Bifurkasion stentləmədə IVUS

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Liv Bona Dea

Damarların daxilində olan anatomik morfolojik dəyişiklikləri göndərib geri aldığı ultrasəs dalgaları sayəsində, formalaşdırdığı tomogramlarla dəyərləndirən müayinədir

Çalışmalar nə deyir?

Randomized Controlled Trials compari

Intravascular Ultrasound-Guided
Coronary Intervention

with coronary angiography alone

	Overall MACE/Target Vessel Failure	Death	Myocardial Infarction
Unselected Lesions			
HOME-DES-IVUS (2010, n = 210)	×	×	×
MOZART (2014, n = 83)	×	×	×
Wang et al (2015, n = 80)	×	×	×
ULTIMATE (2018, n = 1448)	✓	×	×
ULTIMATE 5 Year (2021, n = 1448)	✓	×	×
Complex Lesions			
AVIO (2013, n = 284)	×	×	×
RESET (2013, n = 543)	×	×	×
AIR-CTO (2015, n = 230)	×	×	×
CTO-IVUS (2015, n = 402)	✓	×	×
IVUS-XPL (2015, n = 1400)	✓	×	×
IVUX-XPL 5 Year (2020, n = 1400)	✓	×	×
RENOVATE (2023, n = 1639)	✓	×	×
Left Main Coronary Artery Lesions			
Tan et al (2015, n = 123)	✓	×	×
Liu et al (2019, n = 348)	✓	✓	×

✓ Statistically significant reduction × No statistically signif

18 trials, 11,502 patients, 963 events

Trial and Year	Intravascular Imaging Events	N	Angiography Events	N	Relative Risk (RR)	RR (95%)	Weight (Random)	Weight (Fixed)
HOME DES IVUS, 2010	11	105	12	105		0.92 [0.42, 1.98]	2.5%	2.1%
AVIO, 2013	23	142	29	142		0.79 [0.48, 1.30]	6.1%	5.1%
RESET, 2013	12	269	20	274		0.61 [0.30, 1.23]	3.1%	3.5%
AIR-CTO, 2015	21	115	26	115		0.81 [0.48, 1.35]	5.7%	4.6%
Kim et al, 2015	2	58	3	59		0.68 [0.12, 3.91]	0.5%	0.5%
Tan et al, 2013	8	61	17	62		0.48 [0.22, 1.03]	2.6%	3.0%
CTO-IVUS, 2015	5	201	14	201		0.36 [0.13, 0.97]	1.5%	2.5%
OCTACS, 2015	0	46	2	45		0.22 [0.01, 4.54]	0.2%	0.3%
DOCTORS, 2016	3	120	2	120		1.50 [0.26, 8.82]	0.5%	0.4%
ROBUST, 2018	5	105	1	96		4.57 [0.54, 38.43]	0.3%	0.2%
Liu et al, 2019	22	167	37	169		0.60 [0.37, 0.97]	6.5%	6.5%
IVUS-XPL, 2020	36	700	70	700		0.51 [0.35, 0.76]	10.0%	12.4%
ILUMIEN III, 2021	8	289	2	142		1.97 [0.42, 9.13]	0.6%	0.5%
ULTIMATE, 2021	47	714	76	709		0.64 [0.43, 0.87]	12.4%	13.5%
iSIGHT, 2021	6	101	3	49		0.97 [0.25, 3.72]	0.8%	0.7%
RENOVATE-COMPLEX-PCO, 2023	76	1092	60	547		0.63 [0.46, 0.88]	14.5%	14.2%
ILUMIEN IV, 2023	76	1233	86	1254		0.90 [0.67, 1.21]	16.9%	15.1%
OCTOBER, 2023	59	600	83	601		0.71 [0.52, 0.97]	15.3%	14.7%
Fixed-Effect Model	**420**	**6112**	**543**	**5390**		**0.69 [0.61, 0.78]**	--	**100.0%**
Random-Effect Model (primary analysis)						0.69 [0.61, 0.78]	100.0%	--

Test for heterogeneity: I^2=0%, χ^2 = 16.43 (P=0.49)
Test for overall effect (Fixed): z = -5.89 (P<0.0001)
Test for overall effect (Random): Z = -5.87 (P<0.0001)

0.01 0.25 1 5 25
Favors Intravascular Imaging Favors Angiography

RR 0.69, 95% CI 0.61-0.78

OPINION and MISTIC (OCT vs IVUS without an Angio arm) are not included

Niyə önəmlidir?

- Mortalitə azalması - ST və TVR ⬇
- MACE azalması CTO –İVUS, İVUS- XPL ⬇
- Ultimate trial , Dkcrush V - TVF ⬇
- Səhiyyə sistemi üzərindəki maliyyə yükünün ⬇

Exel trial

1905 xəstə randomizə edilip

- Lmca- bifurkasiya darlığı və **syntax <32** olan xəstələr
- PCİ və CABG qarşılaşdırılıp
- 5 illik təqibdə - **ölüm, infakt, insult** yönündən fərq yox
- 948 xəstədən 722-nə **İVUS** istifadə olunub
- MSA – sı kiçik (4.4- 8.7 mm2) olanlarla böyük (11-17 mm2) olanlar arasinda statiksəl fərq olup **p= 0.01**

GUIDELINES

ESC 2018

Recommendations on intravascular imaging for proce dural optimization

Recommendations	Class[a]	Level[b]
IVUS or OCT should be considered in selected patients to optimize stent implantation.[603,612,651–653]	IIa	B
IVUS should be considered to optimize treatment of unprotected left main lesions.[35]	IIa	B

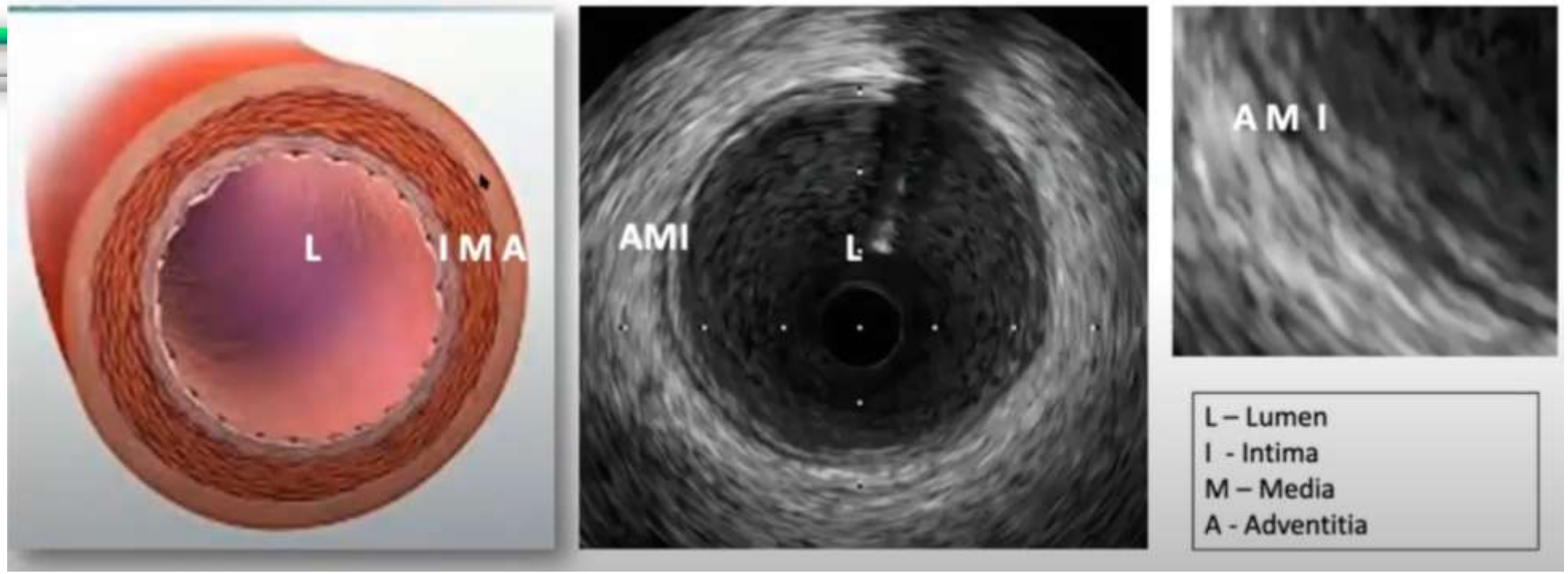
ESC 2024

Assessment of procedural risks and post-procedural outcomes		
Intracoronary imaging guidance by IVUS or OCT is recommended for performing PCI on anatomically complex lesions, in particular left main stem, true bifurcations and long lesions.	I	A
Intracoronary pressure measurement (FFR or iFR) or computation (QFR):		
• is recommended to guide lesion selection for intervention in patients with multivessel disease;	I	A
• should be considered at the end of the procedure to identify patients at high risk of persistent angina and subsequent clinical events;	IIa	B
• may be considered at the end of the procedure to identify lesions potentially amenable to treatment with additional PCI.	IIb	B
Choice of revascularization modality		
It is recommended that physicians select the most appropriate revascularization modality based on patient profile, coronary anatomy, procedural factors, LVEF, patient preferences and outcome expectations.	I	C

Katater adı	T-növü	T-frekans	Keçiş profili	Guide katater	Firma
Eagle Eye Platinum	Digital	20 Mhz	3.5 F	5F	Philips(Chromaflo)
Eagle Eye Platinum ST	Digital	20Mhz	3.5 F	5F	Philips(Chromaflo)
Revolution	Rotational	45 Mhz	3.2 F	6F	Philips
Refinity ST	Rotational	45 Mhz	3.0 F	5F	Philips
Opticross TM-HD	Rotational	60 Mhz	3.1 F	5-6 F	Boston
Opticross-TM	Rotational	40 Mhz	3.1 F	5-6 F	Boston
Kodama	Rotational	40/60 Mhz	3.4 F	6F	ACİST
TrueVision-HD (VivoHeart)	Rotational	40/60 Mhz	3.5 F	6F	İnsight Lifetech
Sonosound TJ001	Rotational	50Mhz	T 2.1F	6F	Sonoscape

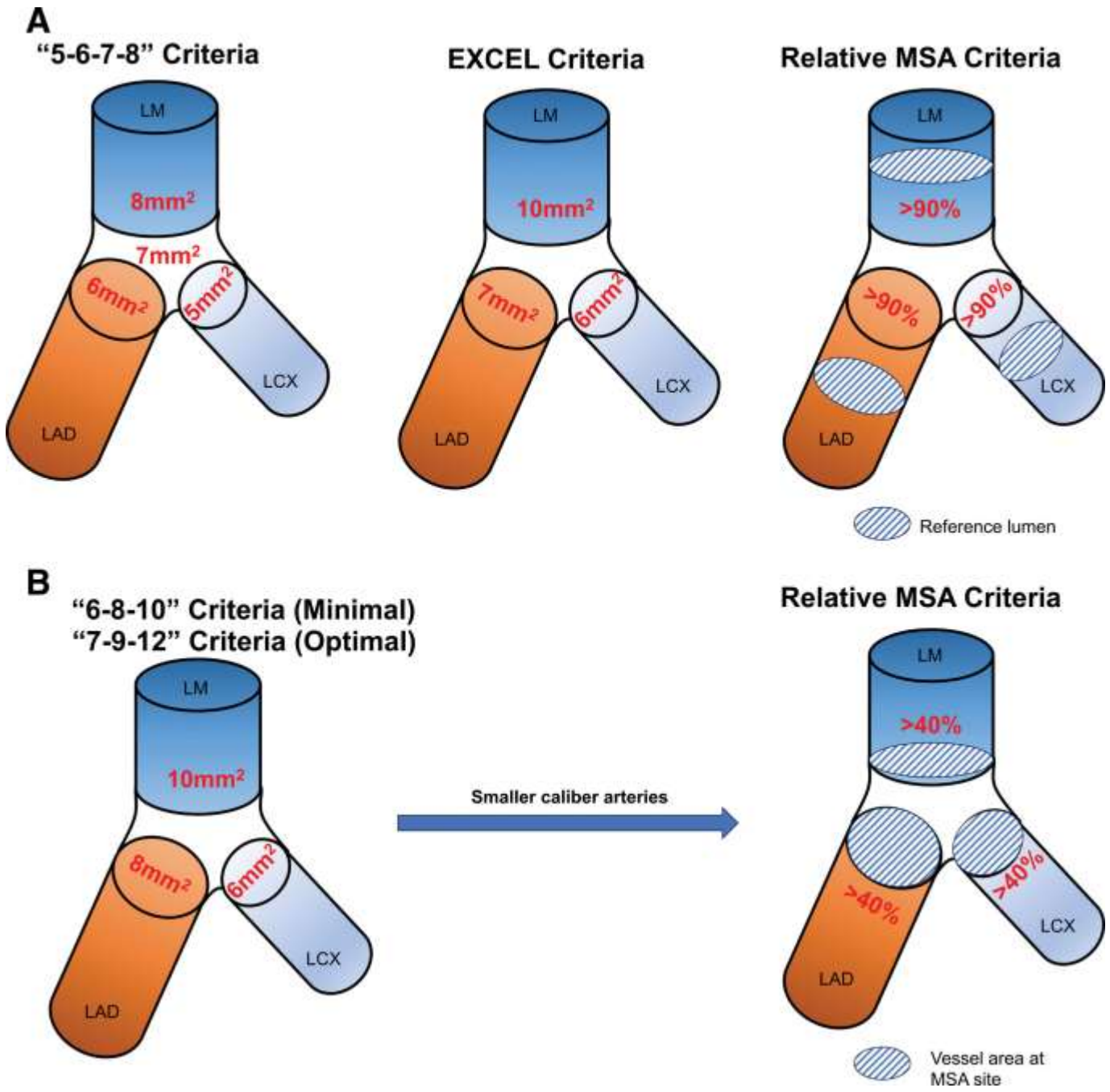
Necə icra olunur?

- **Guide katater ilə kanulasiya və guide wire ilə lezyon keçilir** (HEPARİN və NTG unutma!!!)
- **İVUS kataterini seç və hazırla**
- **İVUS pullback(0.5-10 mm/sn)**
- **Görüntülərin yorumlanması**


L
I M A
AMI
L
A M I
L – Lumen
I - Intima
M – Media
A - Adventitia

Bifurkasiya PCİ-da IVUS

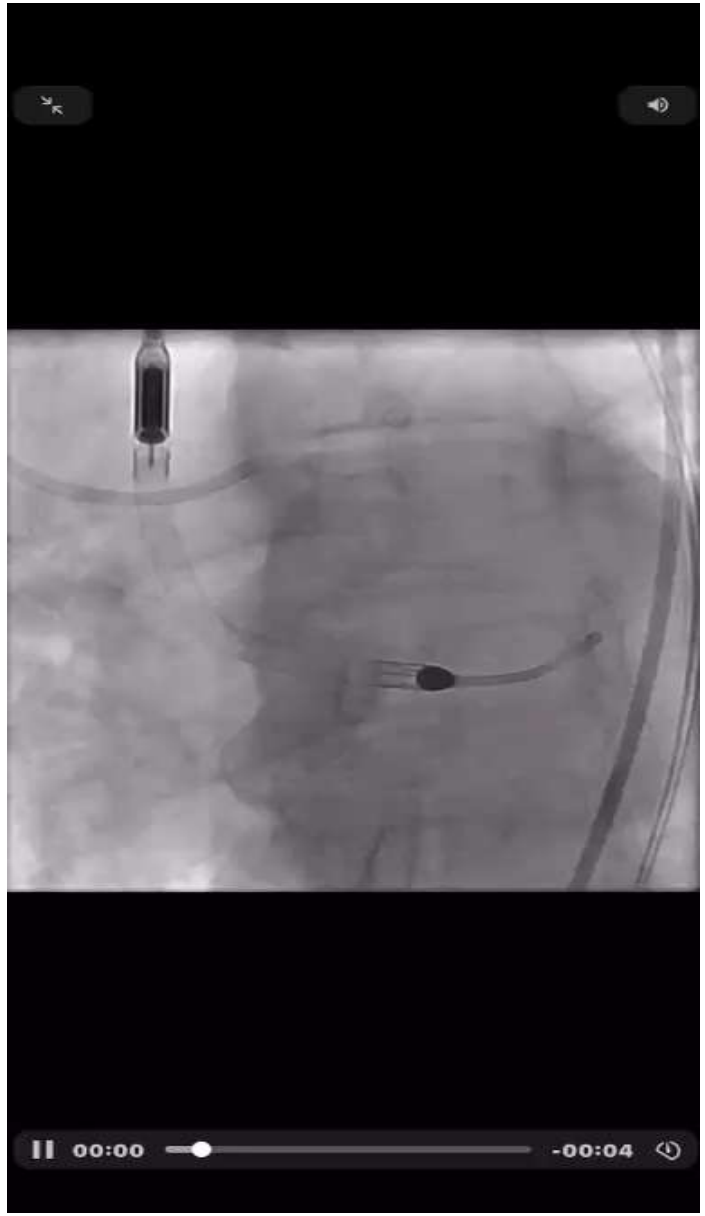
- İVUS-un doğru tətbiqi
- Darlığın ciddiyətini dəyərləndirmək
- Plakın morfologiyasını müəyyən etmək
- Strategiyanı müəyyənləşdirmək
- Referans damar ölçüləri
- PCİ optimizasiyasi

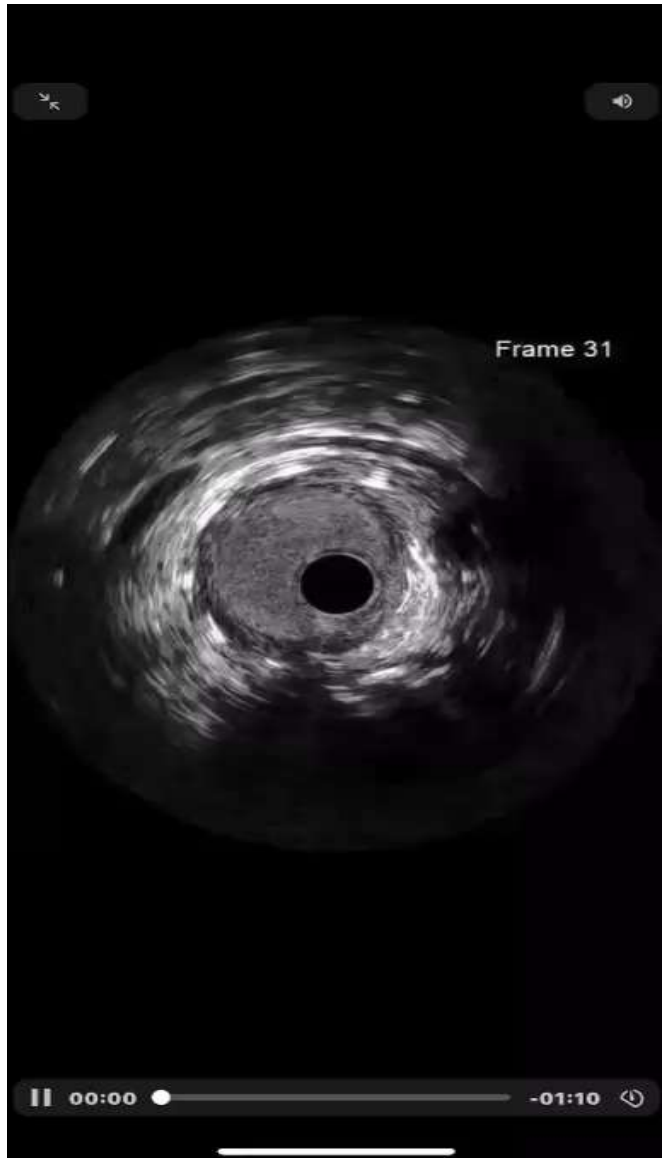

A
"5-6-7-8" Criteria
LM
8mm²
7mm²
6mm²
5mm²
LCX
LAD
EXCEL Criteria
LM
10mm²
7mm²
6mm²
LCX
LAD
Relative MSA Criteria
LM
>90%
>90%
>90%
LCX
LAD
Reference lumen
B
"6-8-10" Criteria (Minimal)
"7-9-12" Criteria (Optimal)
LM
10mm²
8mm²
6mm²
LCX
LAD
Smaller caliber arteries
Relative MSA Criteria
LM
>40%
>40%
>40%
LCX
LAD
Vessel area at MSA site

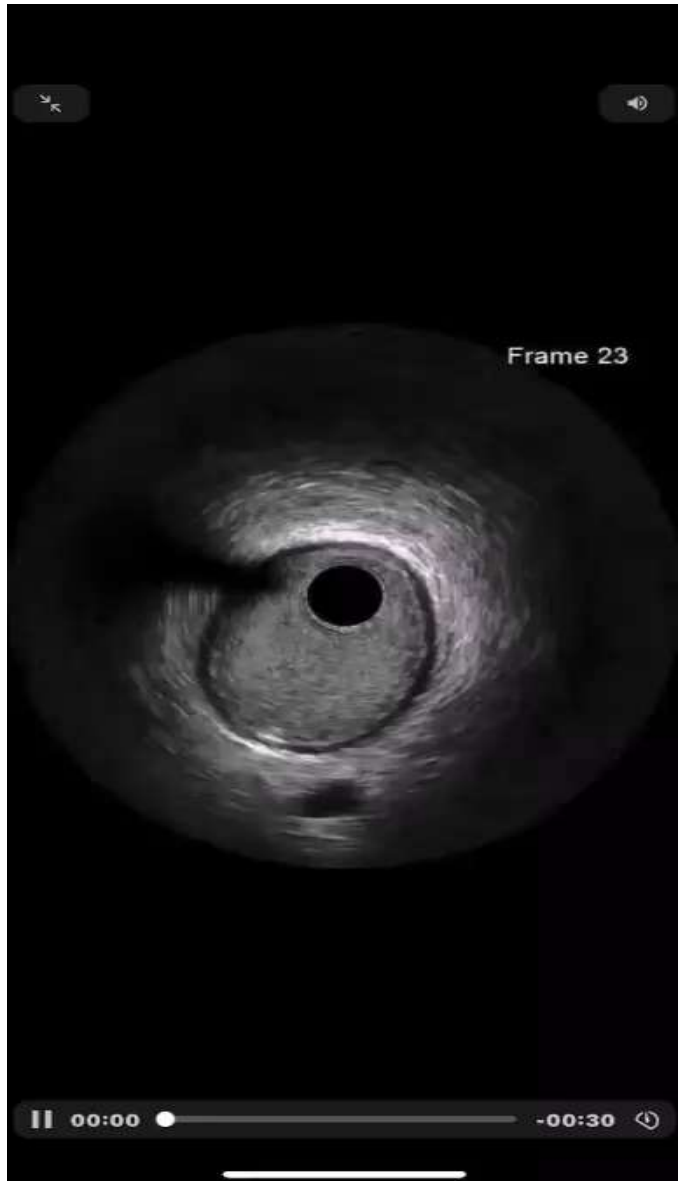
Klinik hal -1

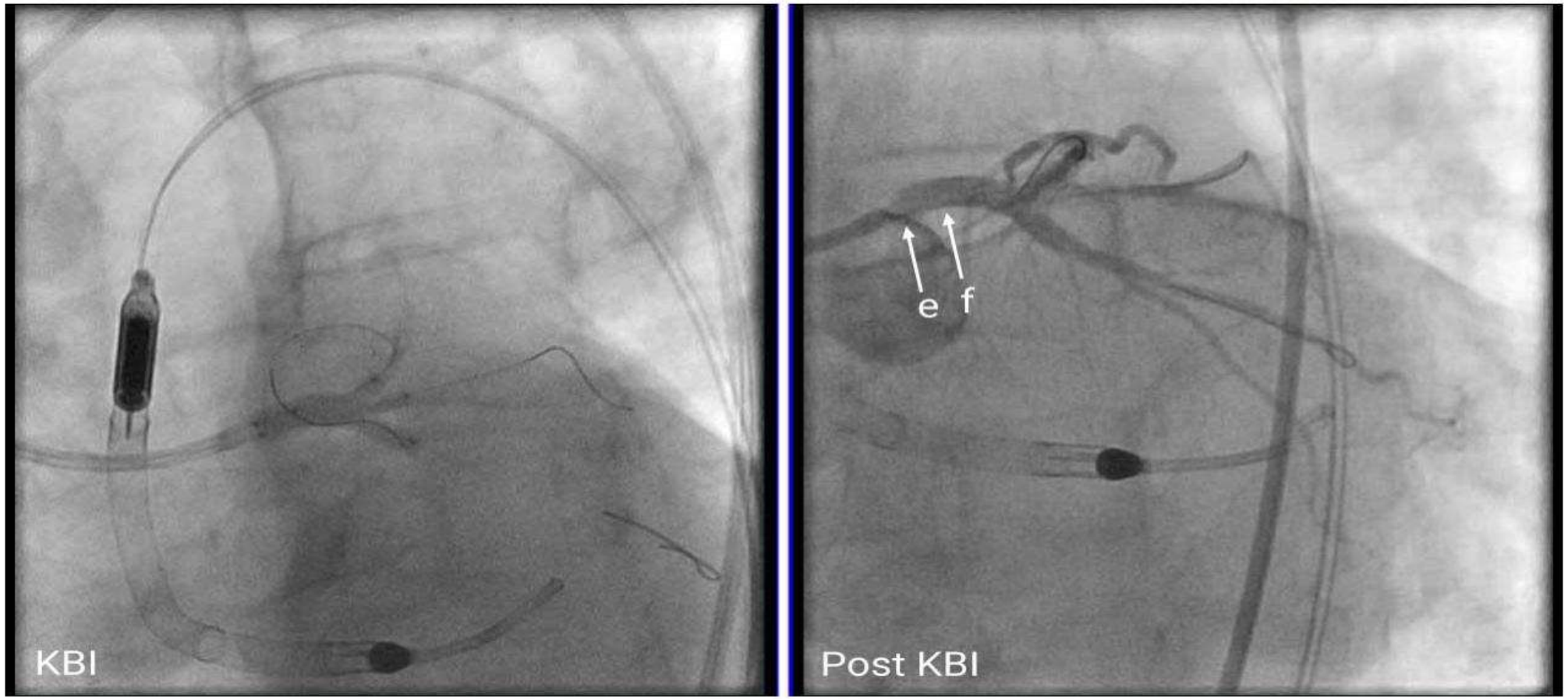
74 yaş kişi

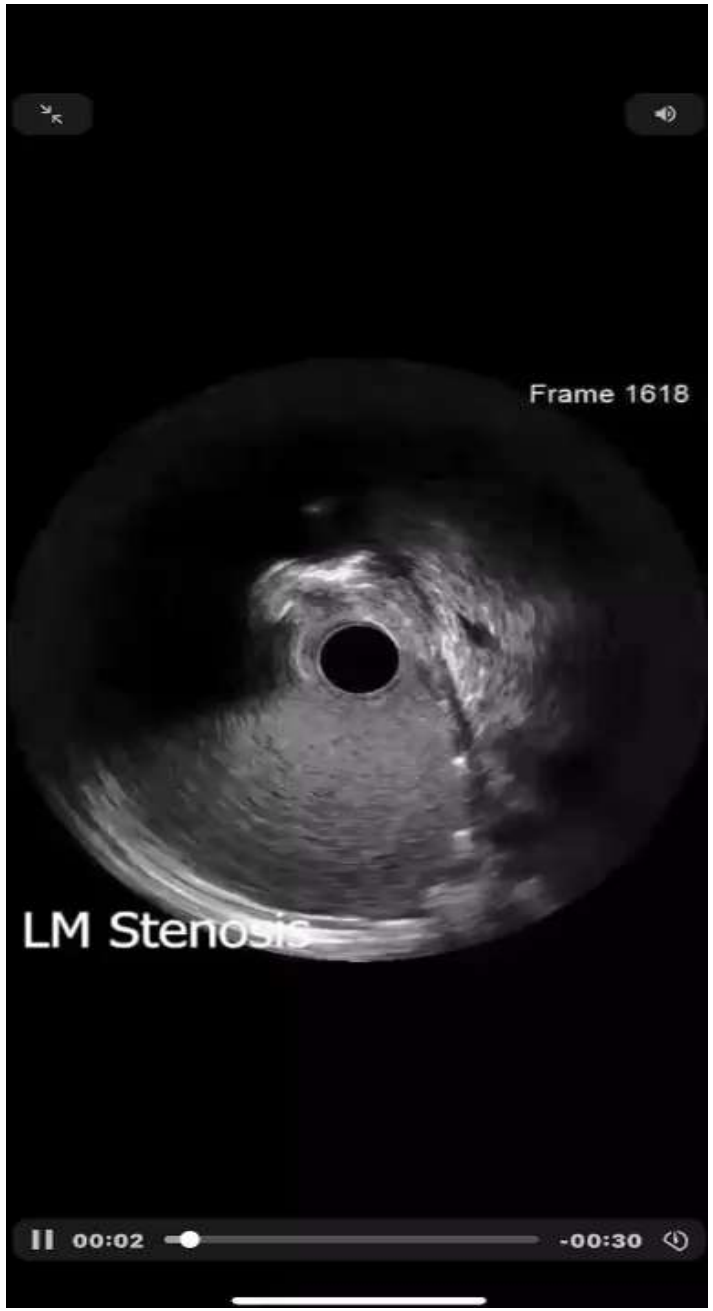
- CCS-IV
- HT+ DM+ HPL+
- ÜİX (PCİ)
- EF 40%
- Troponin +
- İmpella support

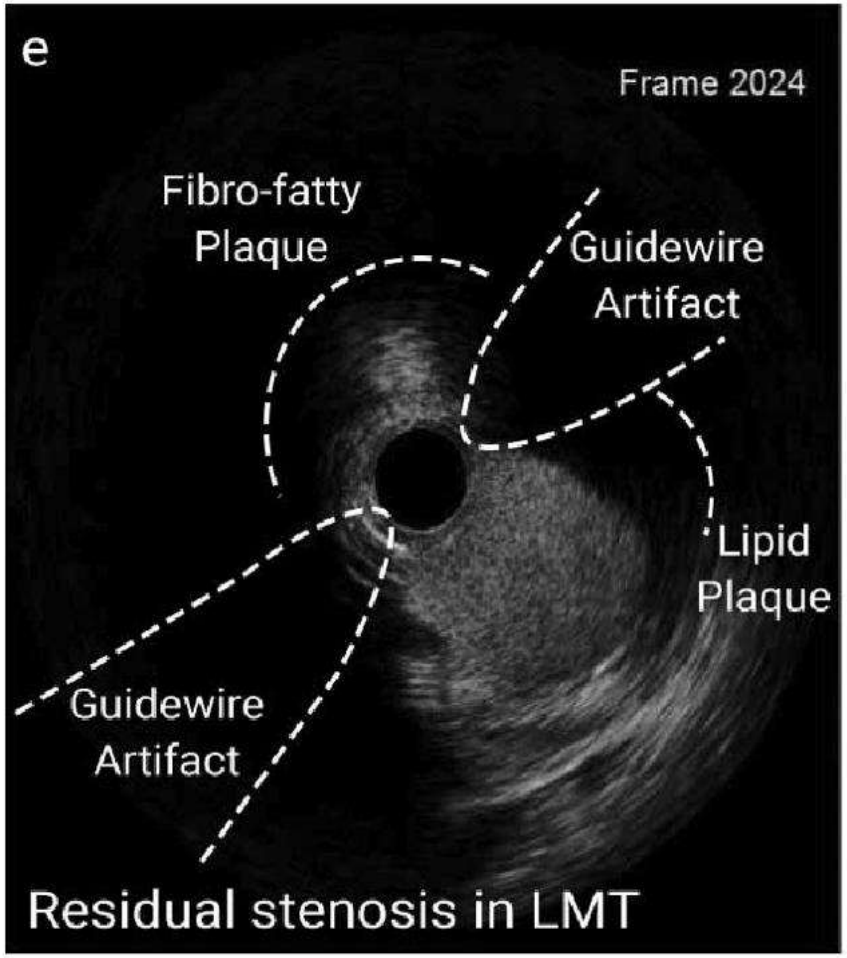

00:00
-00:04

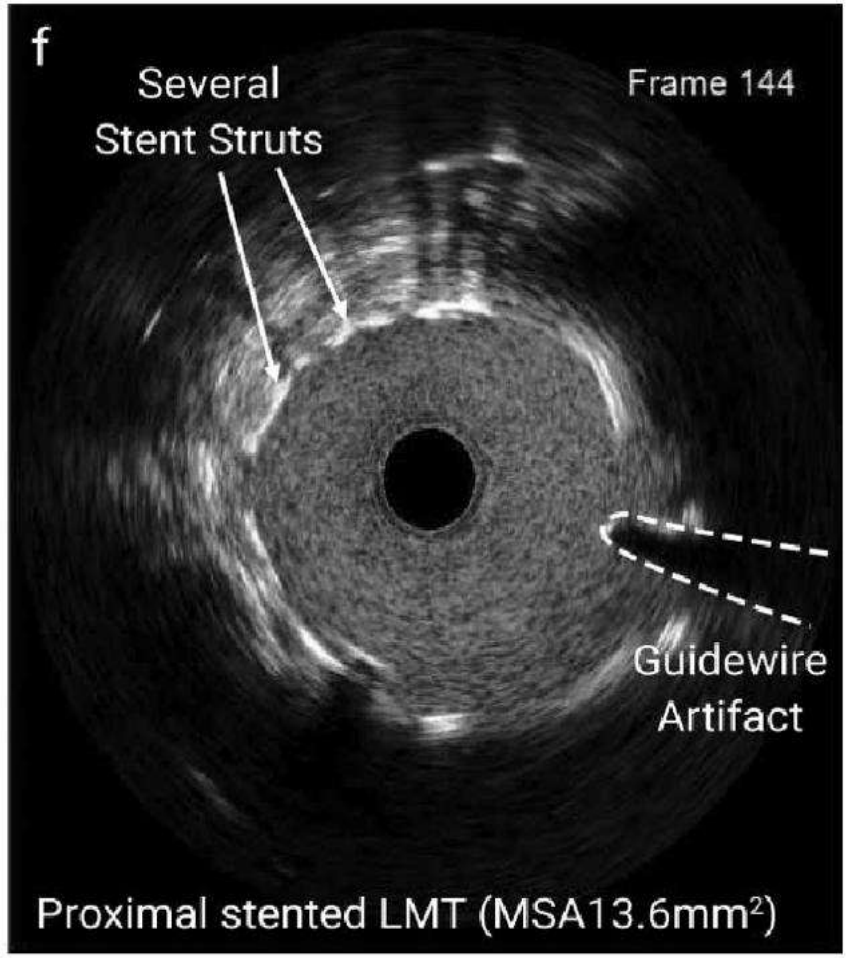

Frame 31
00:00
-01:10

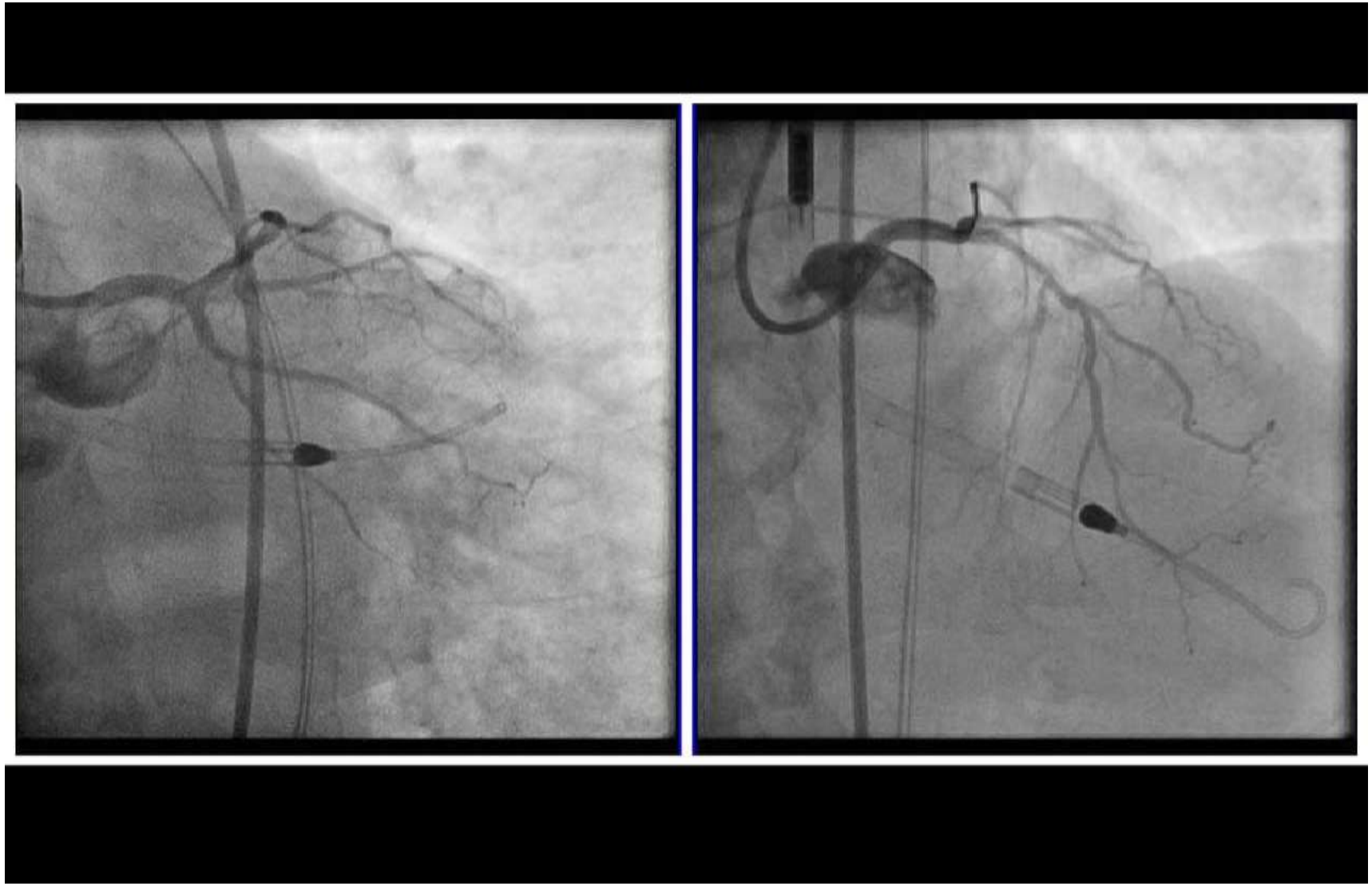

Frame 23
00:00
-00:30

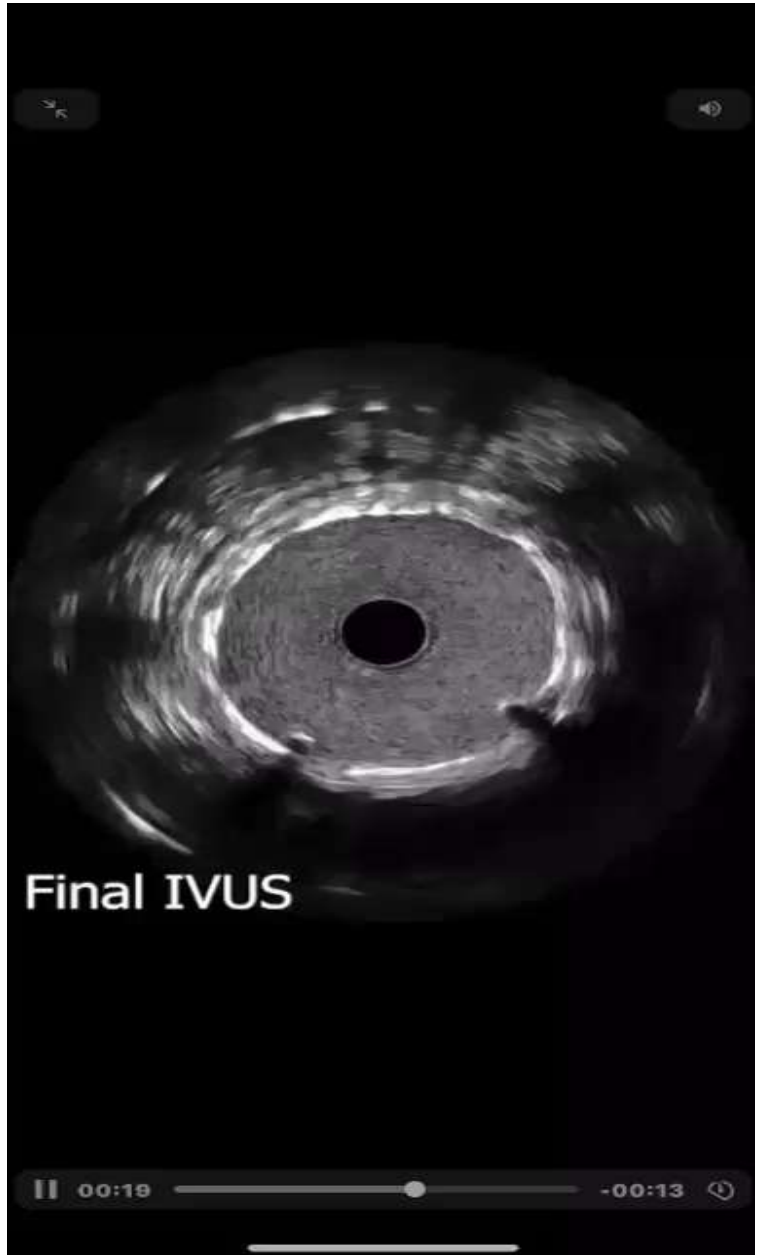

KBI
e
f
Post KBI


Frame 1618
LM Stenosis
00:02
-00:30


e
Frame 2024
Fibro-fatty
Plaque
Guidewire
Artifact
Lipid
Plaque
Guidewire
Artifact
Residual stenosis in LMT


f
Several
Stent Struts
Frame 144
Guidewire
Artifact
Proximal stented LMT (MSA13.6mm²)



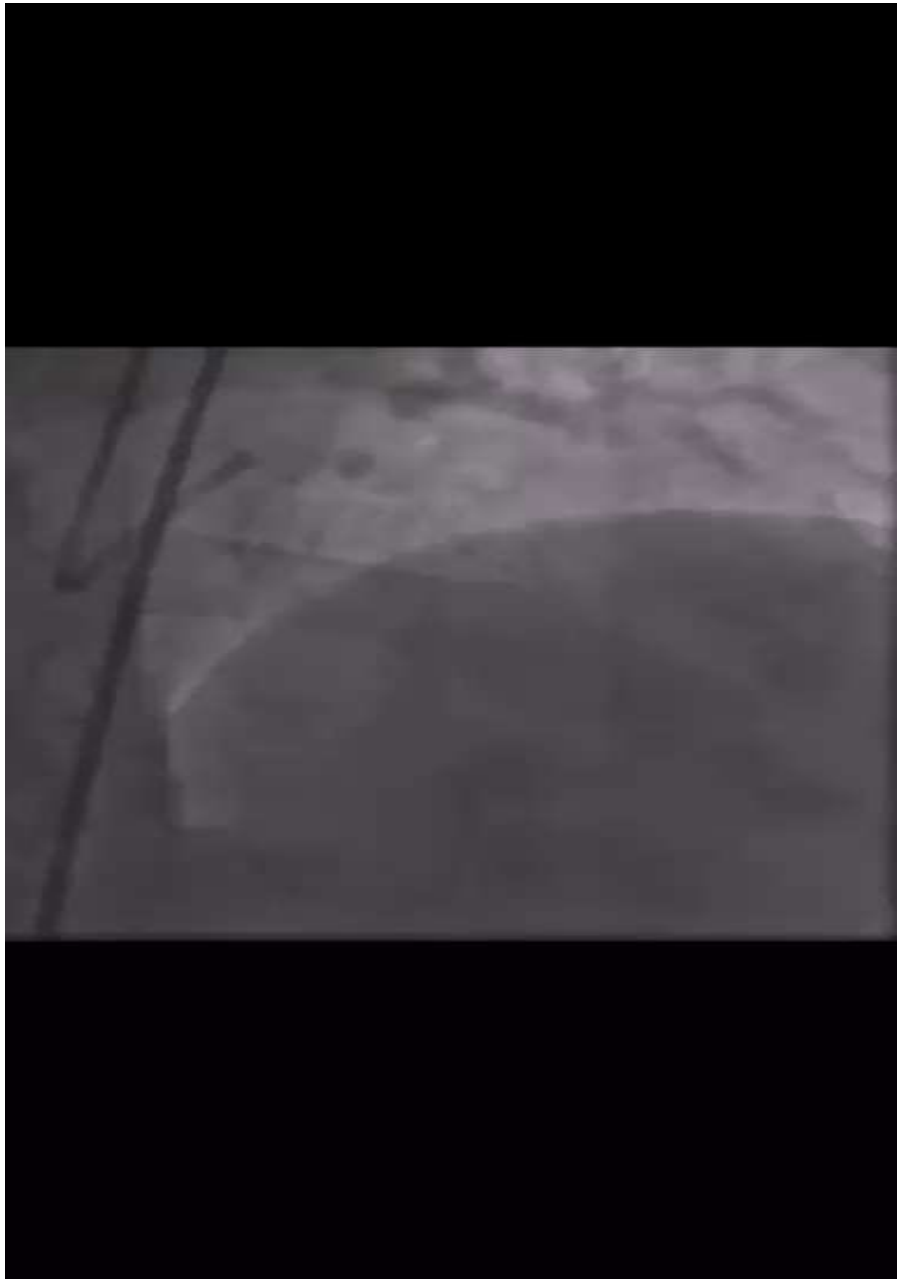

Final IVUS
00:19
-00:13

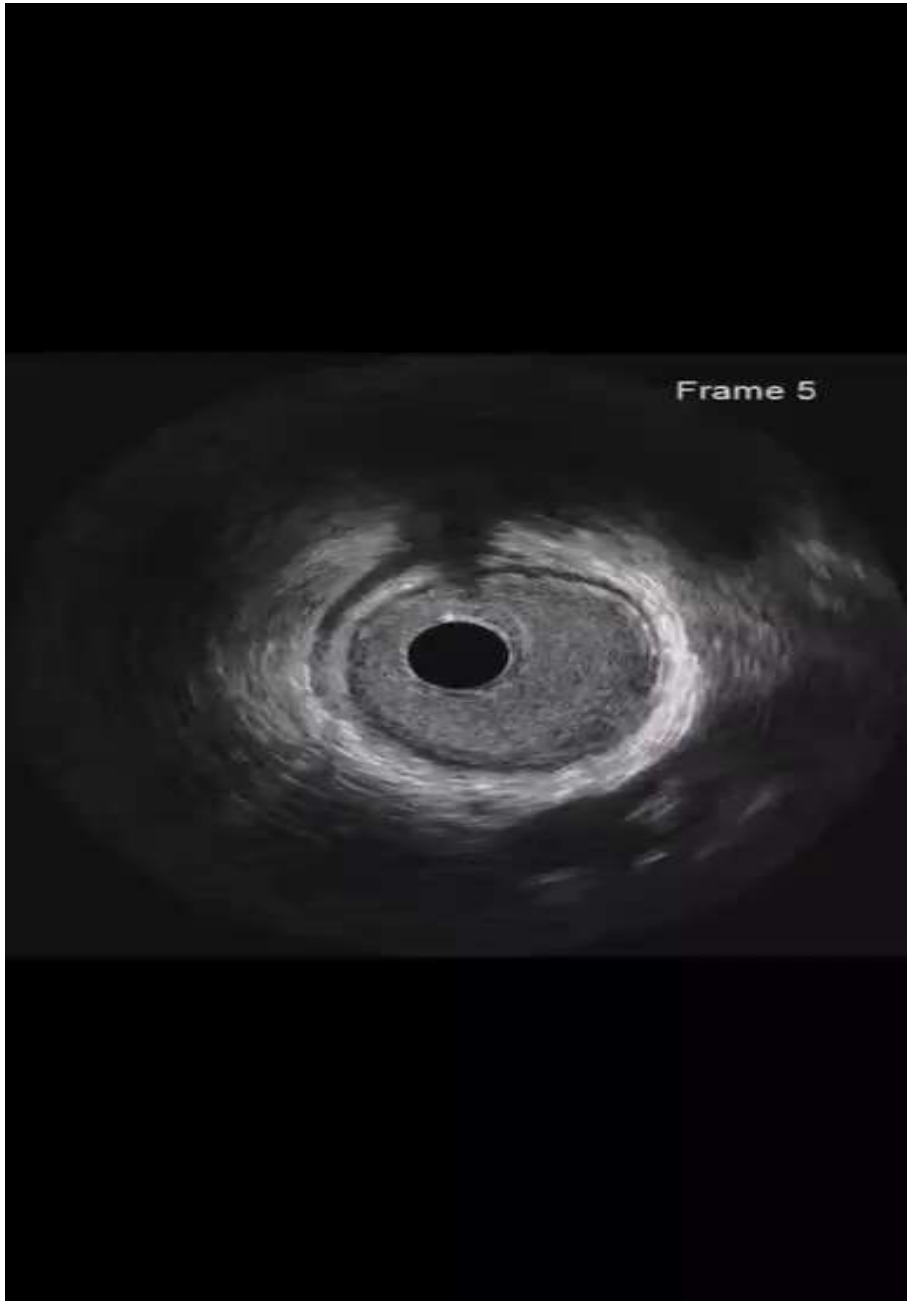
Klinik hal-2

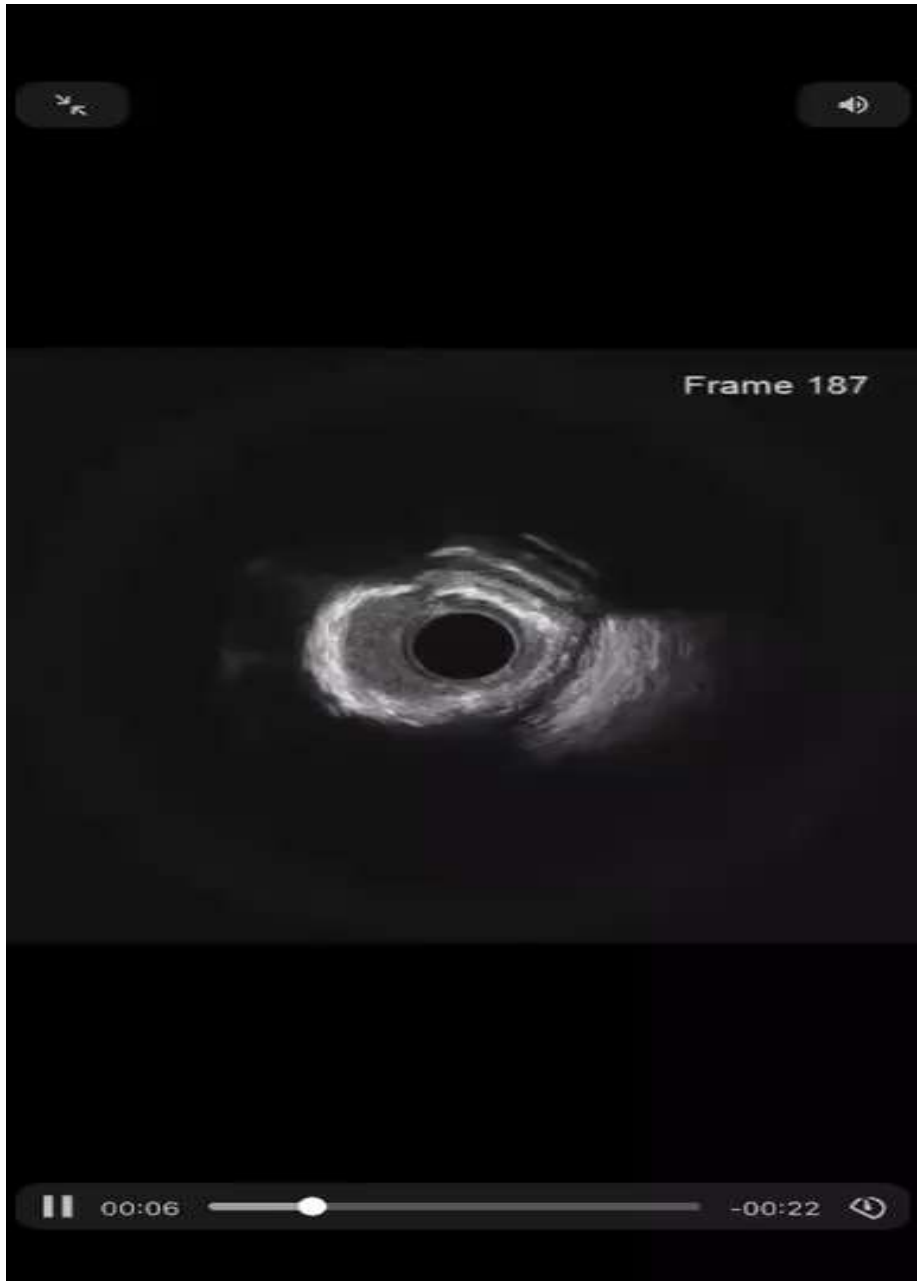
73 yaş kişi

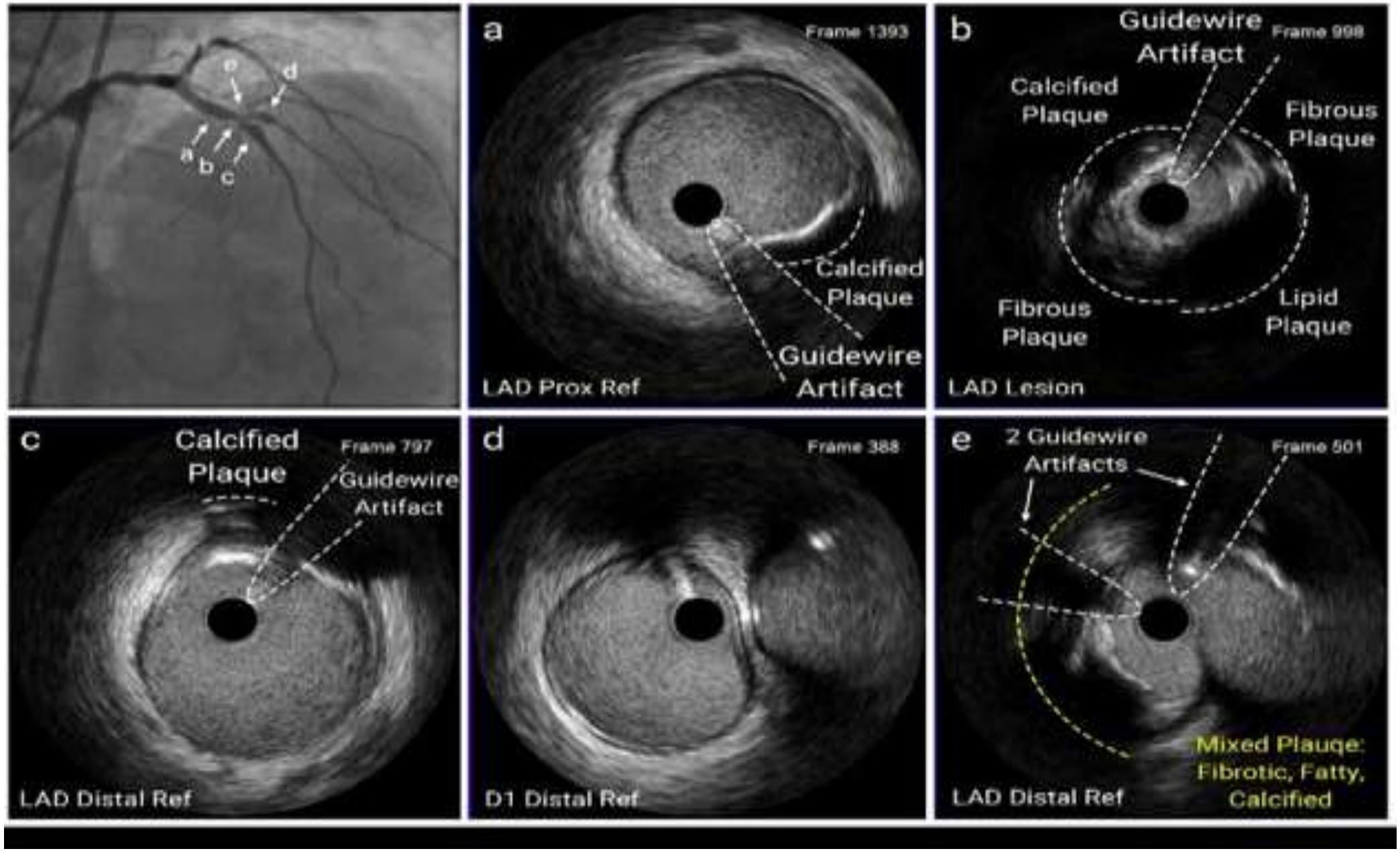
- CCS -2
- DM+ HPL+
- EF 62%

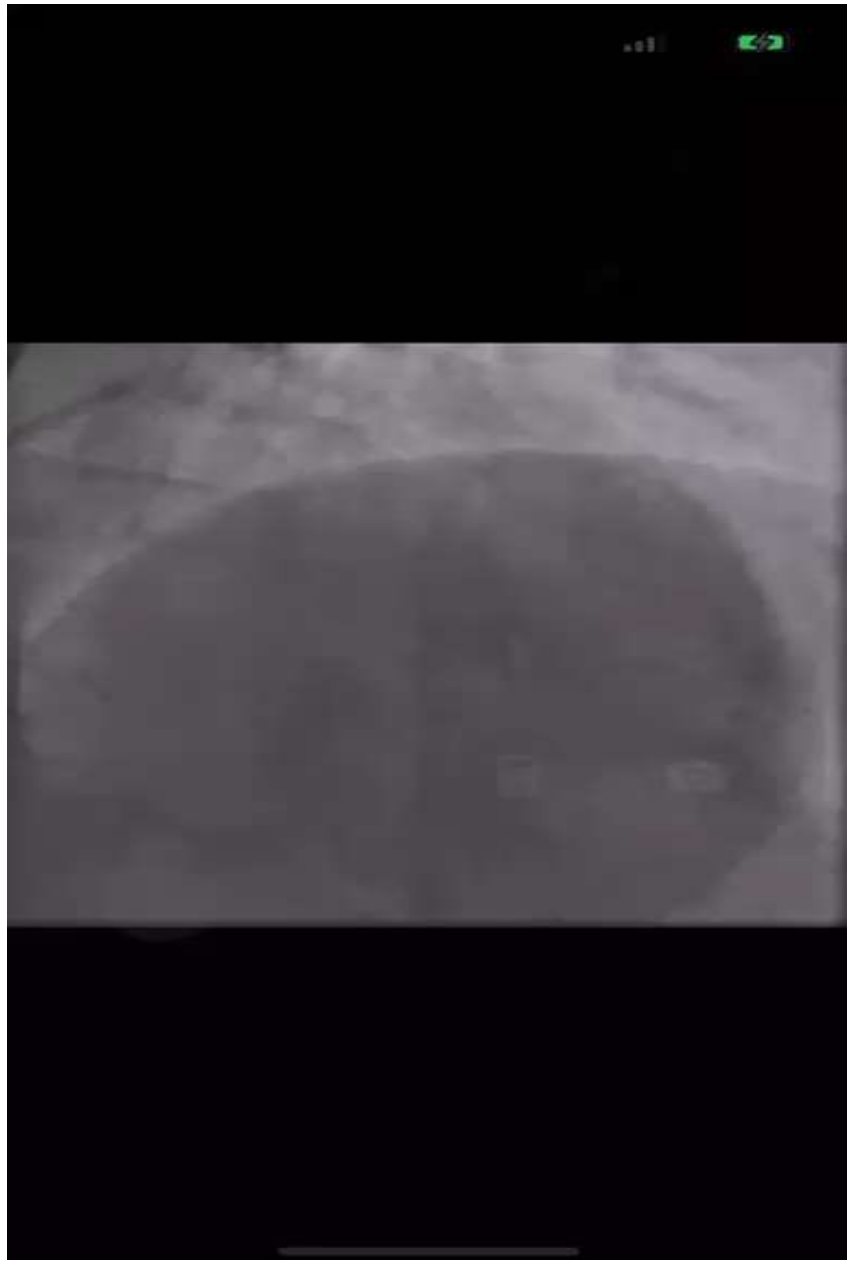
Orta aort darlığı

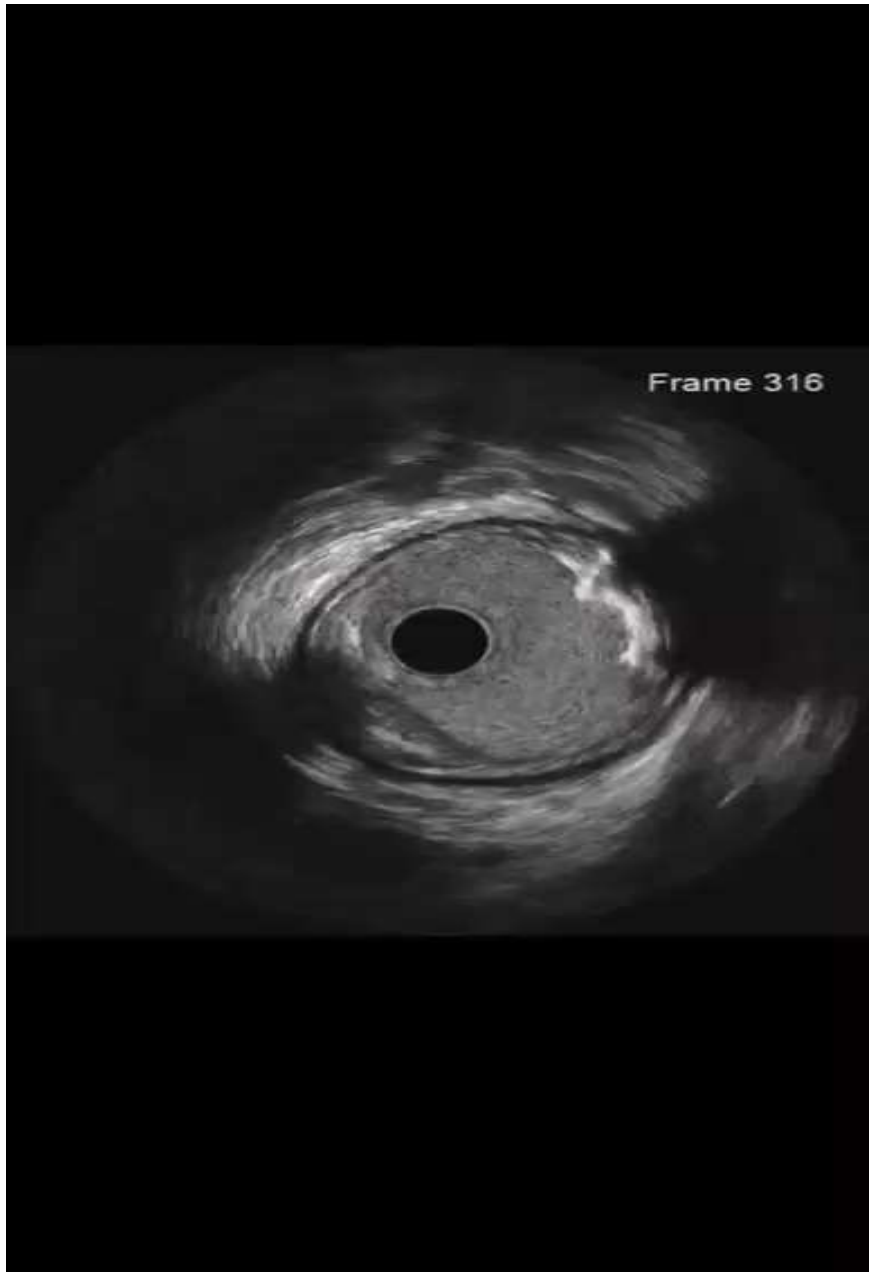


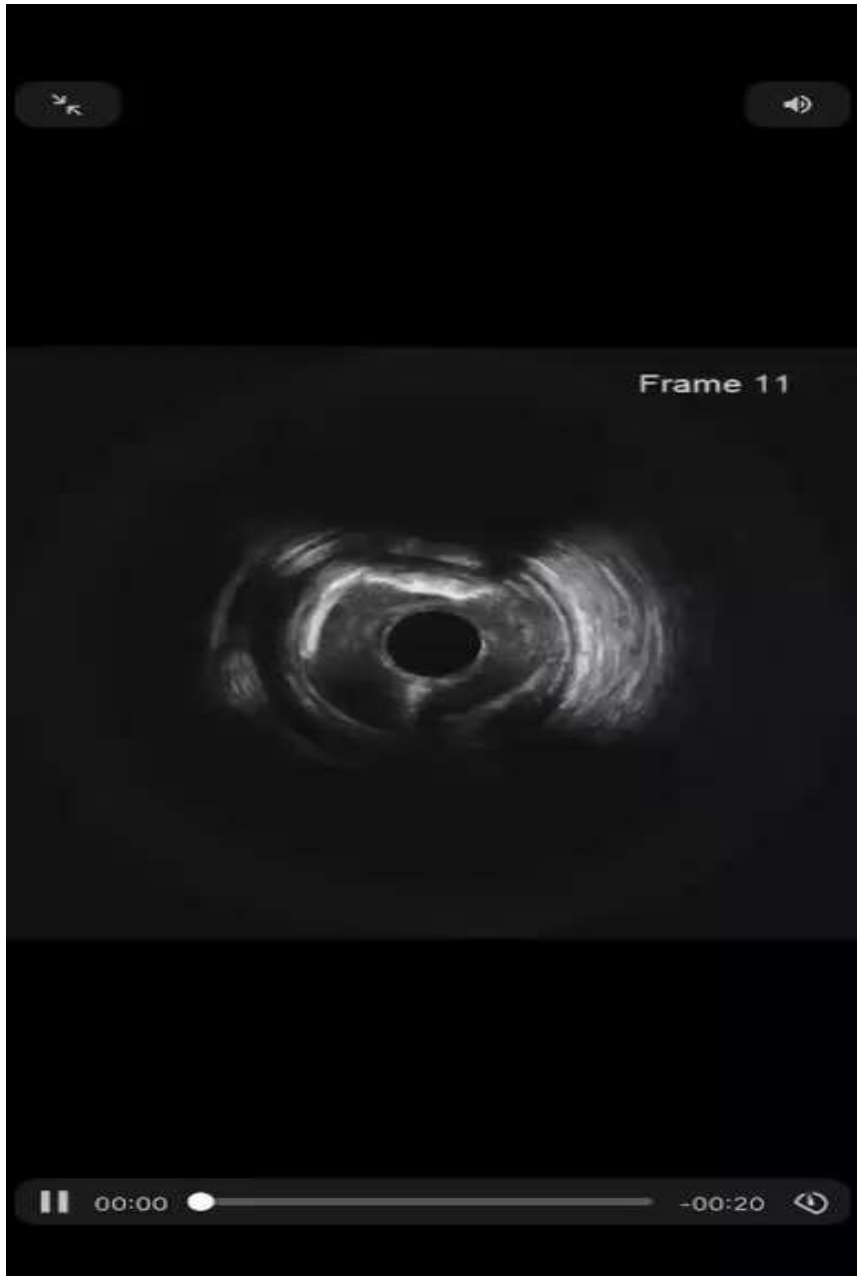

Frame 5

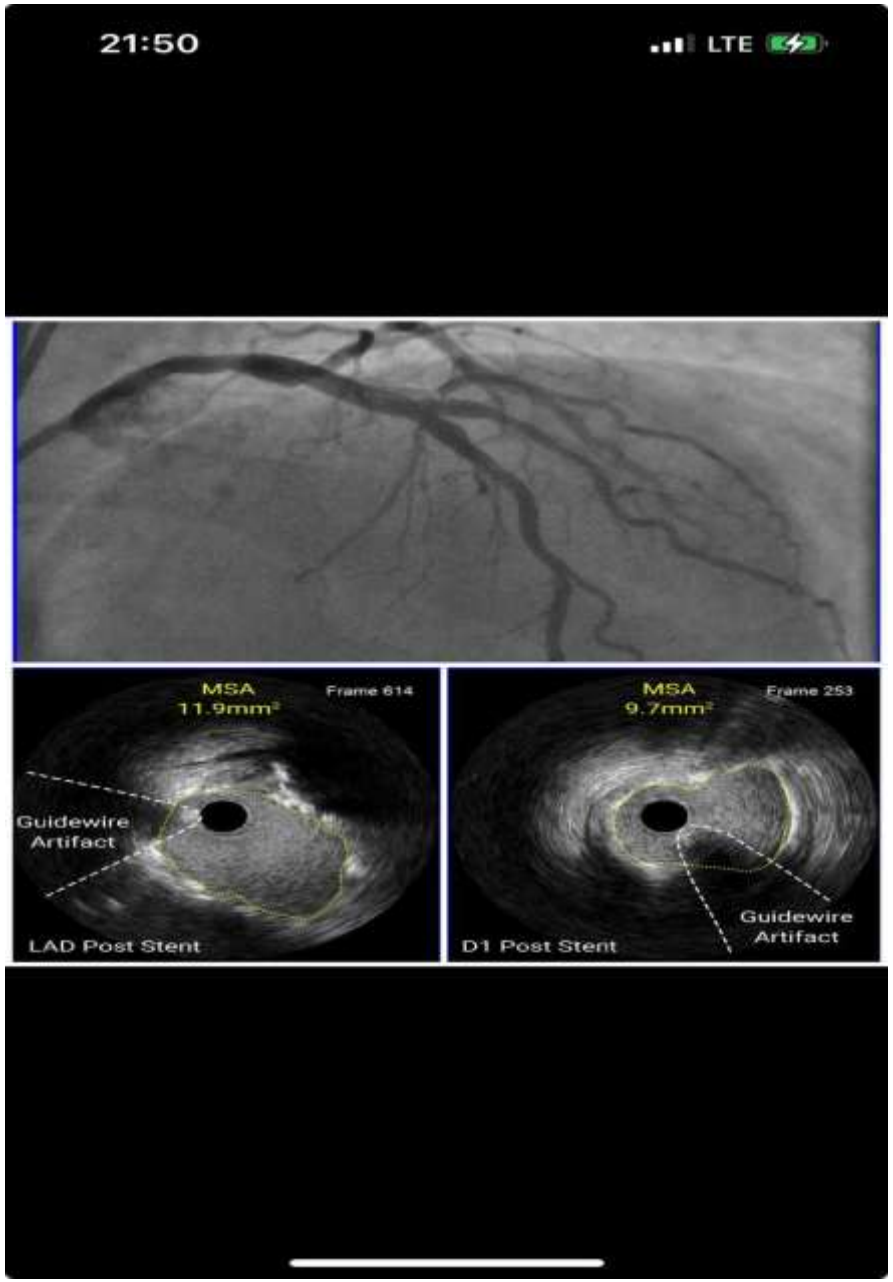

Frame 187
00:06
-00:22


a
b
c
d
e
Frame 1393
Calcified Plaque
Guidewire Artifact
LAD Prox Ref
Guidewire Artifact
Frame 998
Calcified Plaque
Fibrous Plaque
Fibrous Plaque
Lipid Plaque
LAD Lesion
Calcified Plaque
Frame 797
Guidewire Artifact
LAD Distal Ref
Frame 388
D1 Distal Ref
2 Guidewire Artifacts
Frame 501
Mixed Plauqe: Fibrotic, Fatty, Calcified
LAD Distal Ref




Frame 316

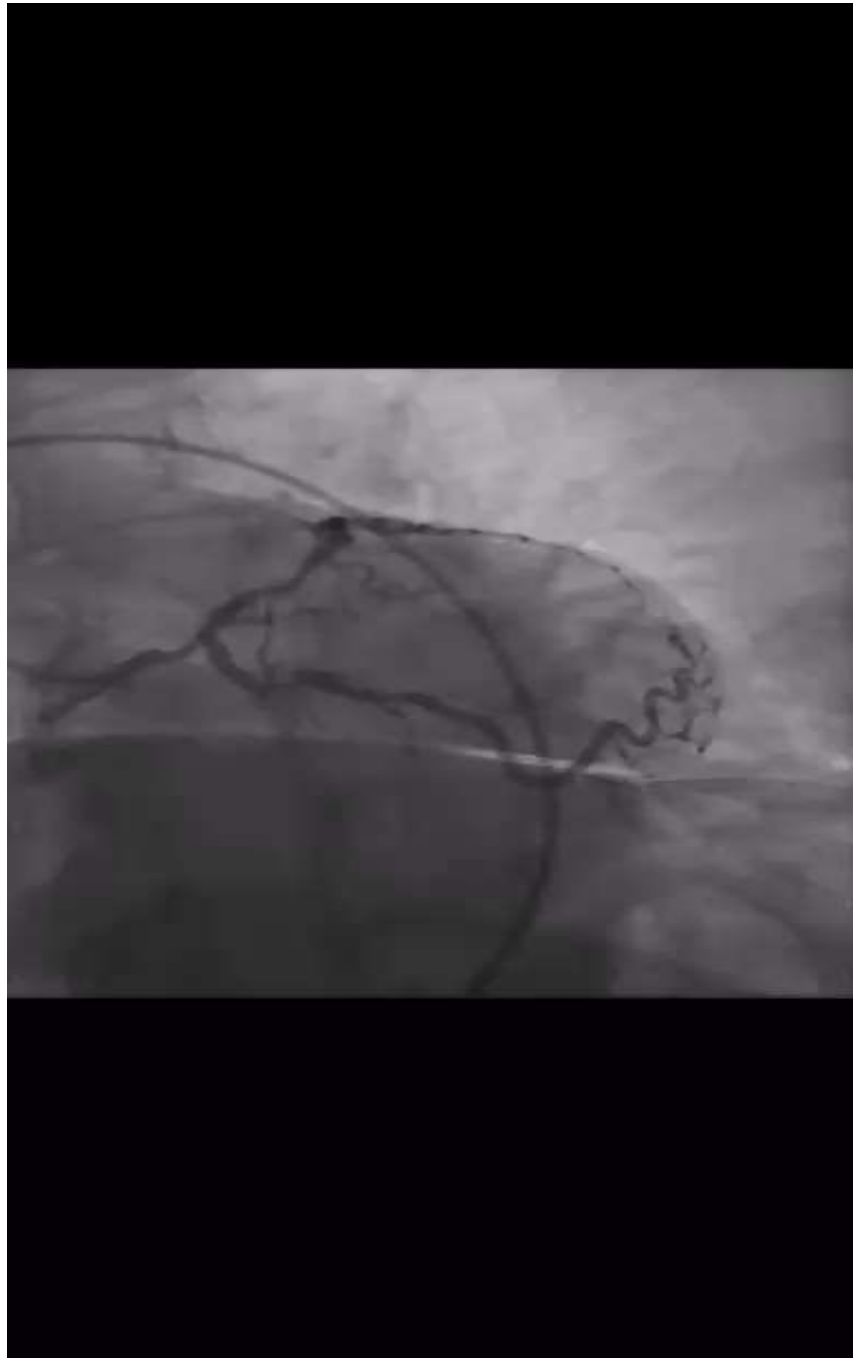

Frame 11
00:00
-00:20

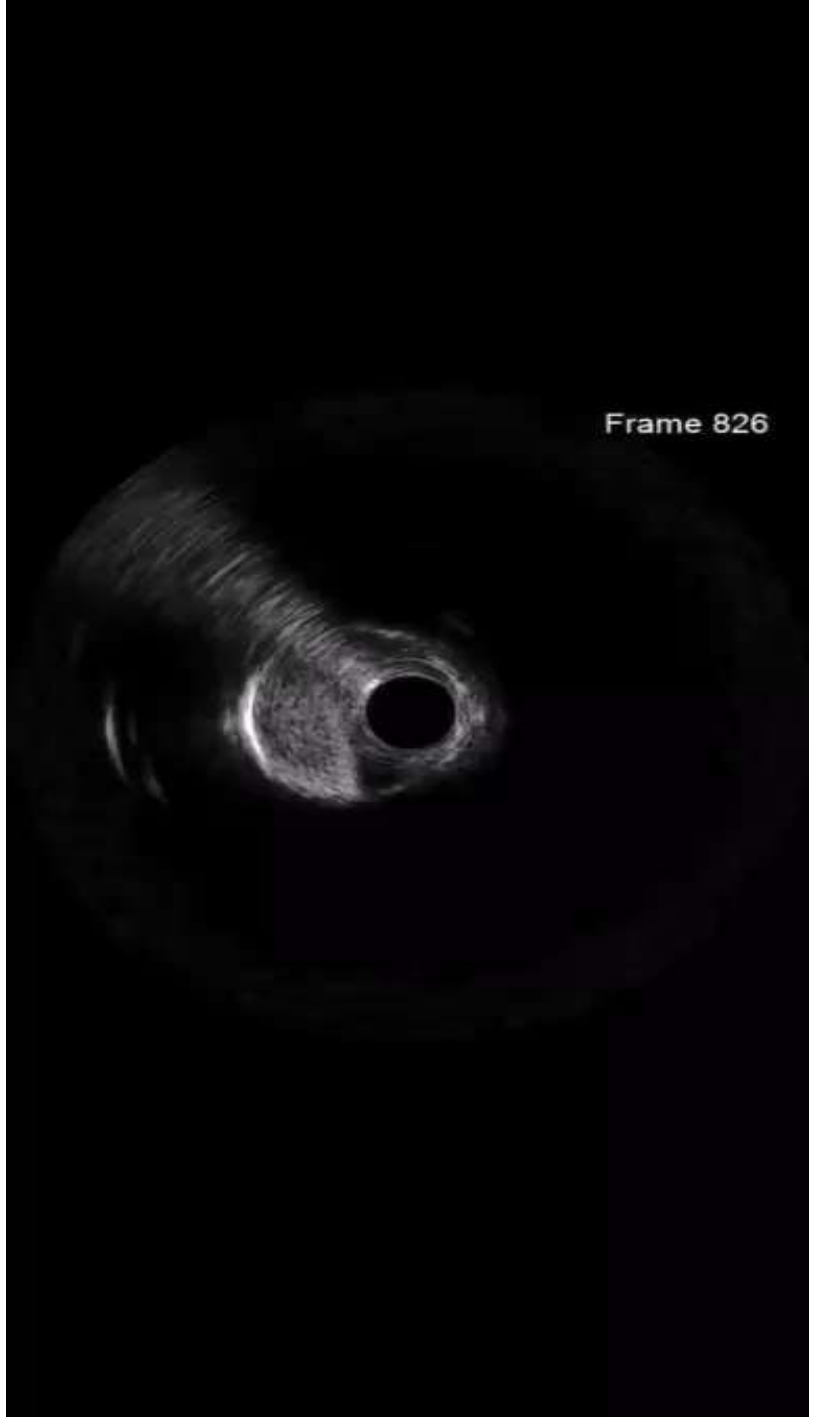

21:50
LTE
MSA
11.9mm²
Frame 614
Guidewire
Artifact
LAD Post Stent
MSA
9.7mm²
Frame 253
Guidewire
Artifact
D1 Post Stent

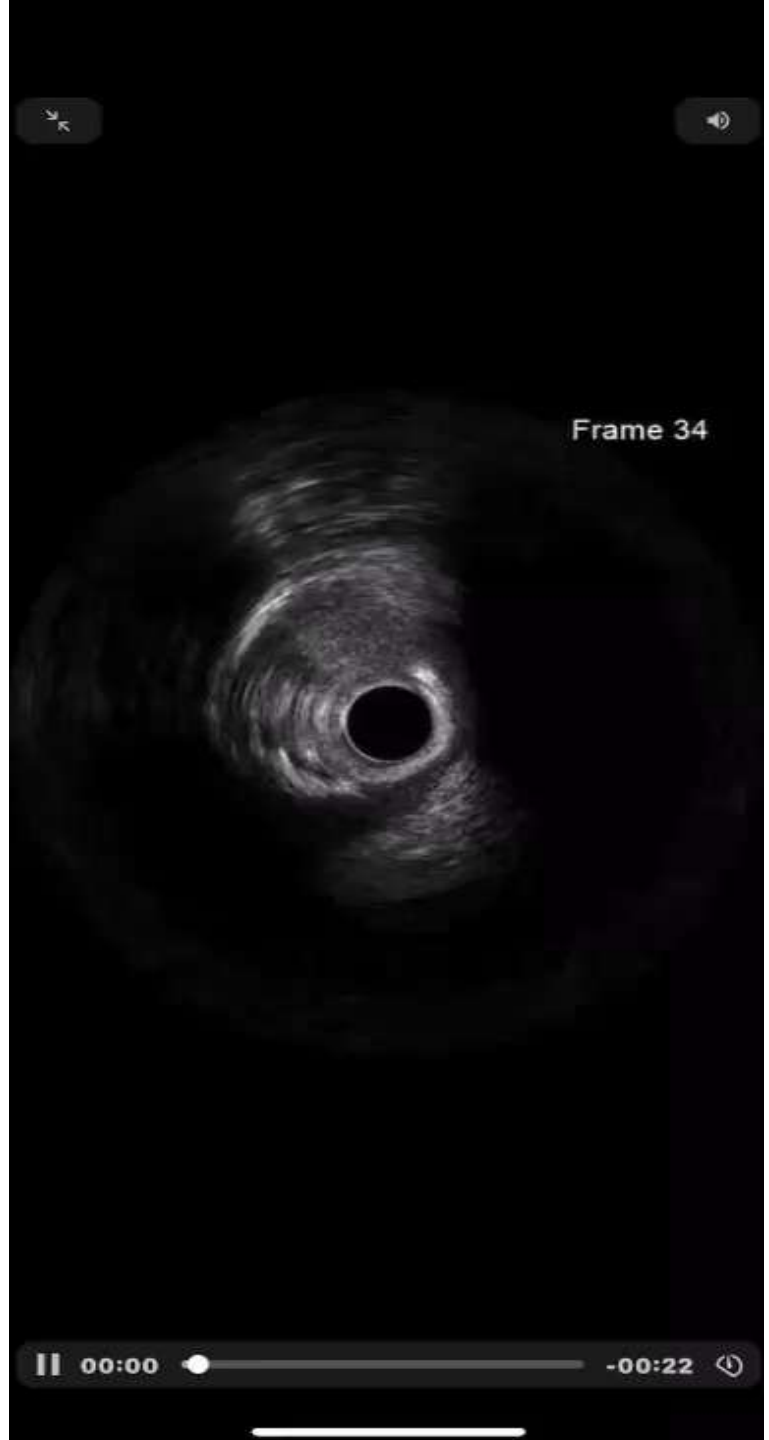
Klinik hal -3

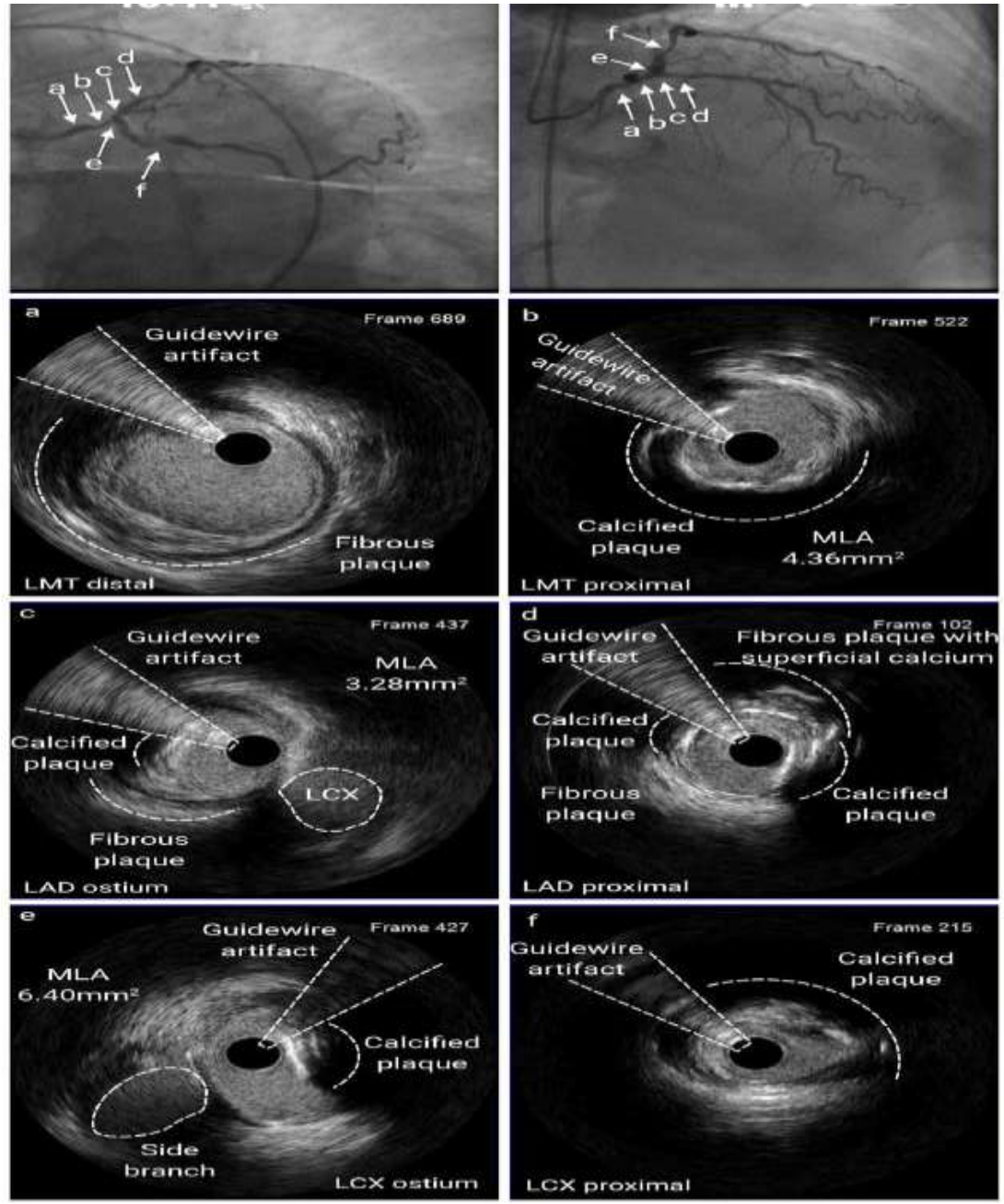
68 yaş qadın

- CCS –III
- DM + HT+ HPL+
- ÜİX (RCA PCİ)
- EF 64%
- SYNTAX 32

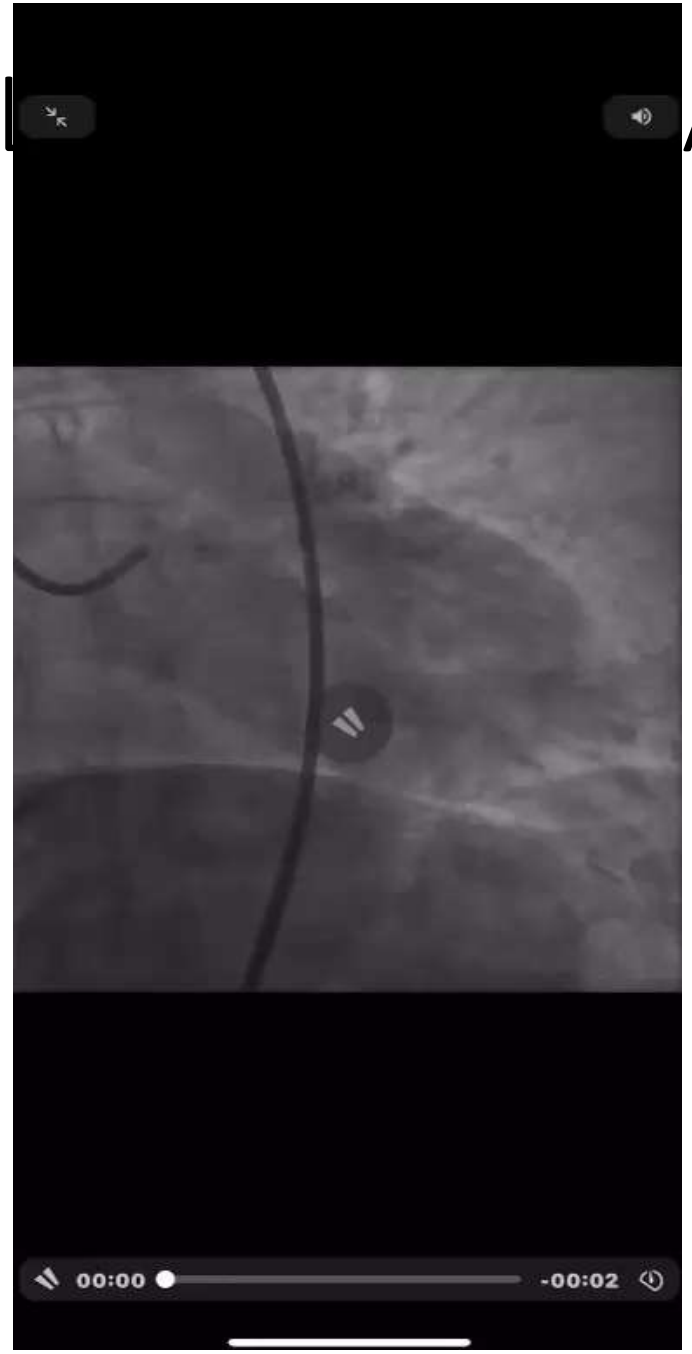


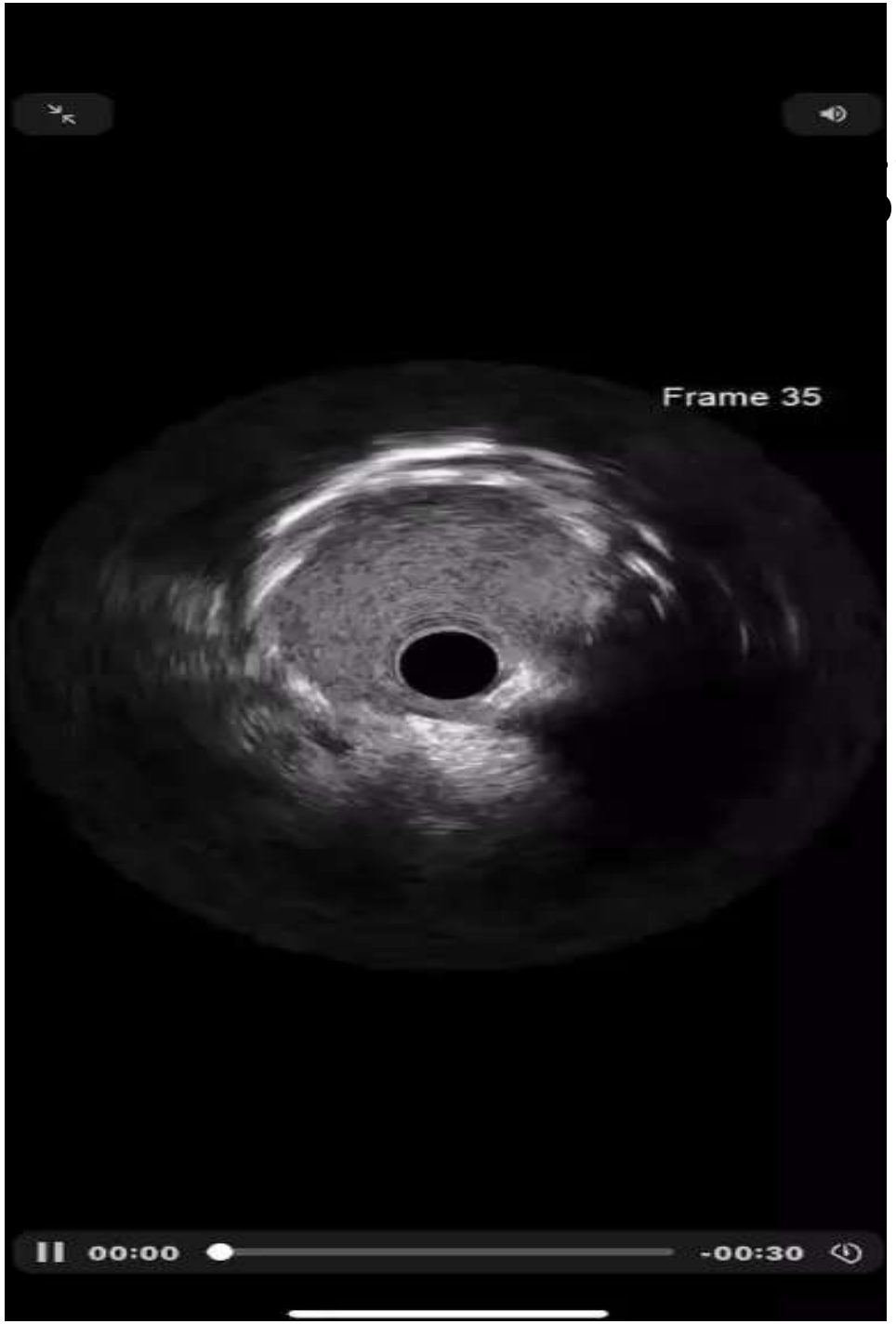

Frame 826

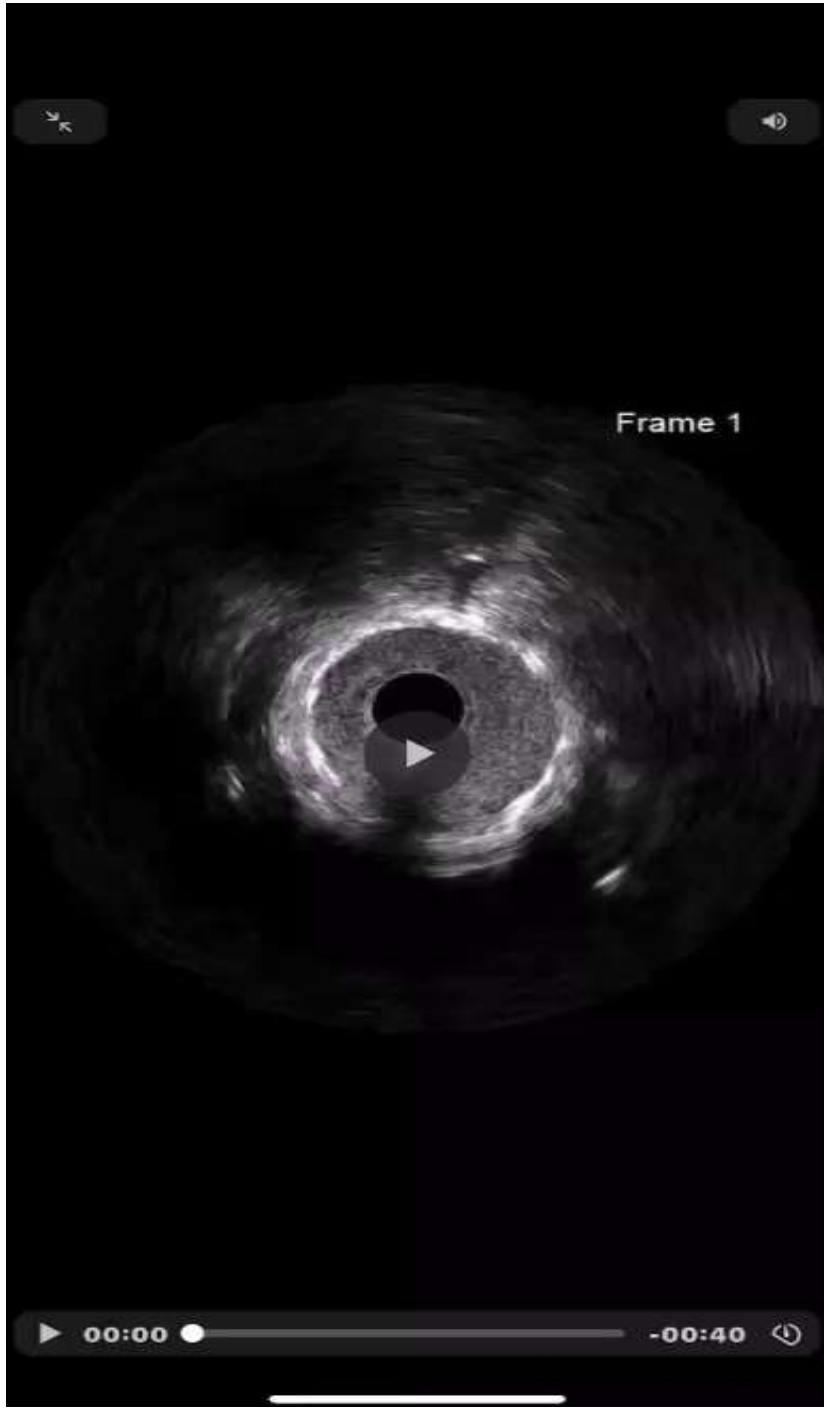

Frame 34
00:00
-00:22

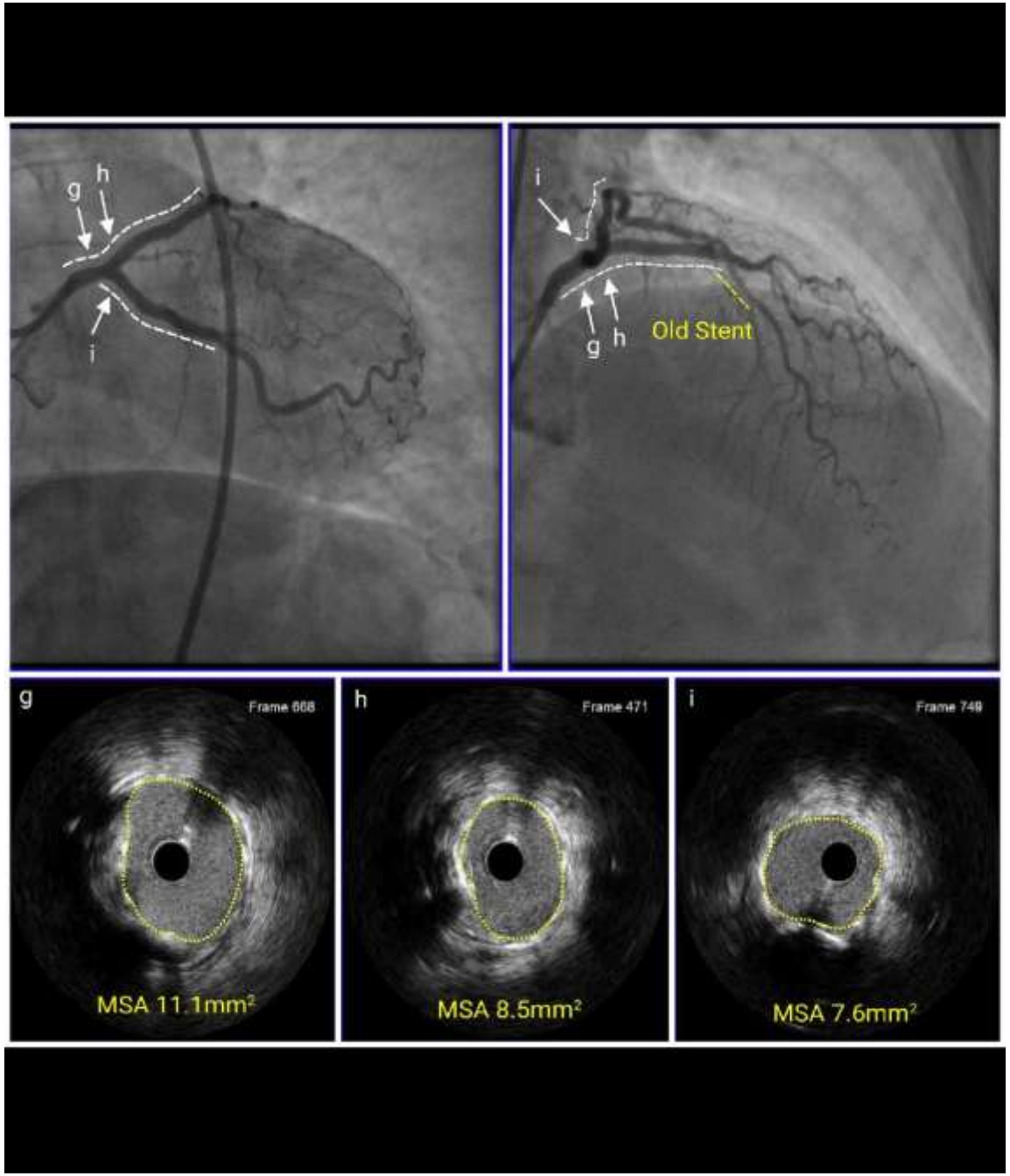

a b c d e f
f e a b c d
a
Frame 689
Guidewire artifact
Fibrous plaque
LMT distal
b
Frame 522
Guidewire artifact
Calcified plaque
MLA 4.36mm²
LMT proximal
c
Frame 437
Guidewire artifact
MLA 3.28mm²
Calcified plaque
LCX
Fibrous plaque
LAD ostium
d
Frame 102
Guidewire artifact
Fibrous plaque with superficial calcium
Calcified plaque
Fibrous plaque
Calcified plaque
LAD proximal
e
Frame 427
Guidewire artifact
MLA 6.40mm²
Calcified plaque
Side branch
LCX ostium
f
Frame 215
Guidewire artifact
Calcified plaque
LCX proximal

AG




Frame 35
00:00
-00:30


Frame 1
00:00
-00:40


g
h
i
i
g
h
Old Stent
g
Frame 668
MSA 11.1mm²
h
Frame 471
MSA 8.5mm²
i
Frame 748
MSA 7.6mm²

Evə mesaj

- IVUS istifadə etmək – lüks deyil, zərurətdir.
- **TLR** və restenoz riski IVUS ilə azaldılır.
- Minimal Stent Sahəsi (**MSA**) kritik önəm daşıyır.
- Təhlükəsiz və effektiv **LMCA** PCI üçün IVUS istifadə olunmalıdır.
- Kompleks bifurkasiya lezyonlarında IVUS, stent strategiyasının düzgün seçilməsini təmin edir.