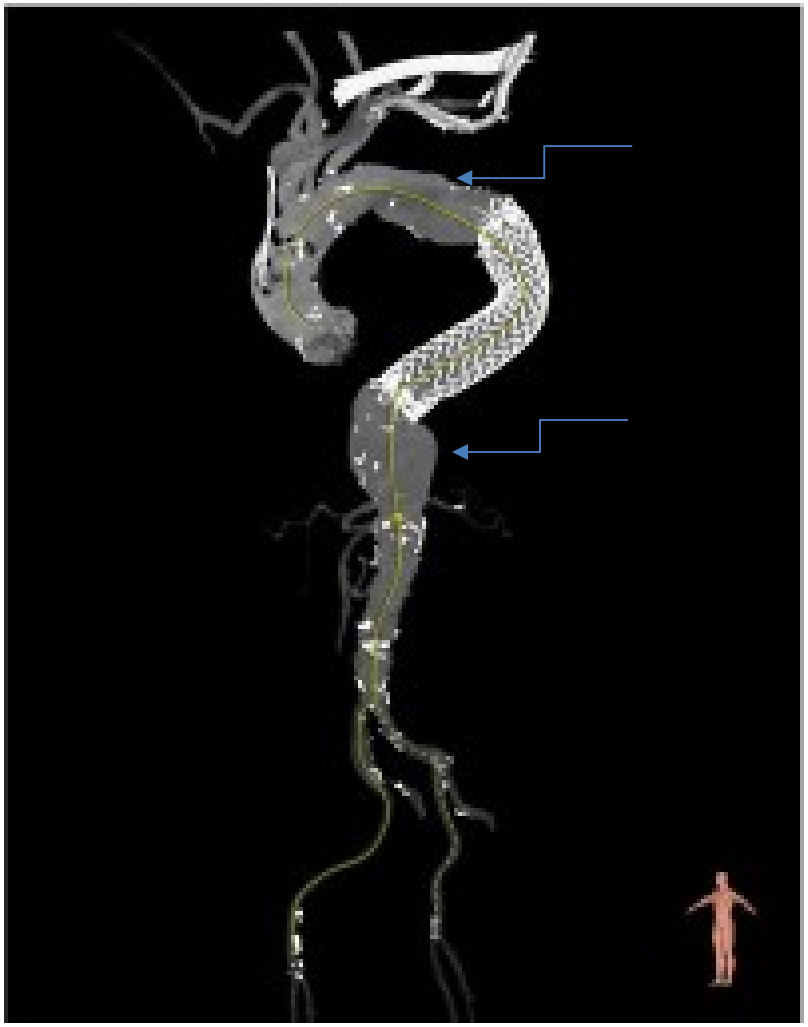
Coronarography

- In february 2012 due to chest pain coronaro- and aortography was done and it was found an aneurysm below the stent graft, above the renal arteries.
- Coronarography- patent stent in RD1, LCx with occlusion in OM2; RCA-degenerative changes.

CITY CLINIC

CT- angio





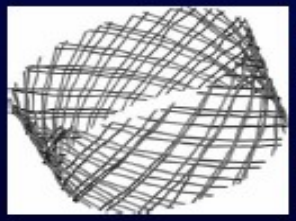
CITY CLINIC

Aortography

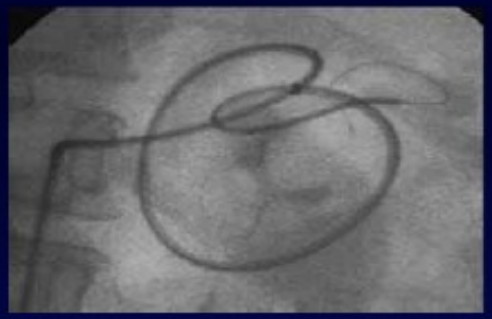
CITY CLINIC

Cardiatis

A theoretical new option



Cardiatis Multilayer Stent is a self-expandable device with a tridimensional mesh made of metallic cobalt alloy wires interconnected in multiple layers: this structure allows the mesh layers number to adapt to diameter, morphology, dimension and course of the target artery

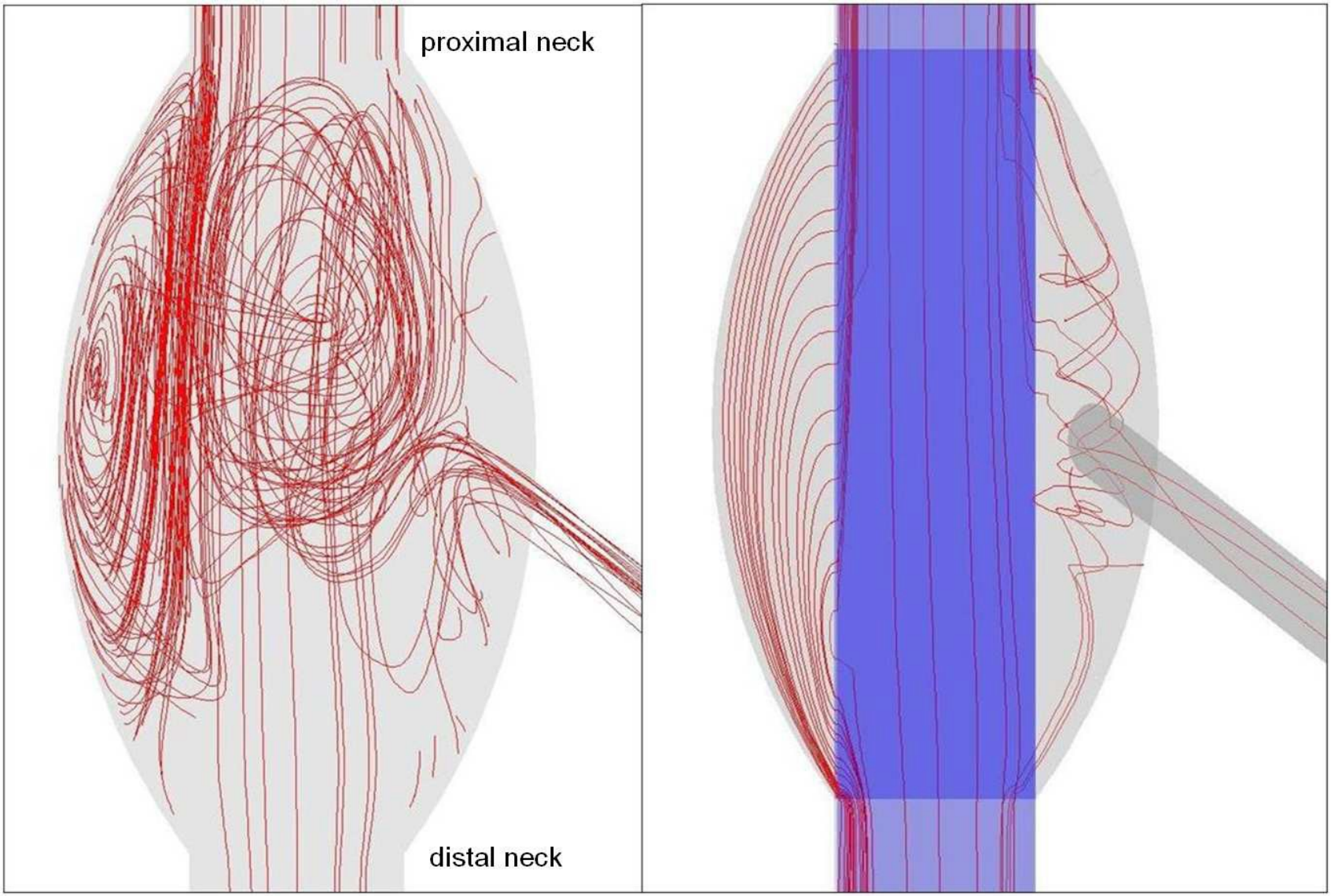


The delivery consists of a guided-catheter with a minimally traumatic soft tip 0.018" (maximum 0.025") compatible.

The sheath is connected by a hemostatic Y valve to the delivery: when the valve is closed, the sheath is fixed to the support, as a safety lock.

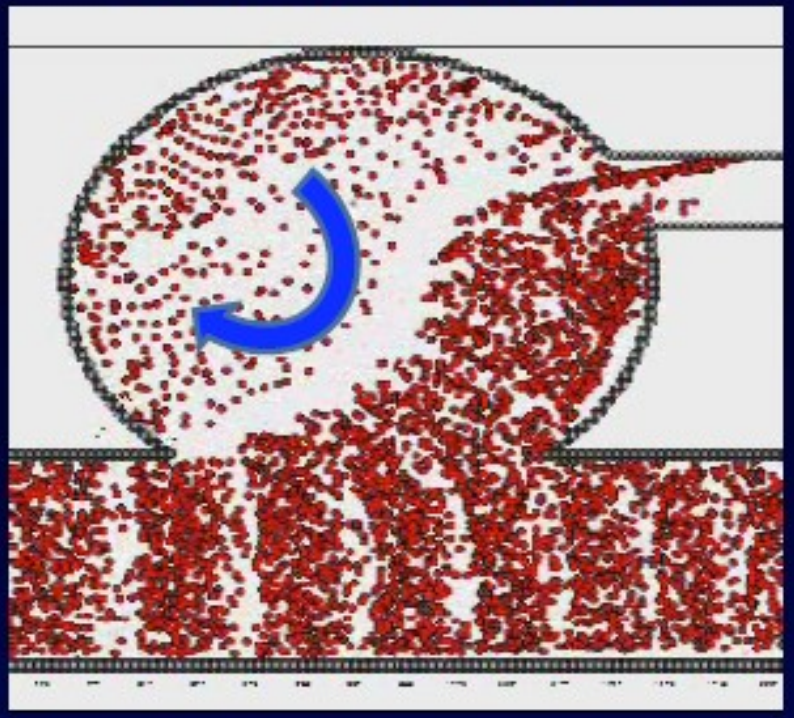
CITY CLINIC

Streamlines inside an aneurysm without sten (left) and with porous wired stent (right, stent in blue). Steady computation.



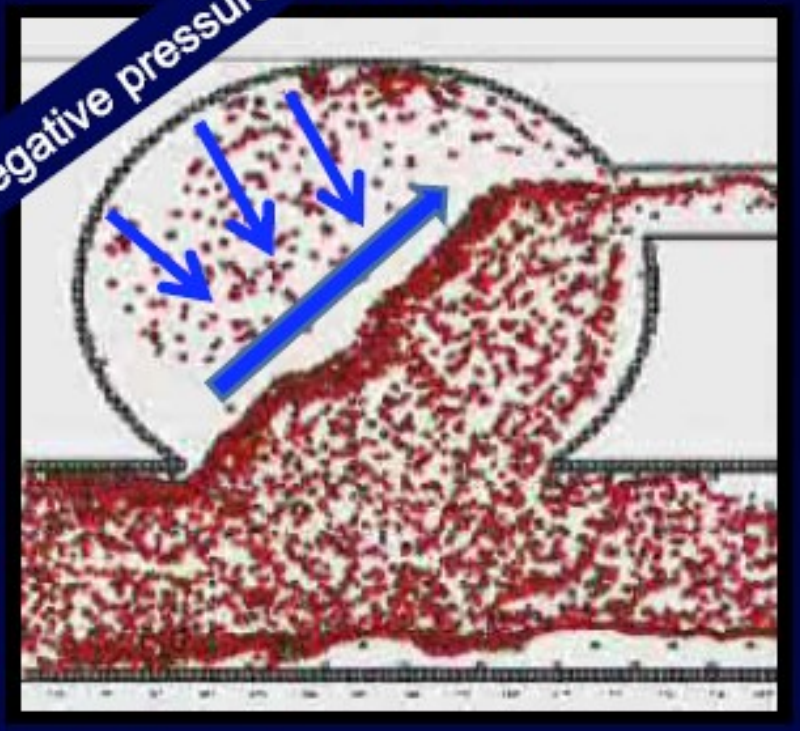
Side branches arising from aneurysm

Flow Recirculation



Without Stent

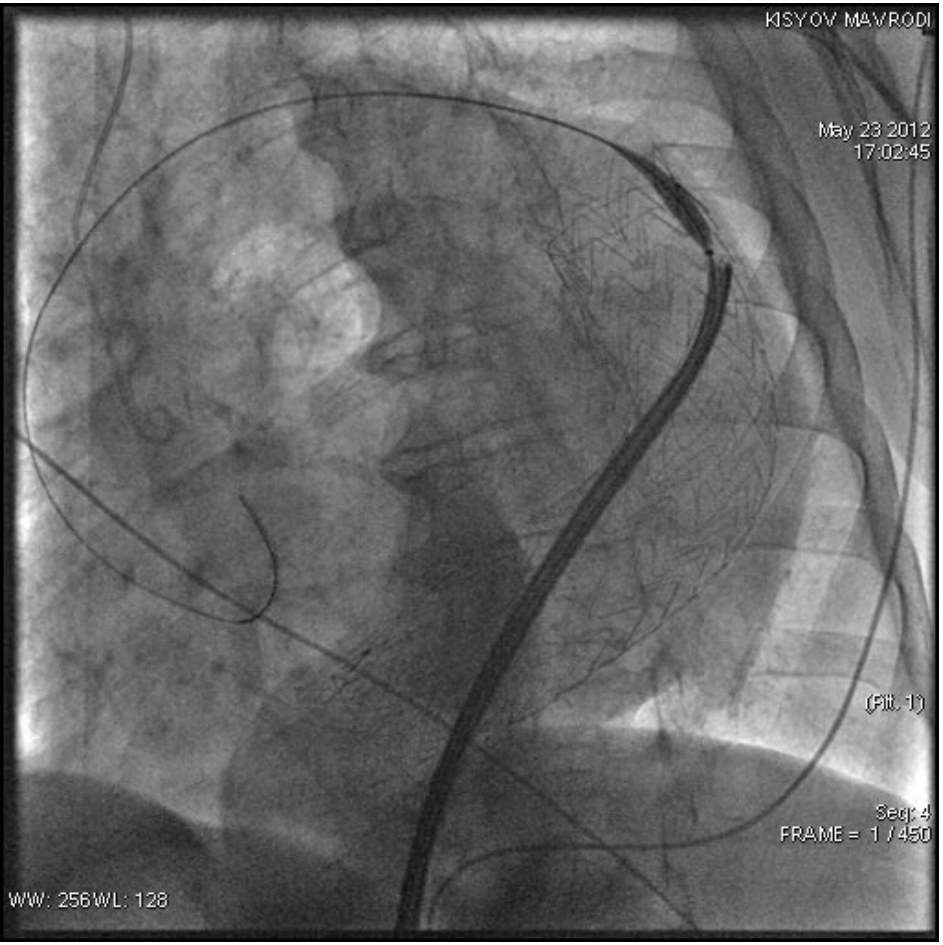
Flow channeled to the branch

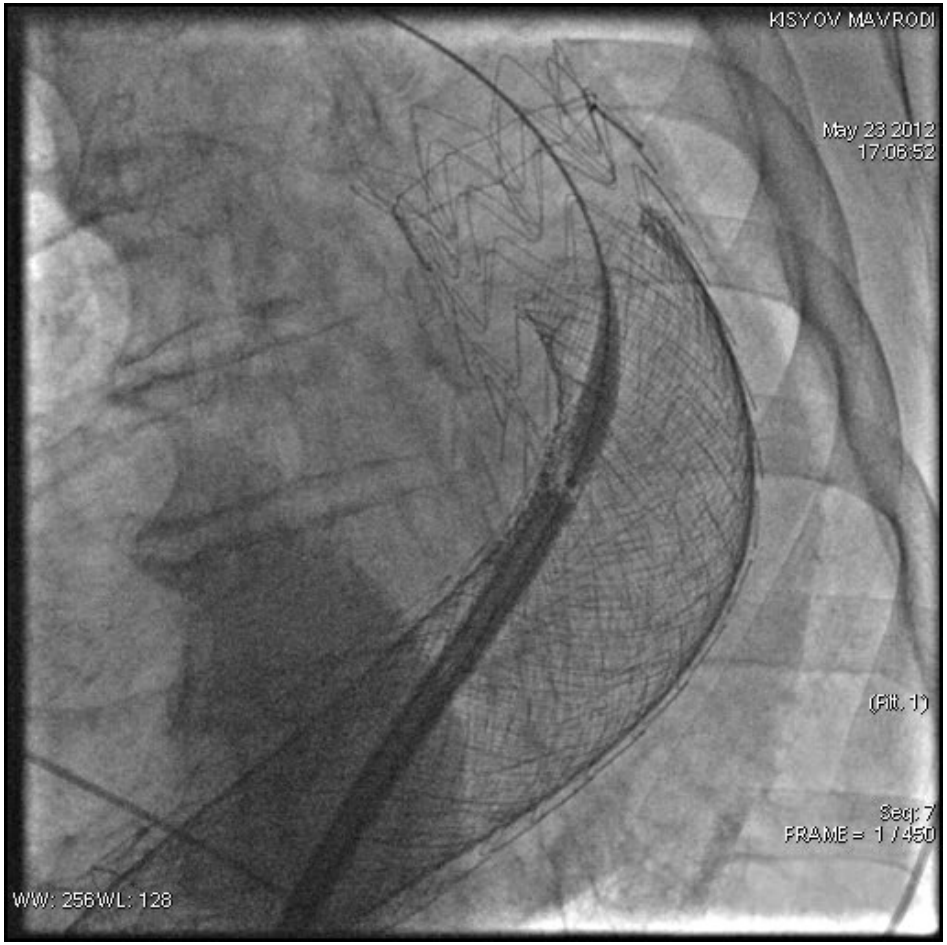


With Multilayer Stent

CITY CLINIC

Implantation





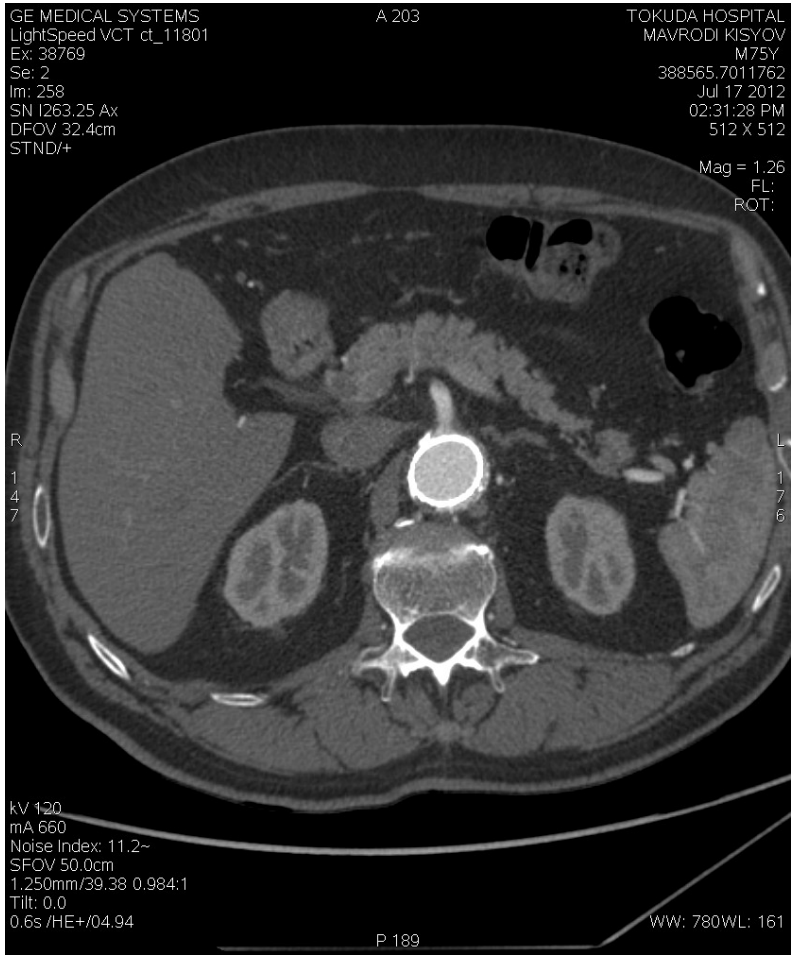
CITY CLINIC

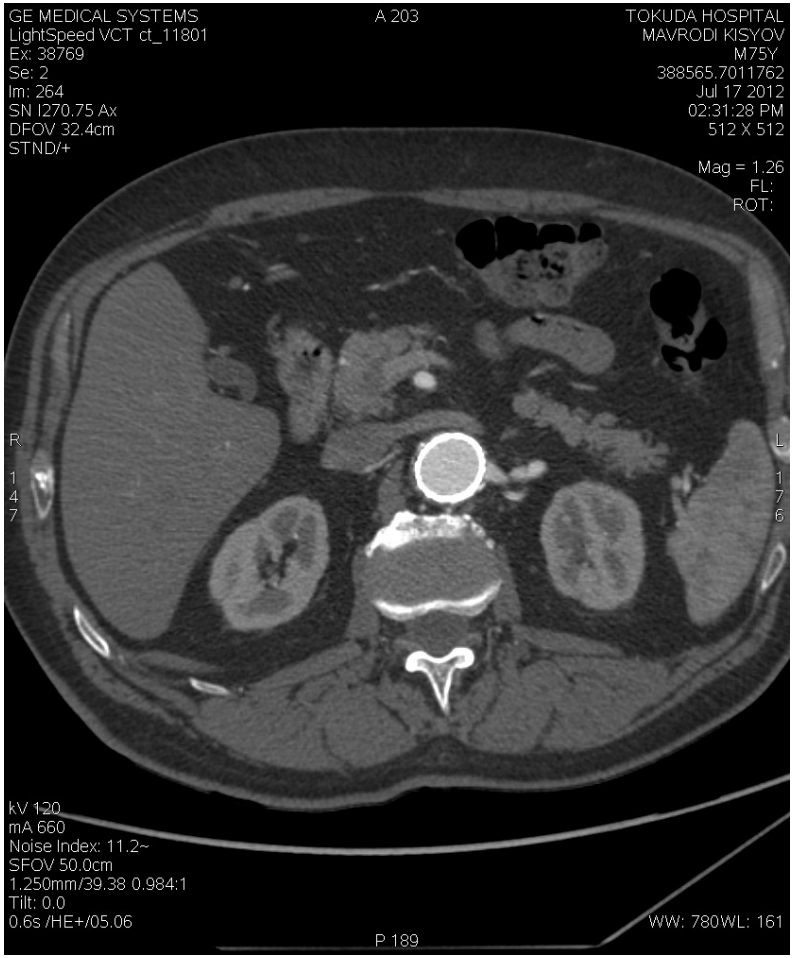
Final

CITY CLINIC

Control CT after 3 monts

CITY CLINIC


GE MEDICAL SYSTEMS
LightSpeed VCT ct_11801
Ex: 38769
Se: 2
Im: 258
SN I263.25 Ax
DFOV 32.4cm
STND/+
A 203
TOKUDA HOSPITAL
MAVRODI KISYOV
M75Y
388565.7011762
Jul 17 2012
02:31:28 PM
512 X 512
Mag = 1.26
FL:
ROT:
R
L
kV 120
mA 660
Noise Index: 11.2~
SFOV 50.0cm
1.250mm/39.38 0.984:1
Tilt: 0.0
0.6s /HE+/04.94
P 189
WW: 780WL: 161


GE MEDICAL SYSTEMS
LightSpeed VCT ct_11801
Ex: 38769
Se: 2
Im: 264
SN I270.75 Ax
DFOV 32.4cm
STND/+
A 203
TOKUDA HOSPITAL
MAVRODI KISYOV
M75Y
388565.7011762
Jul 17 2012
02:31:28 PM
512 X 512
Mag = 1.26
FL:
ROT:
R
L
kV 120
mA 660
Noise Index: 11.2~
SFOV 50.0cm
1.250mm/39.38 0.984:1
Tilt: 0.0
0.6s /HE+/05.06
P 189
WW: 780WL: 161

CITY CLINIC

CASE REPORT

AAA

endografting

Abdominal Aortic aneurysm

- Affects 4-8% of elderly males
- 15,000 deaths per year USA
- Screening and reduction of elderly male smokers reduces aneurysm related mortality by 46%

USPHTF Ann Int Med Feb 2005

Pre-stentgraft AAA Measurement Guidelines

Note: All measurements are made orthogonal to the opacified arterial lumen

Lengths

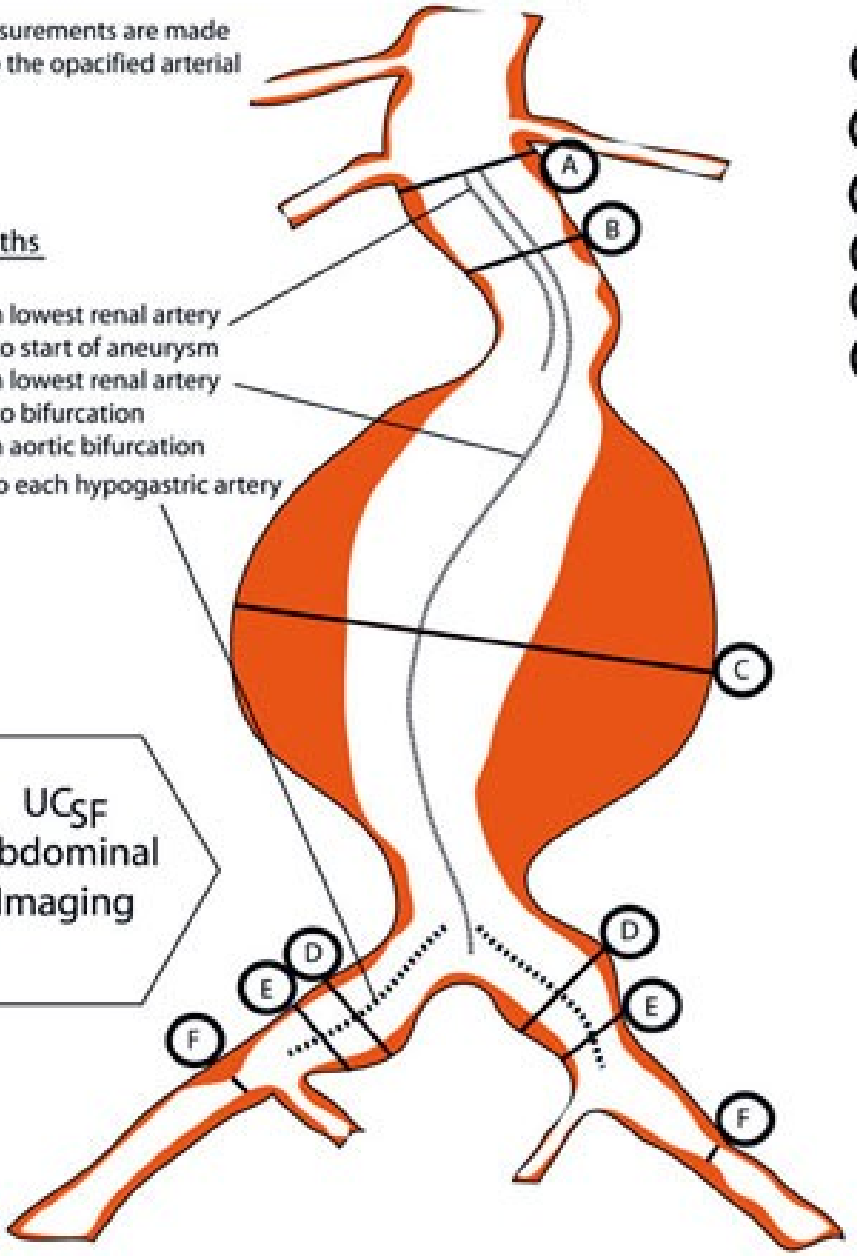
- From lowest renal artery to start of aneurysm
- From lowest renal artery to bifurcation
- From aortic bifurcation to each hypogastric artery

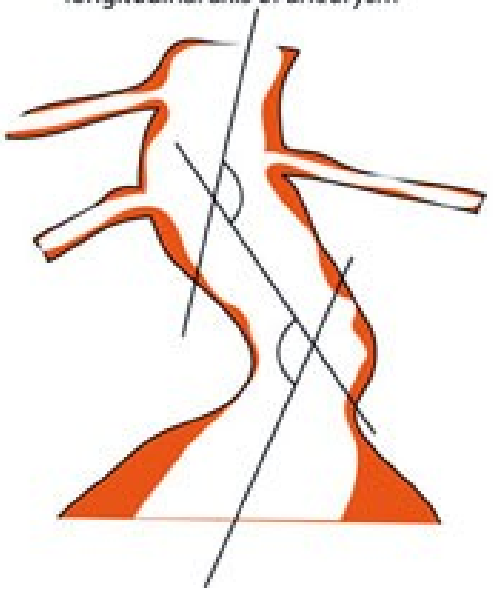
Diameters

- A · Proximal neck diameter (outer diameter at lowest renal artery)
- B · Proximal neck diameter 15mm below lowest renal artery (outer diameter)
- C · Maximum aneurysm diameters (outer wall to outer wall, major & minor diameters)
- D · Maximal outer diameter of each common iliac artery
- E · Outer diameter of each common iliac artery 5 mm above the hypogastric
- F · Narrowest inner diameter of each common or external iliac artery

Angles

- Between immediate suprarenal neck and immediate infrarenal neck
- Between proximal neck and longitudinal axis of aneurysm





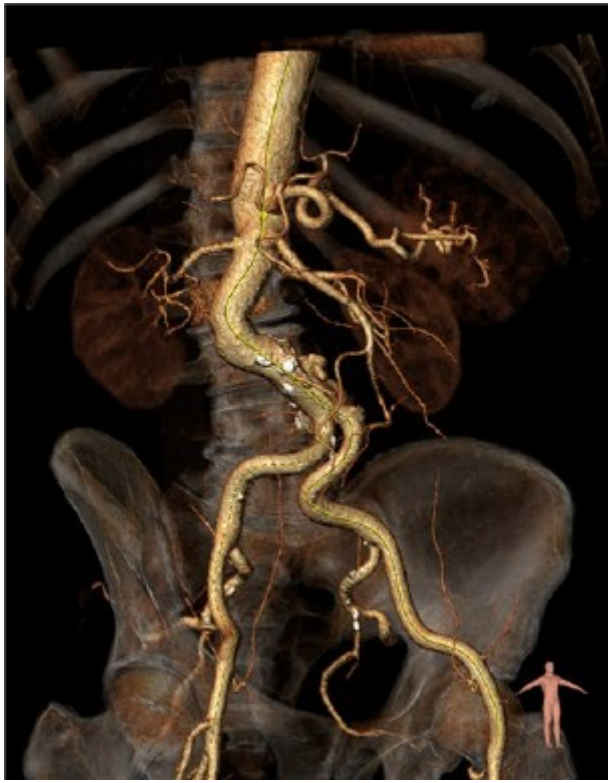
CITY CLINIC

Case presentation 2

- 73 y, male
- Comorbidities- CoAD-1VD. PCI +stents/DES/x2 in LAD. Arterial hypertension, hypercholesterolemia, aortic insufficiency II gr., episodes of paroxismal atrial fibrillation
- Diagnosed with an asymptomatic abdominal aortic aneurysm, proven by echo doppler, CT and aortograpgy.

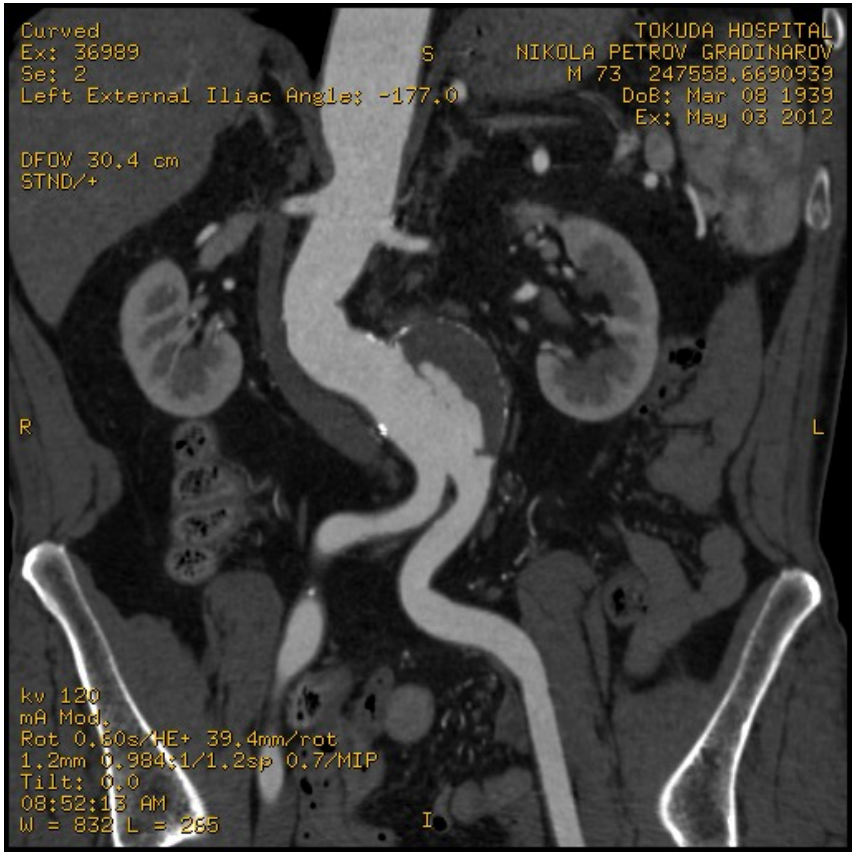
CITY CLINIC

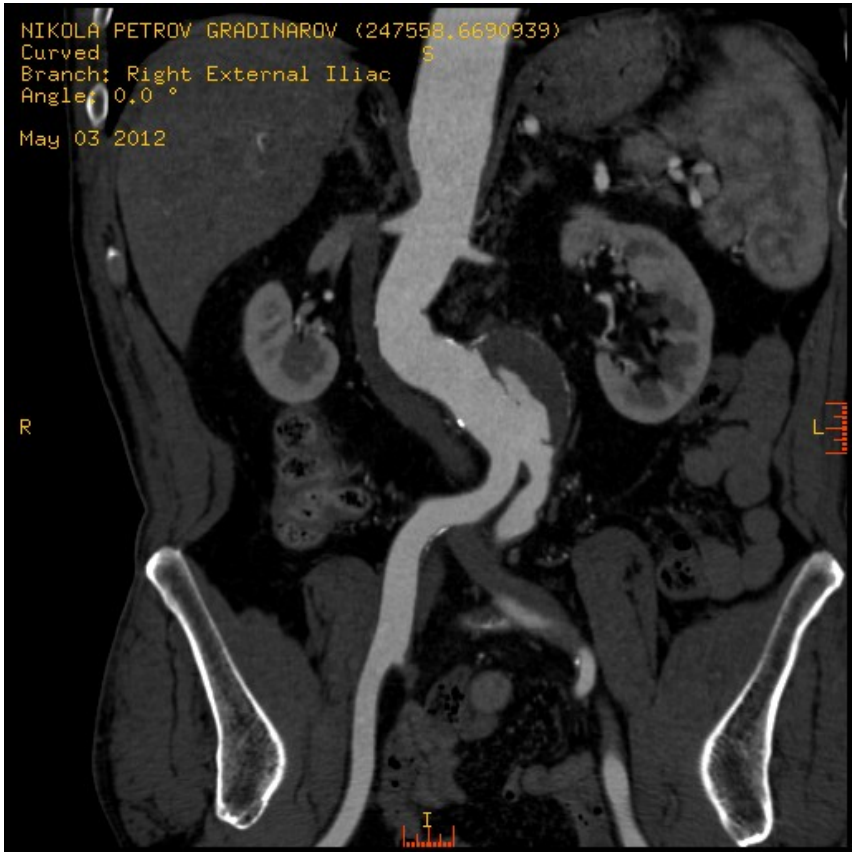
CT- angio



CITY CLINIC

CT-angio





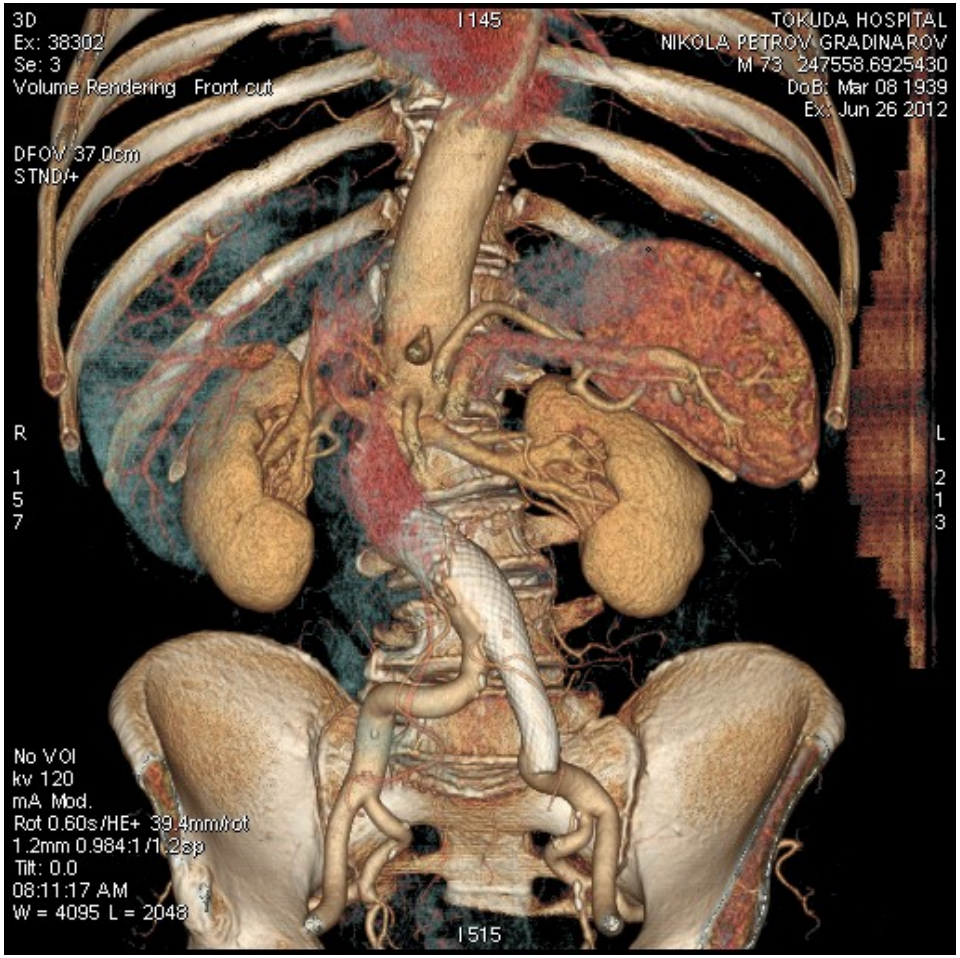
CITY CLINIC

Angiography

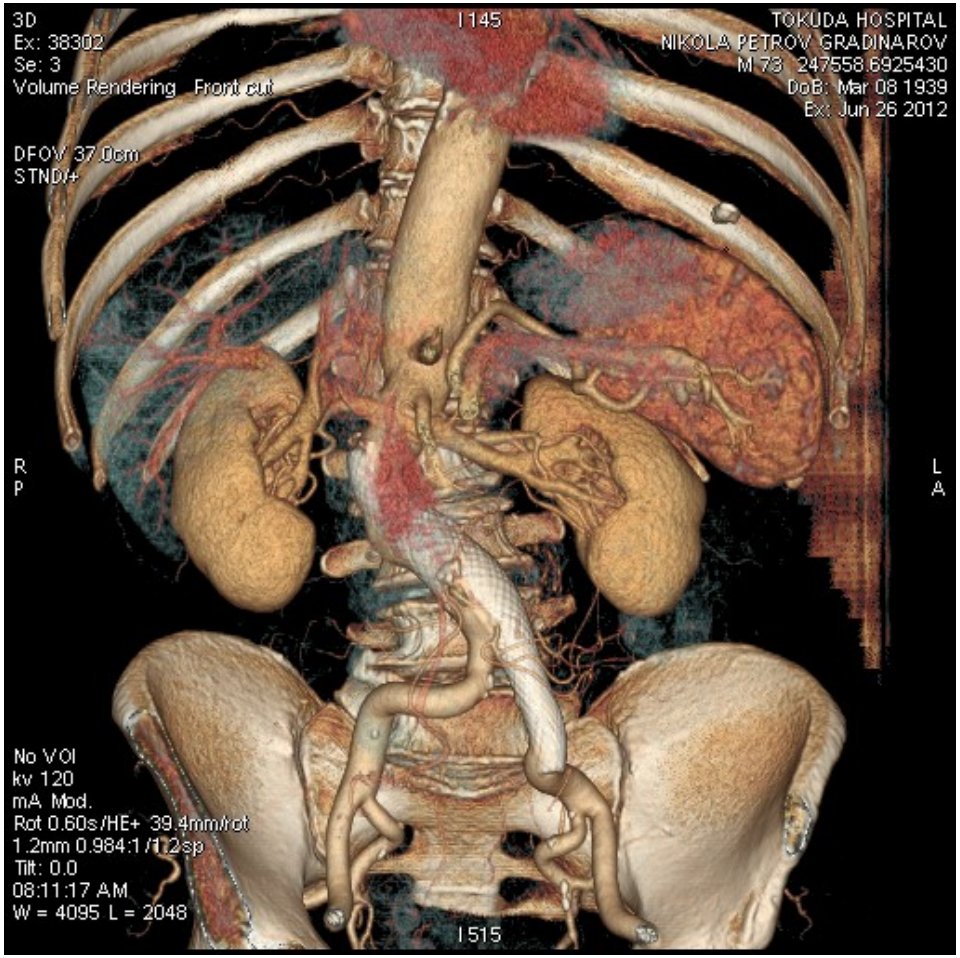
CITY CLINIC

CT- angio after 1- months

CITY CLINIC


3D
Ex: 38302
Se: 3
Volume Rendering Front cut
I145
TOKUDA HOSPITAL
NIKOLA PETROV GRADINAROV
M 73 247558.6925430
DoB: Mar 08 1939
Ex: Jun 26 2012
DFOV 37.0cm
STND/+
R
1
5
7
L
2
1
3
No VOI
kv 120
mA Mod.
Rot 0.60s /HE+ 39.4mm/rot
1.2mm 0.984:1 /1.2sp
Tilt: 0.0
08:11:17 AM
W = 4095 L = 2048
I515

CITY CLINIC


3D
Ex: 38302
Se: 3
Volume Rendering Front cut
DFOV 37.0cm
STND/+
I145
TOKUDA HOSPITAL
NIKOLA PETROV GRADINAROV
M 73 247558.6925430
DoB: Mar 08 1939
Ex: Jun 26 2012
R
P
L
A
No VOI
kv 120
mA Mod.
Rot 0.60s/HE+ 39.4mm/rot
1.2mm 0.984:1/112sp
Tilt: 0.0
08:11:17 AM
W = 4095 L = 2048
I515

CITY CLINIC

Patient presentation

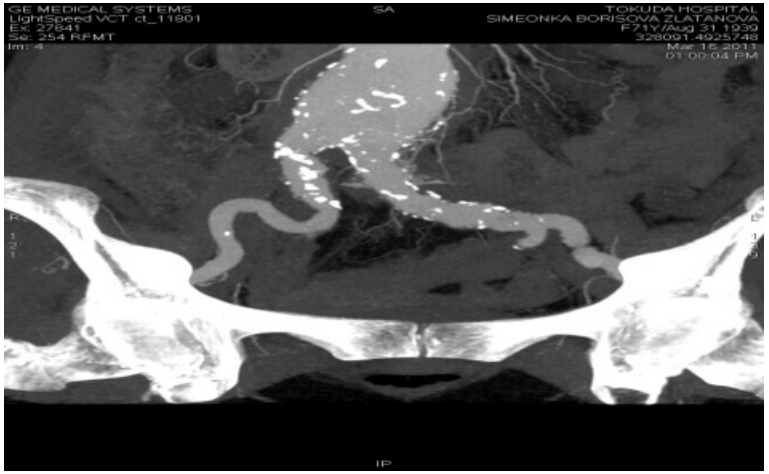
- 71 YO Female patient
- Chest pain on exertion CCS class II-III
- Concurrent long lasting arterial hypertension not controlled with medication
- Wilson's disease on continuous chelator therapy
- Abdominal echo scan done for mid abdominal discomfort with finding of abdominal aortic aneurism
- Regular abdominal echo scan follow up found progression of aneurism dimension

Patient presentation

- Physical exam found a large, pulsatile mass around the umbilicus; liver palpable 3cm below the costal line; BP 130/80mmHg
- Abdominal echo scan confirmed AAA below renal arteries with max d 5.5cm, extending to the aortic bifurcation; mural thrombosis
- Cardiac ultrasound: Ao root 32mm, LA 45mm, IVSd/IVSs 11/10mm, LVEDV / LVESV 94/45ml, EF 52%; no hemodynamically significant valve lesions
- Lab Results: TC 12.2mmol/l; LDL 8.31mmol/l; TG 3.02mmol/l; CPK 58.4U/l; MB 9.0U/l; TnI 0.0; Crea 65.0mcmol/l

CITY CLINIC

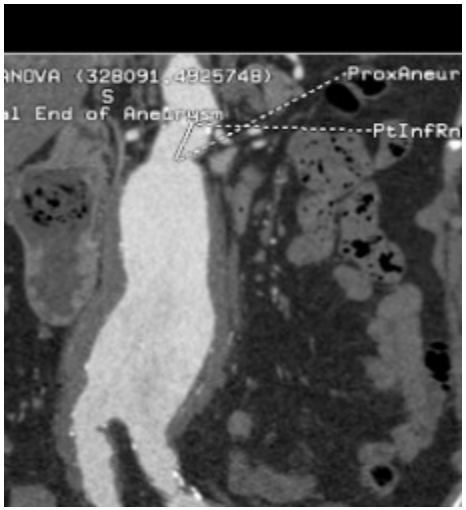
CT



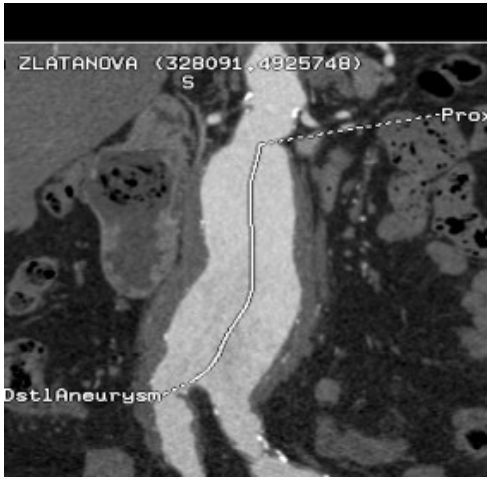
CITY CLINIC

Radiographic assessment

Point Name	Mean (mm)	Min (mm)	Max (mm)	Area (mm²)
PtAbvRnArt	23.3 ± 0.8	20.7 ± 0.8	28.2 ± 0.8	428.0 ± 30.1
PtInfRnArt	20.3 ± 0.9	18.4 ± 0.9	23.8 ± 0.9	323.5 ± 27.7
15mmInfRnArt	17.9 ± 0.9	15.6 ± 0.9	20.3 ± 0.9	251.4 ± 25.0
ProxAneurysm	20.3 ± 0.9	19.3 ± 0.9	21.3 ± 0.9	324.5 ± 28.4
DstlAneurysm	22.2 ± 0.9	19.7 ± 0.9	24.1 ± 0.9	386.4 ± 30.4
LgstLumen	44.6 ± 0.8	37.5 ± 0.8	49.5 ± 0.8	1560.8 ± 59.8
RtIliacBif	13.5 ± 0.9	9.8 ± 0.9	17.1 ± 0.9	144.0 ± 19.0
LtIliacBif	15.1 ± 0.9	13.1 ± 0.9	17.6 ± 0.9	180.1 ± 21.2

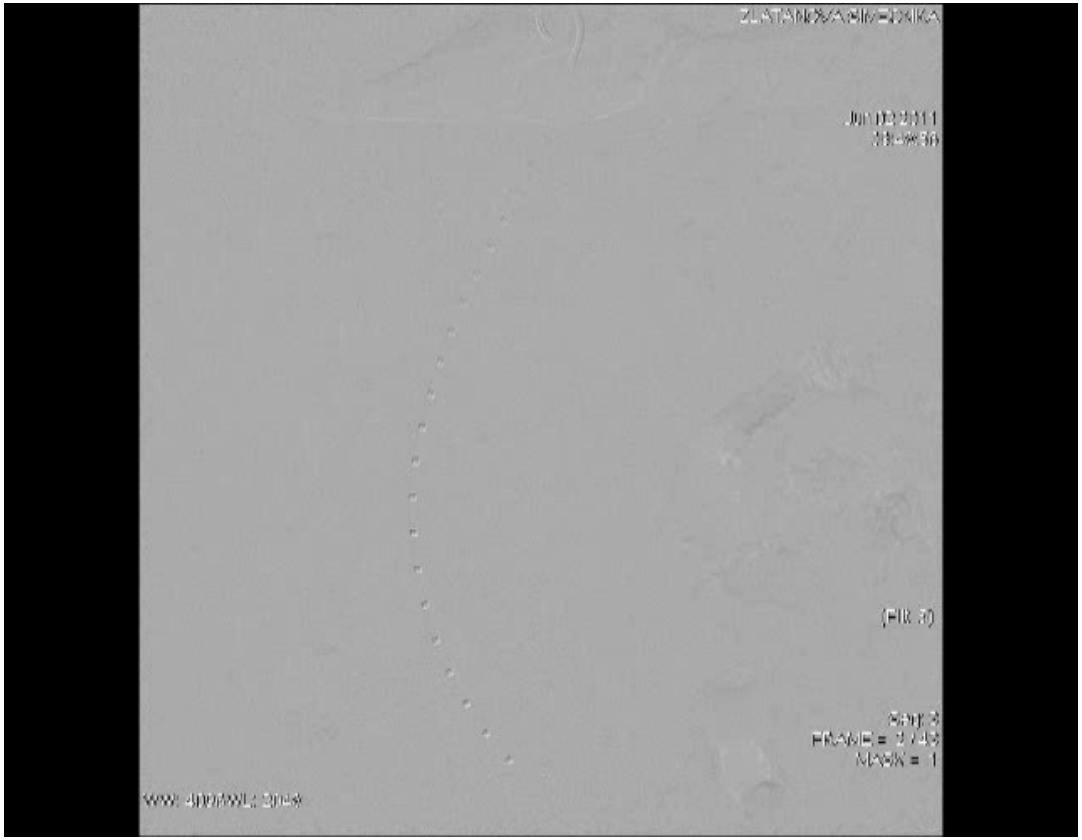


Measurement name	Length
InfRnToProx (Lowest Renal to Proximal End of Aneurysm)	18.7 mm
InfRnToDis (Lowest Renal to Distal End of Aneurysm)	147.5 mm
ProxToDis (Aneurysm Height)	128.7 mm
RILength (Length of Right Common Iliac)	43.1 mm
InfRnToAort (Lowest Renal to Aortic Bifurcation)	151.2 mm
InfRnToRI (Lowest Renal to Right Iliac Bifurcation)	194.4 mm
InfRnToLI (Lowest Renal to Left Iliac Bifurcation)	218.1 mm



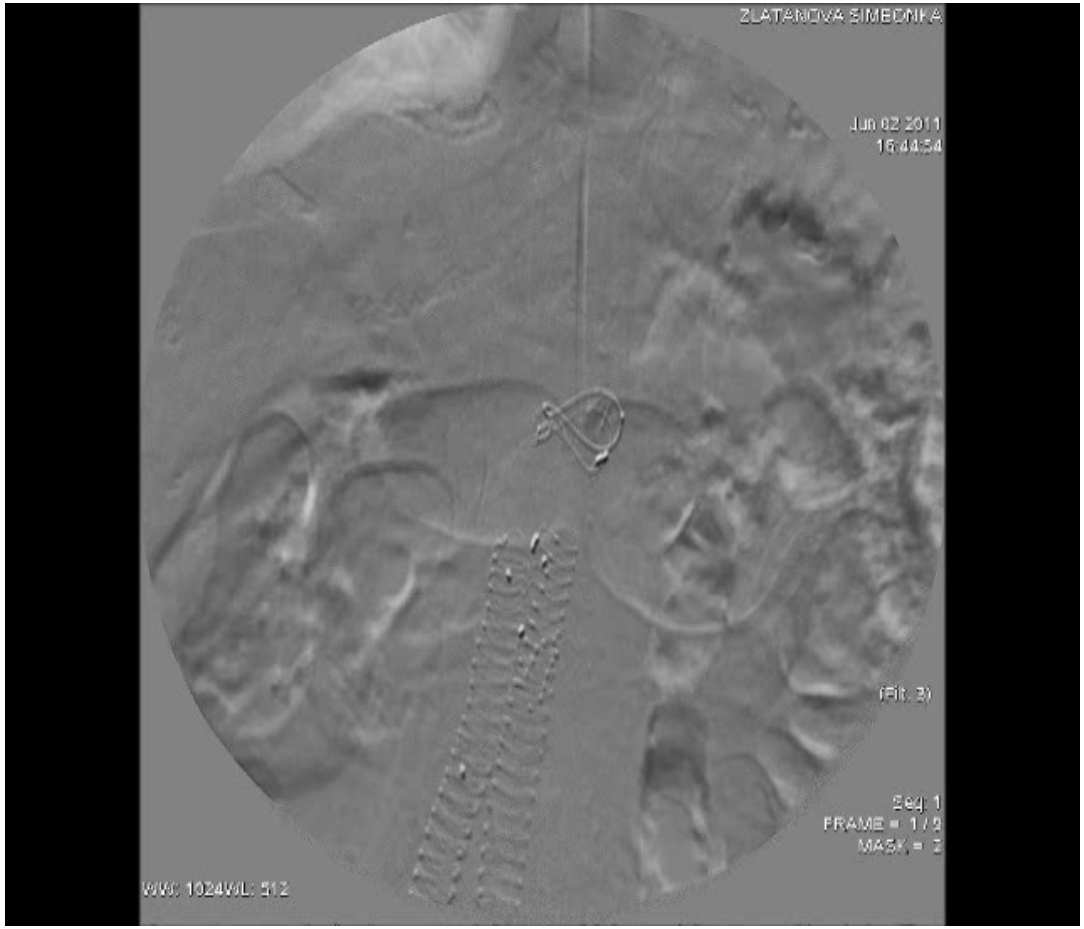
CITY CLINIC

Diagnostic angiography



CITY CLINIC

After EVAR



CITY CLINIC

Take Home messages

- In aortic dissection and aneurysm timely endovascular treatment reduces early mortality and late false lumen and aneurysm sac expansion
- The final success id directly dependent on exact measerments nad planning and is function of multidisciplinary team decision making