

The role of fractional flow reserve assessing collateral function and coronary hemodynamics in patients with chronic total coronary occlusion



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What is our major concerns?

- ❖ Although collaterals can maintain myocardial function in chronic total coronary occlusions (CTOs), even well developed collaterals may not fully substitute normal coronary flow, and surgical or percutaneous revascularization is often indicated.
- ❖ However, limited data is available whether and to what extent collaterals regress after successful recanalization of a CTO.
- ❖ The aim of this case was to assess collateral function and coronary hemodynamics of CTO by pressure-derived collateral pressure index (CPI) using pressure wire.

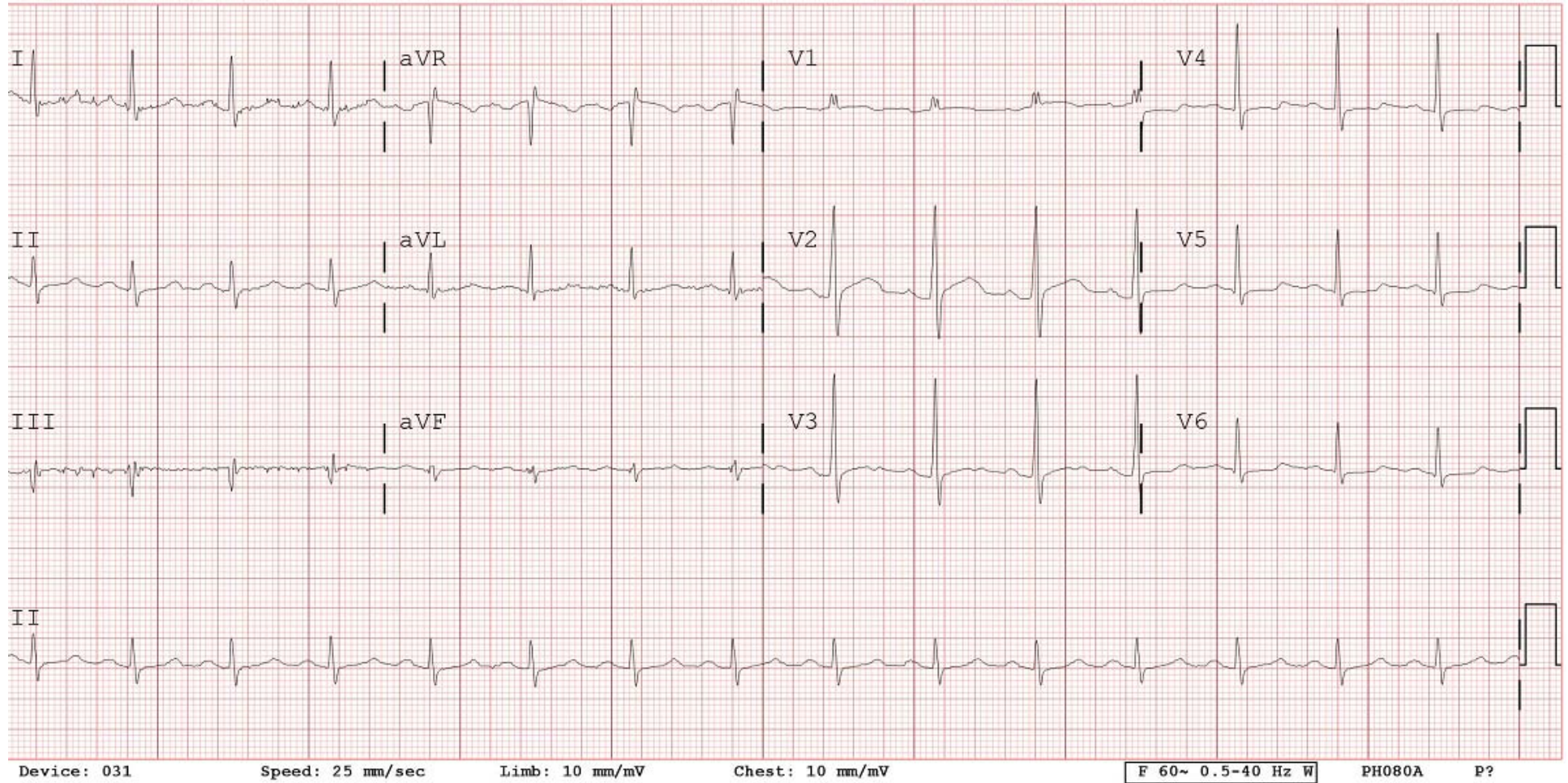


Case

- ❖ 44/Male
- ❖ C/C : chest pain for 3 months
- ❖ Per/Hx: smoking (+), 20 Pack-years
alcohol (+), social drinker
- ❖ Past Hx: Prior CHD (+)
Hypertension (+), 4 years ago
Hyperlipidemia (+)
DM (-)

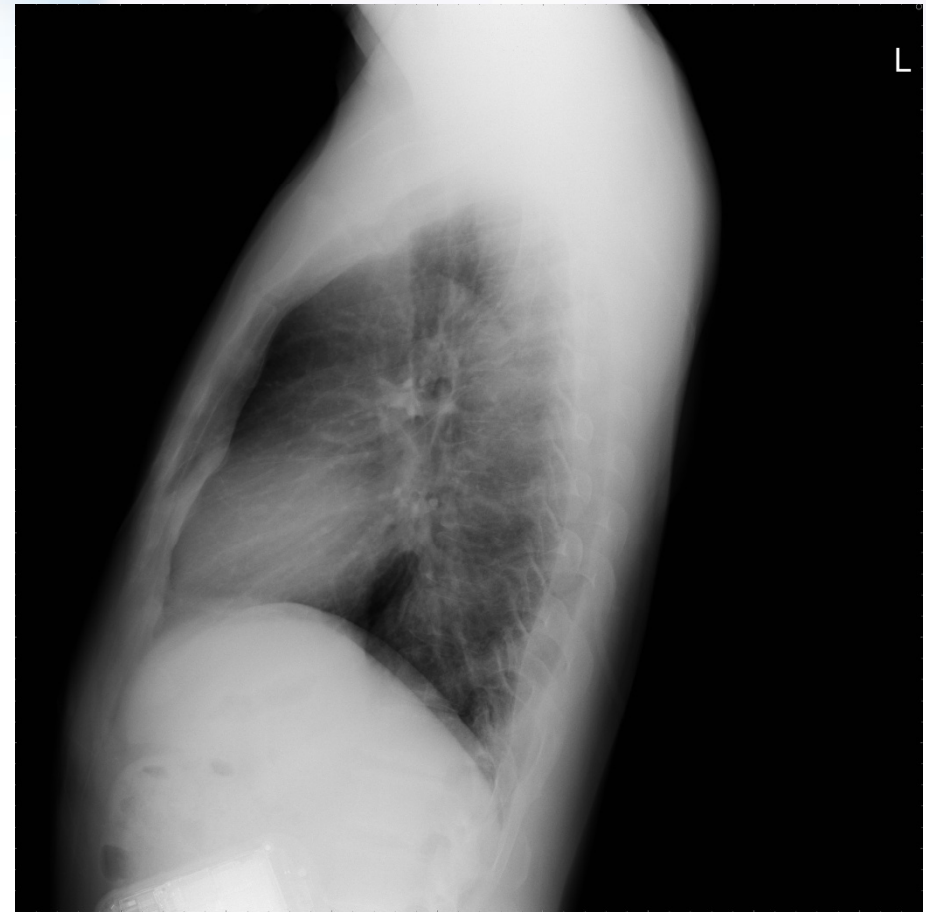


ECG at admission





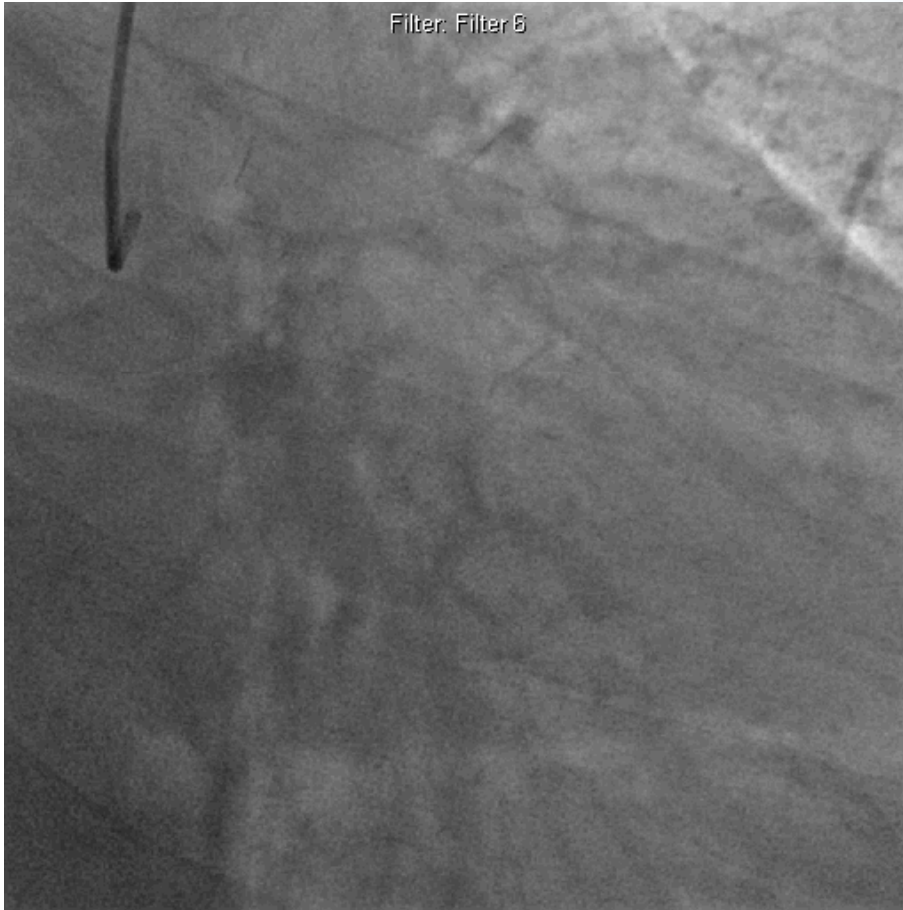
Chest x-ray



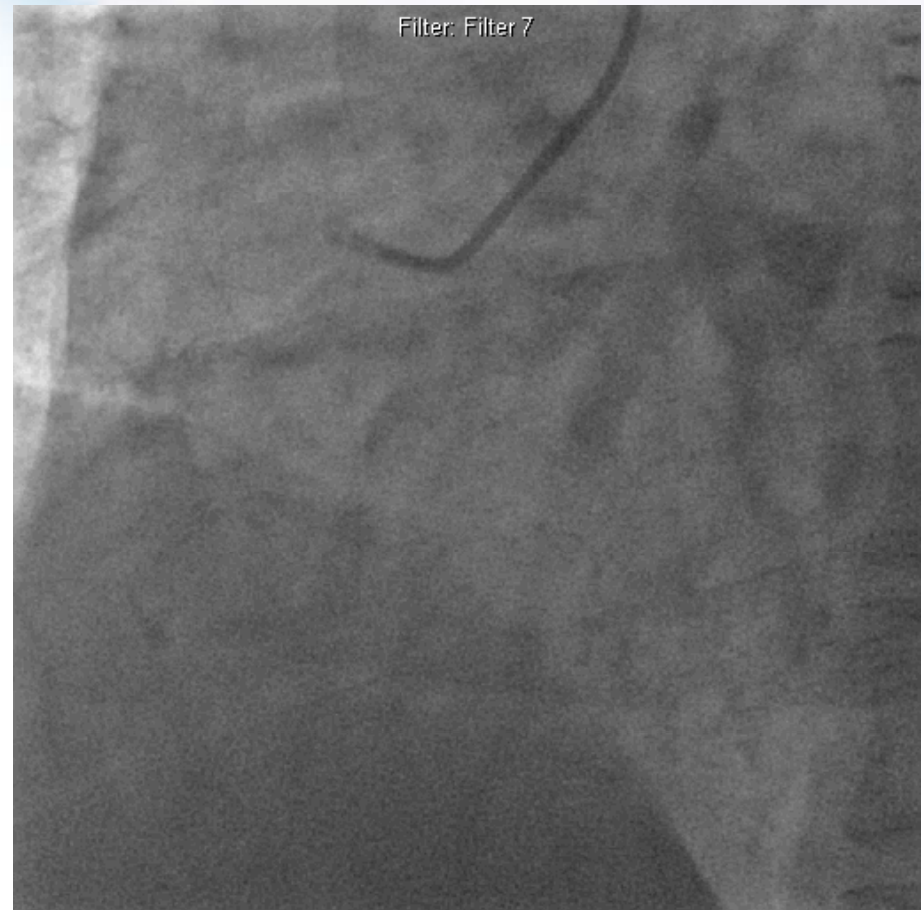


CAG

Filter: Filter 6

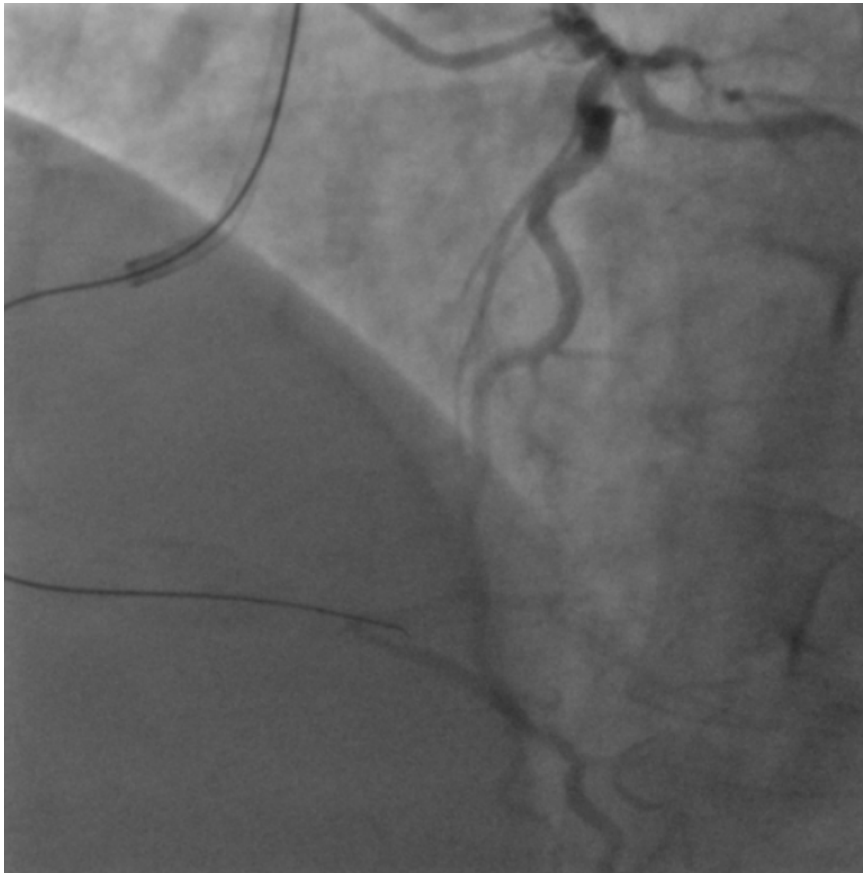


Filter: Filter 7





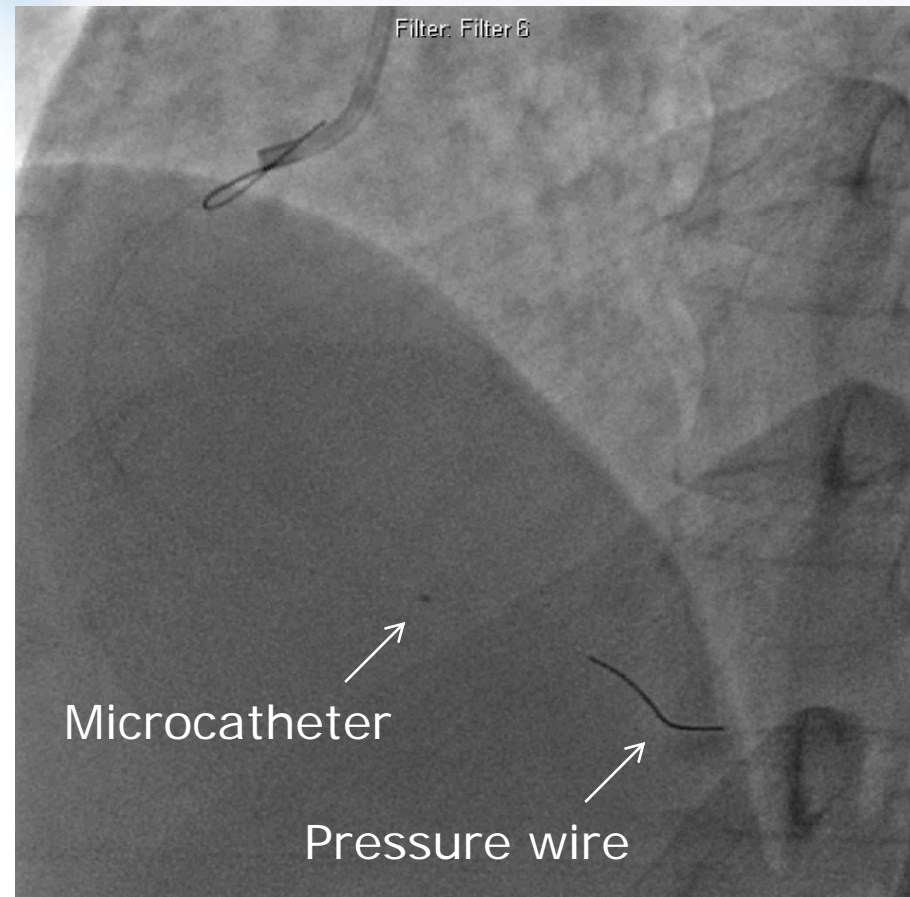
PCI of RCA CTO



- Rt transradial route**
Rt transfemoral route
Guiding catheter – JR4 7Fr
Guidewire
- Run though
 - Fielder XT
 - Conquest 9.0gm



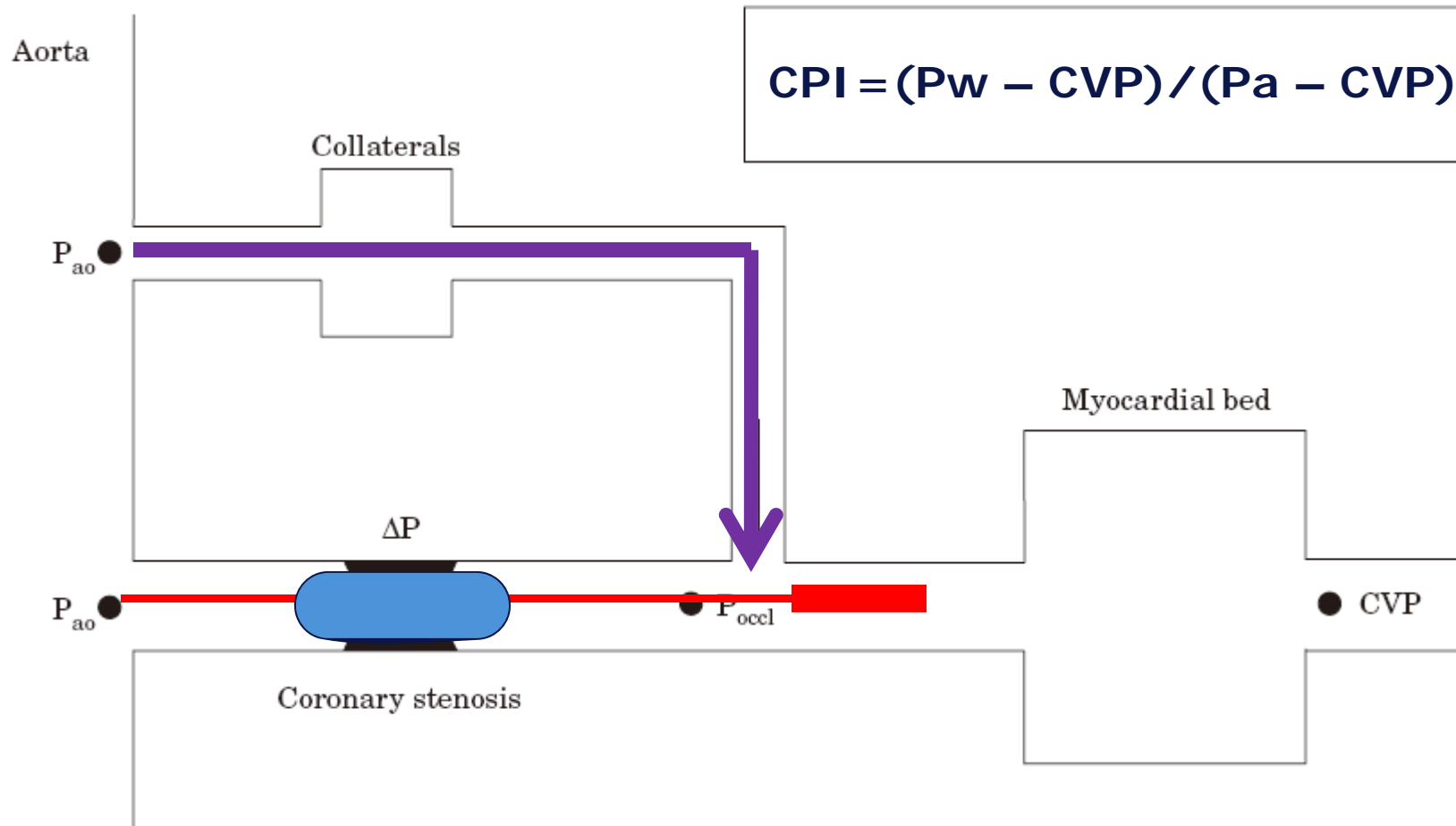
Guidewire passage



Conquest 9.0gm crossed the lesion Guidewire exchange with pressure wire



Measurement of collateral flow

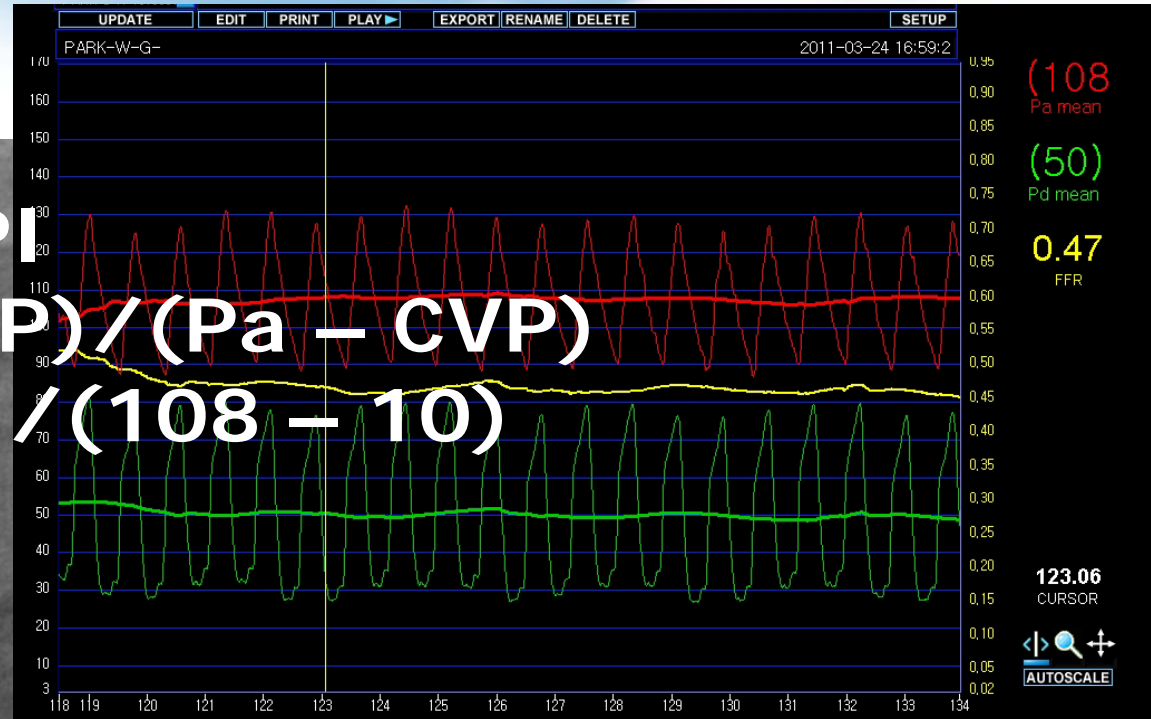




Baseline CPI

Baseline CPI

$$= (Pw - CVP) / (Pa - CVP)$$
$$= (50 - 10) / (108 - 10)$$
$$= 0.41$$

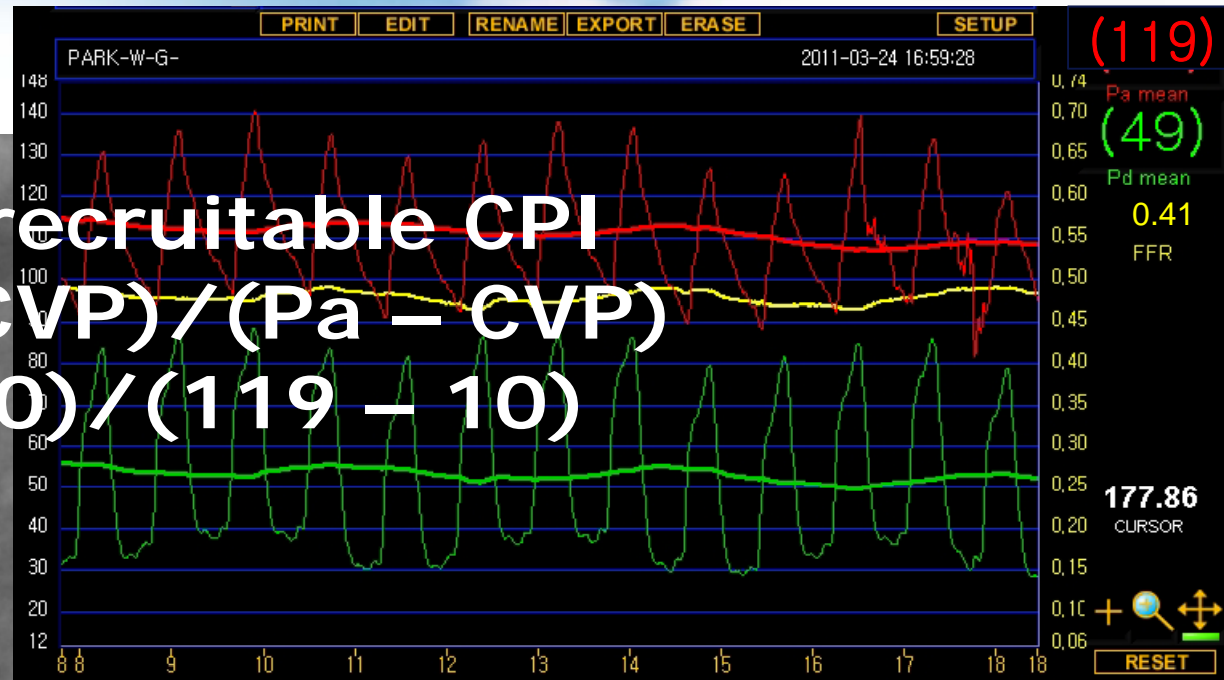


FFR at pre-intervention: 0.47



Baseline recruitable CPI after balloon occlusion

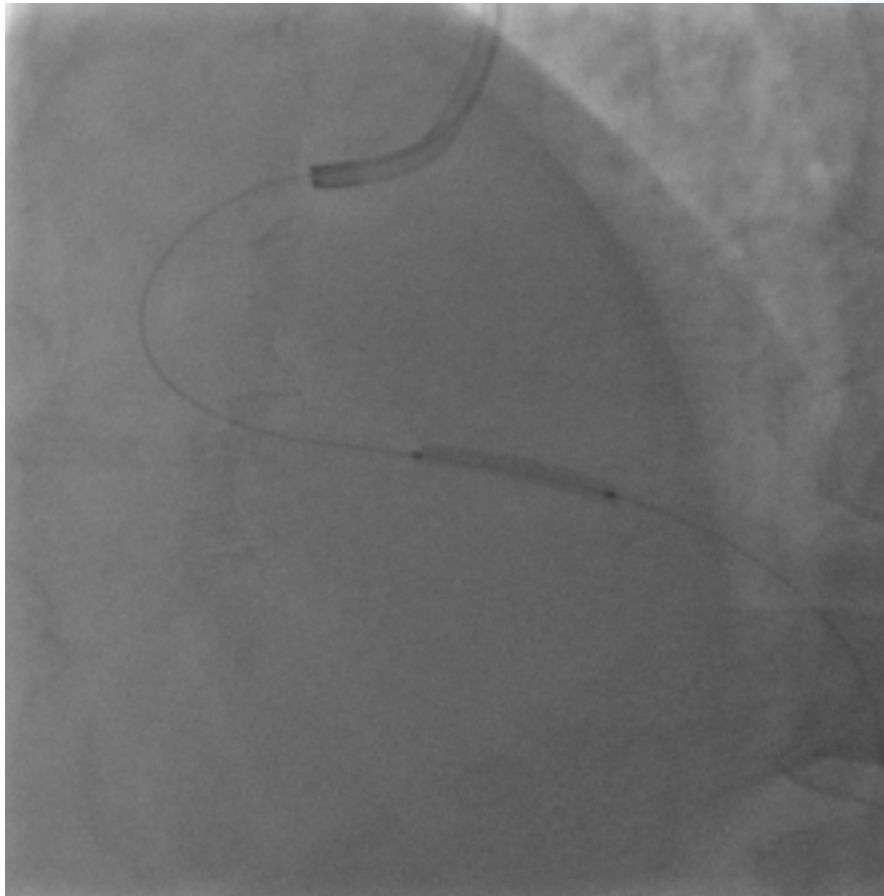
Baseline recruitable CPI
 $= (P_w - CVP) / (P_a - CVP)$
 $= (49 - 10) / (119 - 10)$
 $= 0.36$



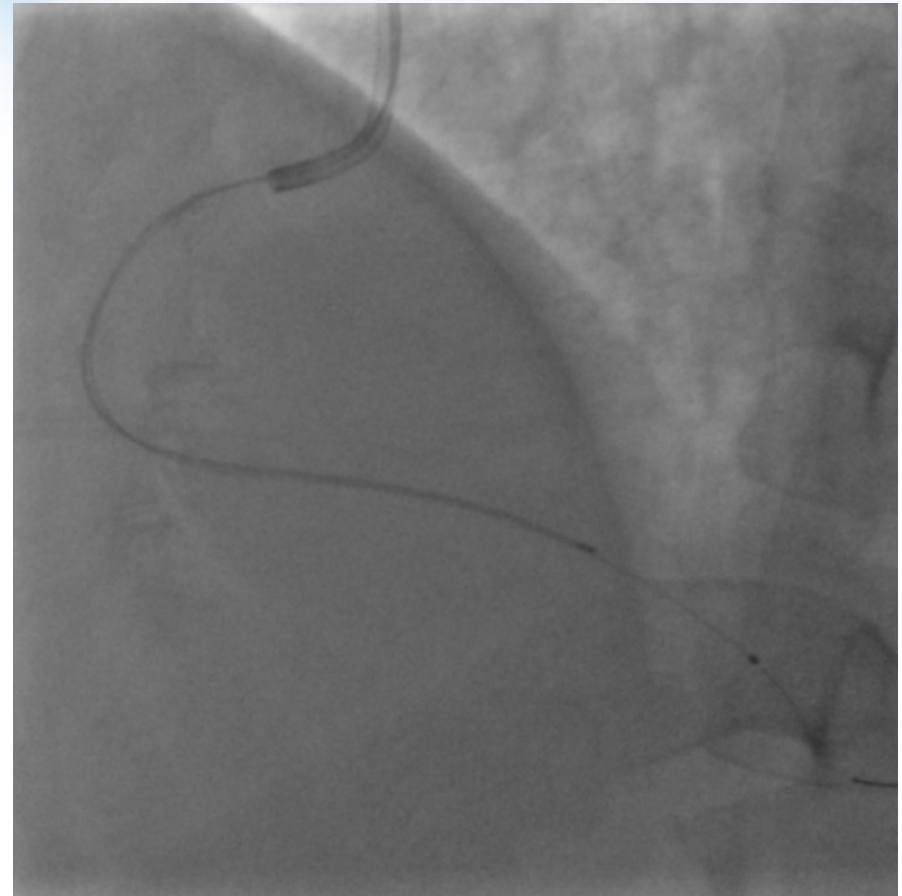
Pw/Pa after balloon occlusion: 0.41



Balloon and IVUS



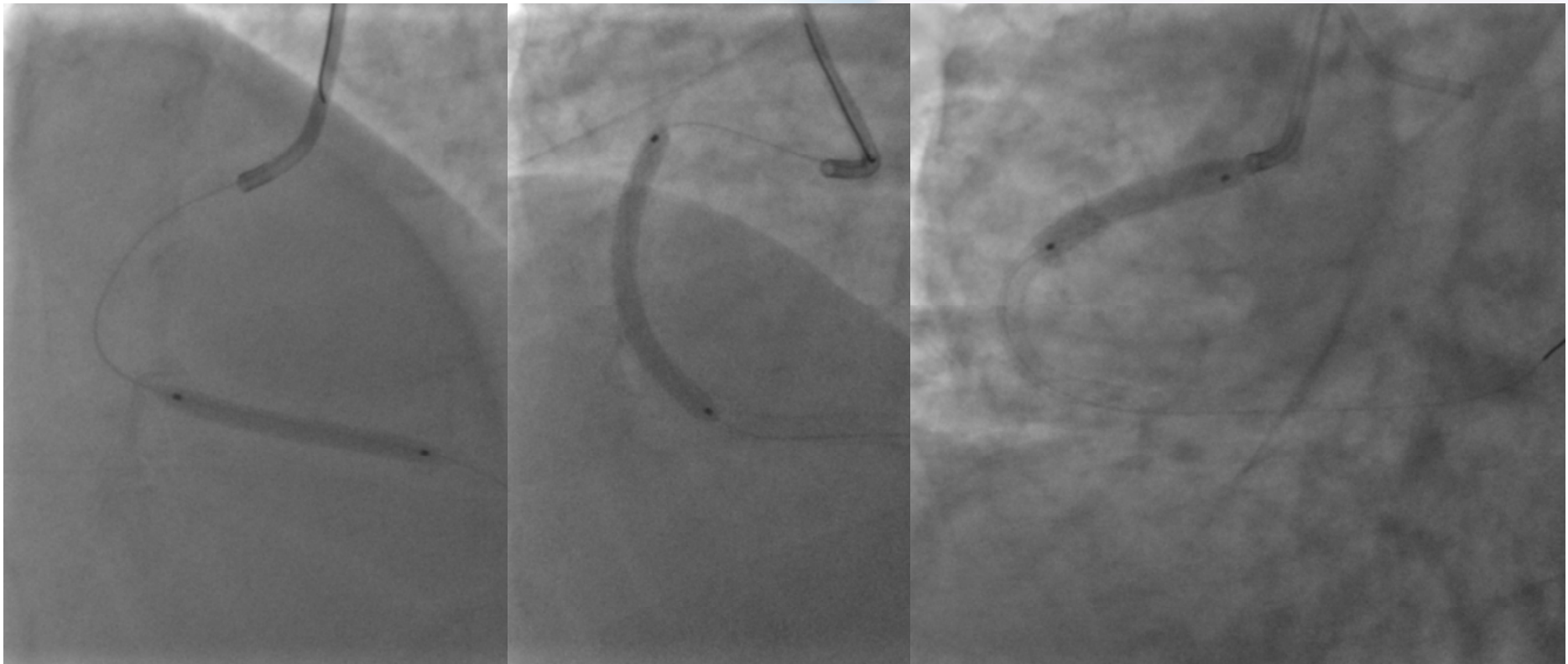
2.0 x 20mm ballooning, 8atm 10sec



IVUS



PCI with stents



Endeavor Resolute 2.75x30mm
Endeavor Resolute 3.0x38mm

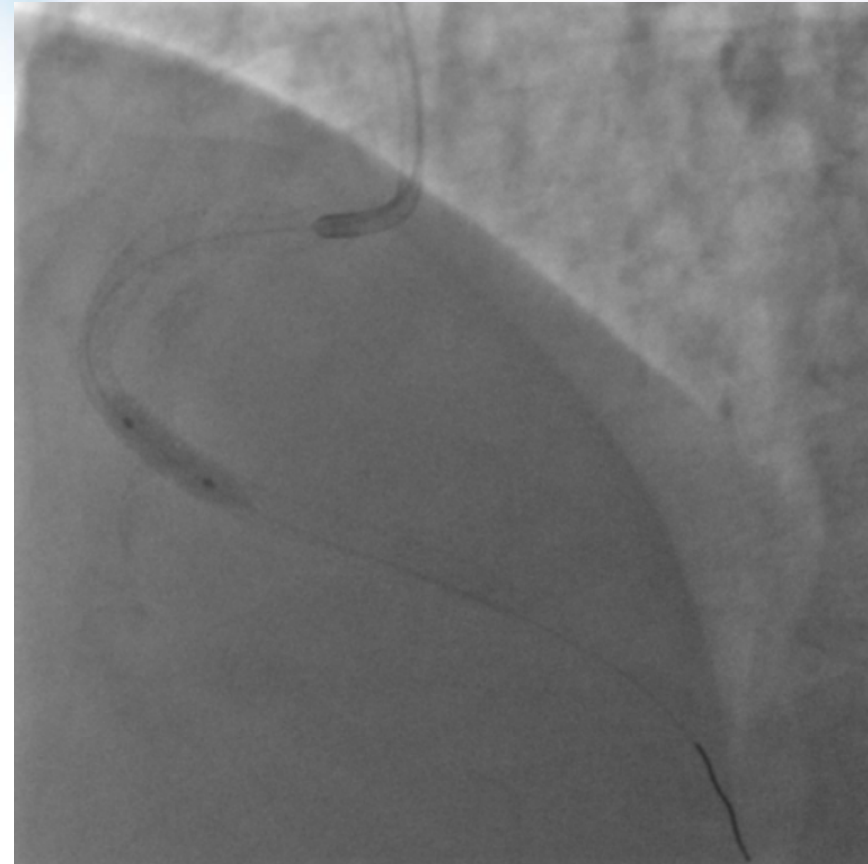
Endeavor Resolute 3.5x24mm



IVUS optimization



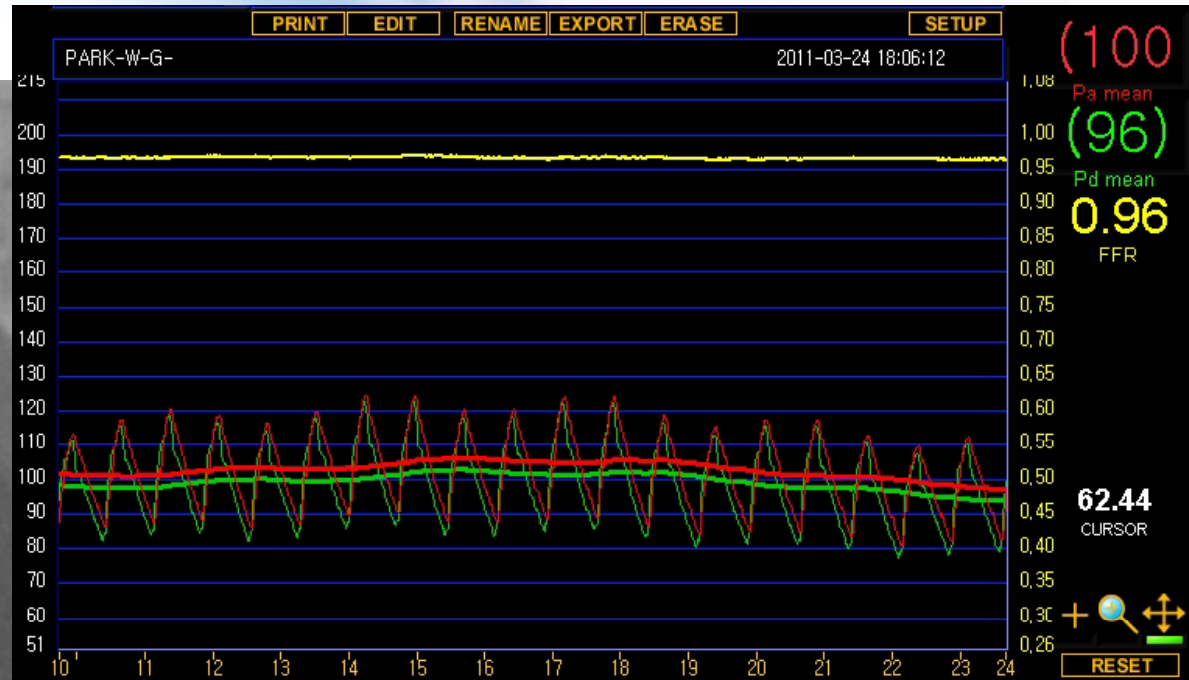
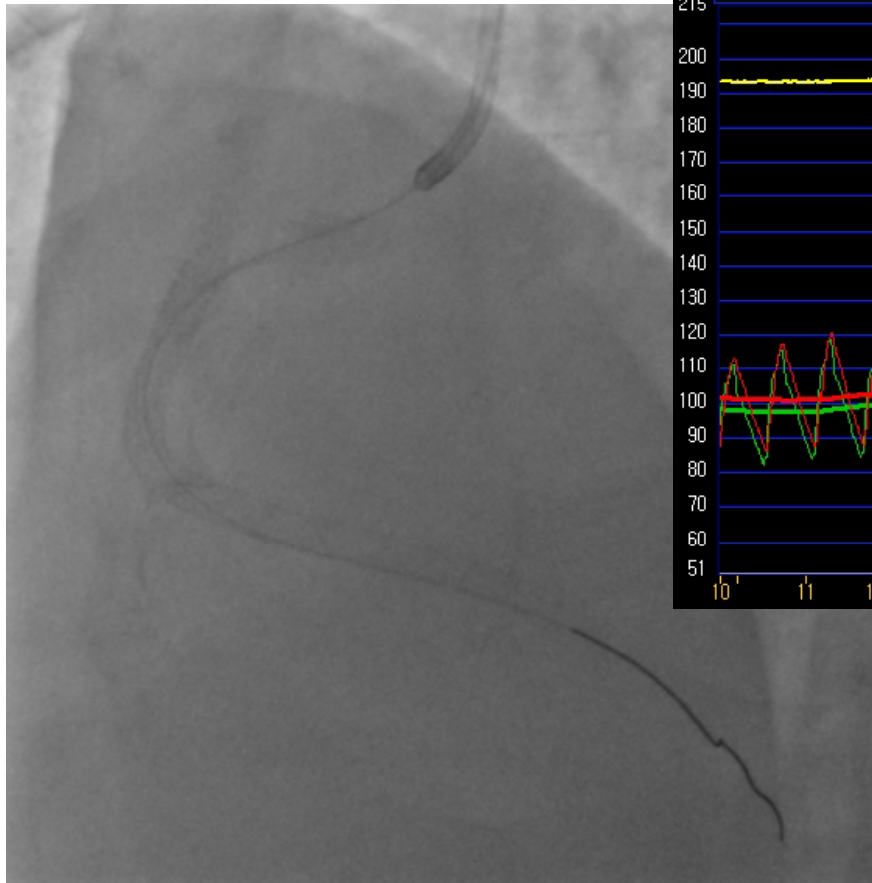
IVUS



NC balloon 4.0 x 12mm



FFR at post-intervention

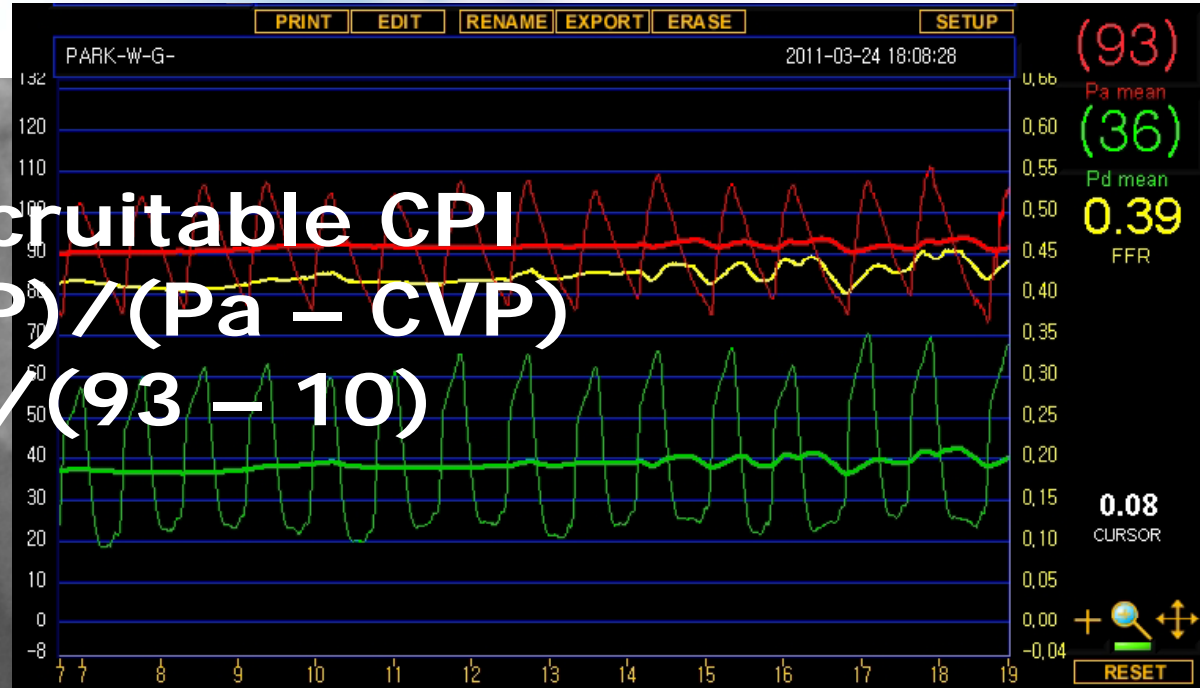


FFR at post-intervention: 0.96



Post-PCI recruitable CPI after balloon occlusion

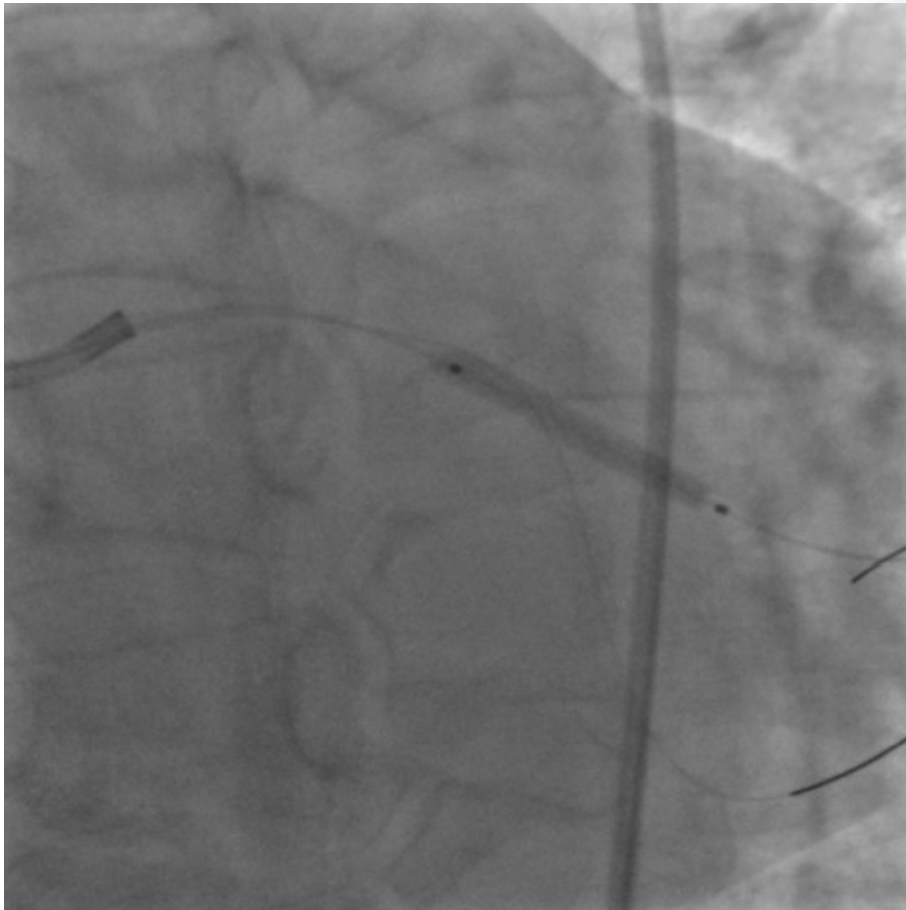
Post-PCI recruitable CPI
= $(Pw - CVP) / (Pa - CVP)$
= $(36 - 10) / (93 - 10)$
= 0.31



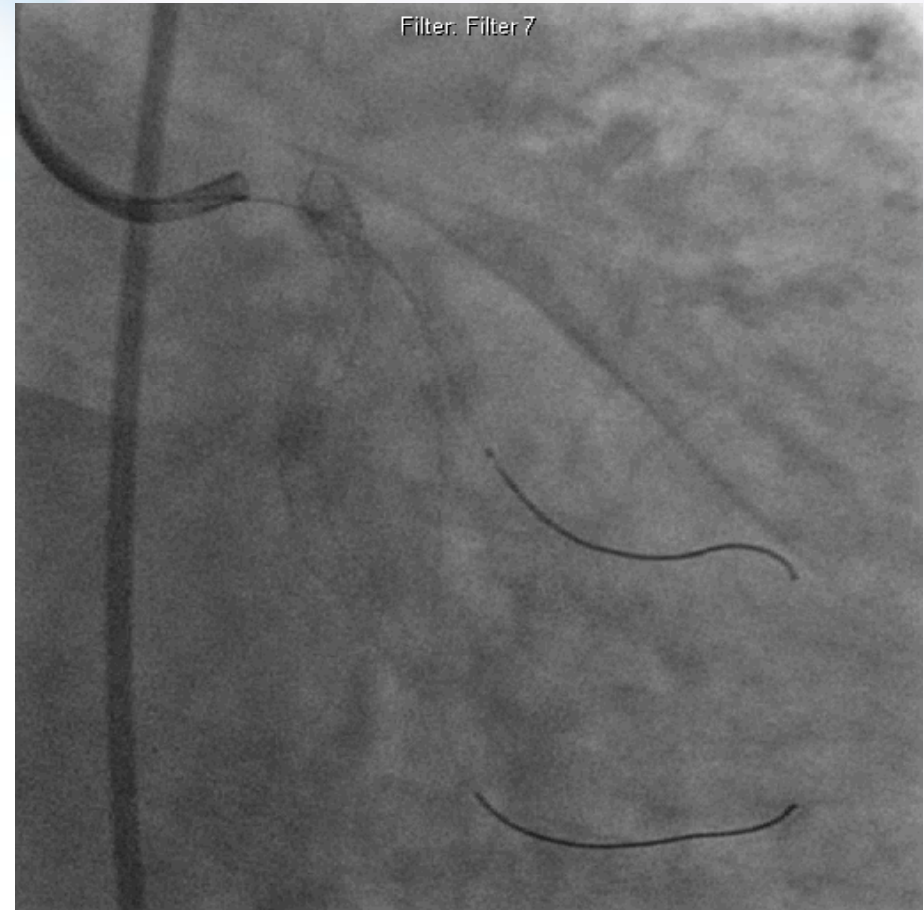
Pw/Pa after balloon occlusion: 0.39



PCI of LCX

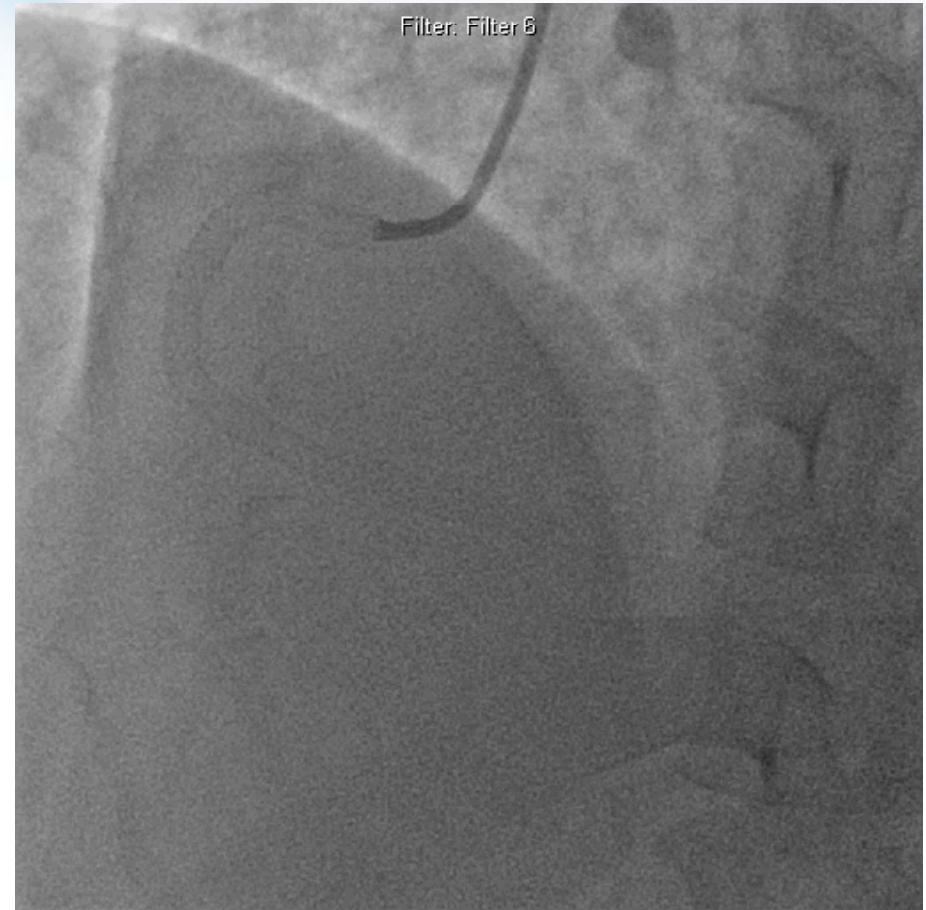
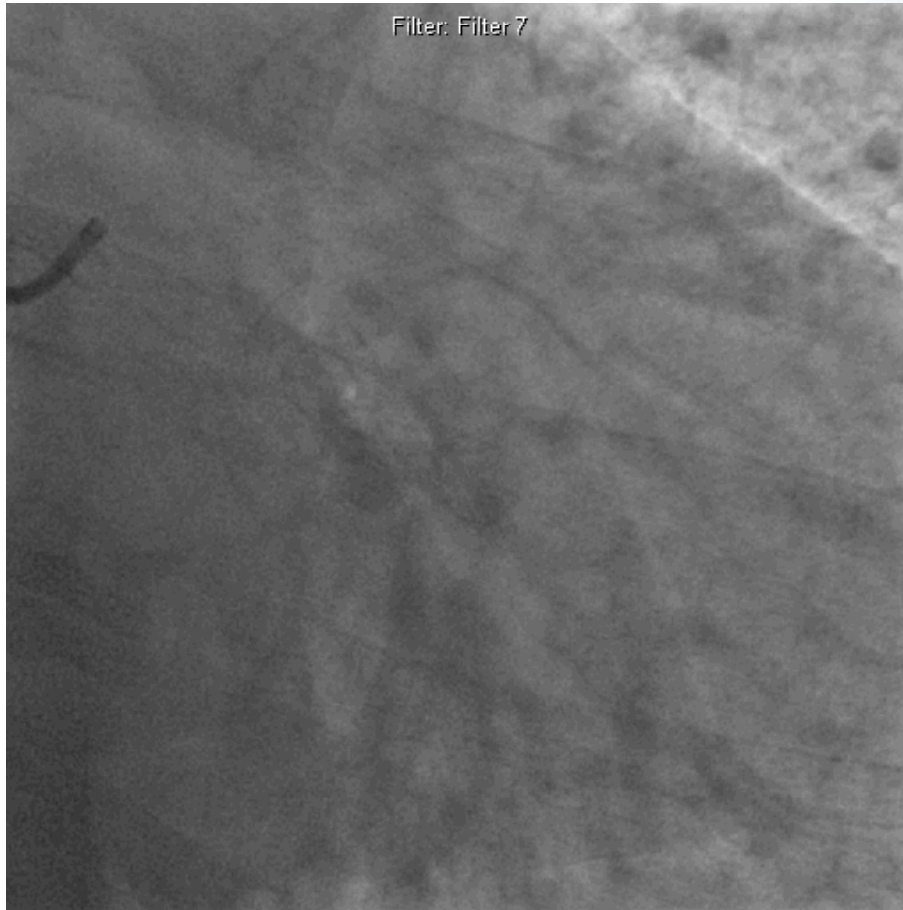


Endeavor Resolute 2.5x24mm



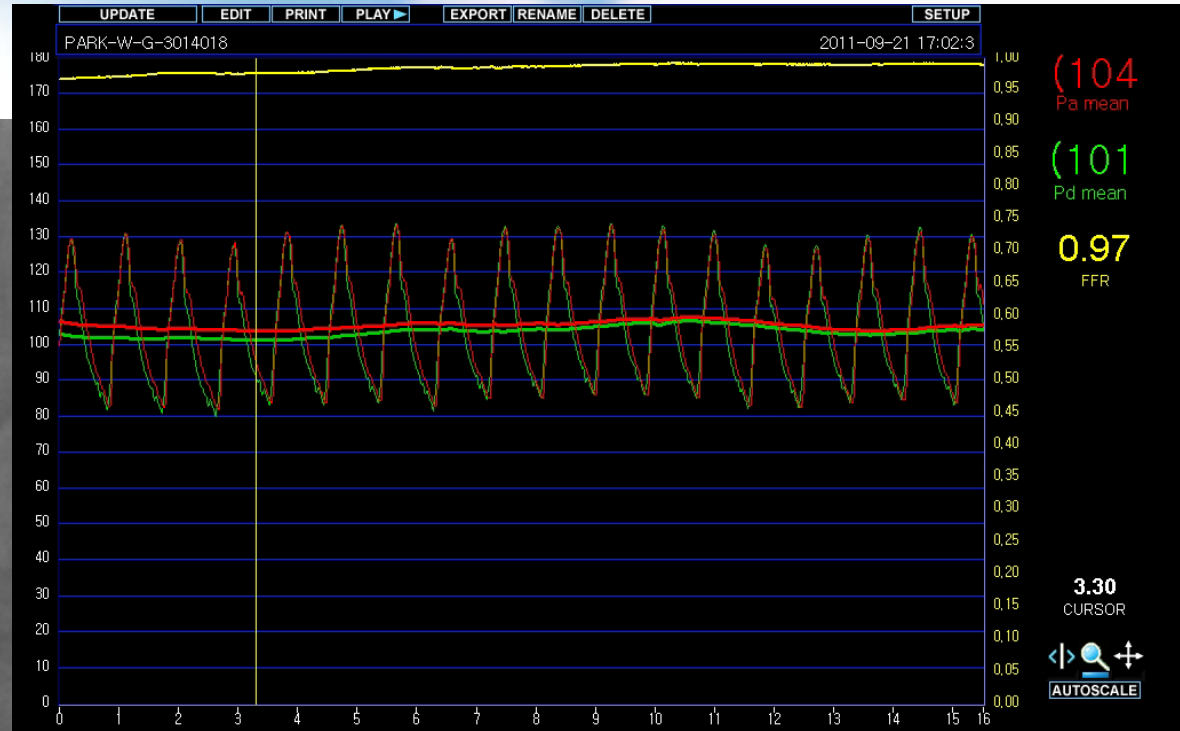
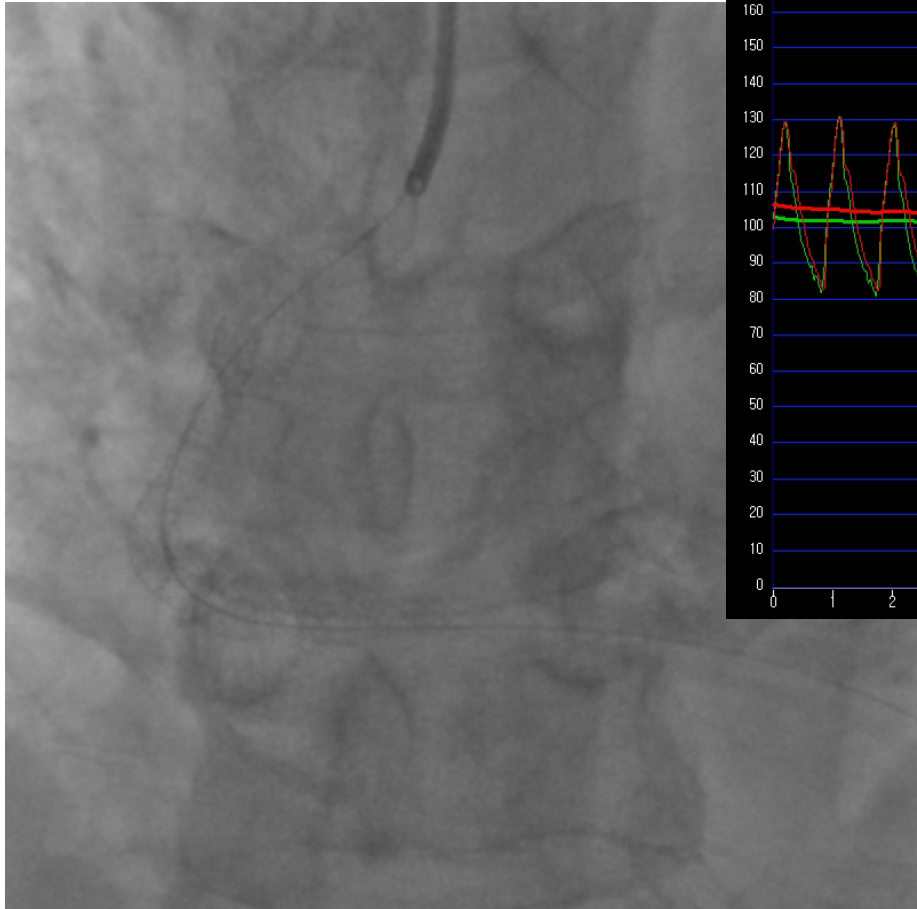


Follow-up CAG @ 6-month





Follow-up FFR @ 6-month

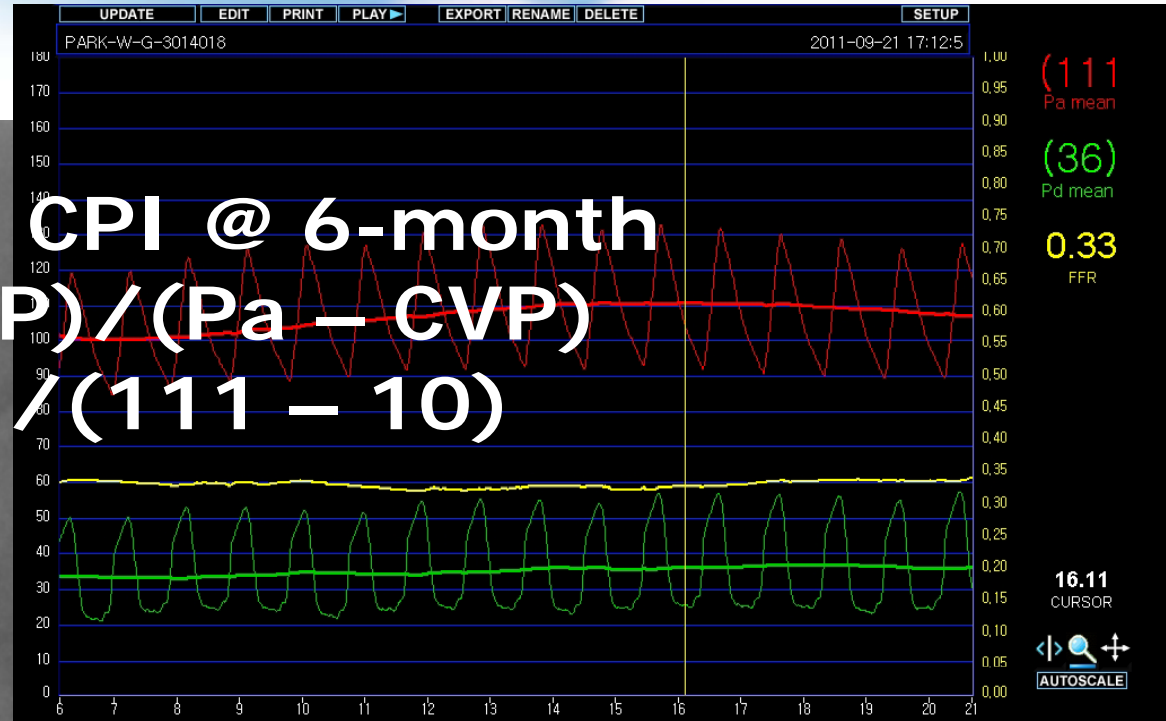


FFR: 0.97



Recruitable CPI after balloon occlusion

$$\begin{aligned} \text{Recruitable CPI @ 6-month} &= (P_w - \text{CVP}) / (P_a - \text{CVP}) \\ &= (36 - 10) / (111 - 10) \\ &= 0.26 \end{aligned}$$



Pw/Pa after balloon occlusion: 0.33



Case summary

	Baseline	6-month
FFR at pre-intervention	0.47	
Baseline CPI	0.41	
	12.1% ↓	36.6% ↓
Recruitable CPI	0.36	
FFR at post-intervention	0.96	0.97
	24.4% ↓	
Recruitable CPI	0.31	0.26
		16.1% ↓



Take Home Message

- ❖ Despite well developed collaterals, baseline CPI of collateral flow was substantially lower than those of our expectation in CTO.
- ❖ Although immediately after restoration of antegrade flow, collateral function is attenuated, with a further regression during a follow-up of 6 months in patient with CTO, CPI (>0.25) at 6-month is relatively higher in patient with epicardial collateral channel.
- ❖ It may be speculated that the patient with well-preserved collaterals after recanalization might have been those with preformed arterial connections.