



Napoli, 1-2 ottobre 2021  
Hotel Excelsior



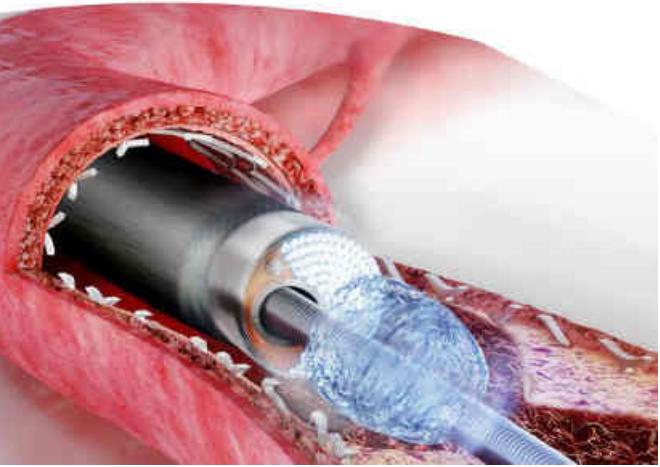
## PCI complessa: strategie alternative – laser a eccimeri

**Fortunato Scotto di Uccio**

Cardiologia UTIC – Emodinamica  
Ospedale del Mare ASL NA1

# INDICAZIONI

- **Lesioni calcifiche**
- **Lesioni fibro-elastiche**
- **Stent ipoespansi**
- **Restenosi intrastent**
- **Graft venosi degnerati**
- **STEMI: trombo-dissoluzione (in alternativa alla tromboaspirazione, no reflow)**



Sonde 0,9 – 1,4 mm

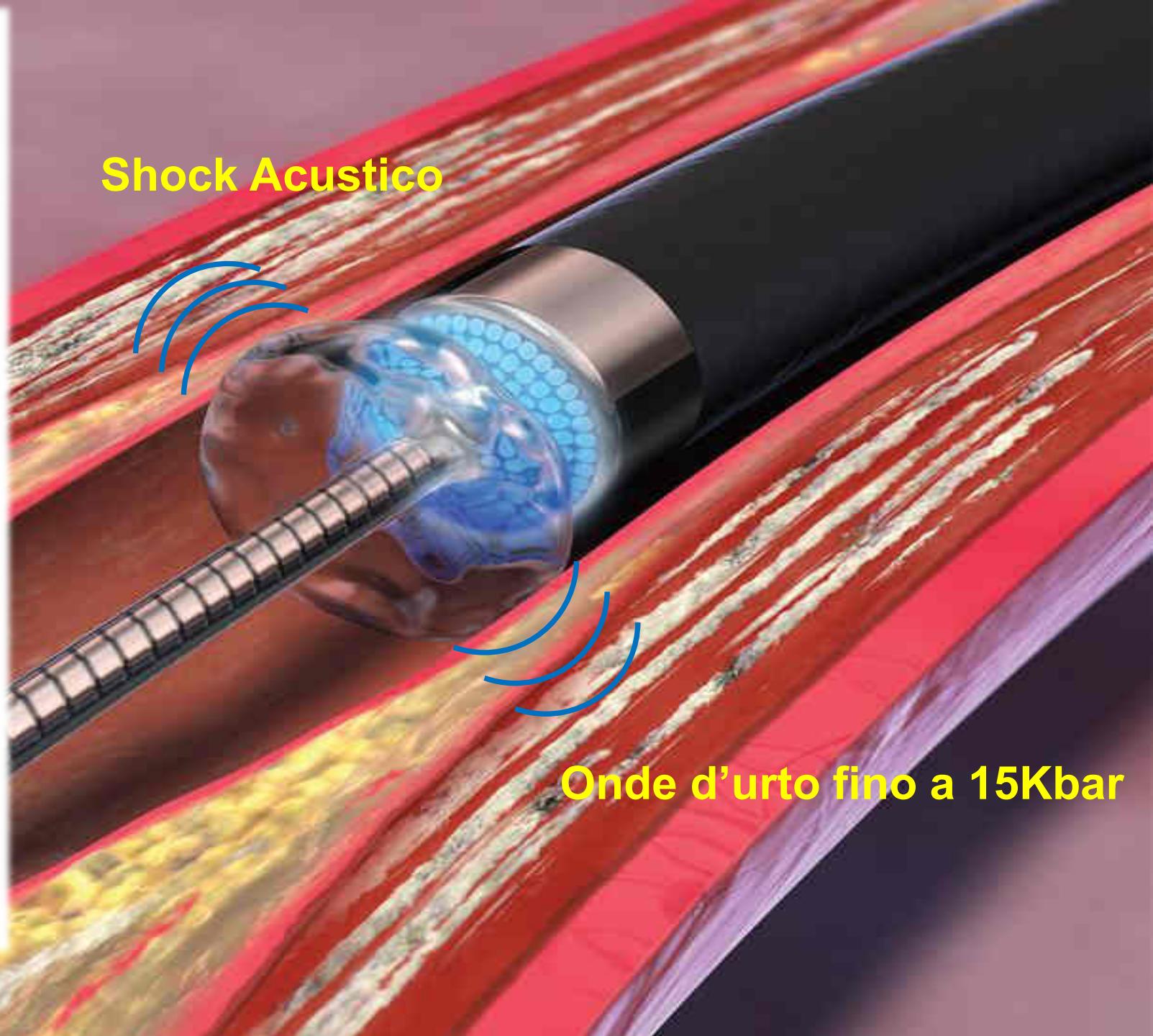
## Meccanismi d'Azione a cascata della Fotoablazione Laser

- La Fotoablazione è l'uso della luce per rompere, vaporizzare e rimuovere la materia
- Avviene attraverso tre distinti meccanismi a cascata:



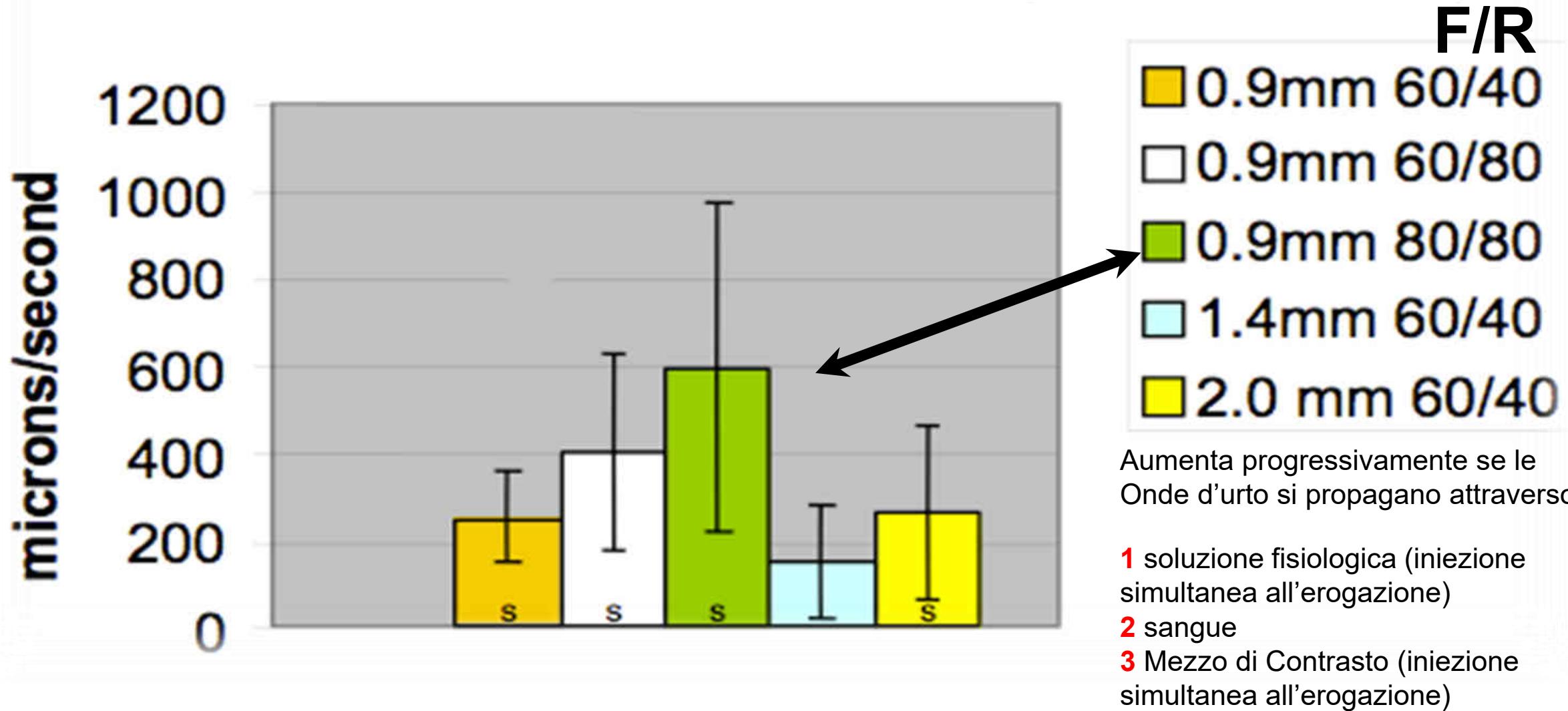
# LASER A FREDDO

- L'impulso di luce UV colpisce il tessuto per 135 miliardesimi di secondo (la durata di un impulso laser)
- La luce assorbita fa vibrare i legami molecolari e miliardi di legami vengono fratturati (rottura delle molecole)
- Le vibrazioni provocano il riscaldamento dell'acqua intracellulare che evapora e provoca l'esplosione cellulare
- L'esplosione cellulare forma una **BOLLA DI VAPORE** in 100 milionesimi di secondo
- L'espansione ed il collasso della bolla di vapore causano la disintegrazione della placca frontalmente alla sonda laser e contestualmente provocano l'emissione di ONDE D'URTO ACUSTICHE che si propagano radialmente
- I sottoprodotti della foto-ablazione sono costituiti da acqua, gas, e micro-particolato( $<7\mu$ )



# Forza di Penetrazione sul calcio

La sonda più penetrante sul calcio è quella da 0.9 mm usata alla massima energia



# Modalità di erogazione

**Lesioni:  
calcifiche  
restenosi**



Sonda 0,9 mm



F/R = 60/60  
8- 10 sec ripetibile

Ballon test (NC)



F/R = 80/80 + MDC  
8-10 sec ripetibile

**Lesioni:  
Fibroelastiche**

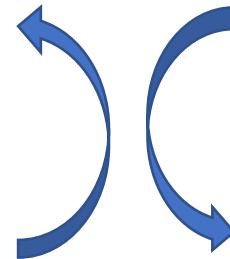


Sonda 0,9 mm



F/R = 60/60 + soluzione fisiologica  
8- 10 sec ripetibile

Ballon test (NC)



F/R = 80/80 + sangue  
8-10 sec ripetibile

**Lesioni:  
Trombotiche  
Graft venosi**



Sonda 0,9 mm e/o 1,4 mm



F/R = 60/60 + soluzione fisiologica  
8- 10 sec ripetibile



F/R = 60/60 + soluzione fisiologica  
8- 10 sec ripetibile

# European Heart Journal Supplements

## *The Heart of the Matter*

**Abstracts from the 52nd Congress  
of the Italian Association of  
Hospital Cardiologists (ANMCO),  
Rimini, 26-28 August 2021  
and ANMCO Position Papers**

**Editor-in-Chief:**  
Professor Roberto Ferrari

**Co-Editor:**  
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ANMCO Past-President and  
President of the 52nd ANMCO  
Congress

Furio Colivicchi  
ANMCO President  
on behalf of the ANMCO Executive  
Boards 2018-2021 and 2021-2023



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### USE OF CORONARY ATHERECTOMY WITH EXCIMER LASER (EXCIMER LASER CORONARY ATHERECTOMY –ELCA–) IN CALCIFIC INJURIES: EXPERIENCE OF A SINGLE CENTER

M.C. De Angelis , A. Tuccillo, P. Spadaro, G. Granata, G. Arena, C. De Biase, F. Punzo, F. Scotto di Uccio, B. Tuccillo  
CARDIOLOGIA UTI – EMODINAMICA OSPEDALE DEL MARE ASL NA1

Calcific lesions and stent under-expansion are the most frequent causes of procedural failure and intrastent restenosis. Excimer laser coronary atherectomy (ELCA–) improves stent under-expansion and treatment of calcific lesions. 'ELCA exploits the principle of photoablation with cold laser. The heating of the intracellular water causes an explosion forming a vapor bubble, disintegrating the plate in front of the probe and shock waves that propagate radially. The cardiovascular laser has a width of d 120 ns pulse. The factors that influence the mechanism of action on the plate are: Energy (Fluence and Rate or pulse frequency. MIN 45/25 – MAX 80/80), Probe (0.9 - 2.5), Technique (infusion of saline solution and / or contrast medium). From November 2018 to December 2020, 62 patients (45–86 years) were treated with acute (86% NSTEMI - UNSTABLE ANGINA) and chronic ischemic heart disease (14%). Using ELCA, the following were treated: -48 severely calcified lesions (circular extension > 180 °) and 11 stent sub-expansions - 2 fibroelastic lesions (circular extension <90 °) and 2 venous grafts with FR 80/80 + solution saline. An average of 9 disbursements were performed for calcified lesions and under-expanded stents (probe 0.9) with an average time of 10 seconds and 4 disbursements for fibroelastic lesions (probe 0.9) and venous grafts (probe 1.7) with an average time of 7 seconds. performed for 90% for radial arterial access in 6 Fr and for 10% for femoral arterial access. Low osmolarity contrast medium (Iodixanol 270 mg I / ml) used. Intracoronary imaging (OCT) used in 2% of cases. 2 procedural failures were recorded in particular in the treatment of 1 fibroelastic lesion and 1 venous graft with the presence of residual post-procedural stenosis of 40%. Procedural success was recorded in 98% of cases with total expansion of the under-expanded stents and absence of residual stenosis in all of them. the other cases. 8 cases of distal embolization with spontaneous resolution have been recorded. ELCA represents a valid alternative in the treatment of calcified coronary lesions and under-expansion of stents. The laser causes the calcium to soften and fracture; facilitates balloon and / or stent expansion and minimizes intraprocedural complications and / or coronary ruptures, proving to be safe and effective.

### C62 Use of laser excimer in primary PCI to reduce the thrombotic burden in acute myocardial infarction: preliminary data from LASER-AMI registry

F. Scotto di Uccio, V. Ambrosino, P. Calabro, M. Contarini, L. Gollino, A. Mucaj, R. Perrotta, P. Armigliato

CARDIOLOGIA UTIC-EMODINAMICA OSPEDALE DEL MARE ASL NA1, NAPOLI; UOC CARDIOLOGIA A.O. S.G. MOSCATI AVELLINO, AVELLINO; CARDIOLOGIA A.O. SAN SEBASTIANO UNIVERSITÀ "VANVITELLI" CASERTA, CASERTA; UOC CARDIOLOGIA OSPEDALE UMBERTO I SIRACUSA, SIRACUS; UOC CARDIOLOGIA OSPEDALE CIVILE G. MOSCATI AVERSÀ CE, AVERSÀ; UOC CARDIOLOGIA A.O.U. RIUNITI ANCONA, ANCONA; UOC CARDIOLOGIA A.O. S. SEBASTIANO CASERTA, CASERTA; UOC CARDIOCHIRURGIA UNIVERSITÀ DI VERONA, VERONA

**Introduction:** Laser excimer is the first device of thrombectomy able to lyse and vaporize the thrombus through a direct foto-ablation ad to inhibition platelet aggregation through a direct foto-chimical action.

**Aims:** To value the efficacy and safety on laser excimer to reduce the thrombotic burden and distal embolization and no-reflow phenomenon in acute myocardial infarction underwent primary PCI. **Methods:** From 1 january to 30 november 2020, 71 consecutive patients with acute myocardial infarction were treated with primary PCI ad use of laser exdmer, 70% men and 30% women,  $66 \pm 24$  years. In 86% of the culprit lesions the coronary artery was occluded with TIMI flow 0, in 62% with thrombus grade > 4. In 58% of patients the culprit lesion was on interventricular anterior coronary artery, in 34% on right coronary artery and in 8% on circumflex coronary artery. In 97% and 3% of procedure was used a laser excimer catheter respectively of 0.9 mm and 1.4mm. In 45% of the cases only two delivery of laser excimer was enough to get a thrombectomy with an efficacy recanalization and stent implant.

**Results:** At the end of PCI a TIMI flow 3, 2, 1 and 0 was observed respectively in 81%, 4.7%, 4.7% and 4.7% of patients, and a MBG flow 2-3 and an ST resolution > 70% was observed in the 60% and 86% respectively of the patients. The median time of laser excimer delivery was  $60 \pm 40$  sec.

**Conclusion:** Preliminary data of the registry show that laser excimer is an efficacy system of thrombectomy with significantly reduction of thrombus burden and increase of reperfusion indexs, and safe because no significant complication was observed.

### C63 Laser excimer as new therapeutic strategy to prevent and treat no-reflow phenomenon in patients with AMI underwent primary PCI

F. Scotto di Uccio, A. Tuccillo, C. De Angelis, G. Arena, G. Granata, P. Spadaro, F. Punzo, C. De Biase, B. Tuccillo

CARDIOLOGIA UTIC-EMODINAMICA OSPEDALE DEL MARE ASL NA1, NAPOLI; CARDIOLOGIA UTIC-EMODINAMICA ASL NA1, NAPOLI

**Introduction:** Laser excimer is the first device of thrombectomy able to lyse and vaporize the thrombus through a direct foto-ablation ad to inhibition platelet aggregation through a direct foto-chimical action. **Aims:** to value the efficacy and safety on laser eximer to reduce the thrombotic burden and distal embolization and no-reflow phenomenon in acute myocardial infarction underwent primary PCI.

**Methods:** From 1 january to 30 november 2020, 21 consecutive patients with acute myocardial infarction were treated with primary PCI ad use of laser excimer, 65% men and 35% women,  $67 \pm 15$  years. In 95% of the culprit lesions the coronary artery was occluded with TIMI flow 0, in 77% with thrombus grade > 4. In 65% of patients the culprit lesion was on interventricular anterior coronary artery, in 25 % on right coronary artery and in 10% on circumflex coronary artery. In all procedure was used a laser excimer catheter of 0.9 mm. In 55% of the cases only two delivery of laser excimer of eight seconds was enough to get a thrombectomy with an efficacy recanalization and stent implant.

**Results:** At the end of PCI a TIMI flow 3, 2, 1 and 0 was observed respectively in 87%, 4.3%, 4.3% and 4.3% of patients, and a MBG flow 2-3 and an ST resolution > 70% was observed in the 65% and 86% respectively of the patients. There wasn't complications such as dissection or perforation, but only two cases of distal microembolization and the duration of the procedures wasn't increased: the median time of laser excimer delivery was  $60 \pm 40$  sec.

**Conclusion:** this data show that laser excimer is an efficacy system of thrombectomy with significantly reduction of thrombus burden and increase of reperfusion indexs, and safe because no significant complication was observed. Therefore it is proposed as new therapeutic strategy to prevent and treat no-reflow phenomenon. More supporting data is needed.

# LESIONI CALCIFICHE

Two-year outcome after treatment of severely calcified lesions with newer-generation drug-eluting stents in acute coronary syndromes  
A patient-level pooled analysis from TWENTE and DUTCH PEERS

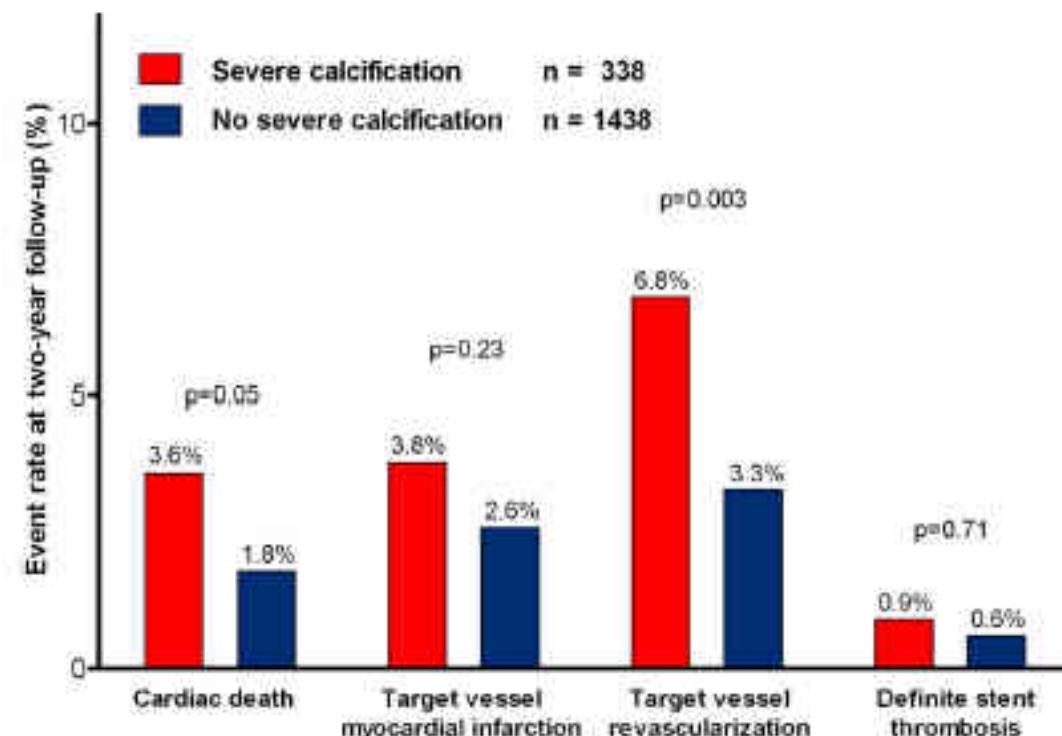
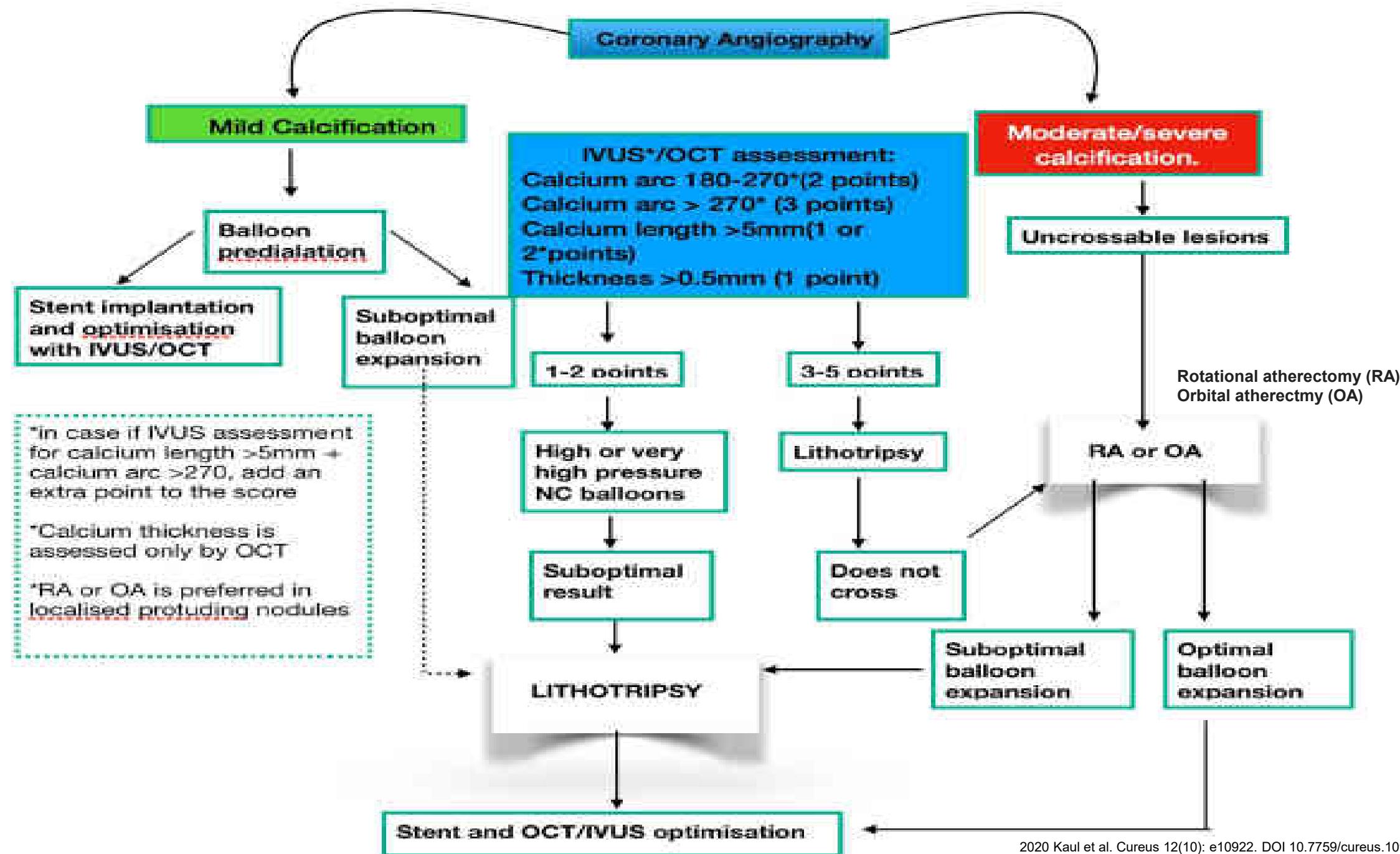


Fig. 2. Adverse cardiovascular events at 2-year follow-up. 2-year follow-up data were available for 1776 of all 1779 patients (99.8%).

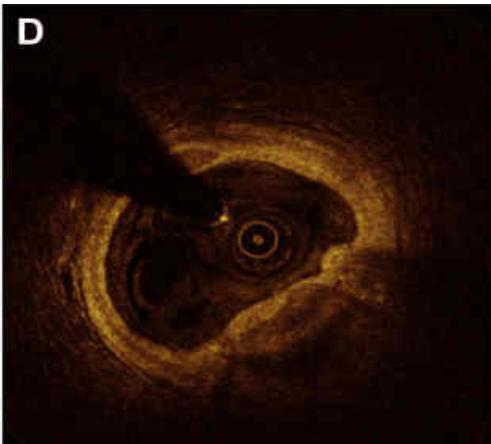
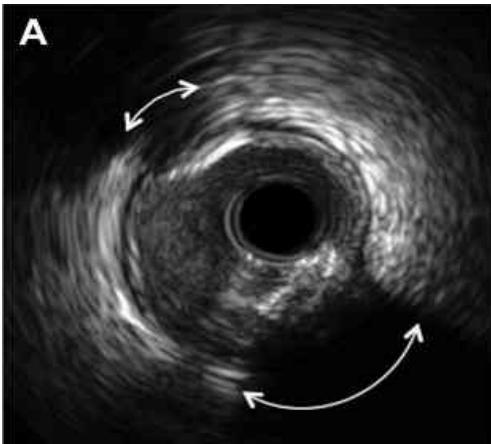


# Differenze tra i principali device per il trattamento delle lesioni calcifiche

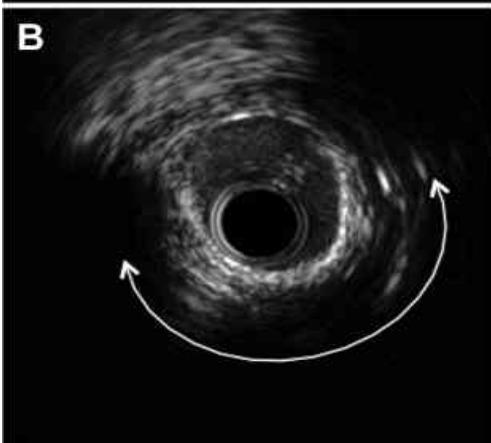
	LASER	ROTABLATOR	SHOCKWAVE
Guida dedicata	No	Si	No
Crossabilità lesione	↑↑	↑↑	↑
Microembolizzazione	↑	↑↑	-
Lesioni fibroelastiche restenosi intrastent	Si	No	Si
Lesioni trombotiche	Si	No	No
Stent ipoespansi	Si	No	Si
Graft venosi degenerati	Si	No	No

## L'imaging coronarico: IVUS - OCT

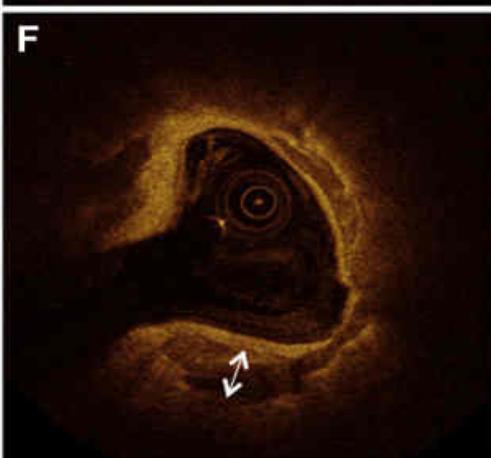
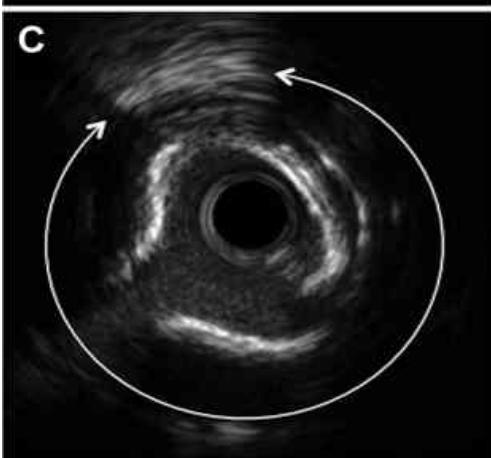
1



2



3



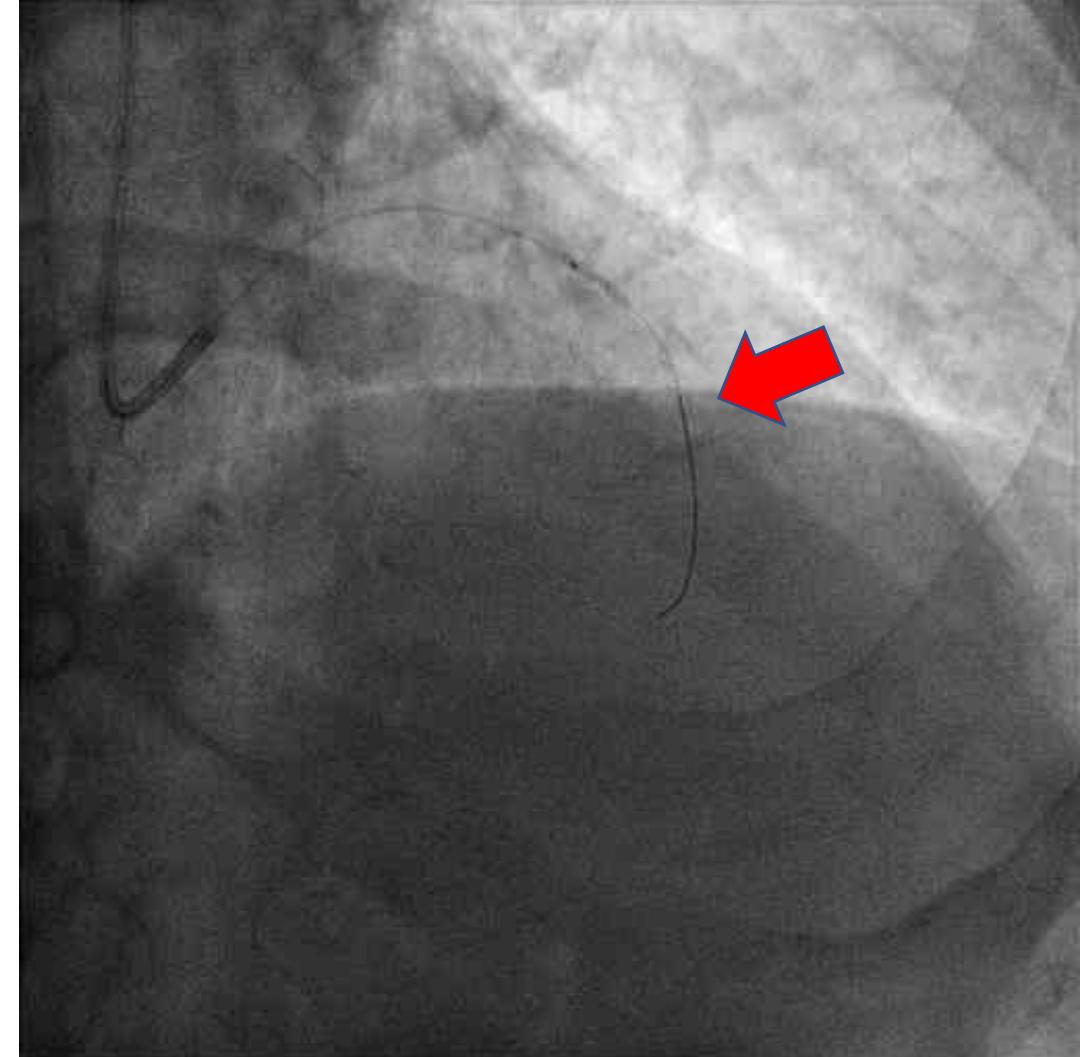
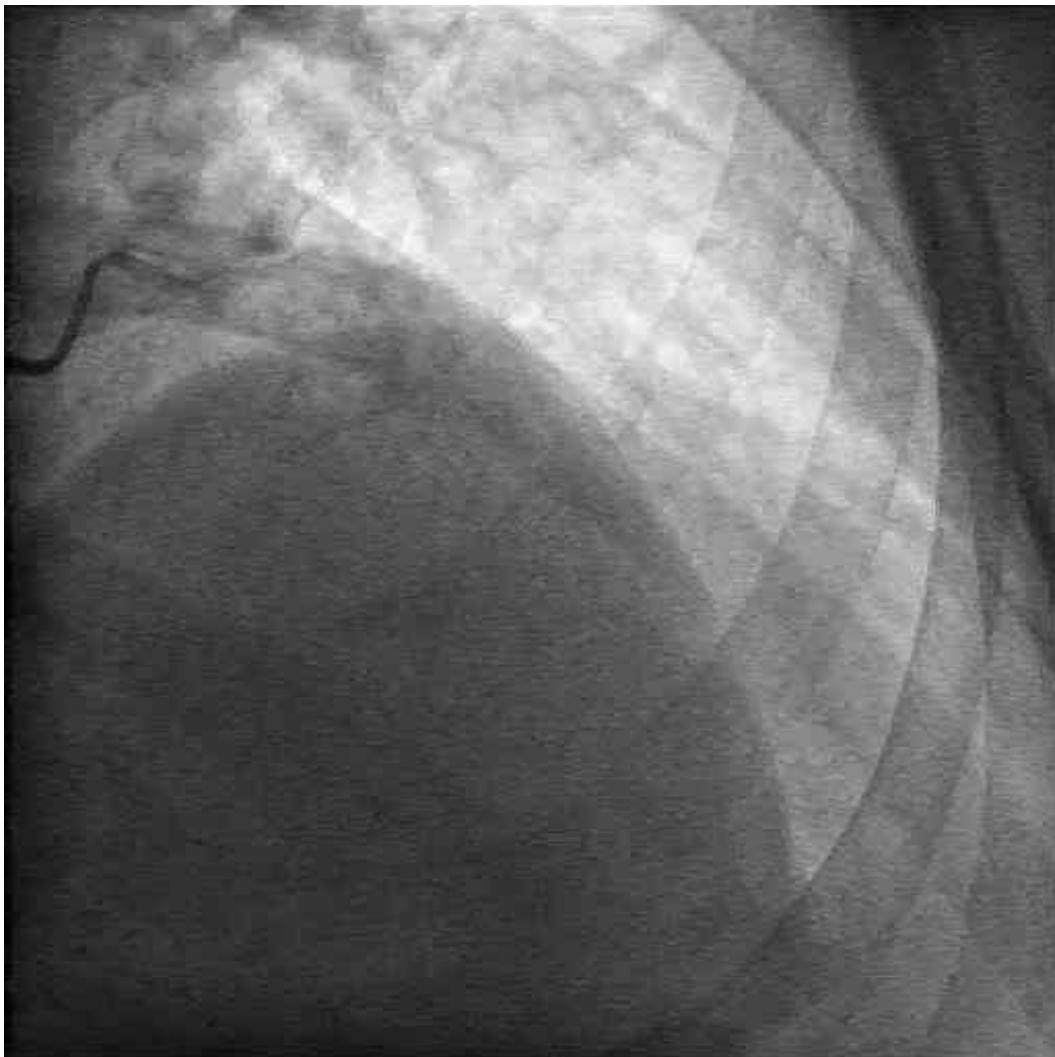
Intravascular Ultrasound Images of

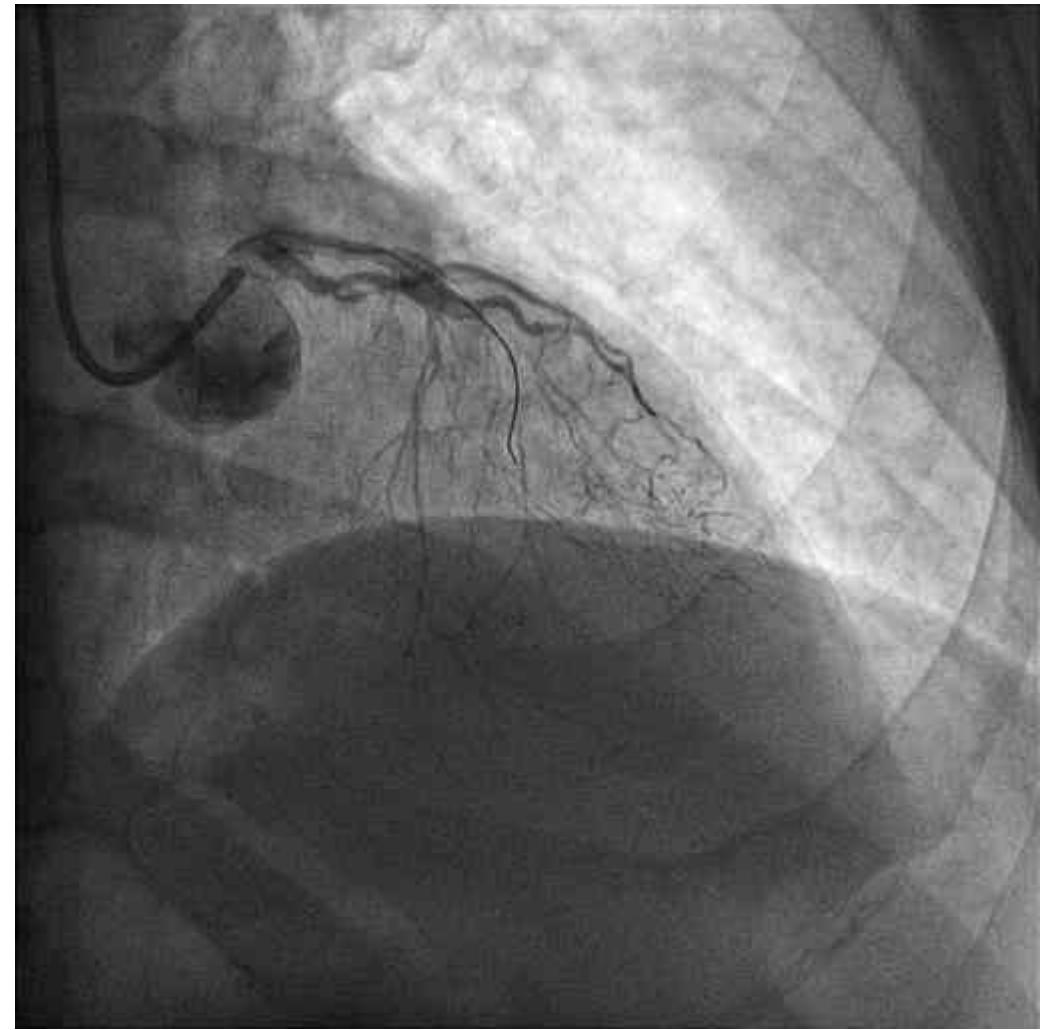
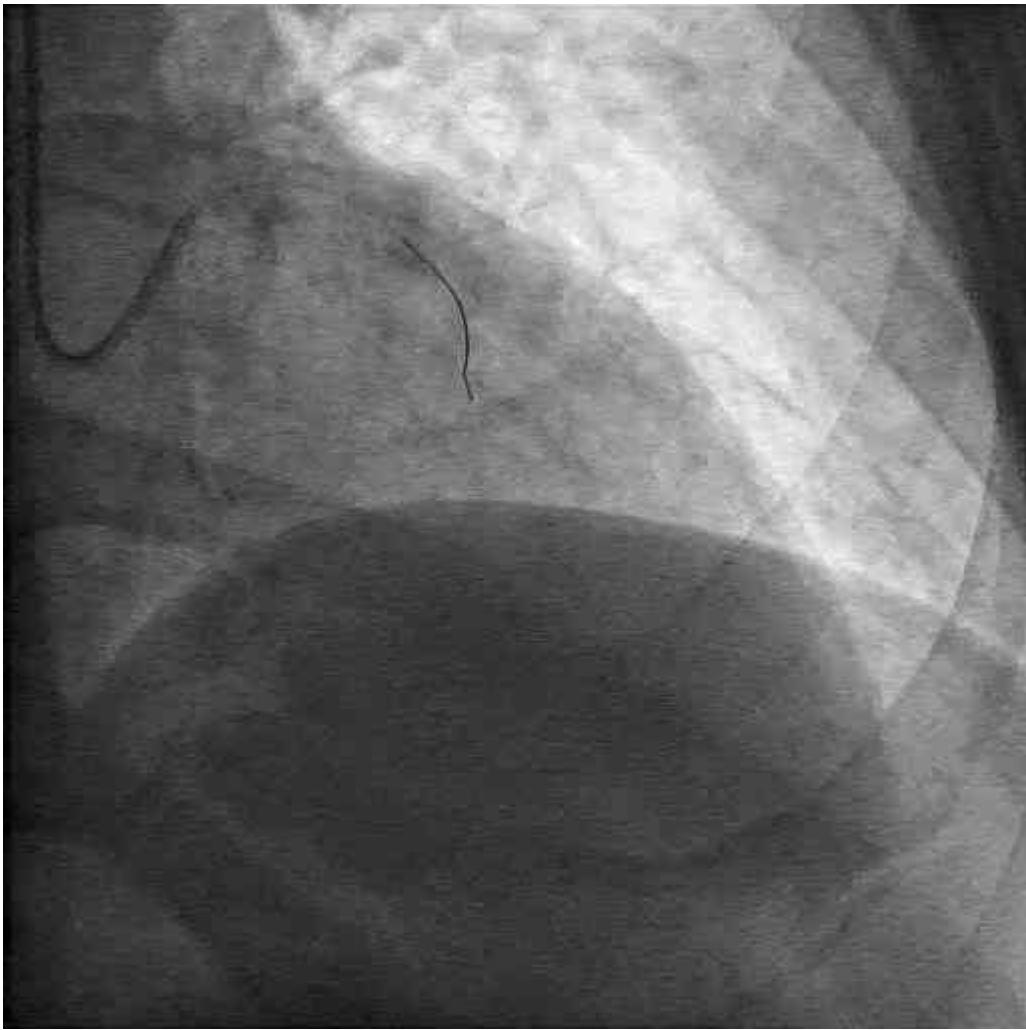
1. Mild
2. Moderate
3. Severe Calcification

Caso 1:

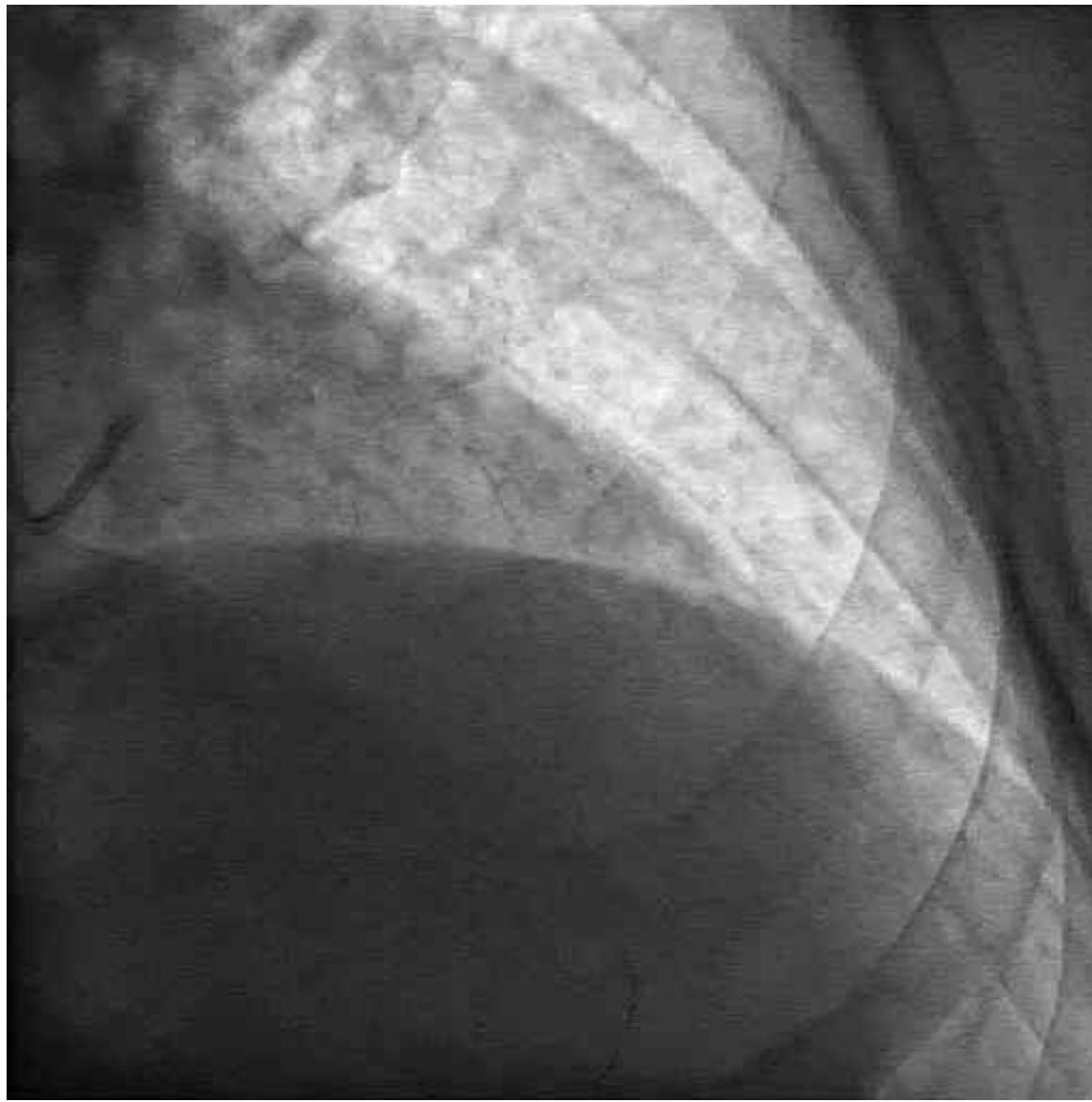
Uomo di 71 anni

NSTEMI

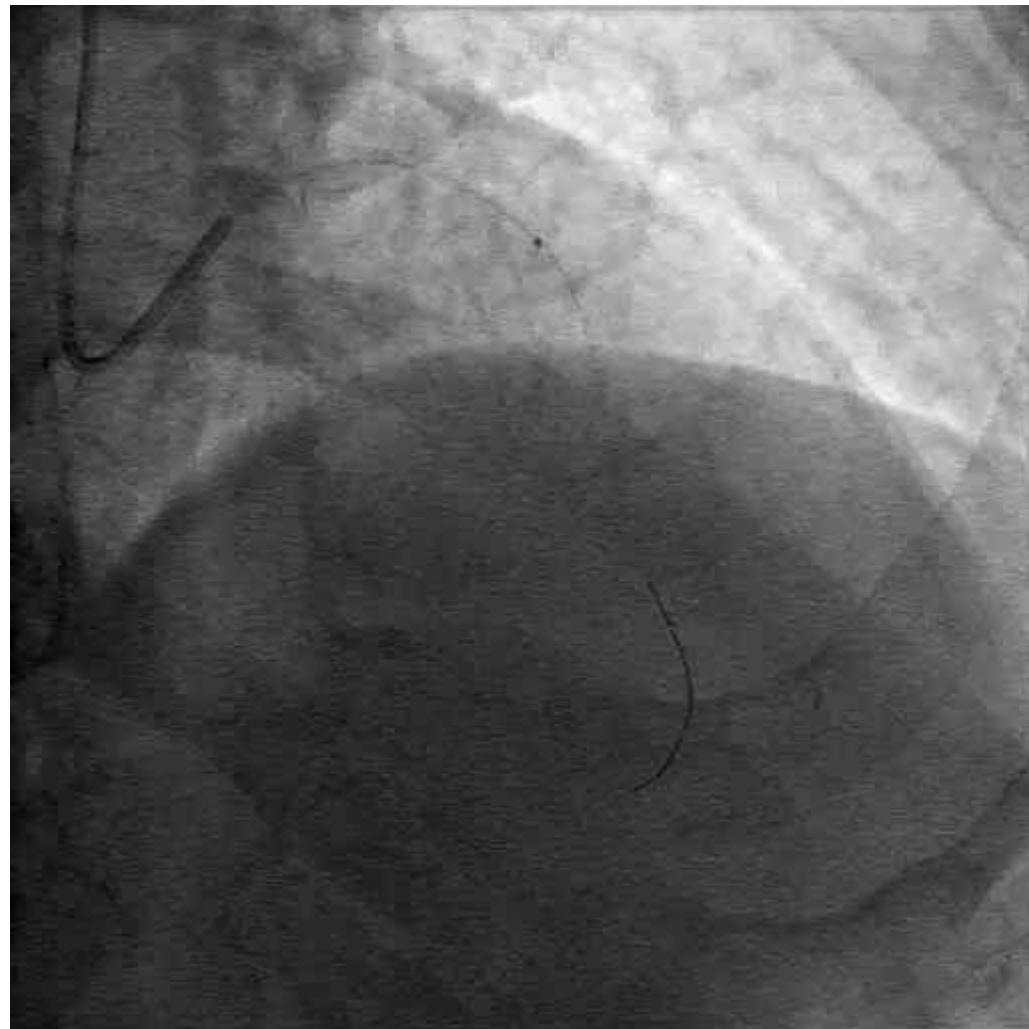




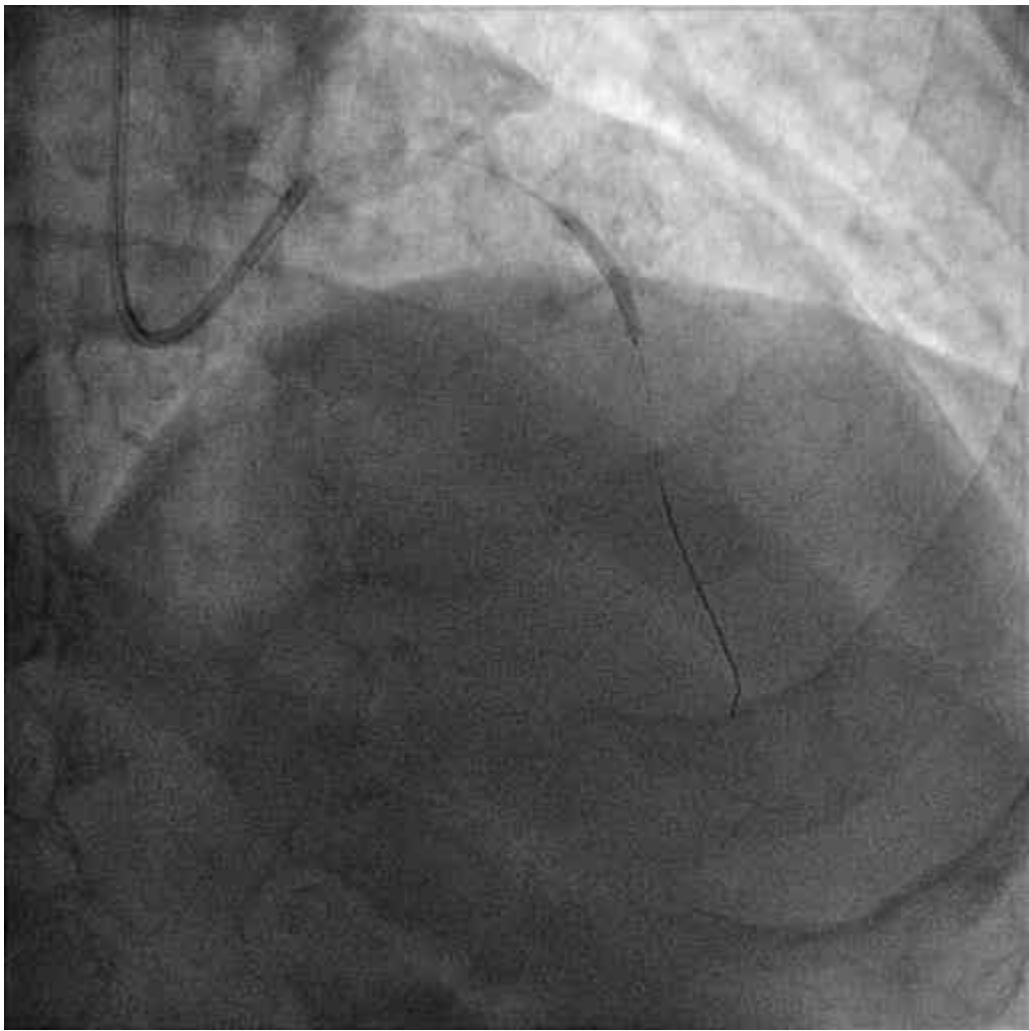
Guida: Progess 120



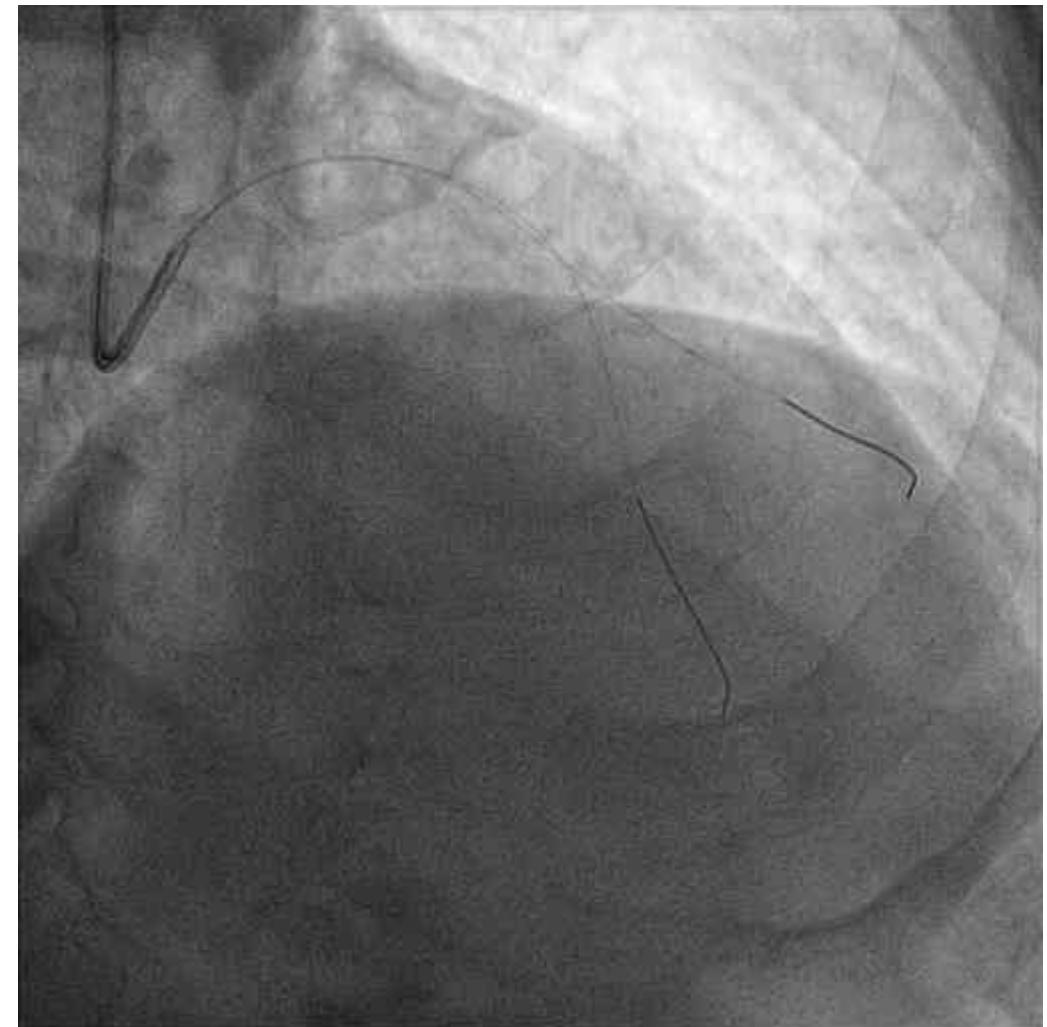
Laser ad eccimeri: 4 erogazioni F/R 80/80, 8 sec. ciascuna

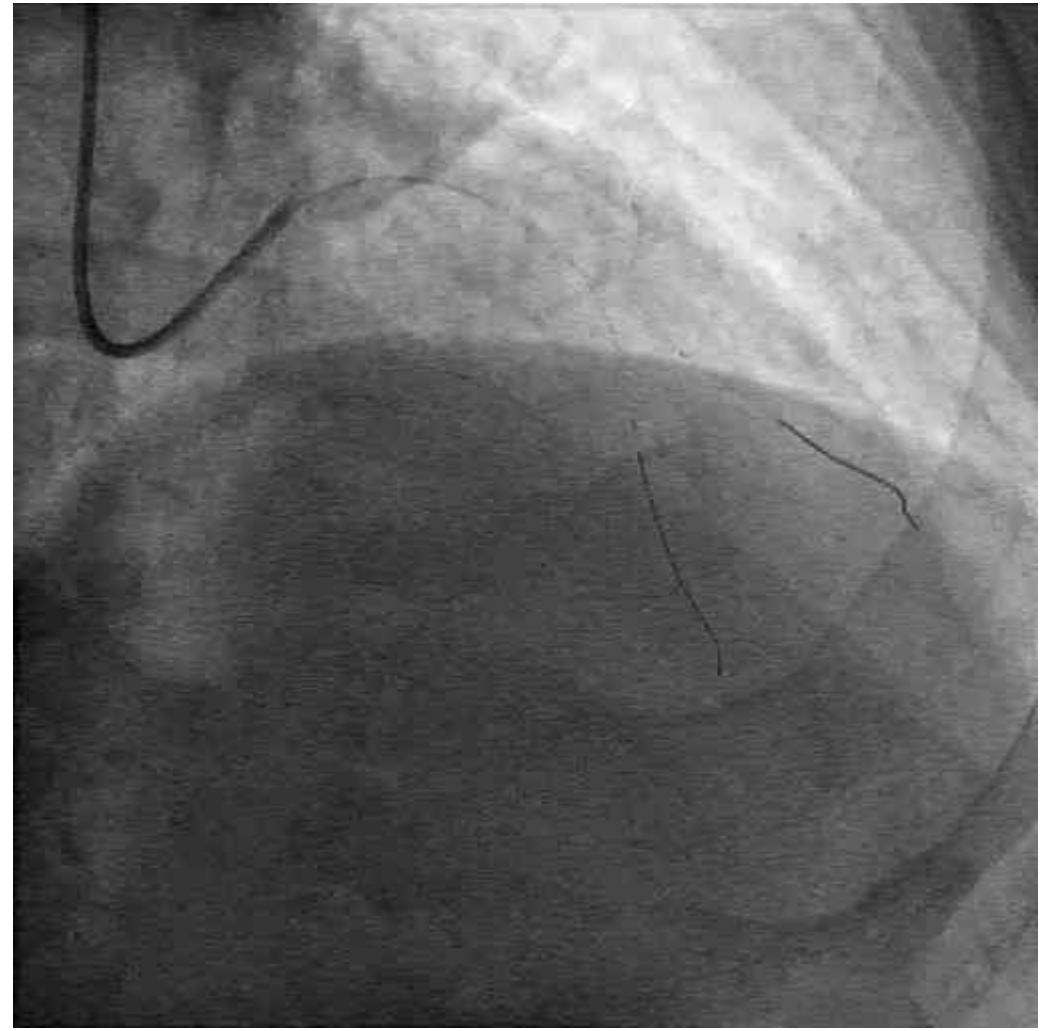
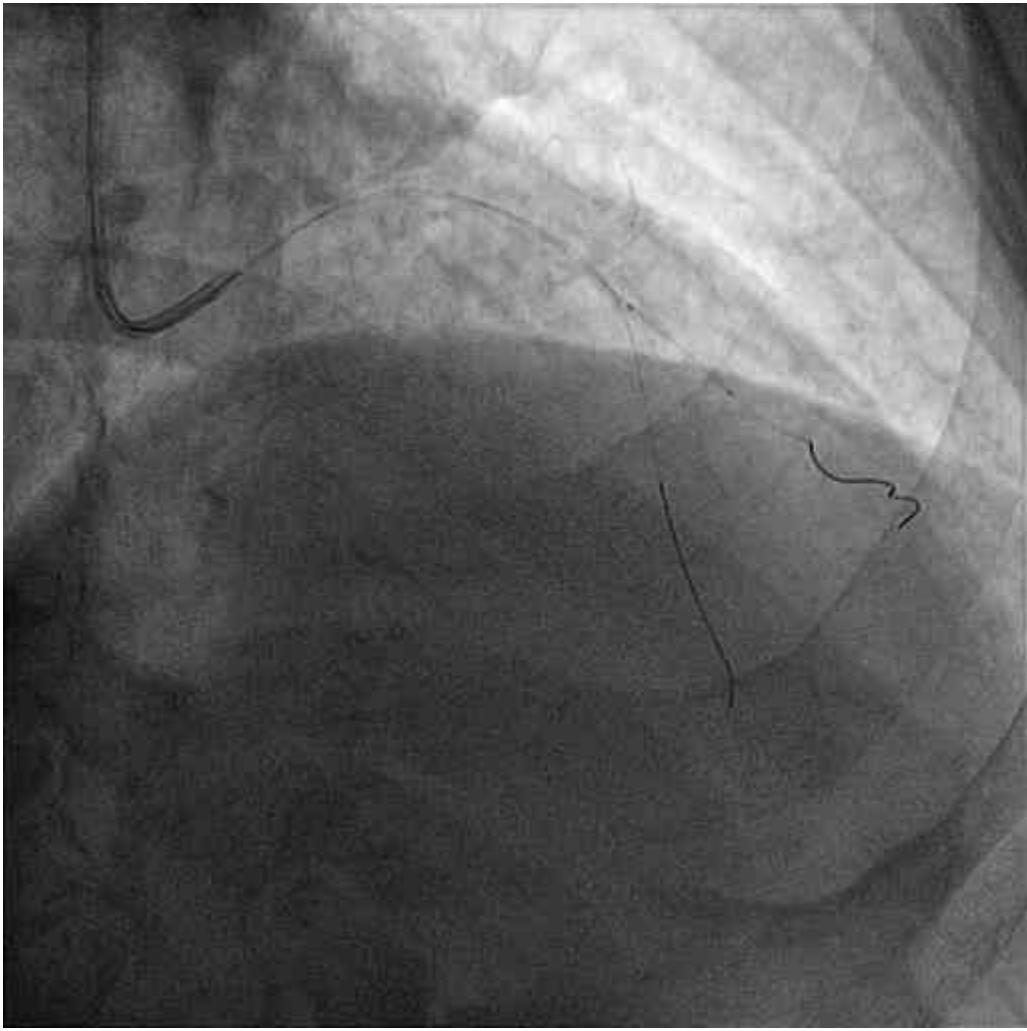


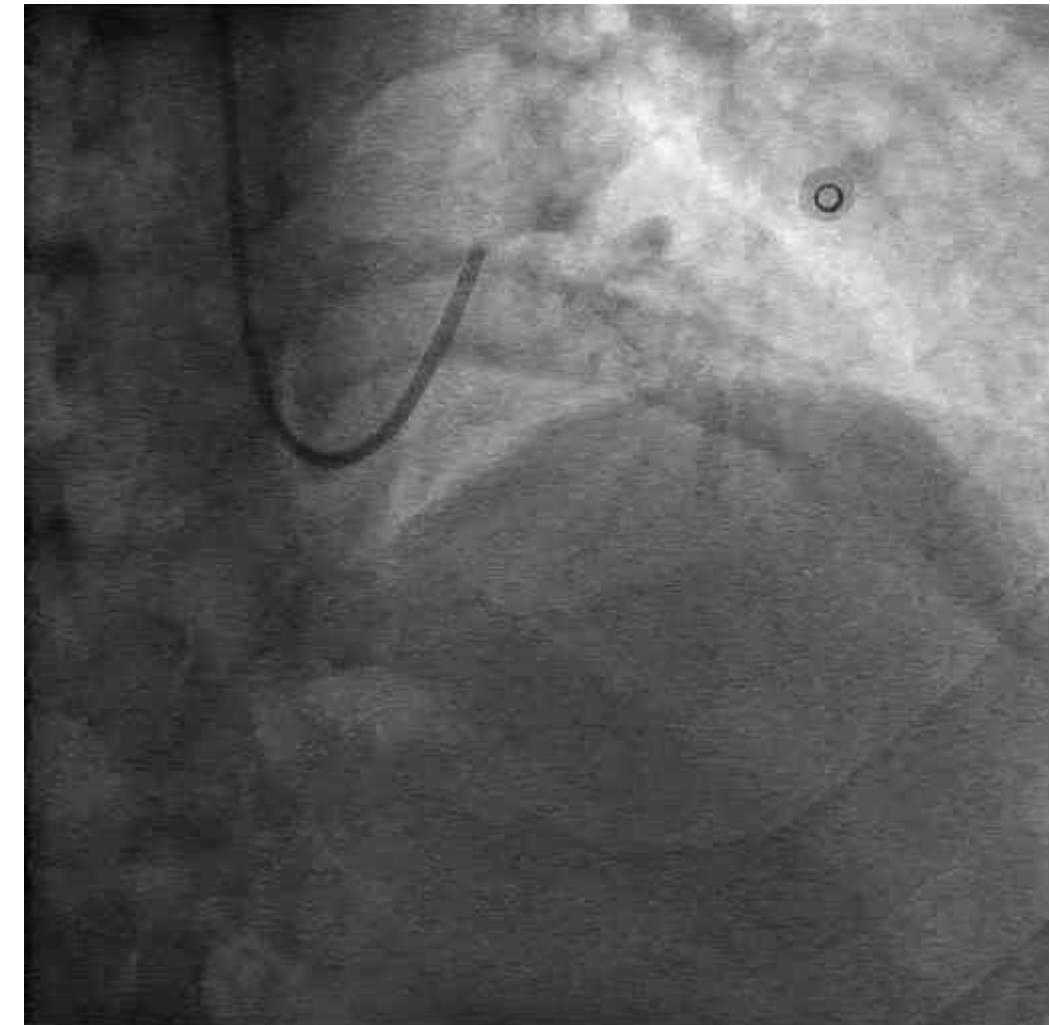
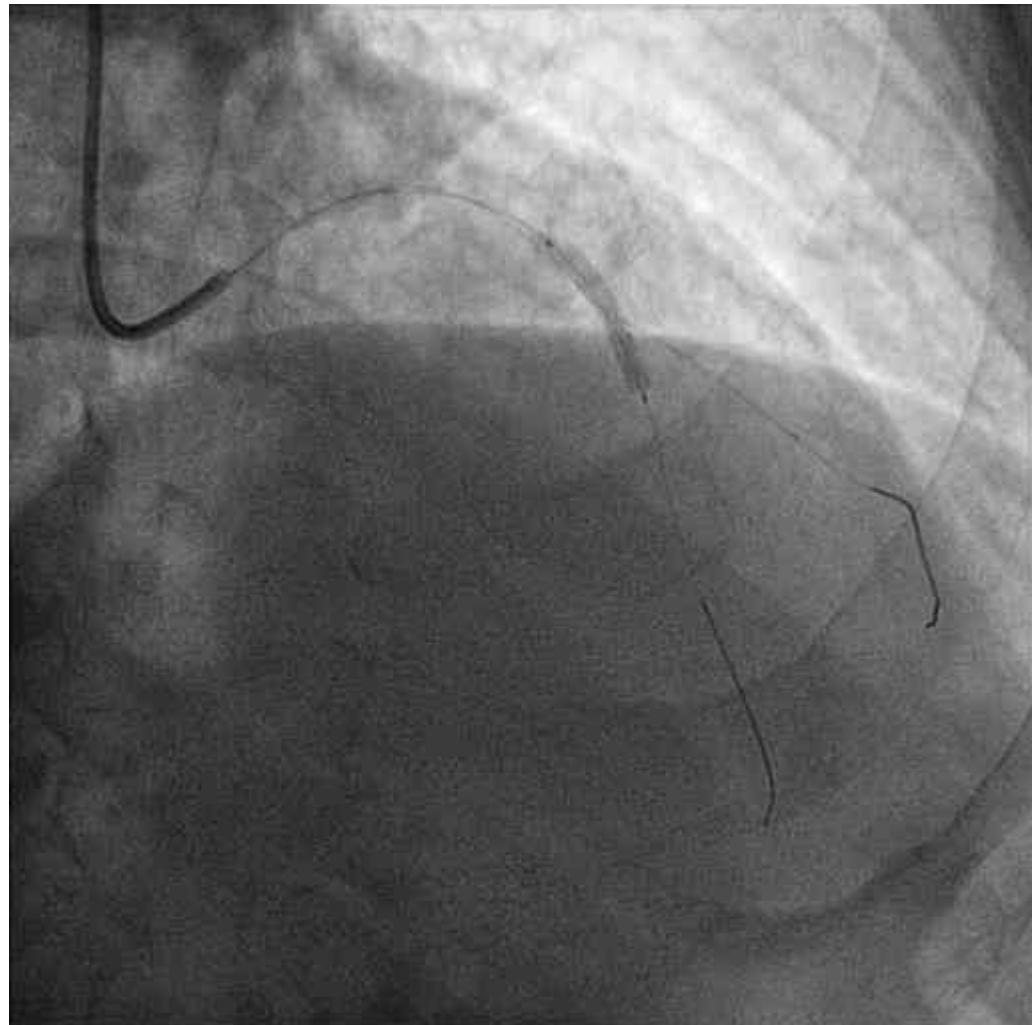
Predilatazione pallone 1,5x15 mm



Predilatazione pallone 2x20 mm

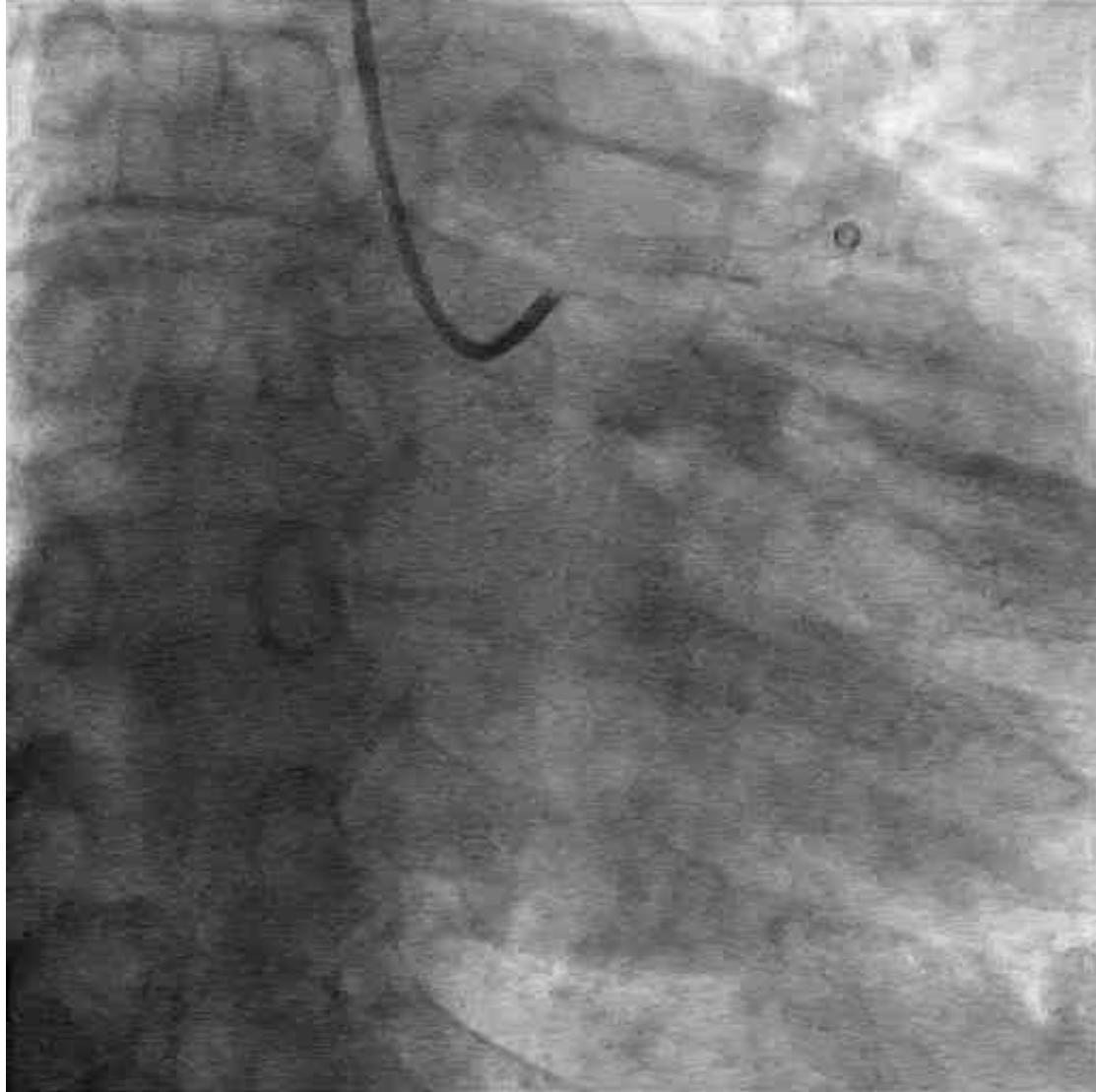




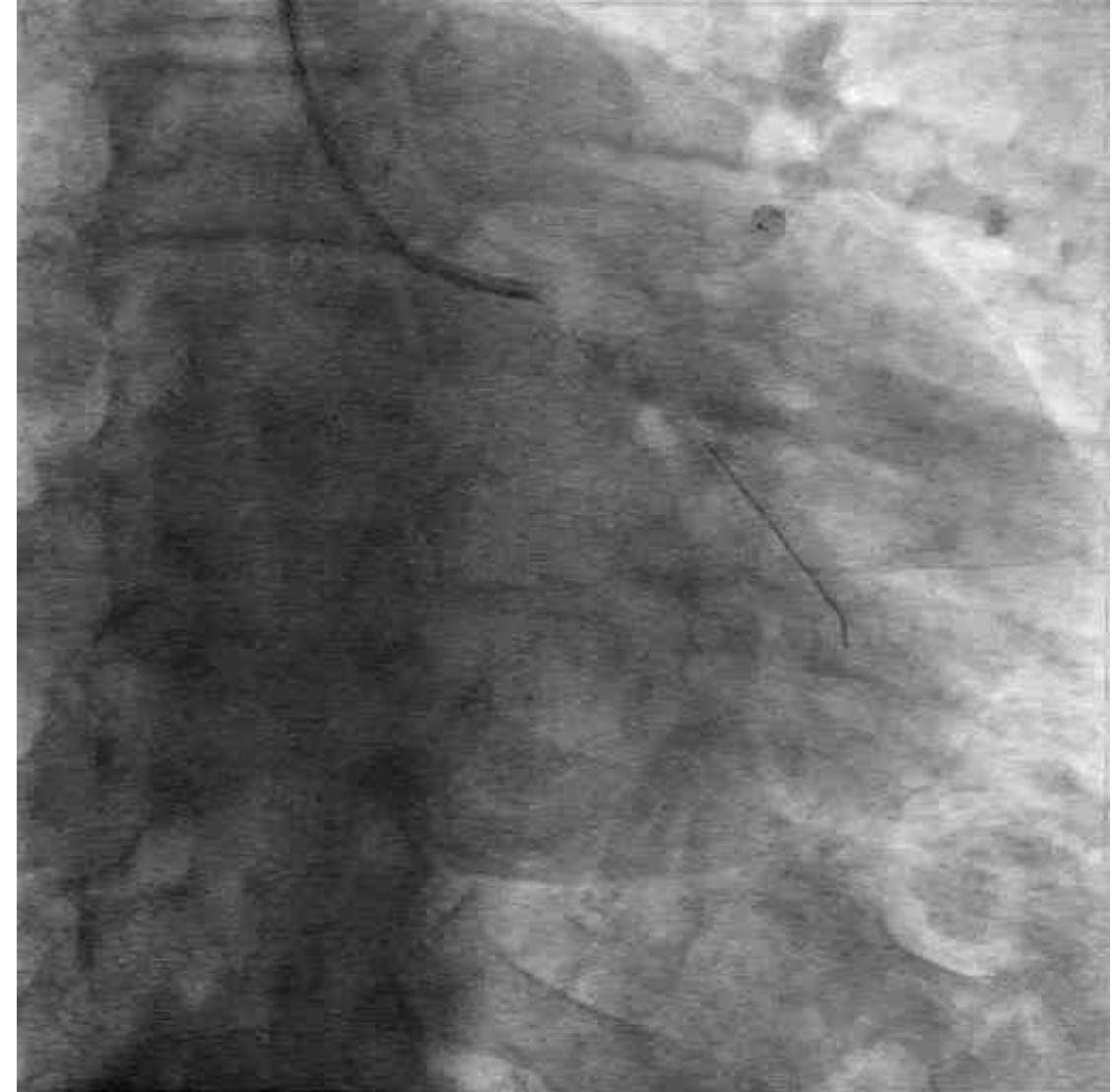


Impianto Stent: Xience 3x23 mm 16 atm

Laser ad eccimeri: 3 erogazioni F/R 80/80, 8 sec. ciascuna



Guida: Progess 80



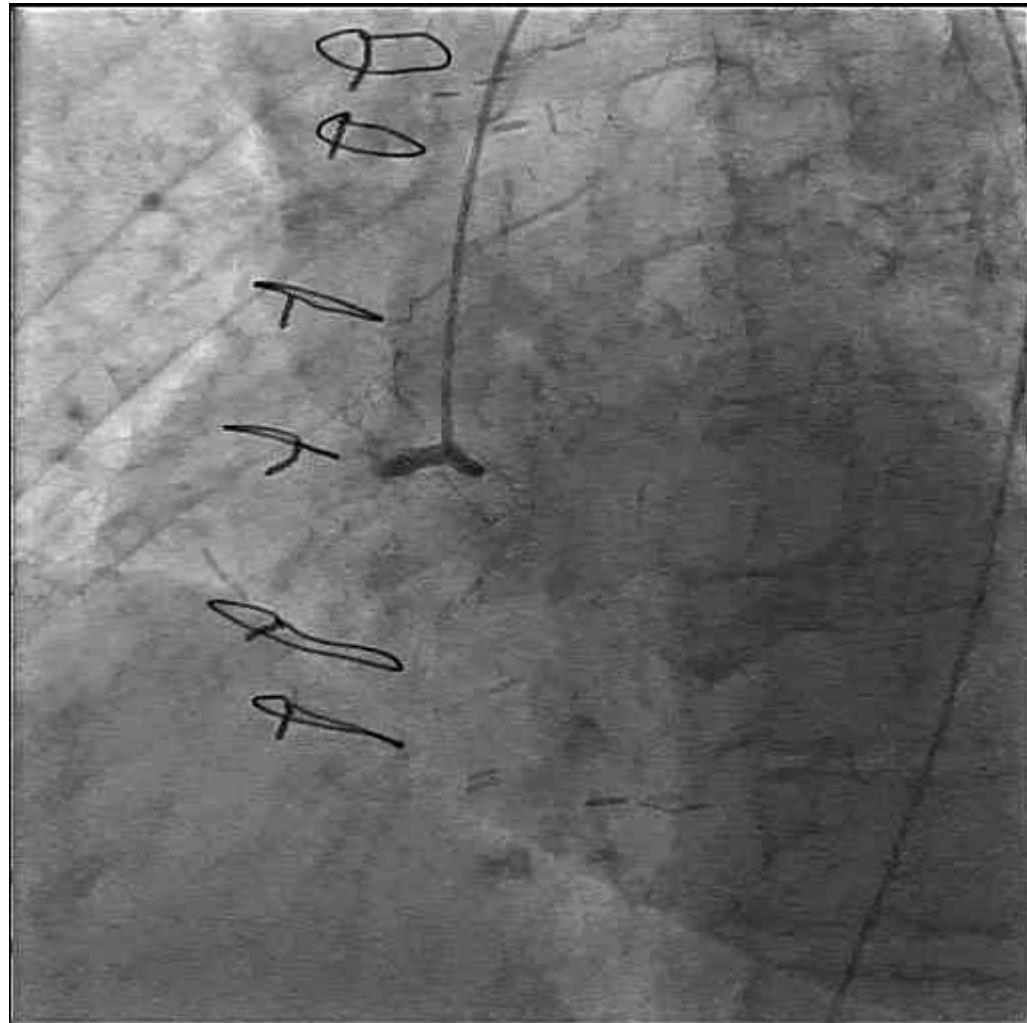
Stent: Synergy 3x32 mm

Caso 2:

Donna di 77 anni

CABG AMIS su IVA e VSA MO + Valvola aortica biologica

STEMI inferiore

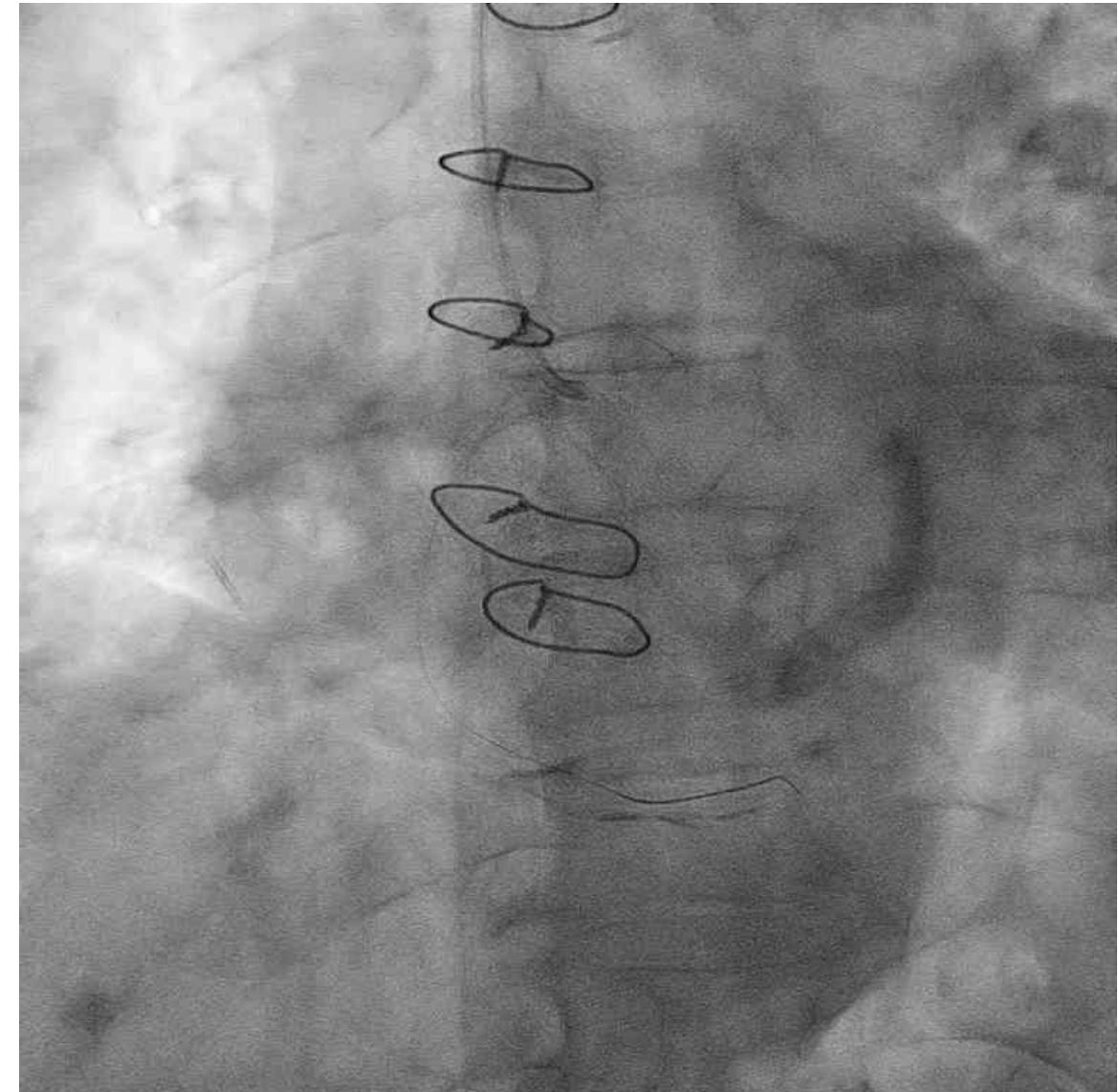
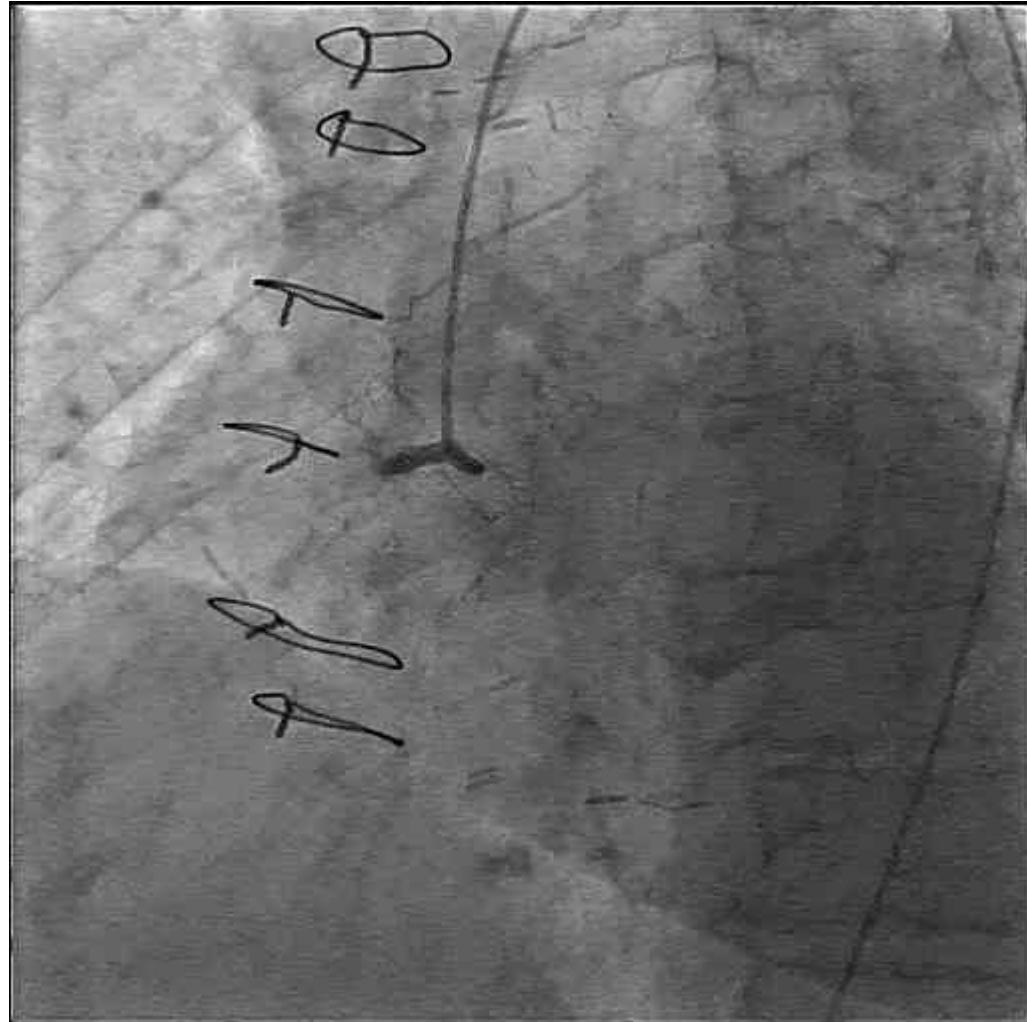


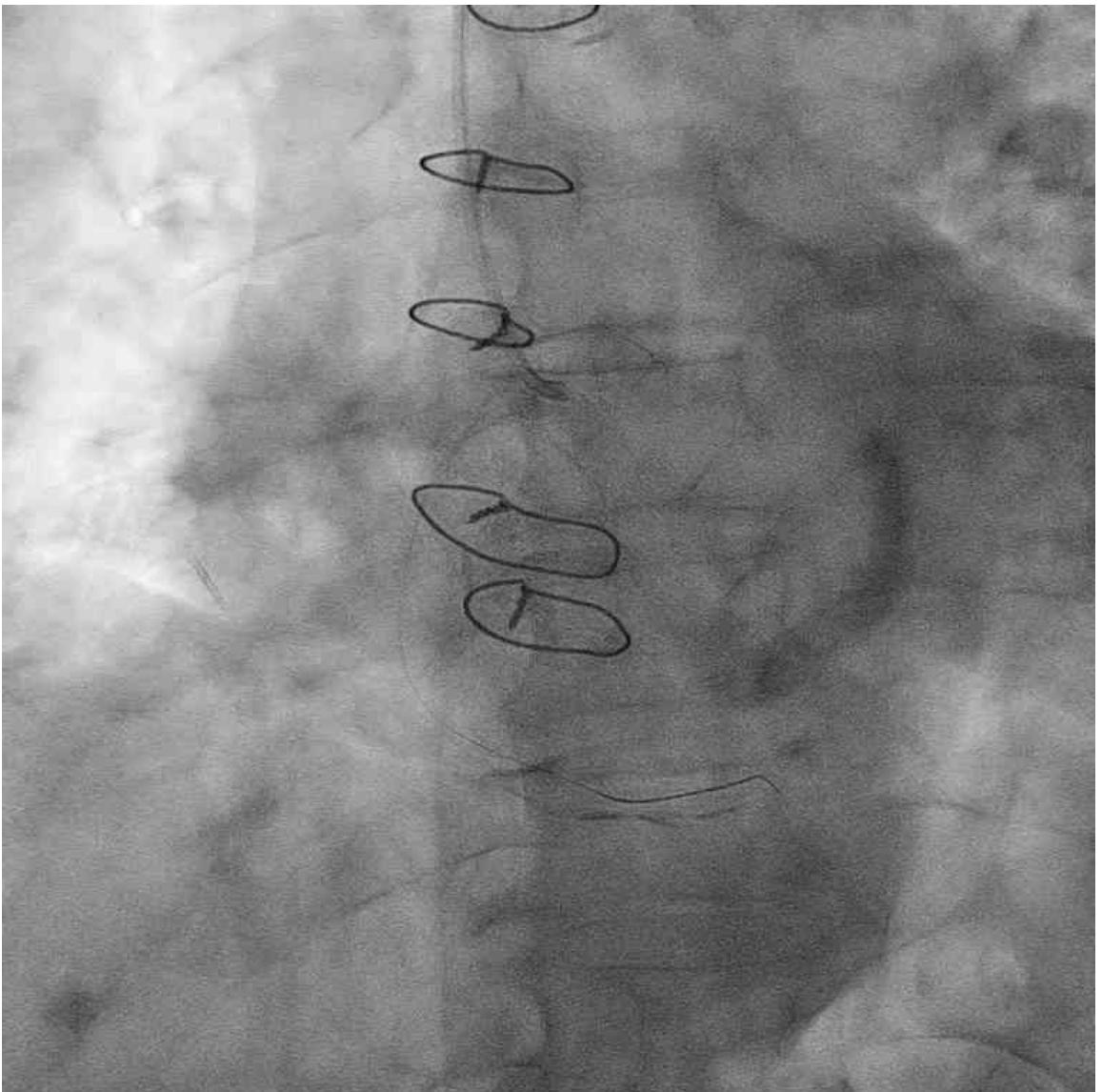
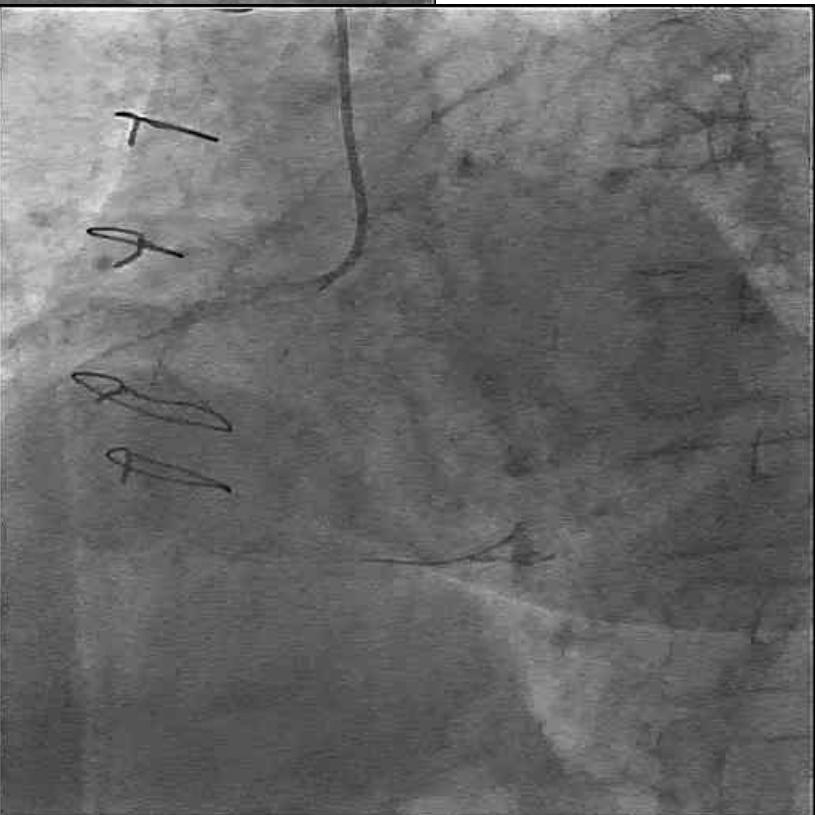
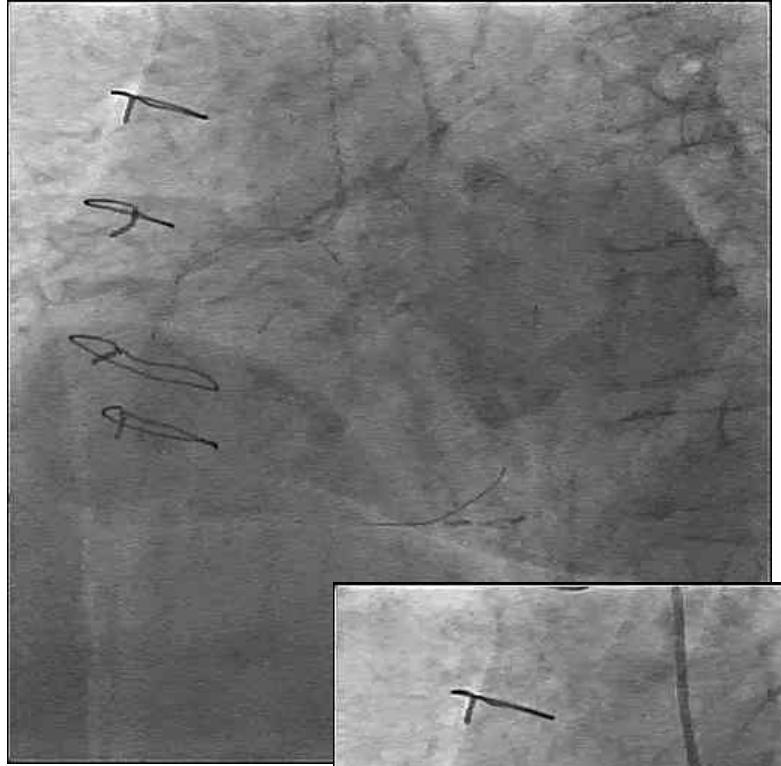
Caso 2:

Donna di 77 anni

CABG AMIS su IVA e VSA MO + Valvola aortica biologica

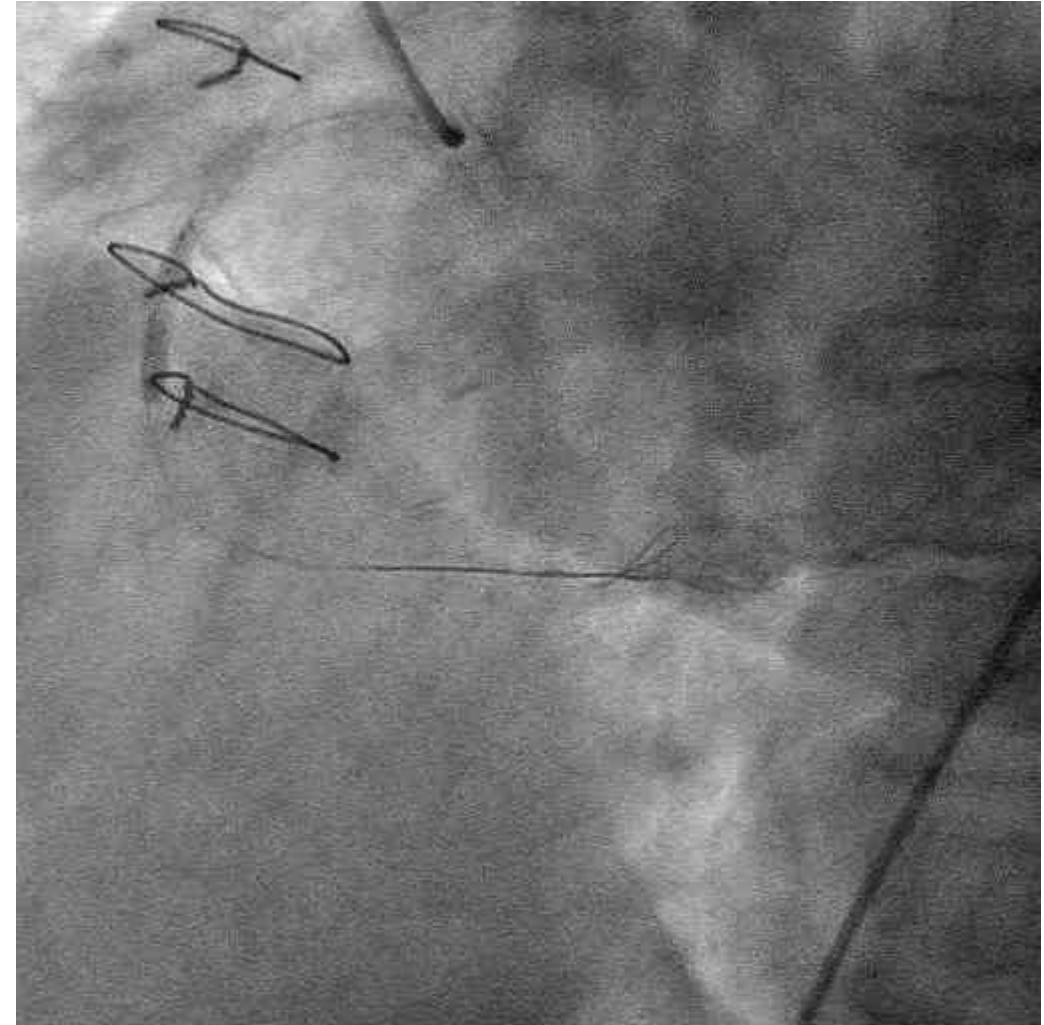
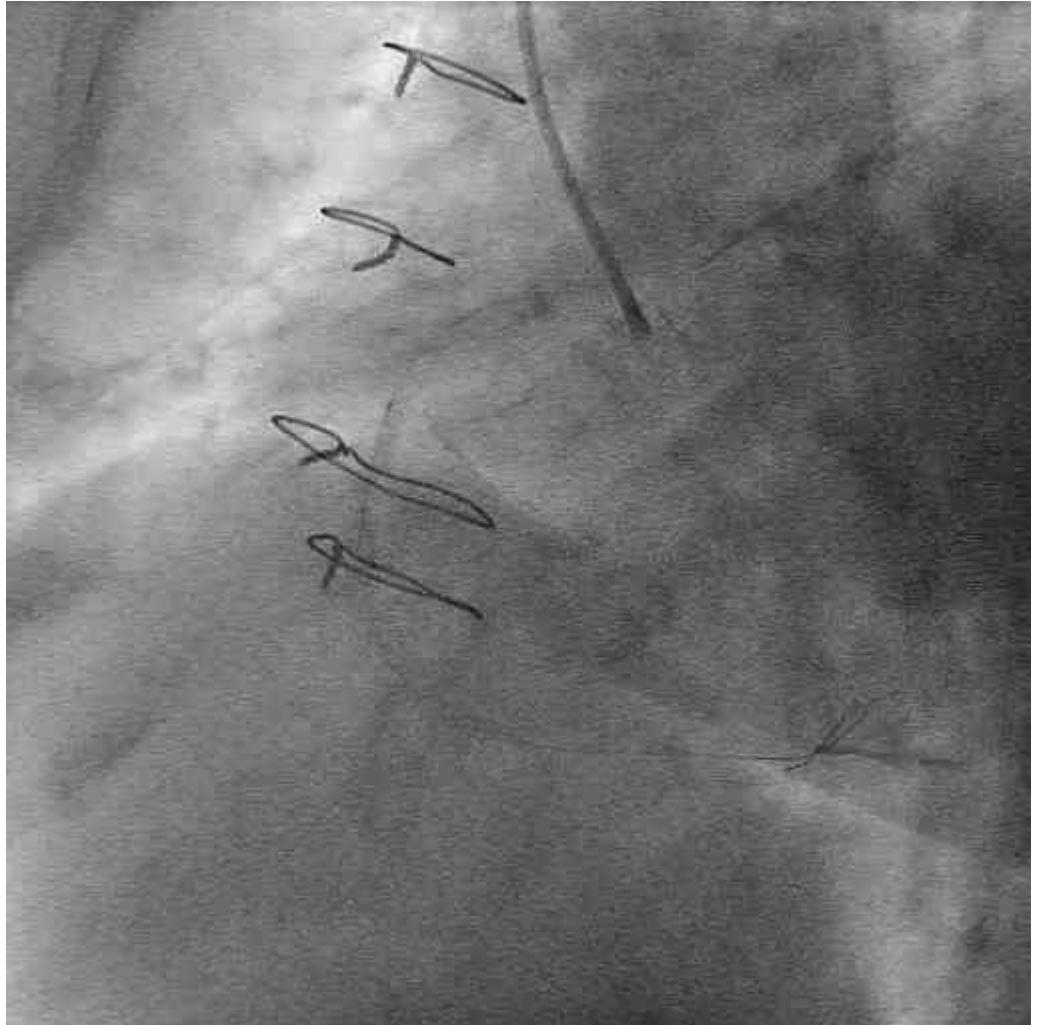
STEMI inferiore





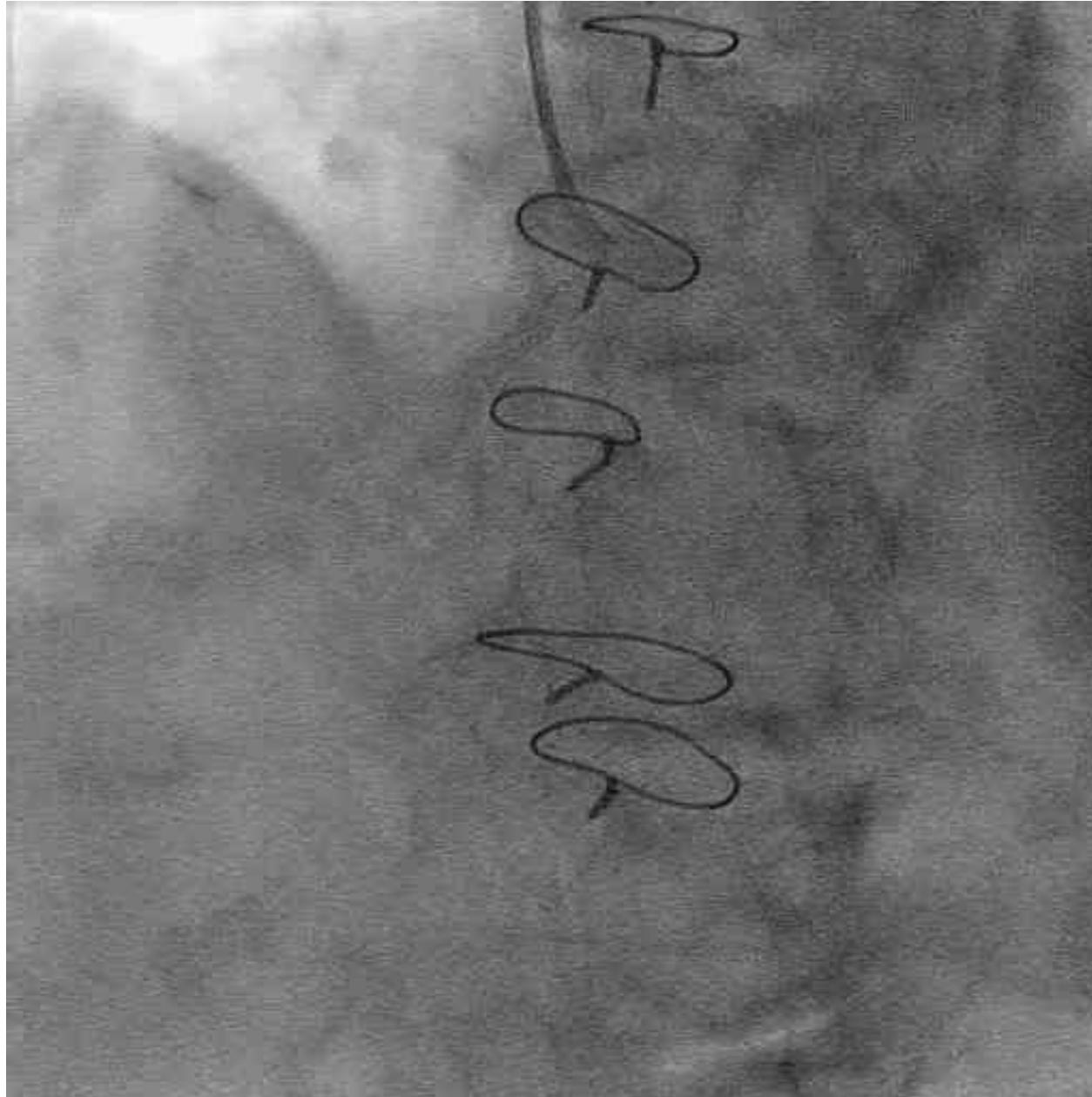
Caso 2:

PCI shockwave faild



Caso 2:

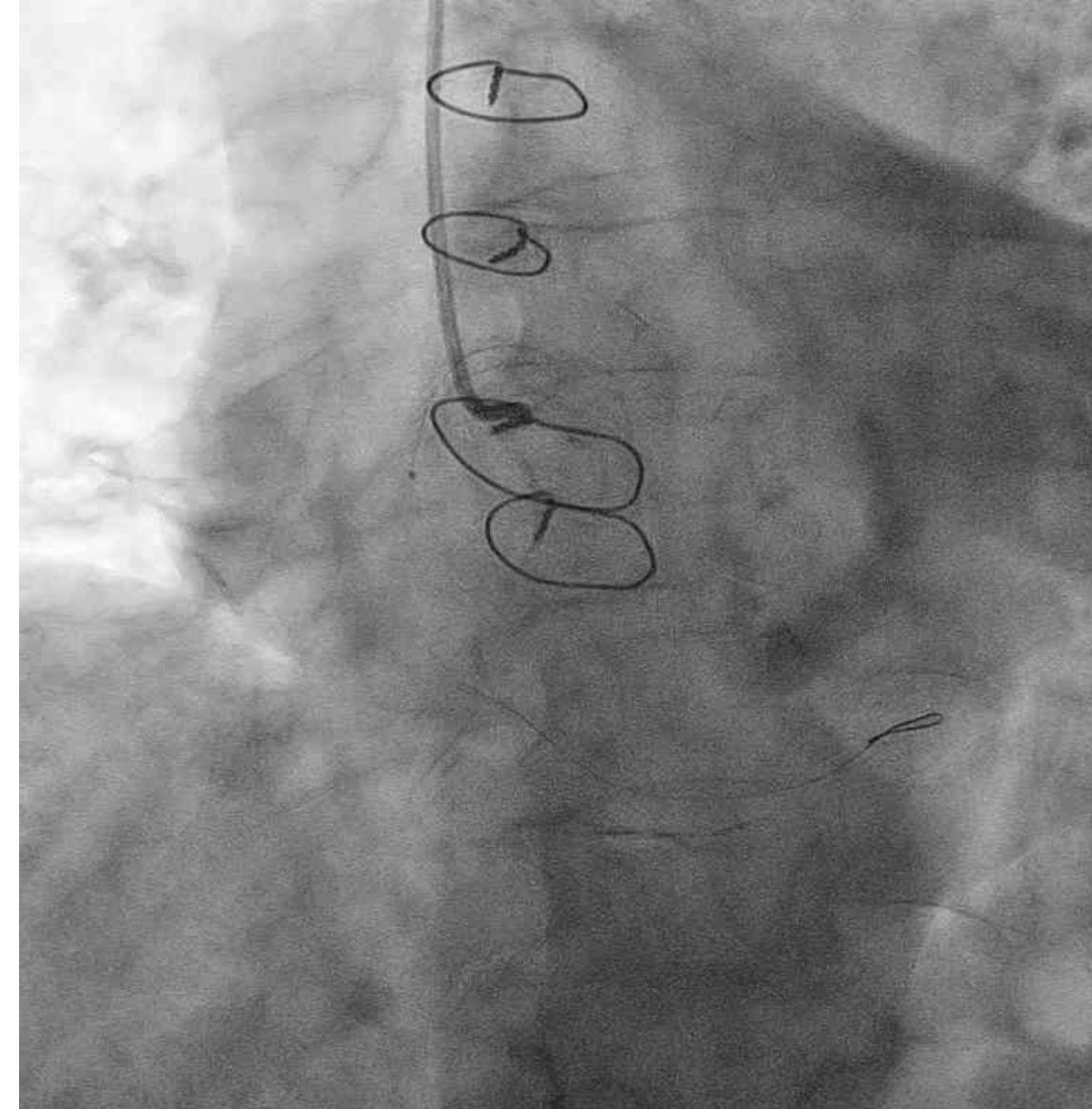
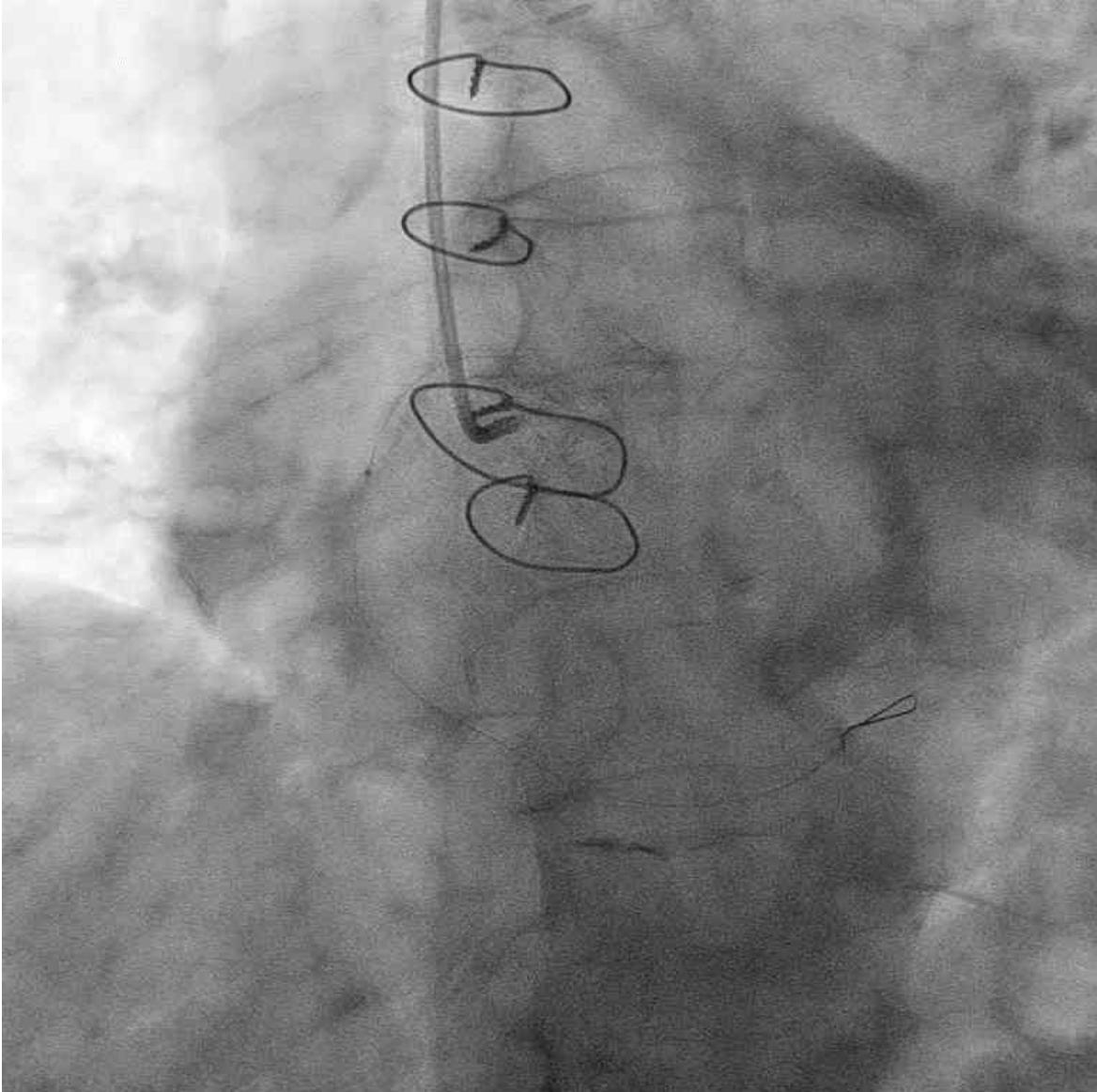
PCI shockwave faild



Caso 2:

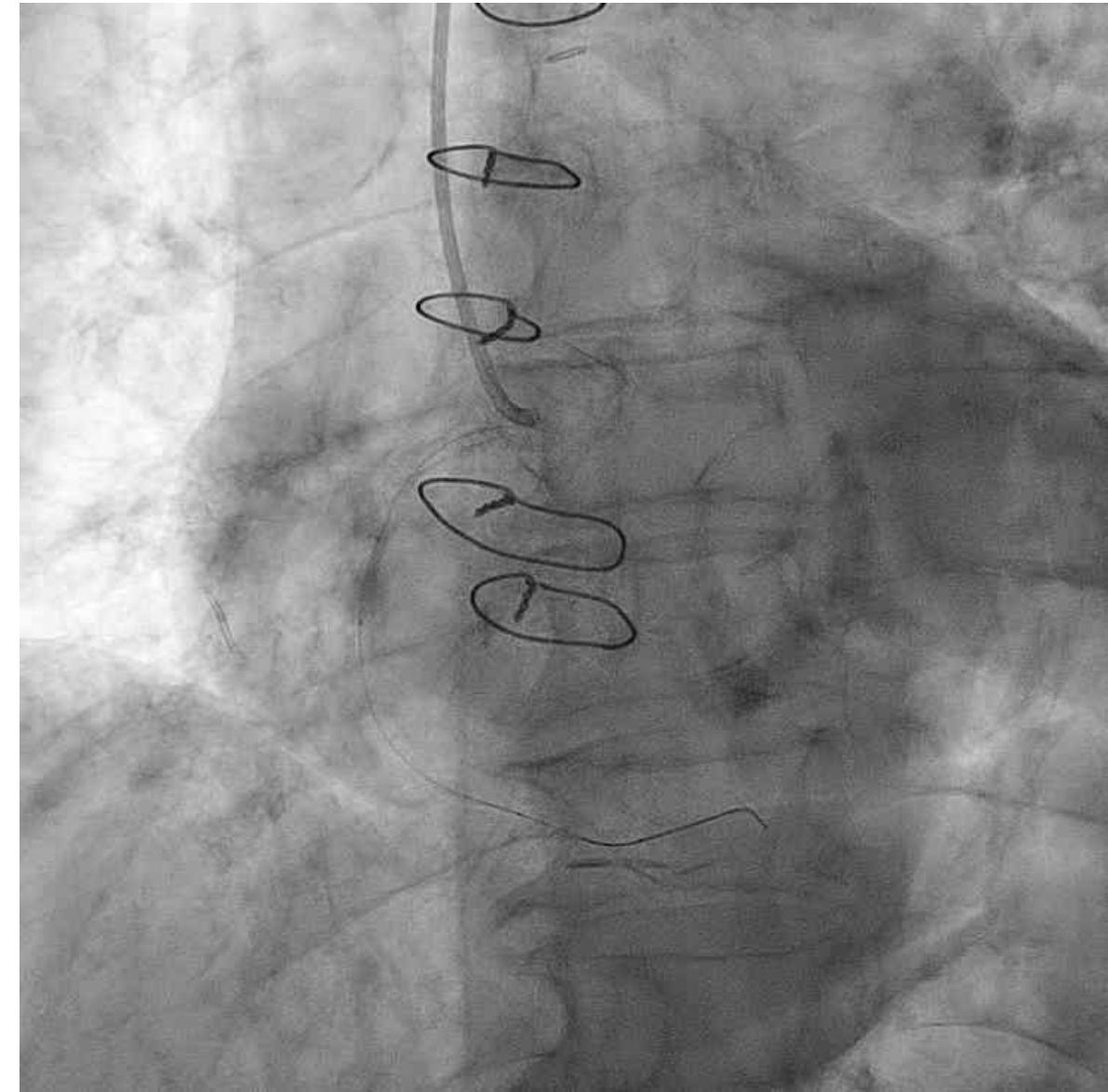
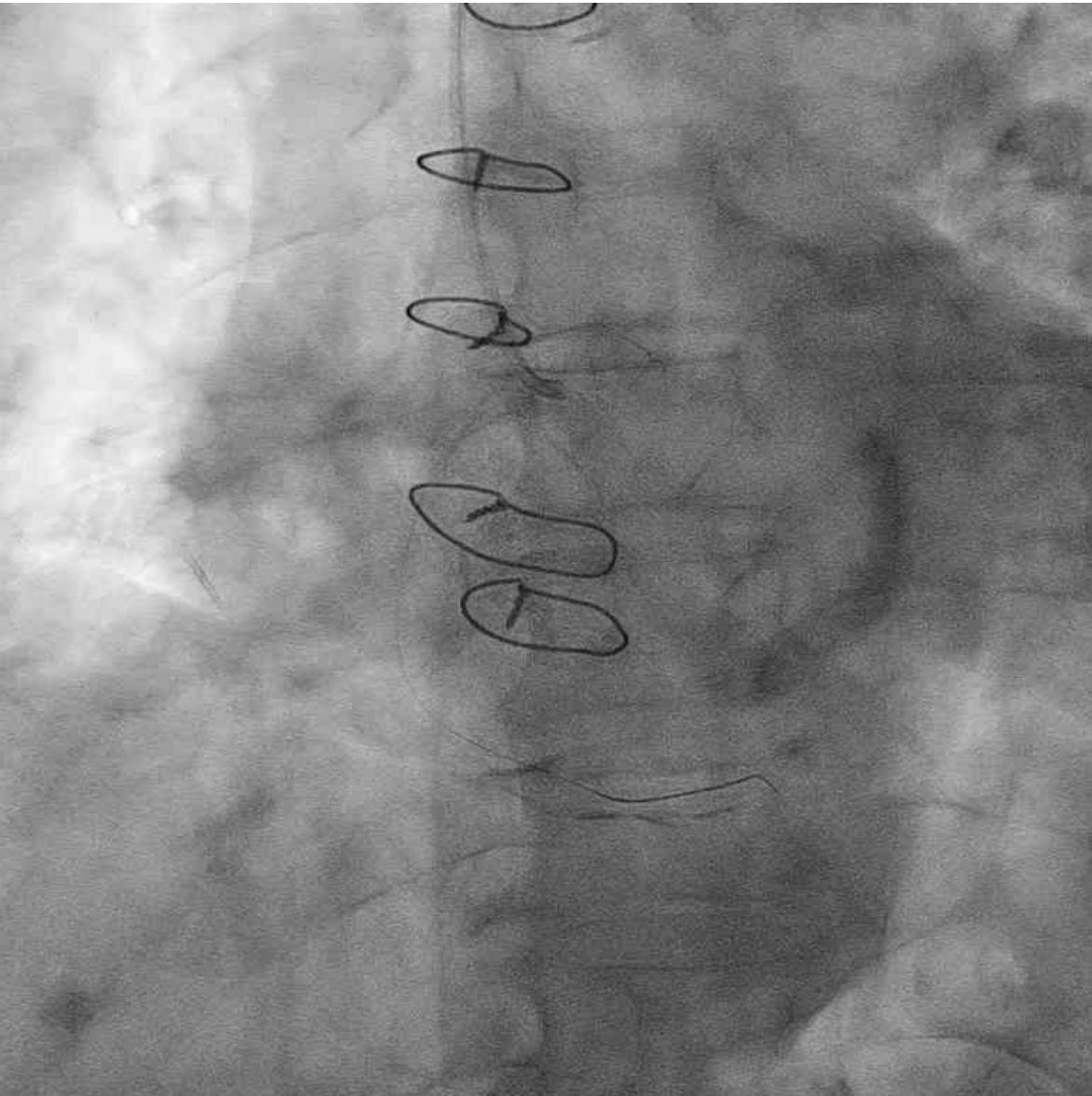
PCI con Laser ad eccimeri

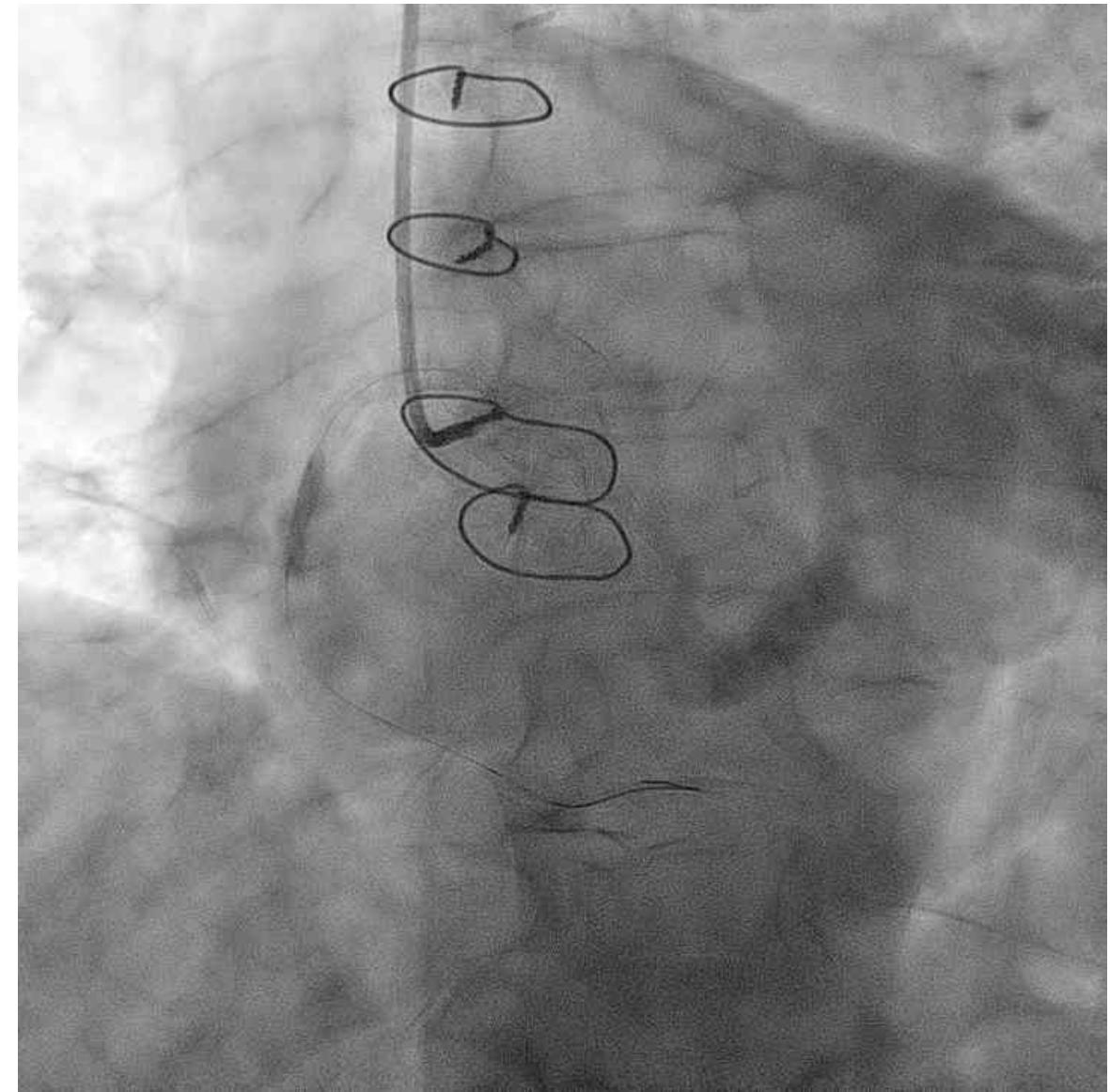
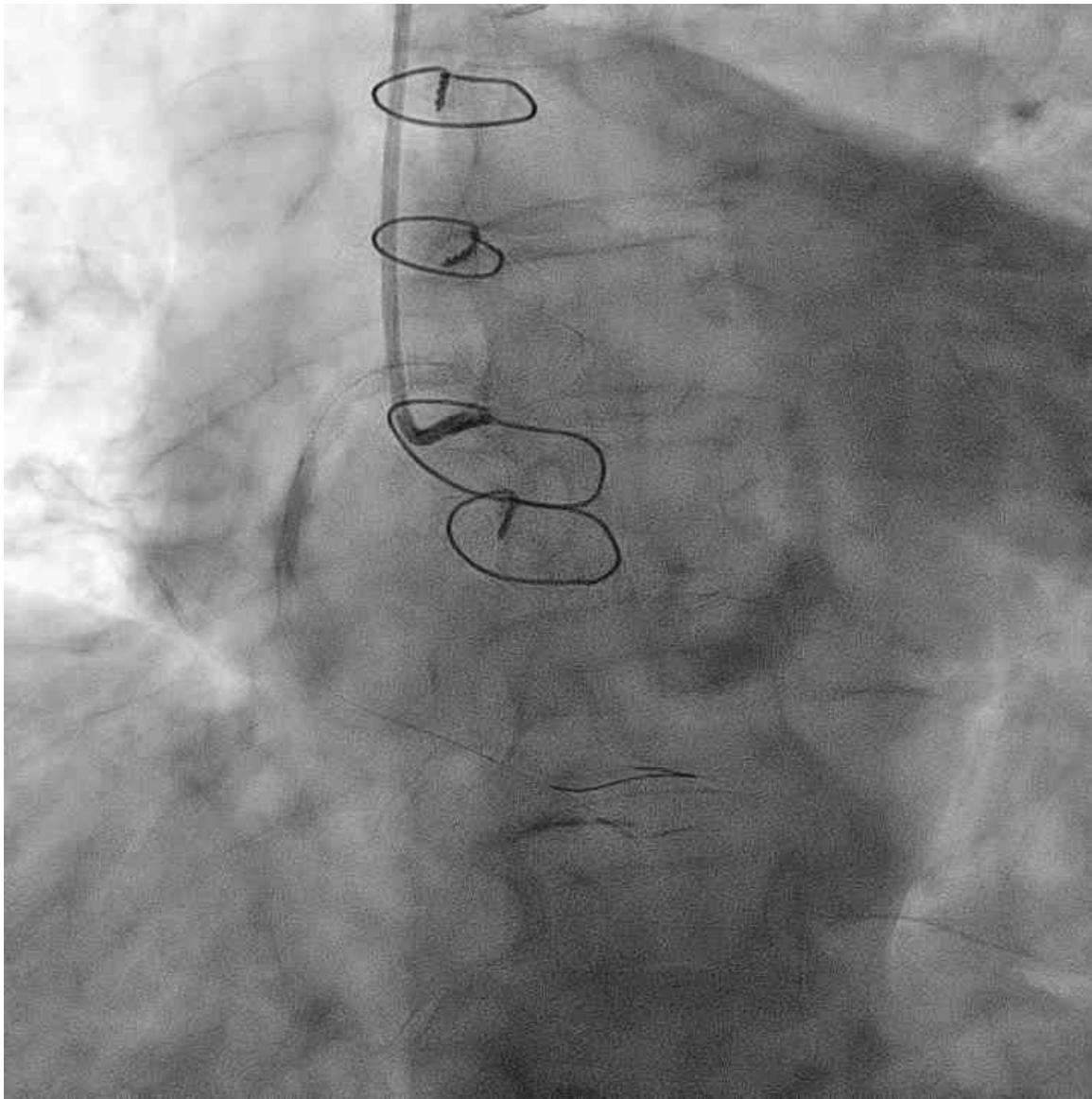
Laser ad eccimeri: 2 erogazioni F/R 60/60, 3 erogazioni F/R 80/80 + MDC, 8 sec. ciascuna



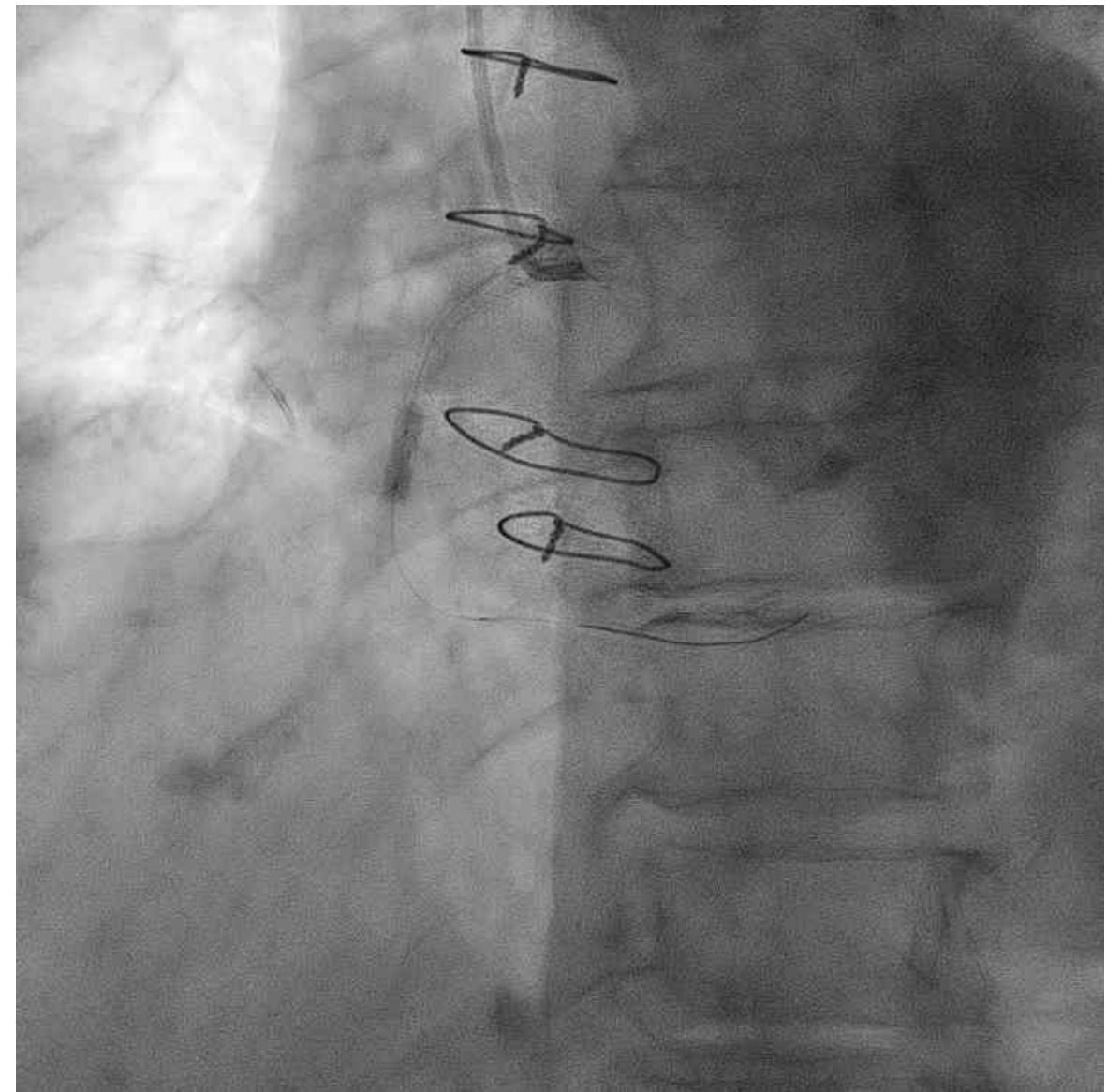
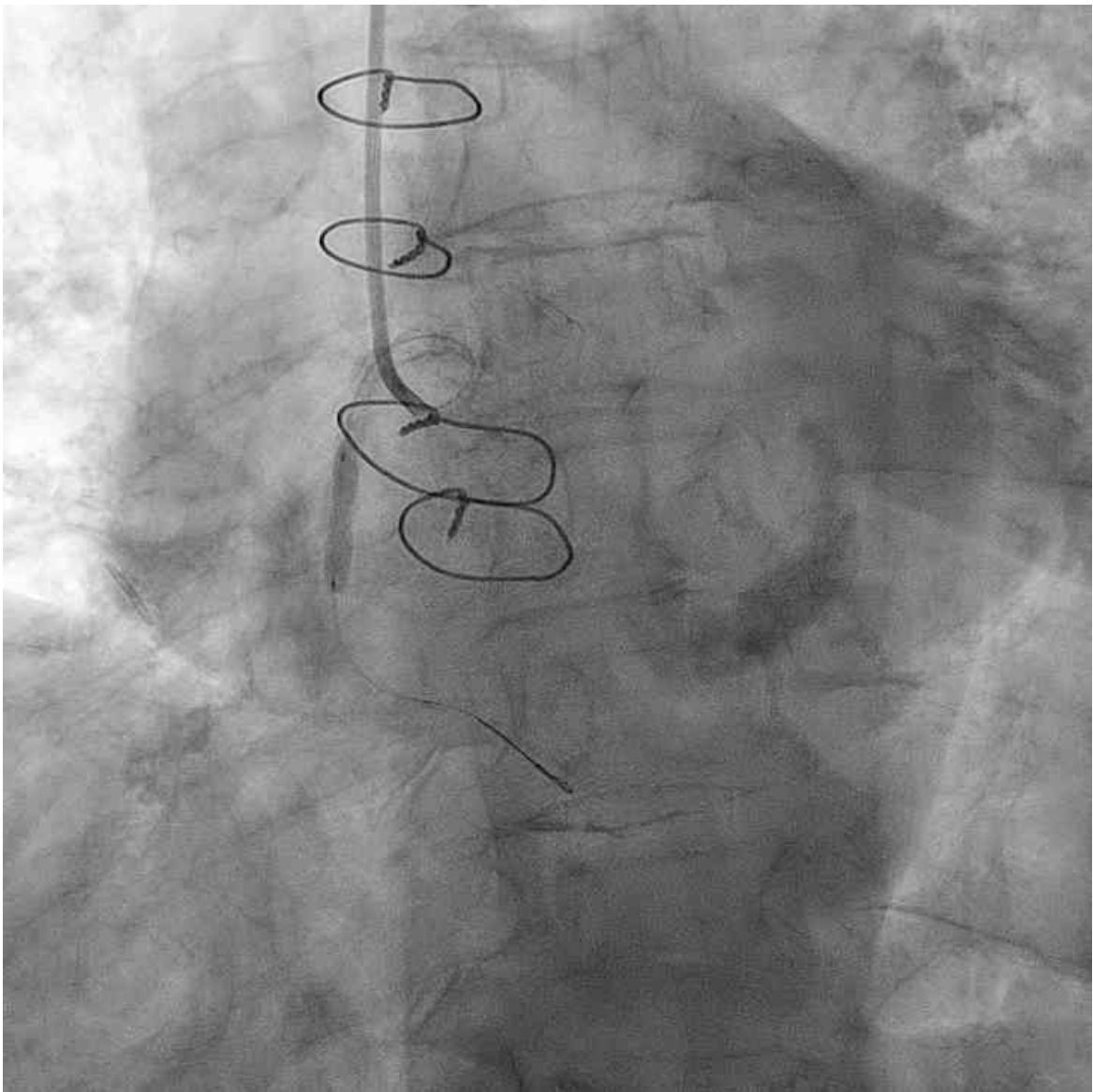
Caso 2:

Donna di 77 anni

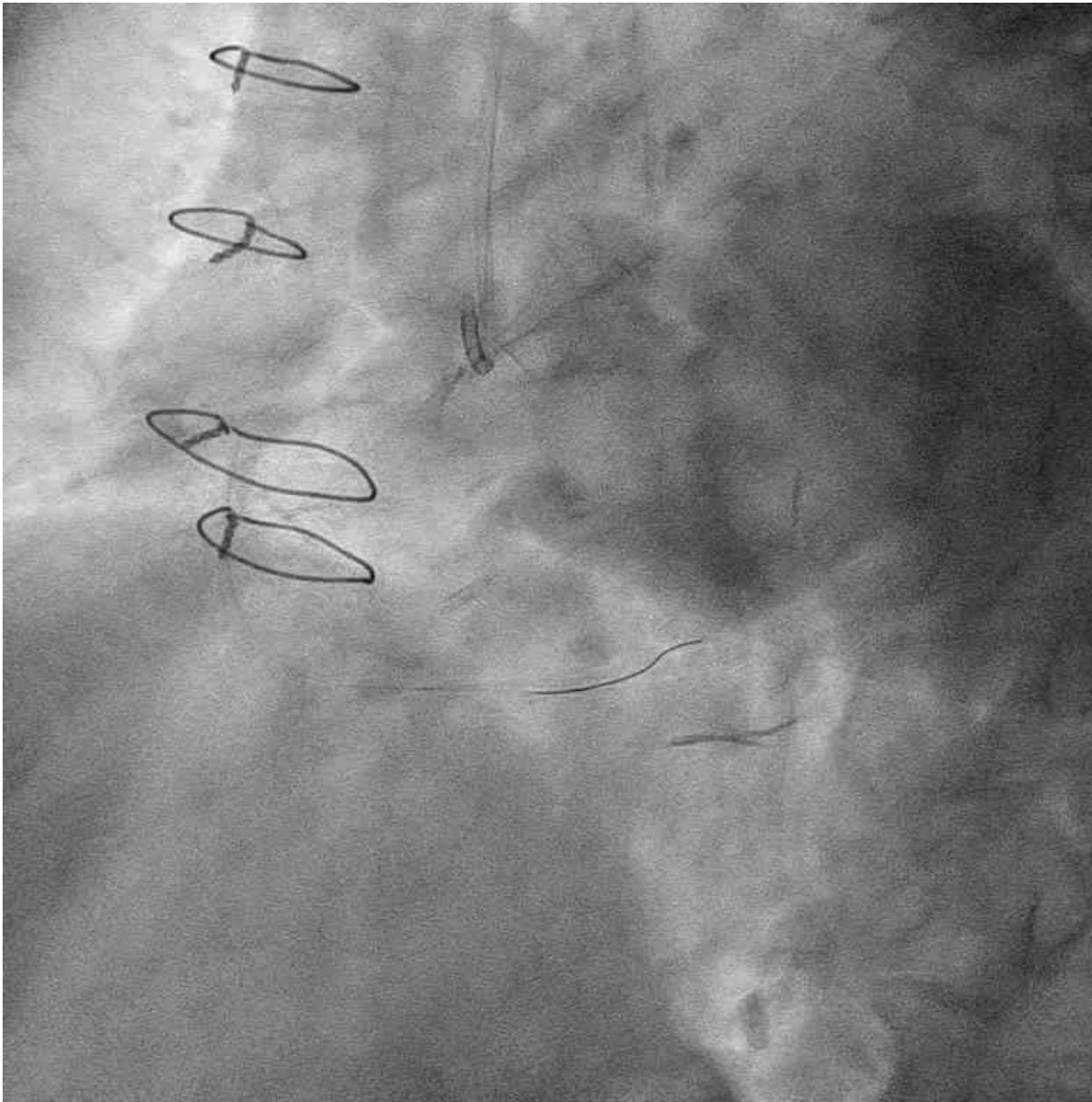




Predilatazione Pallone NC 2,5x 15 mm e 3x12 mm 16 atm

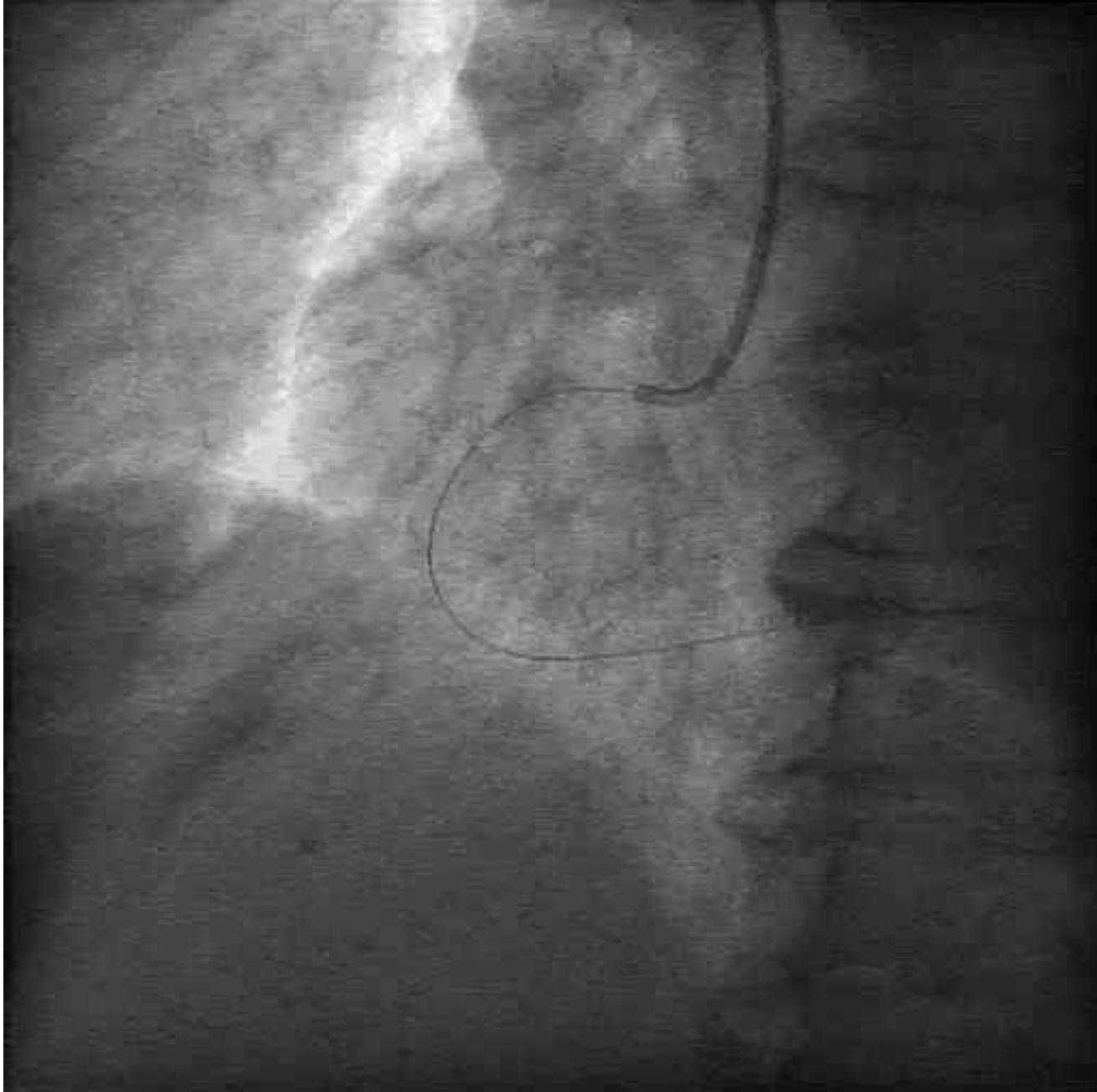


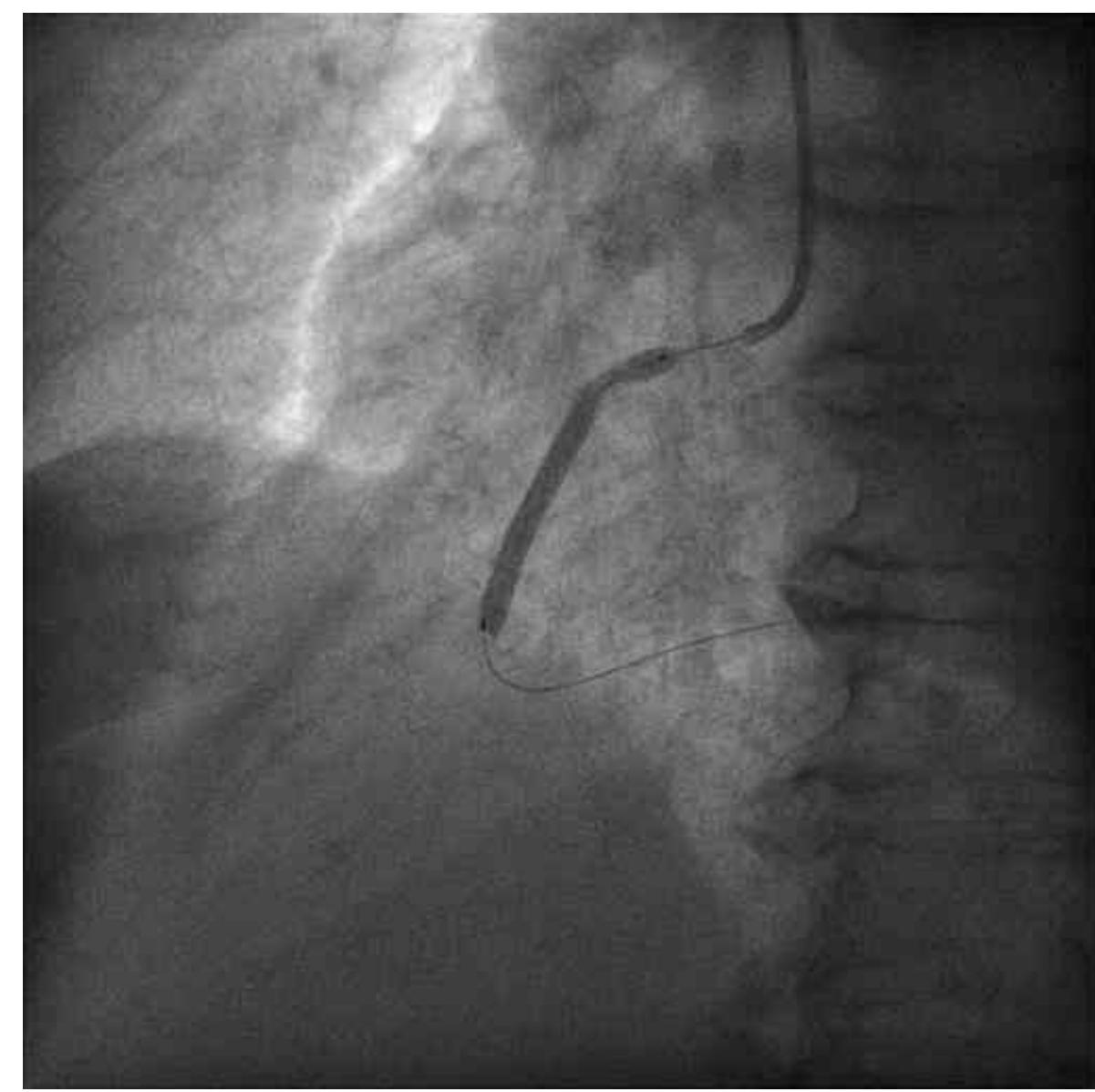
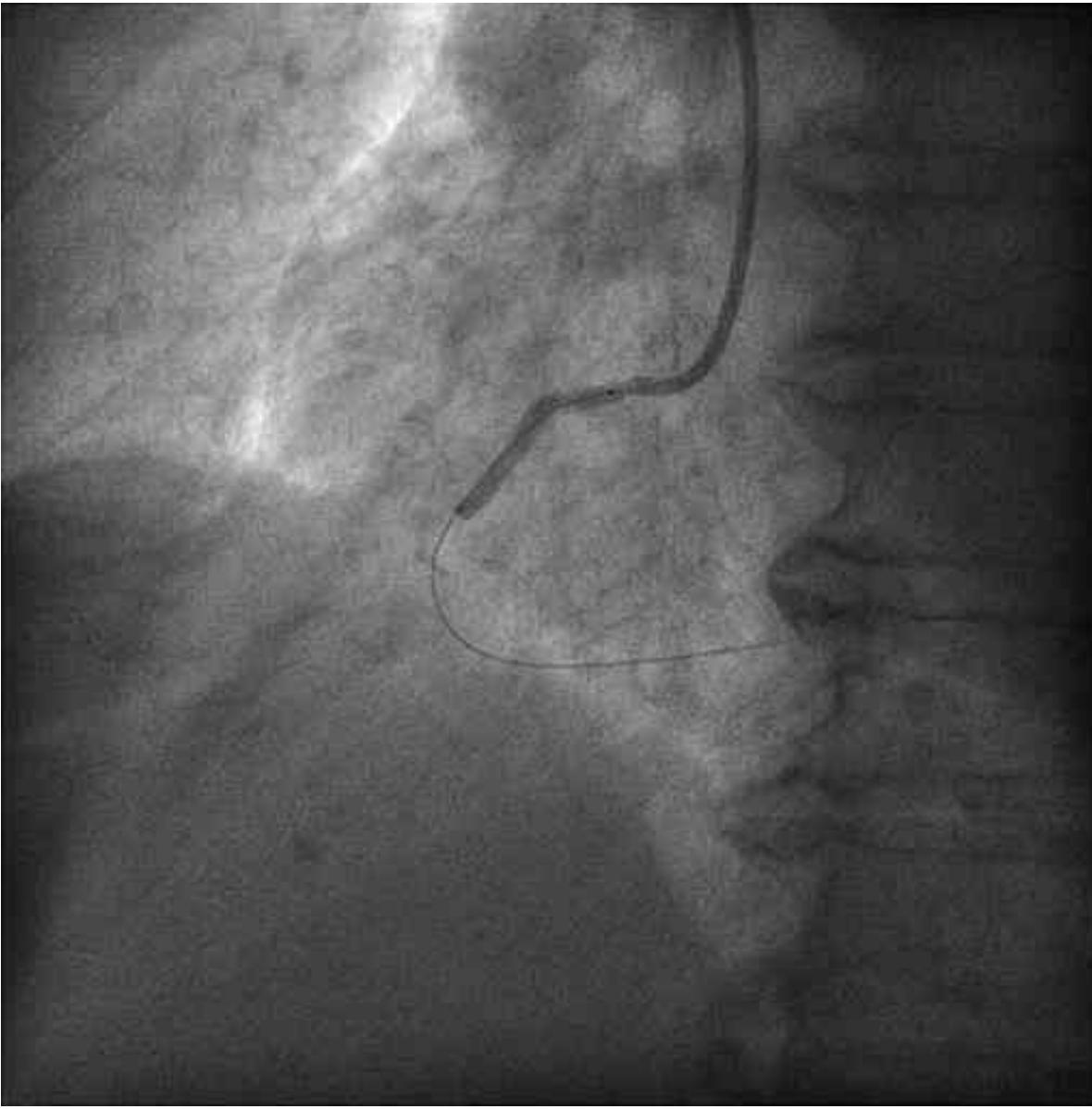
Stent: Onyx 3x15 mm, post-dilatato pallone NC 3,5x8 mm 14 atm

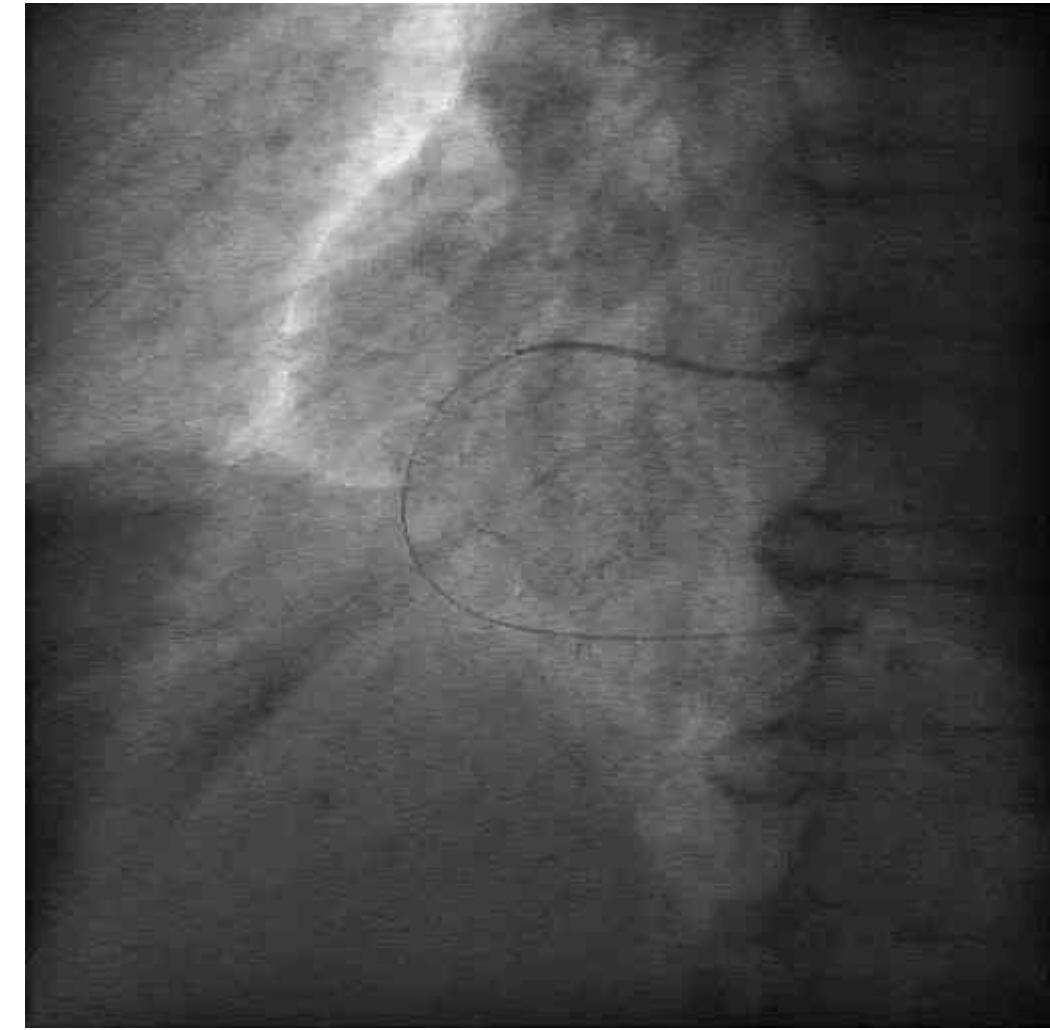
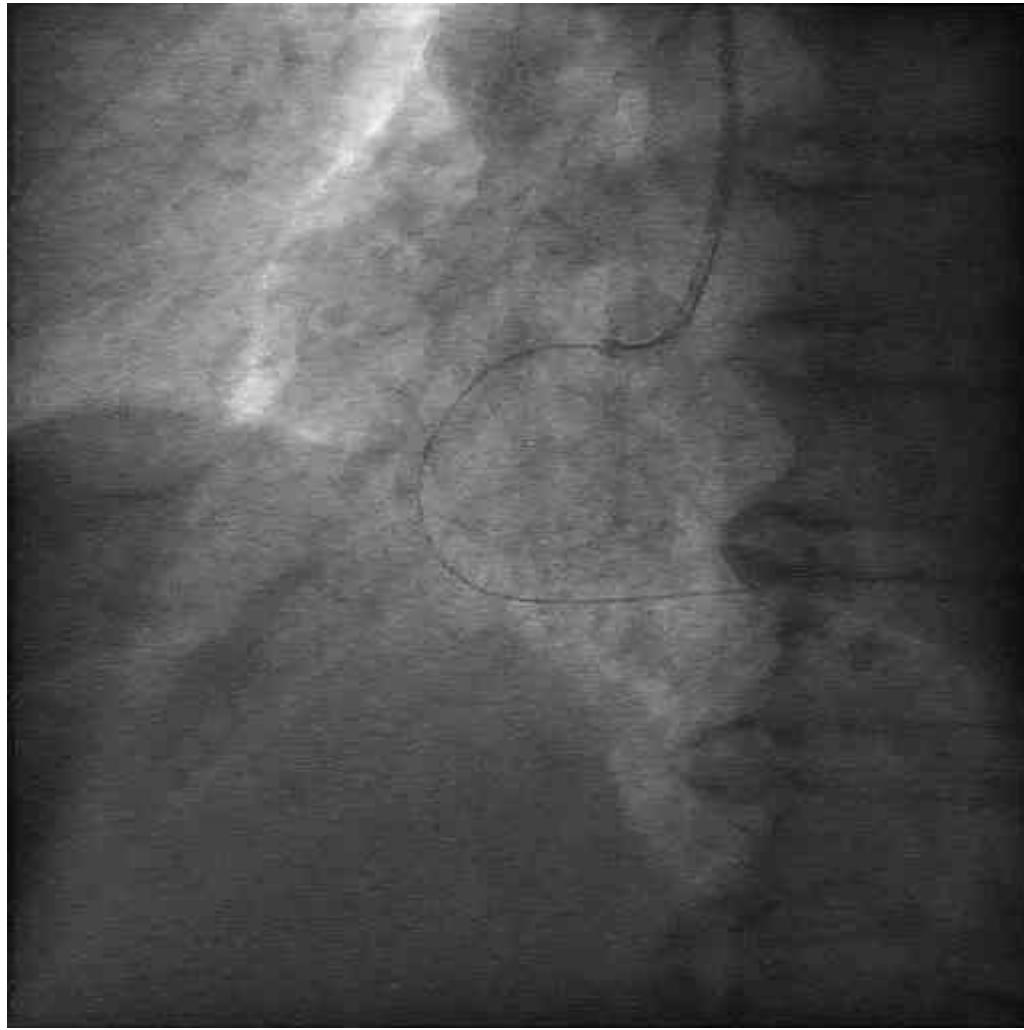


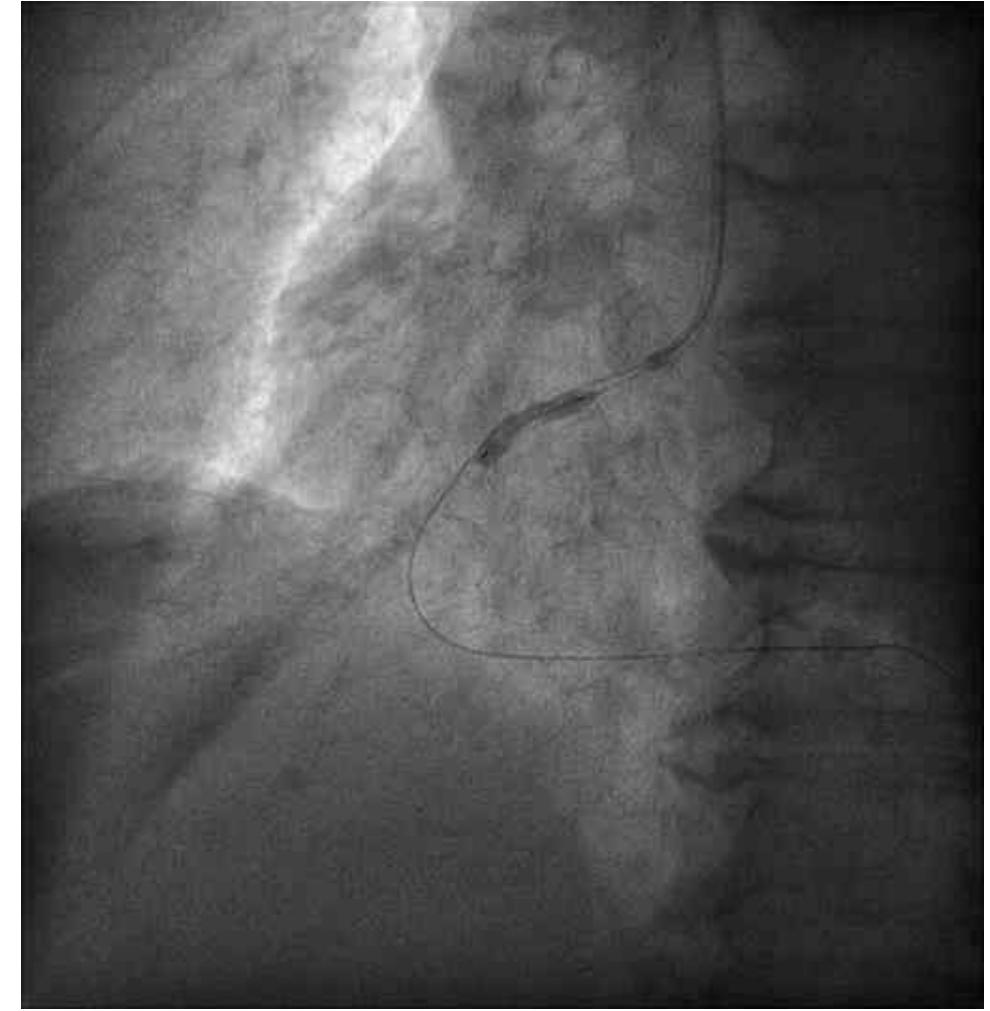
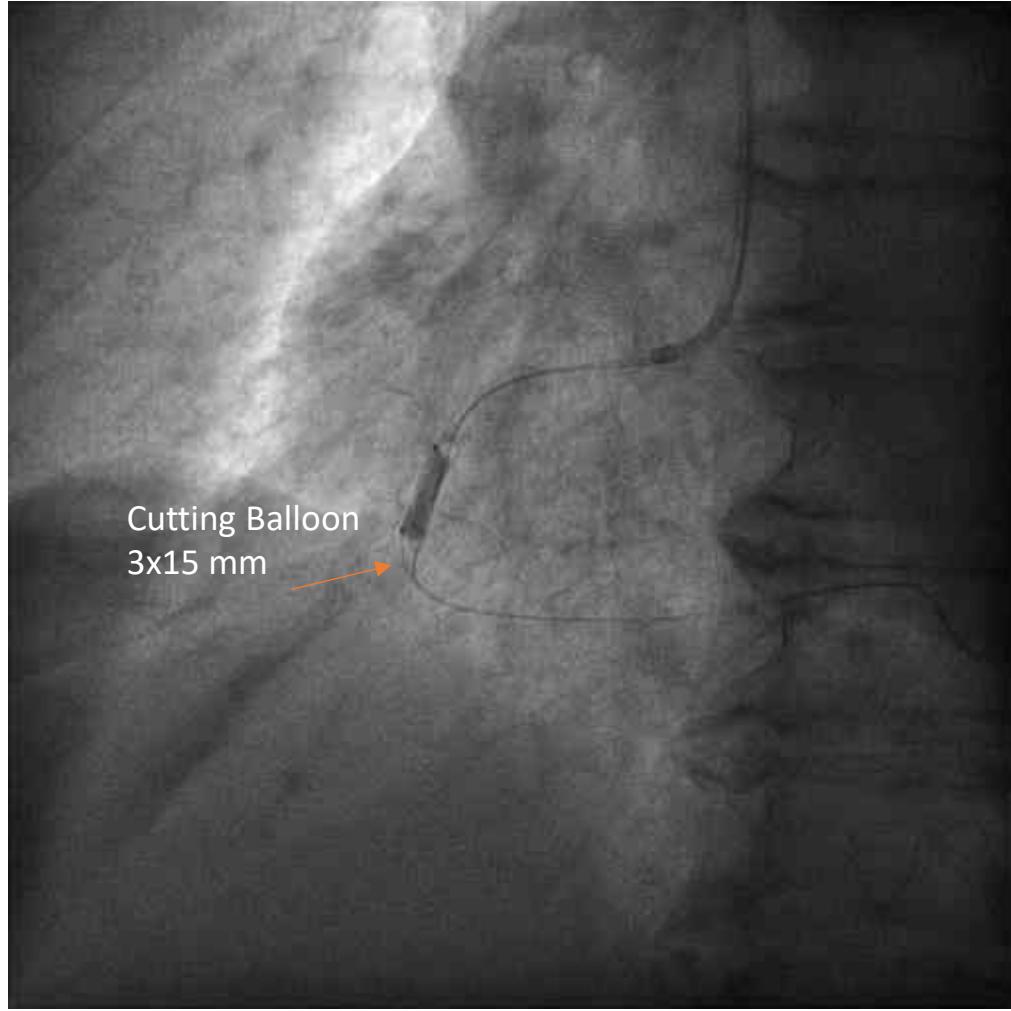
# STENT IPO-ESPANSI

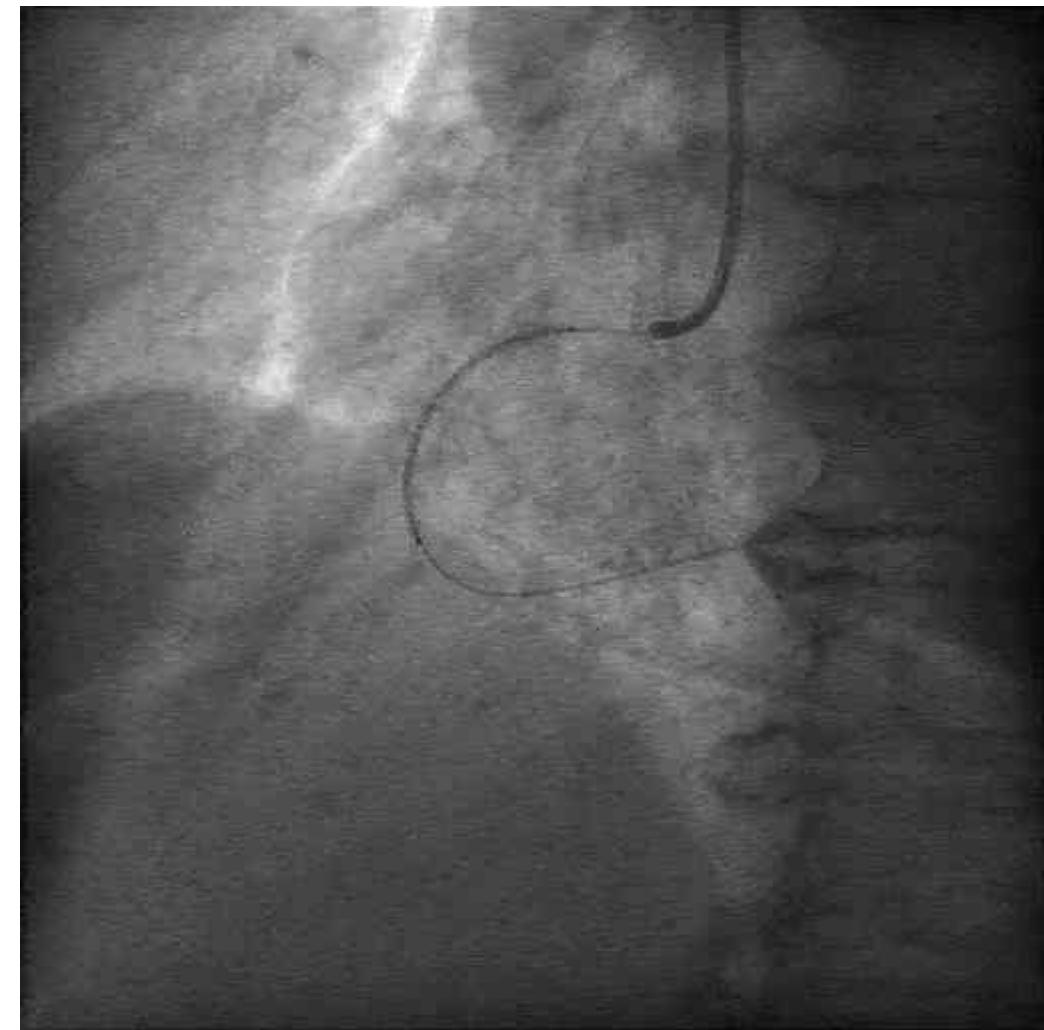
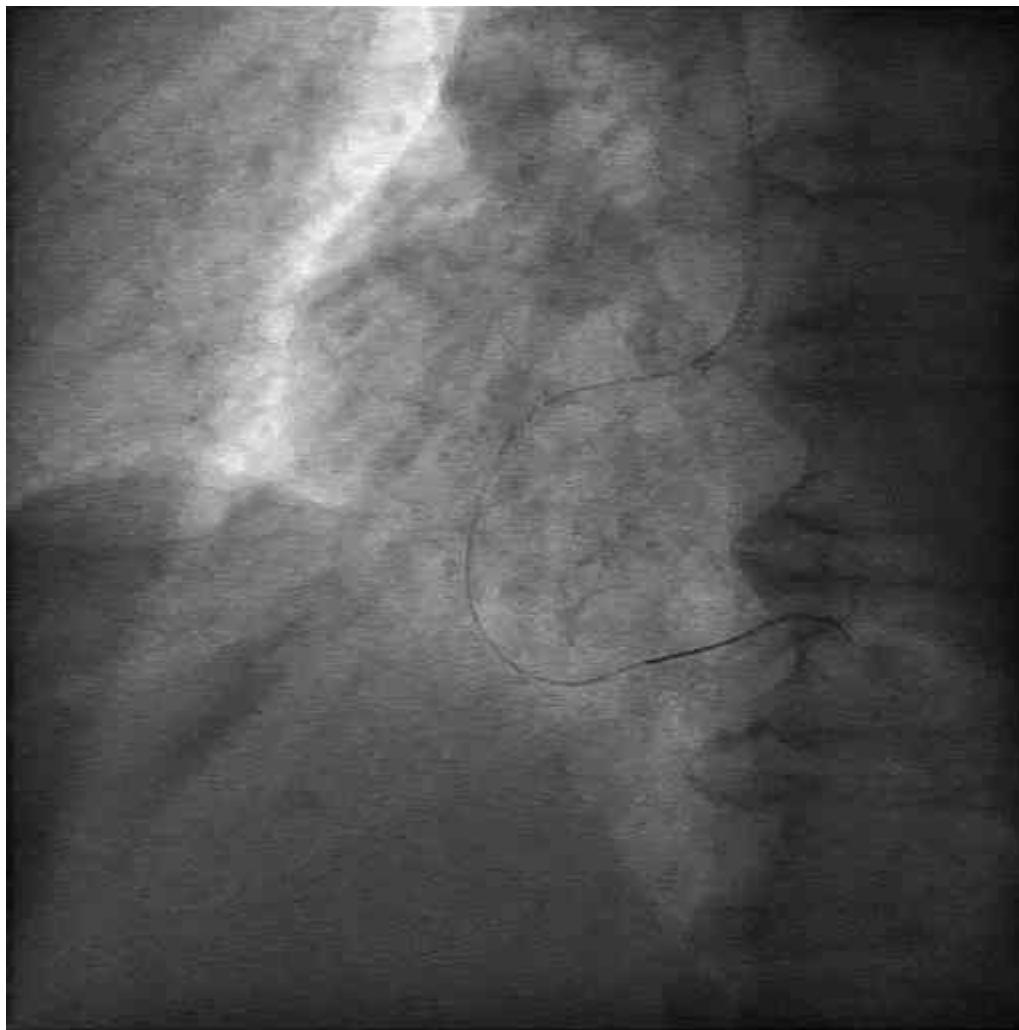
Caso 1:  
Donna di 82 anni  
NSTEMI

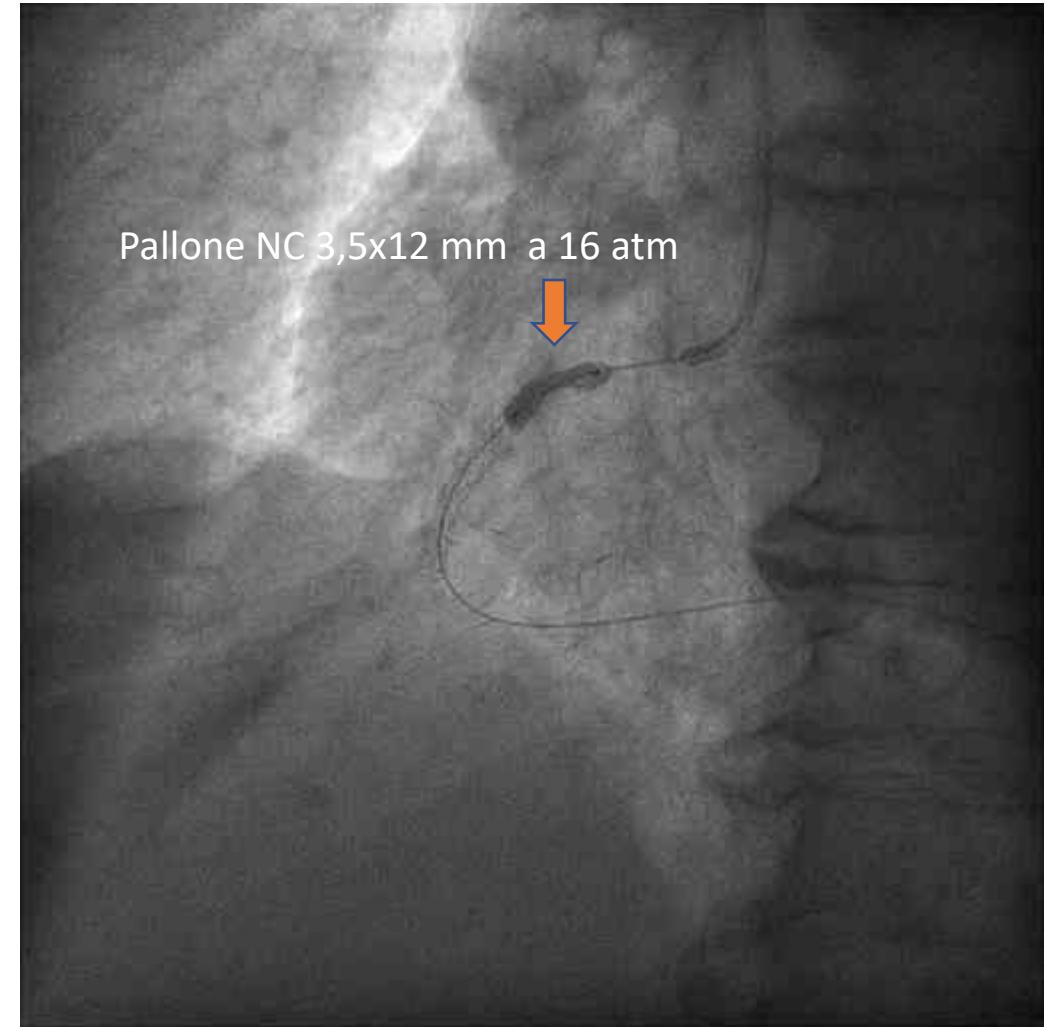
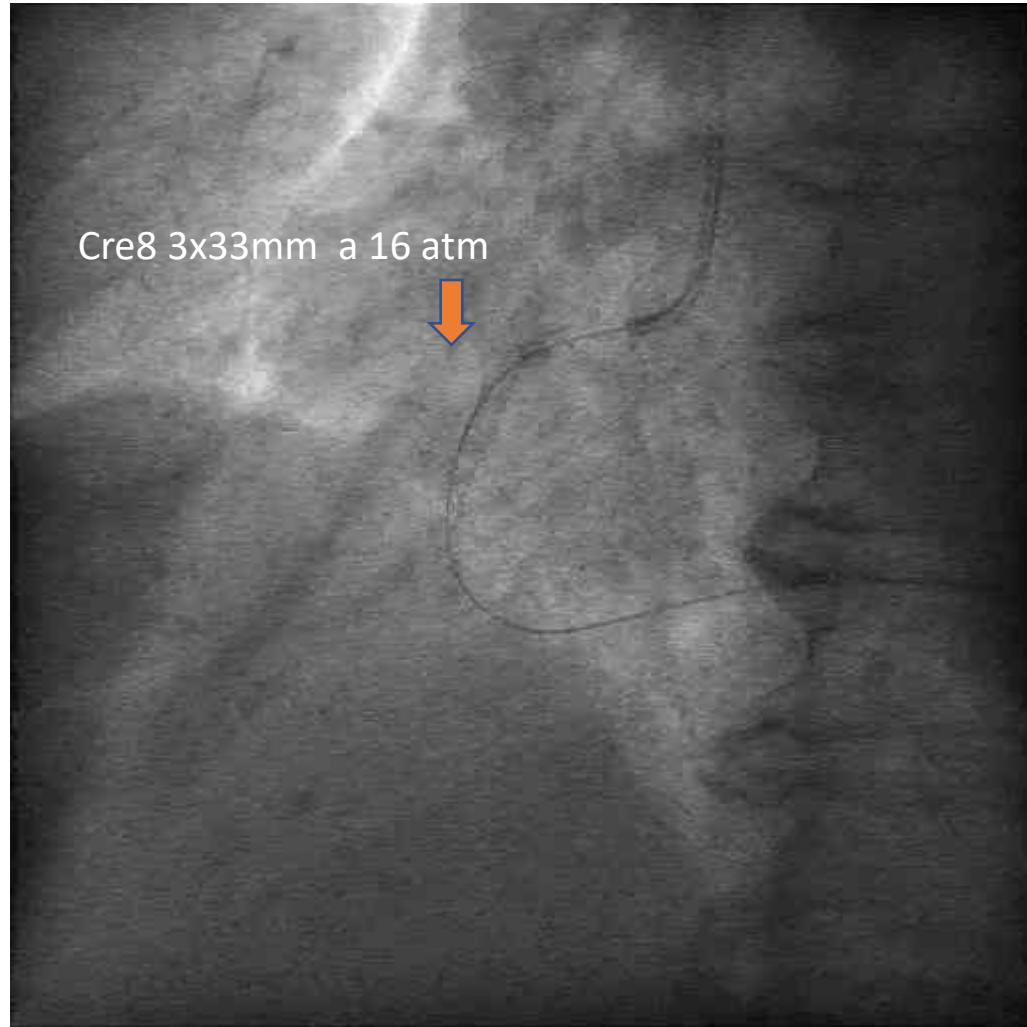


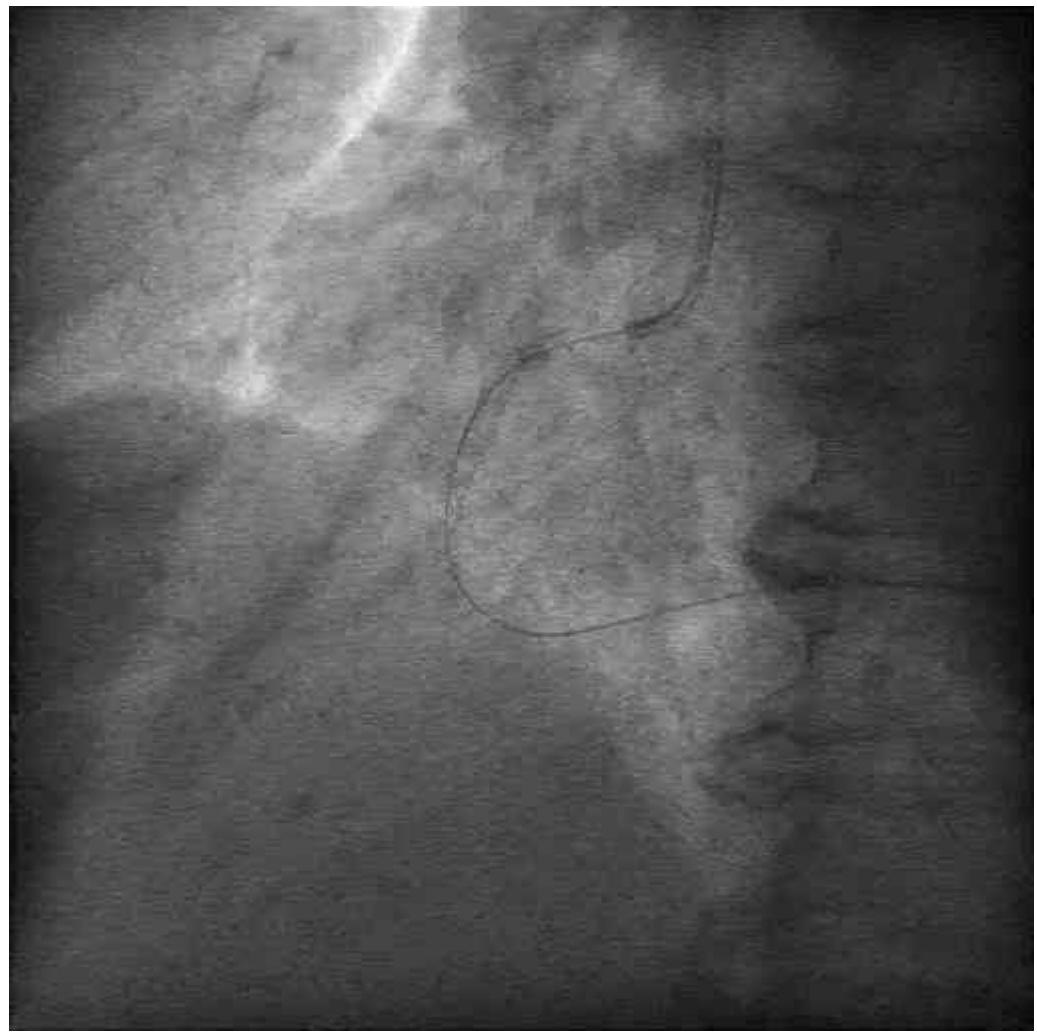




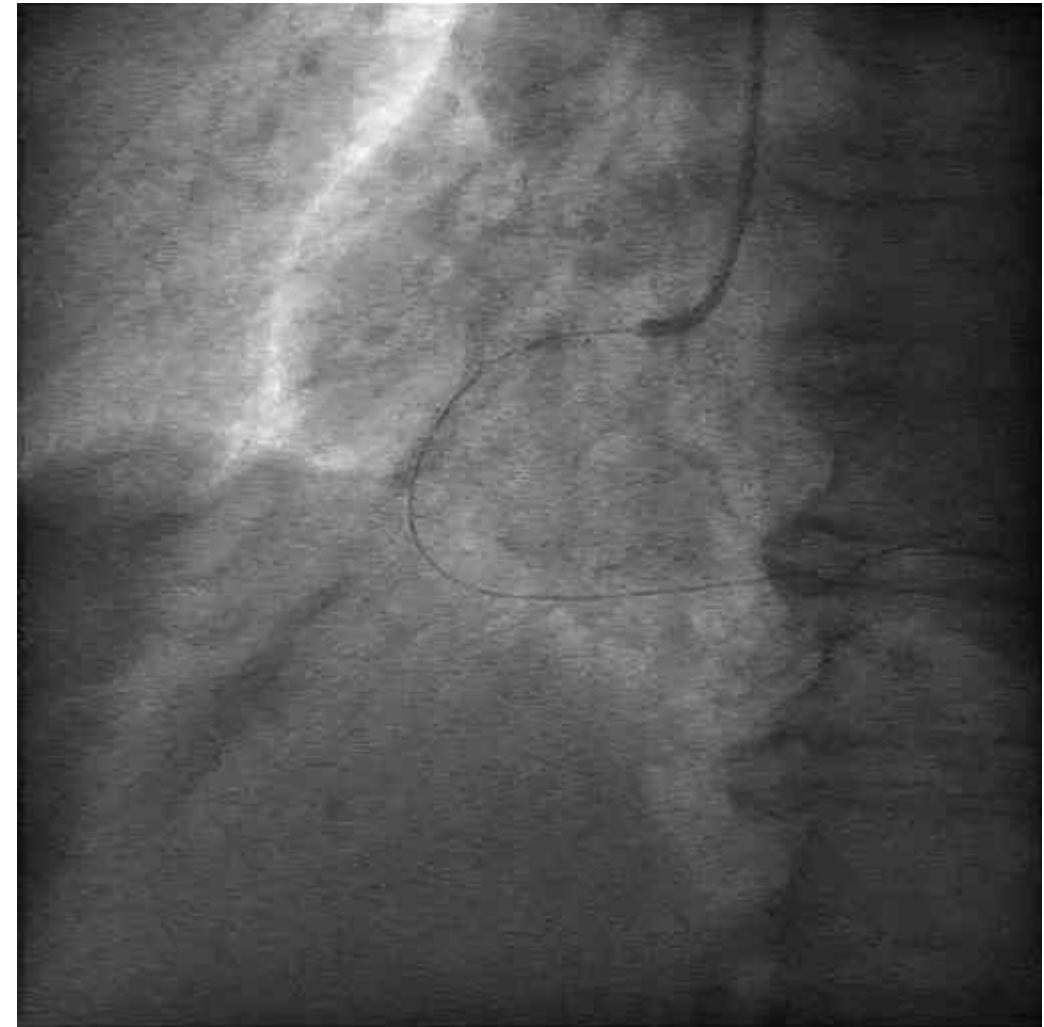
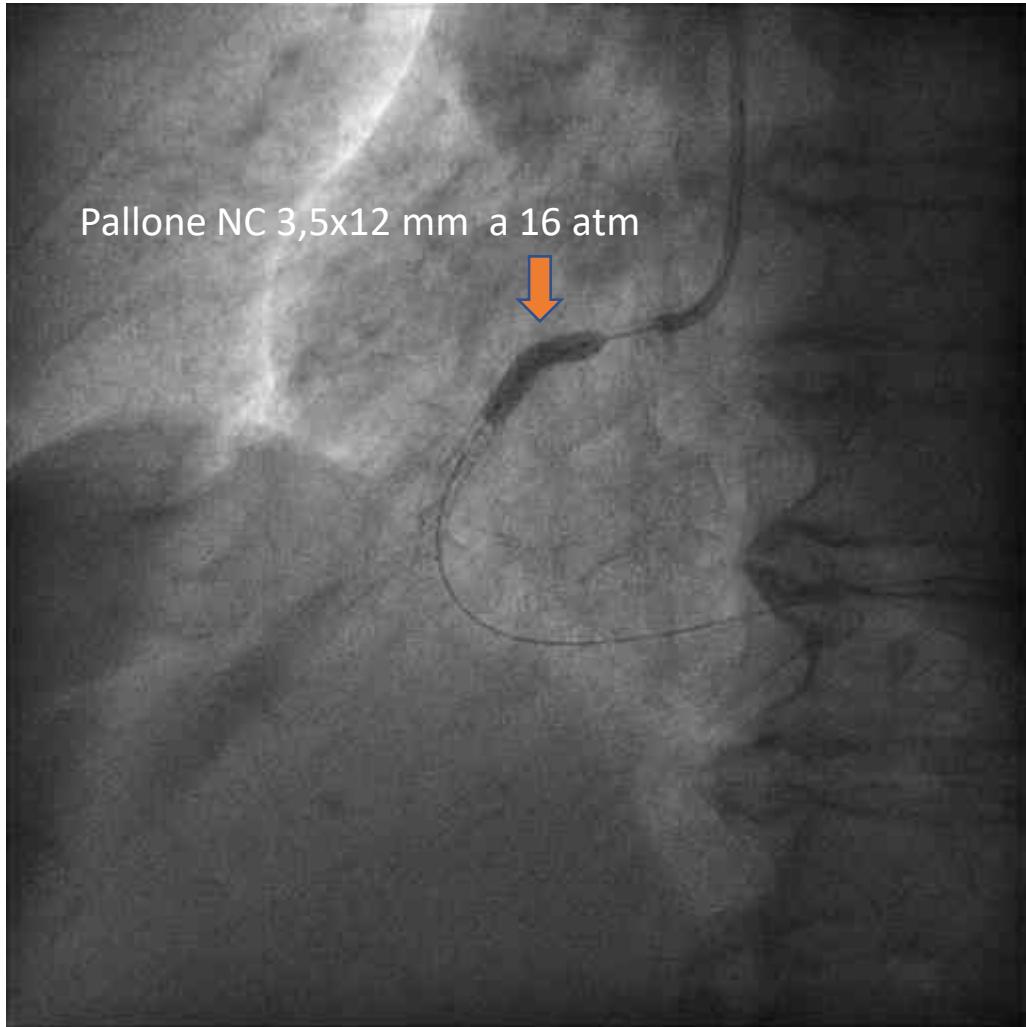






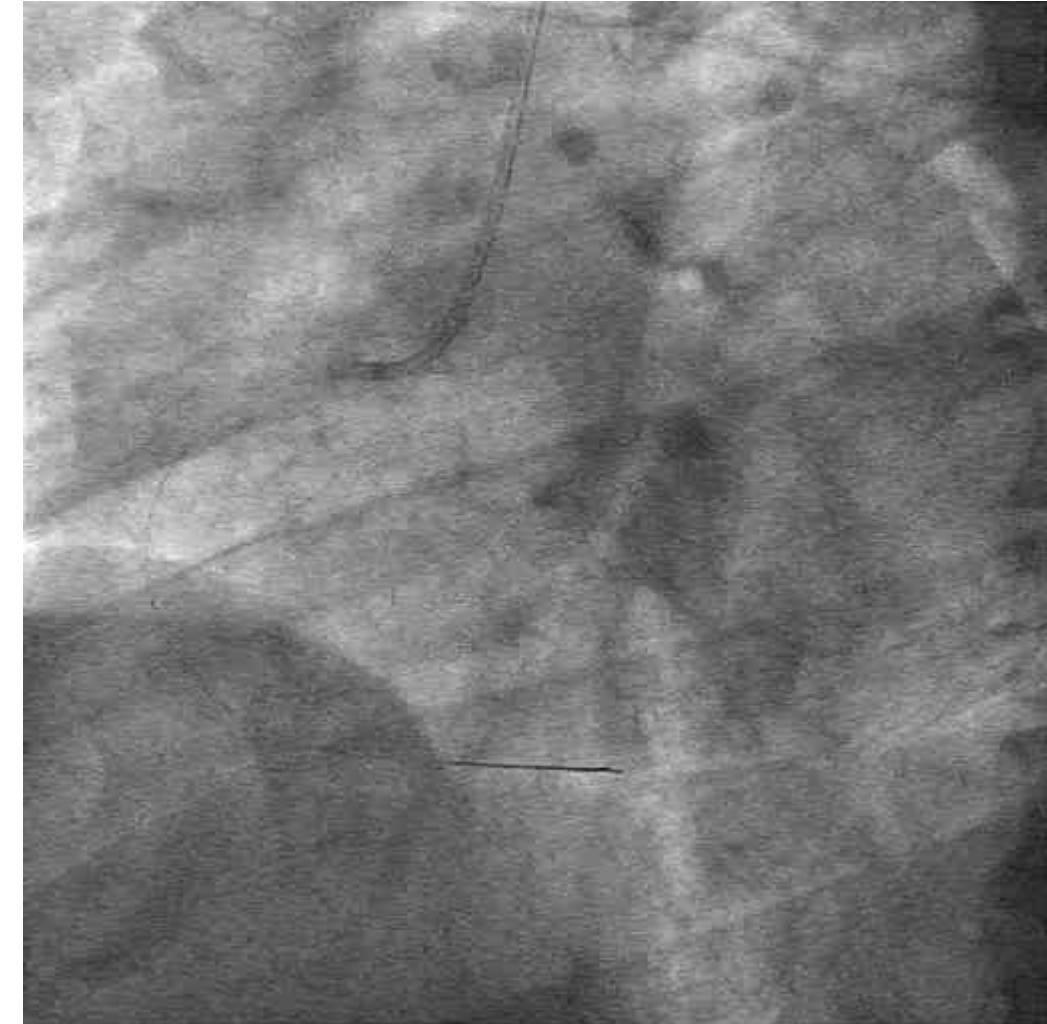
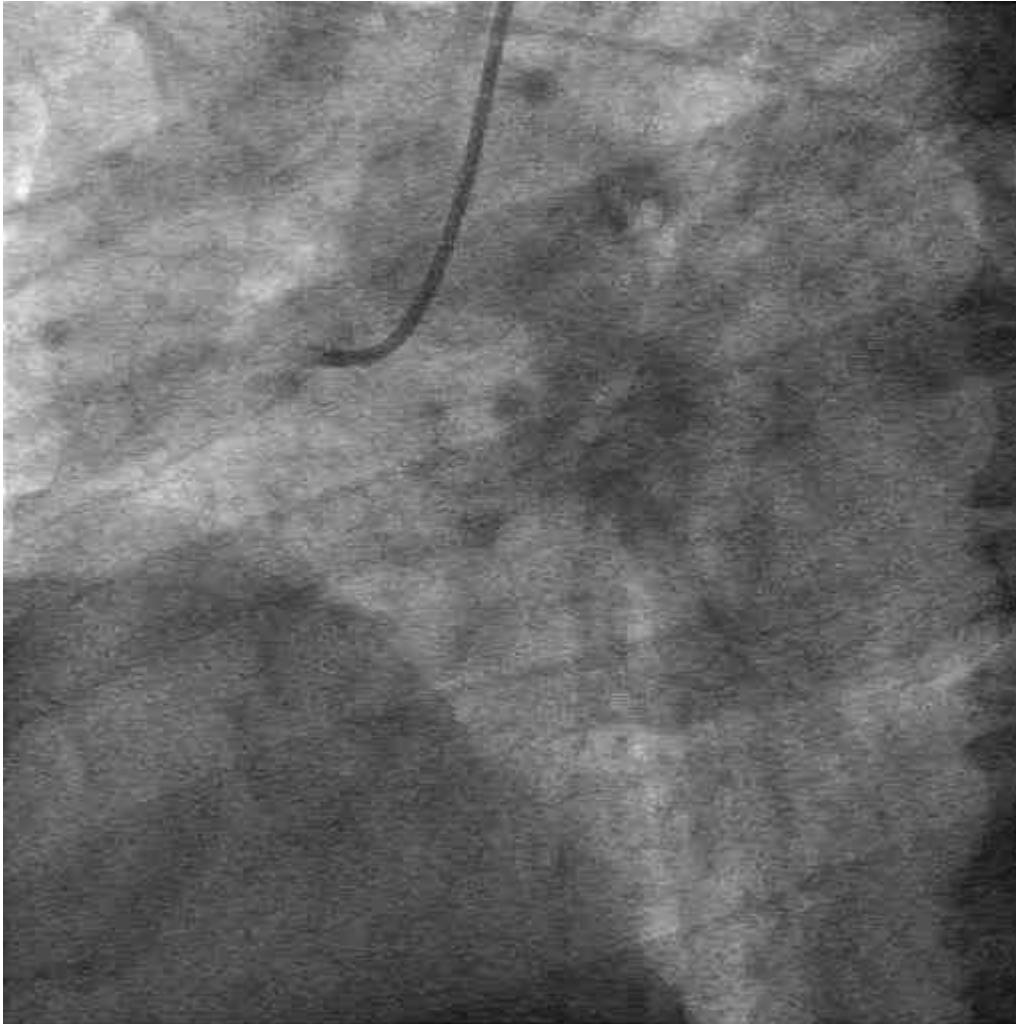


Laser ad eccimeri Fr 80/80; 3 erogazioni x 6 sec.



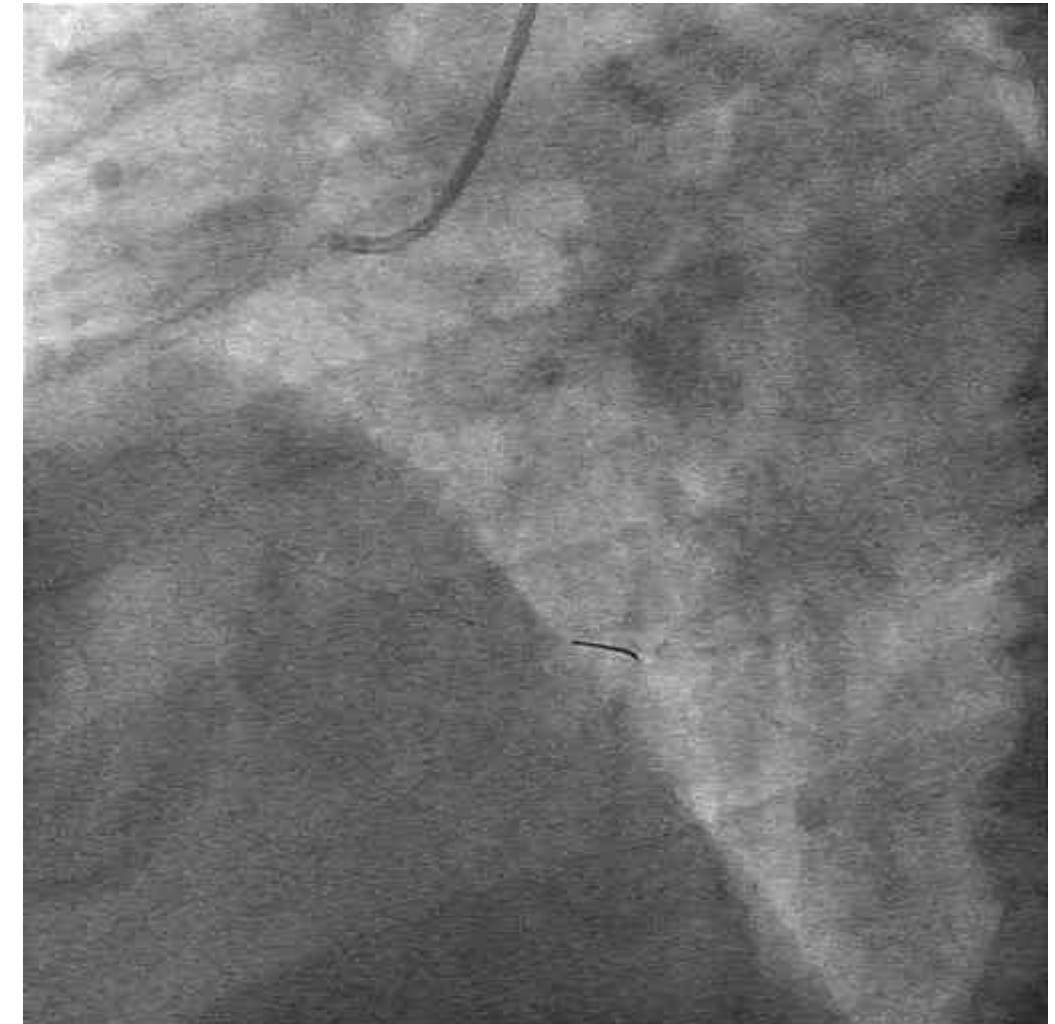
# TROMBO-DISSOLUZIONE IMA

## Caso clinico 1: STEMI inferiore – occlusione trombotica di Coronaria Destra





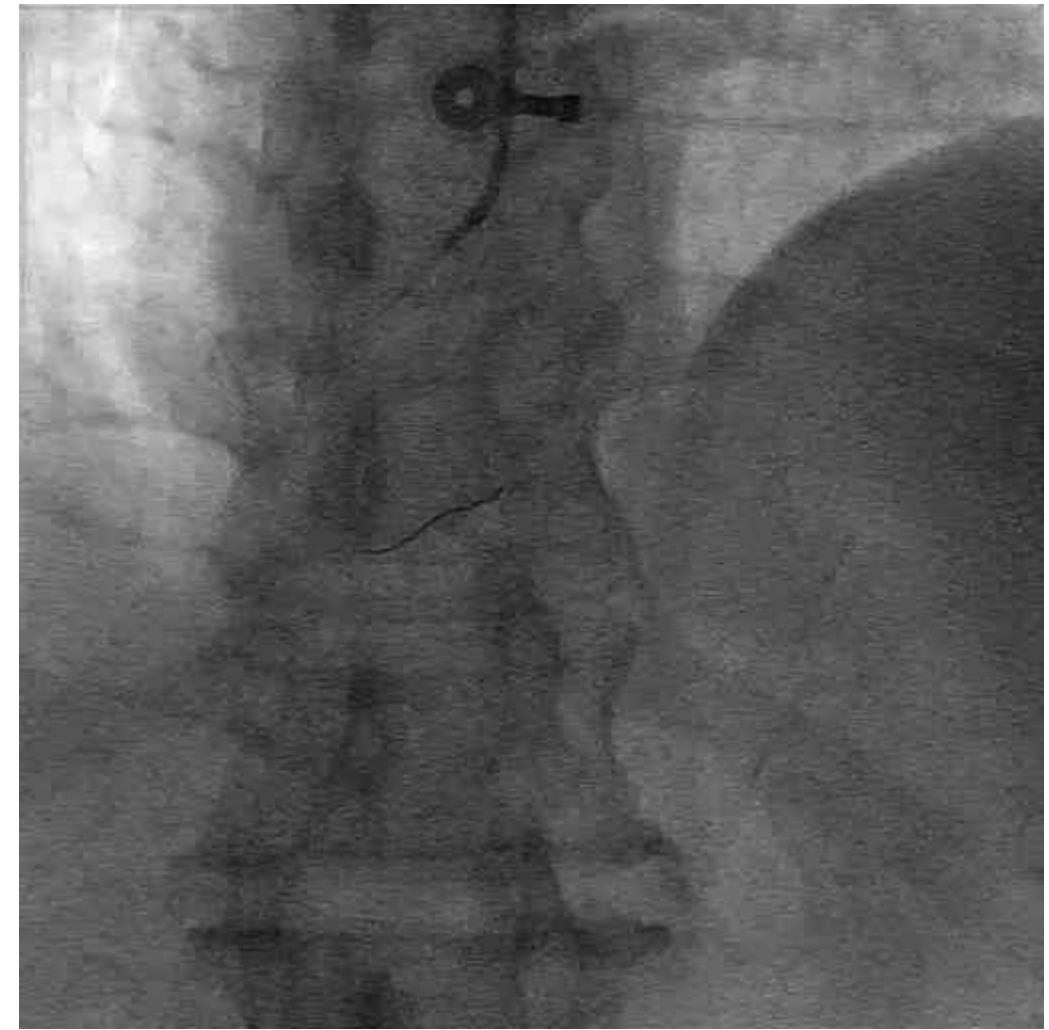
**Detrombosi -laser**



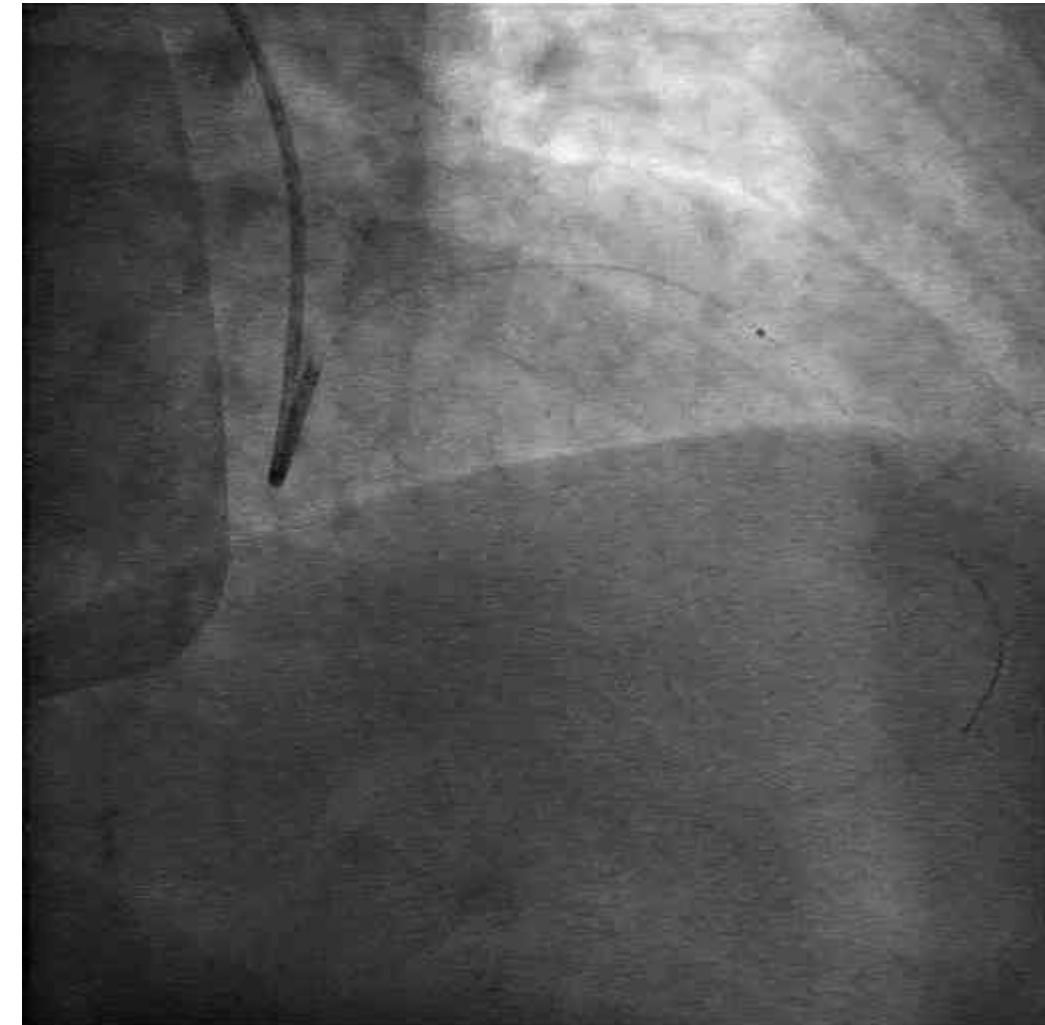
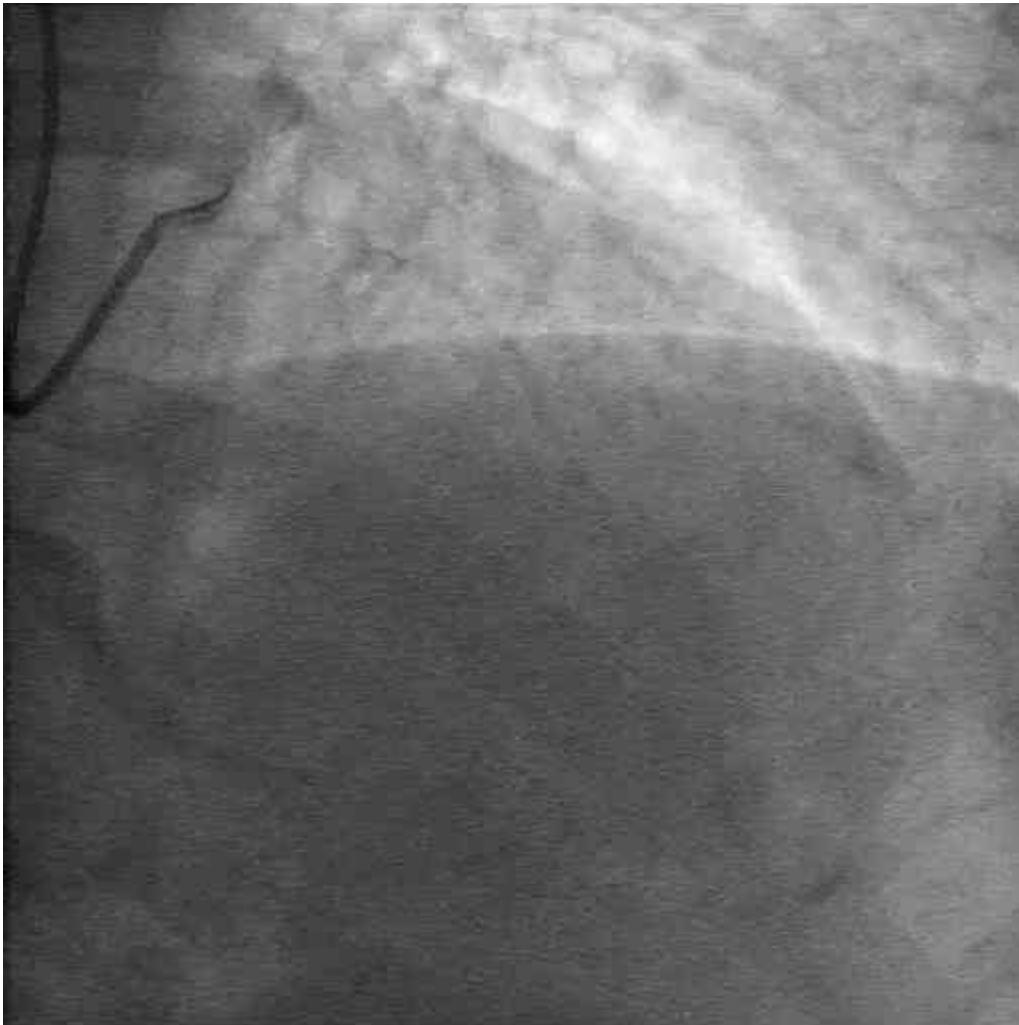
**Flusso TIMI post-laser**



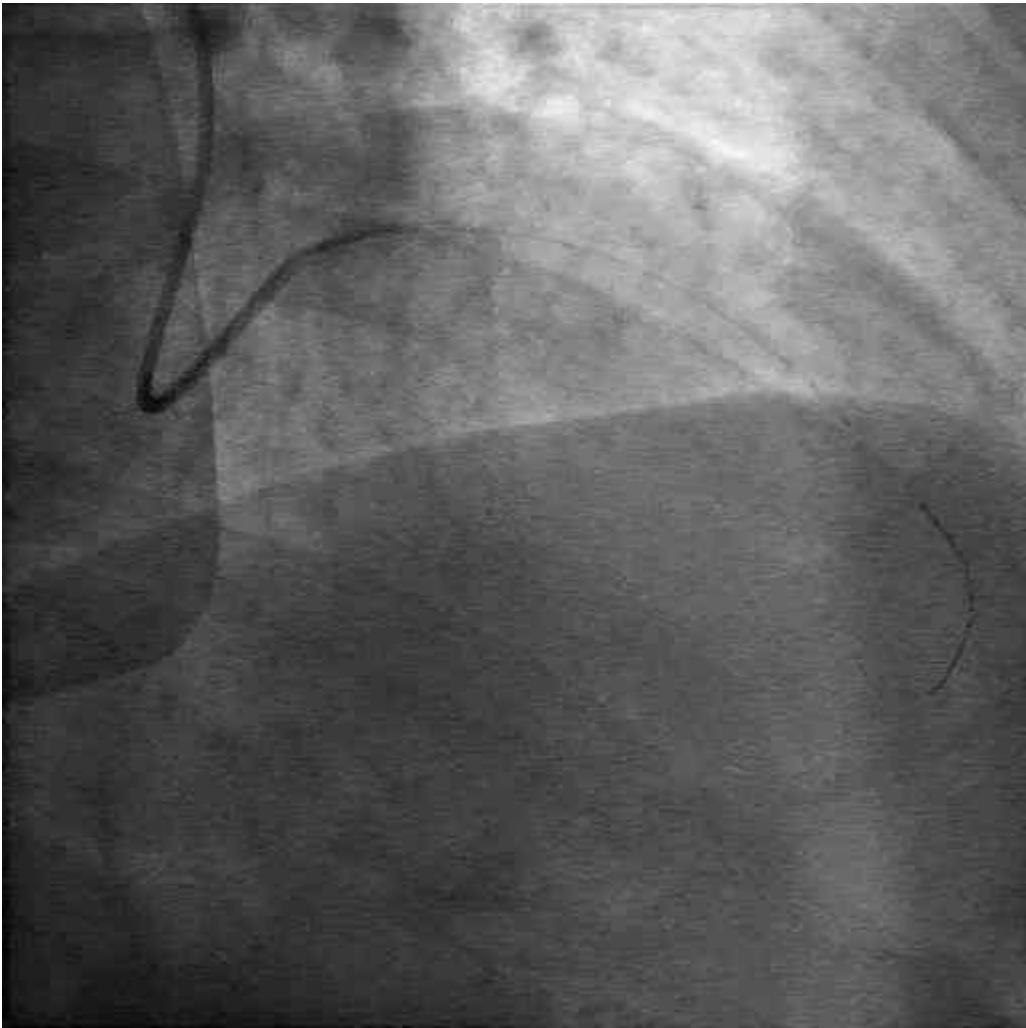
**Stenting diretto**



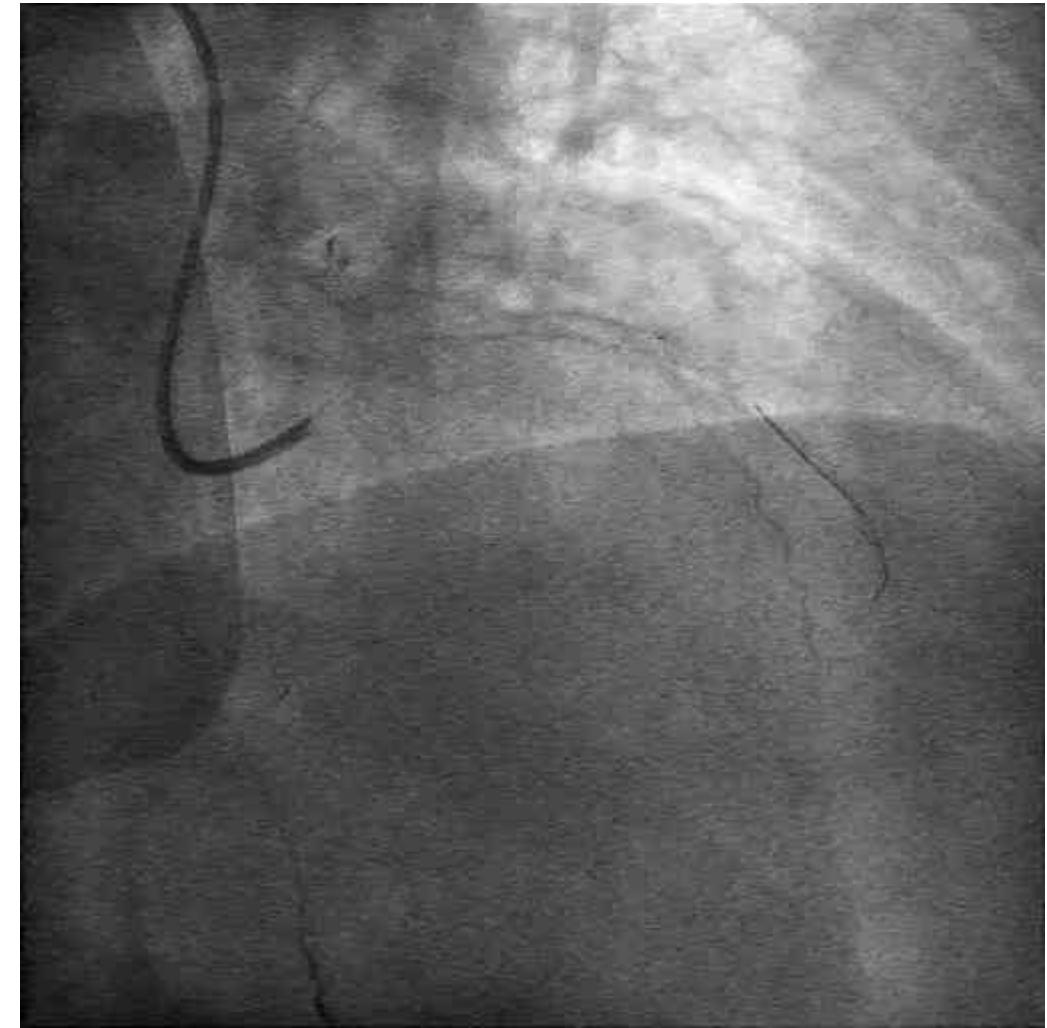
## Caso clinico 2: STEMI Anteriore – occlusione trombotica di Interventricolare Anteriore



**Detrombosi -laser**



**Flusso TIMI post-laser**



**Stenting diretto**

# TAKE HOME MESSAGE

- La litotrissa con il Laser ad eccimeri è un device «easy»
- Efficace nel trattamento della maggior parte delle lesioni calcifiche
- Efficace nel trattamento delle lesioni trombotiche
- Tecnica da poter utilizzare in bail out
- Basso rischio di complicanze peri-procedurali