Iatrogenic coronary artery perforation (CAP)

MUDr. Michal Paďour
MUDr Roman Ondrejčák

MUDr.Michal Paďour, KKN a.s., Kardiologické oddělení Karlovy Vary, michal.padour@kkn.cz

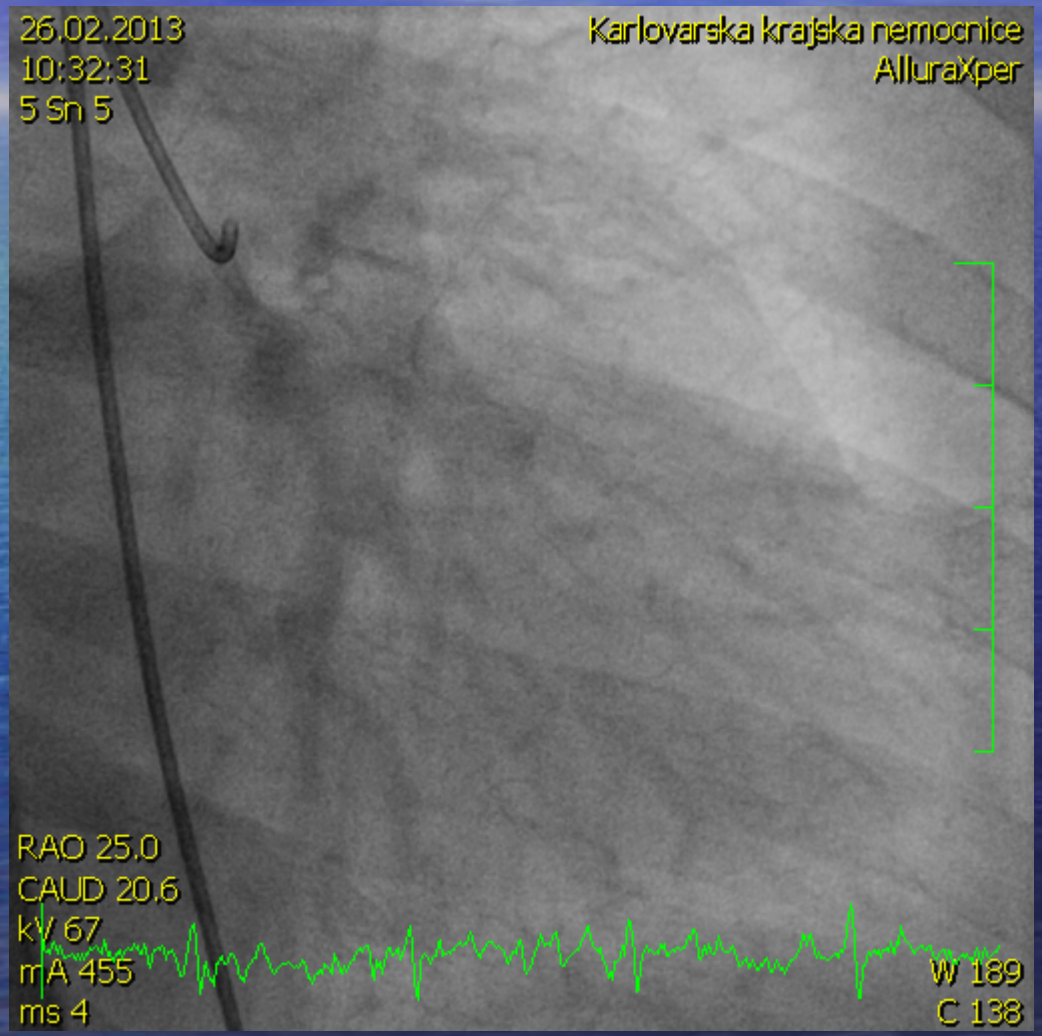
Disclosure Statement of Financial Interest

- I, Michal Pad'our, DO NOT have a financial interest/arrangement or affiliation with one or more organizations that could be perceived as a real or apparent conflict of interest in the context of the subject of this presentation

Case report

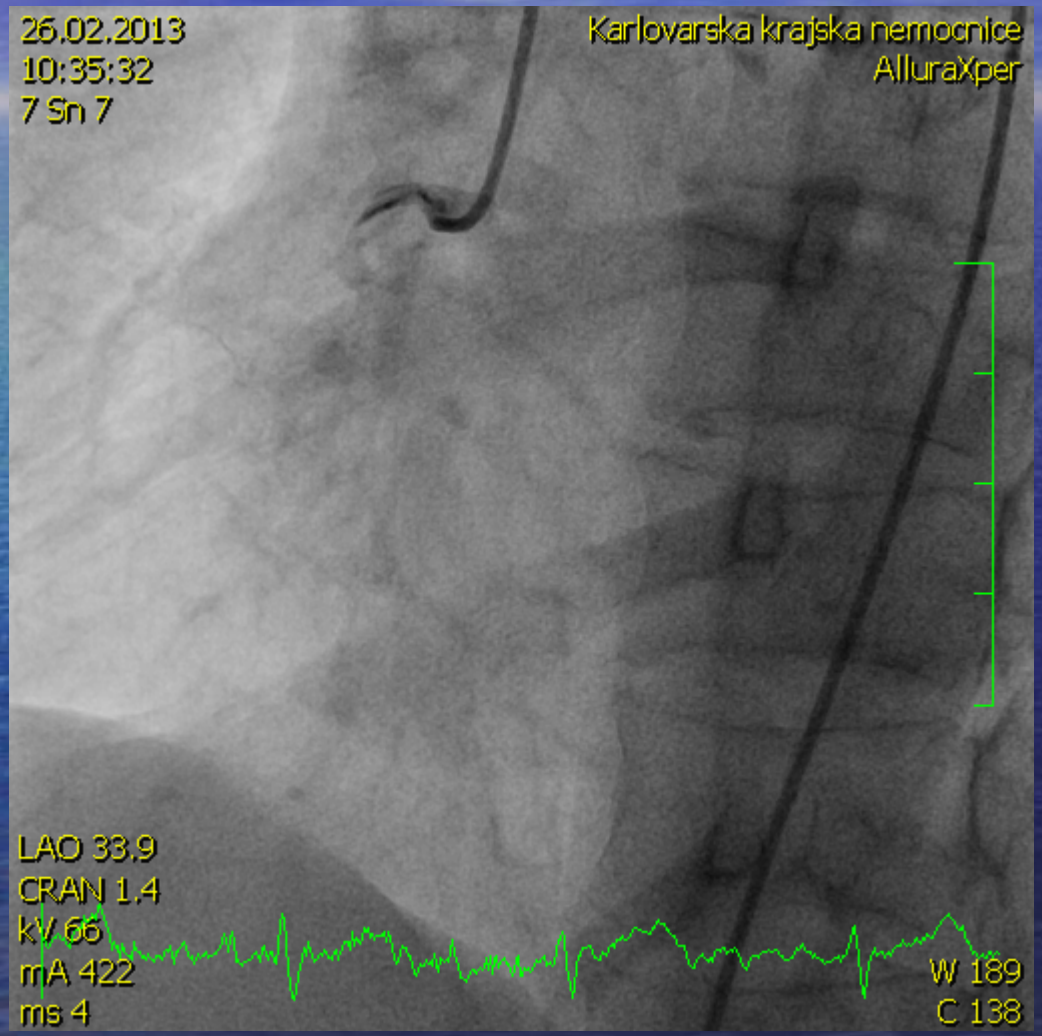
- 67 years old lady, former smoker, accepted in January 2013 to smaller hospital in western Bohemia with nSTEMI. Echo- normal EF. Before MI AP II CCS.
- SKG via art. rad. dx. LAD- sign. calcified stenoses in prox. part, OMB- sign. stenoses, LCx- intermed. stenoses. RCA- sign. stenoses in middle part
- Spasm of art. rad. not receding after i.v. Diazepam and Fentanyl. Sheath was removed after short time general anesthesia.

Case report


26.02.2013
10:32:31
5 Sn 5
Karlovarska krajska nemocnice
AlluraXper
RAO 25.0
CAUD 20.6
kV 67
mA 455
ms 4
W 189
C 138

Karlovarská krajská nemocnice

Case report



Karlovarská krajská nemocnice

Case report

- PCI of LAD was being performed via femoral artery in the second stage.
- Direct implantation of DES 2,75/28 to proximal part of LAD was done. Since the stent was insufficiently expanded in calcified artery, postdilatation by NC balloon was done and rupture (class III) of the artery follows.

Karlovarská krajská nemocnice

CASE report

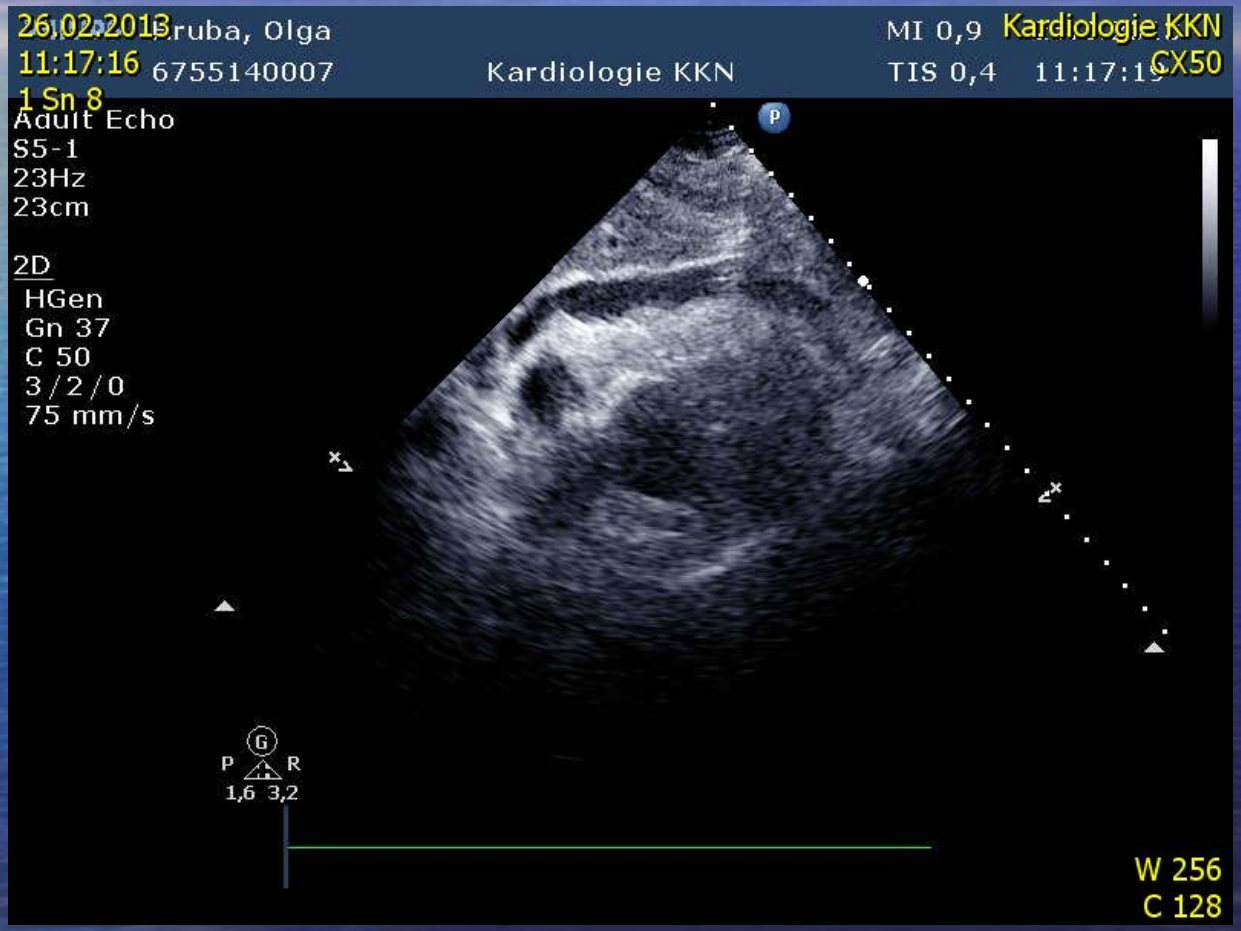
- 5F guiding cat. does not allow implantation of covered stent, therefore M guard stent was implanted with no effect on perforation. Reversion of anticoagulation was achieved by Protamin.

Karlovarská krajská nemocnice

Case report

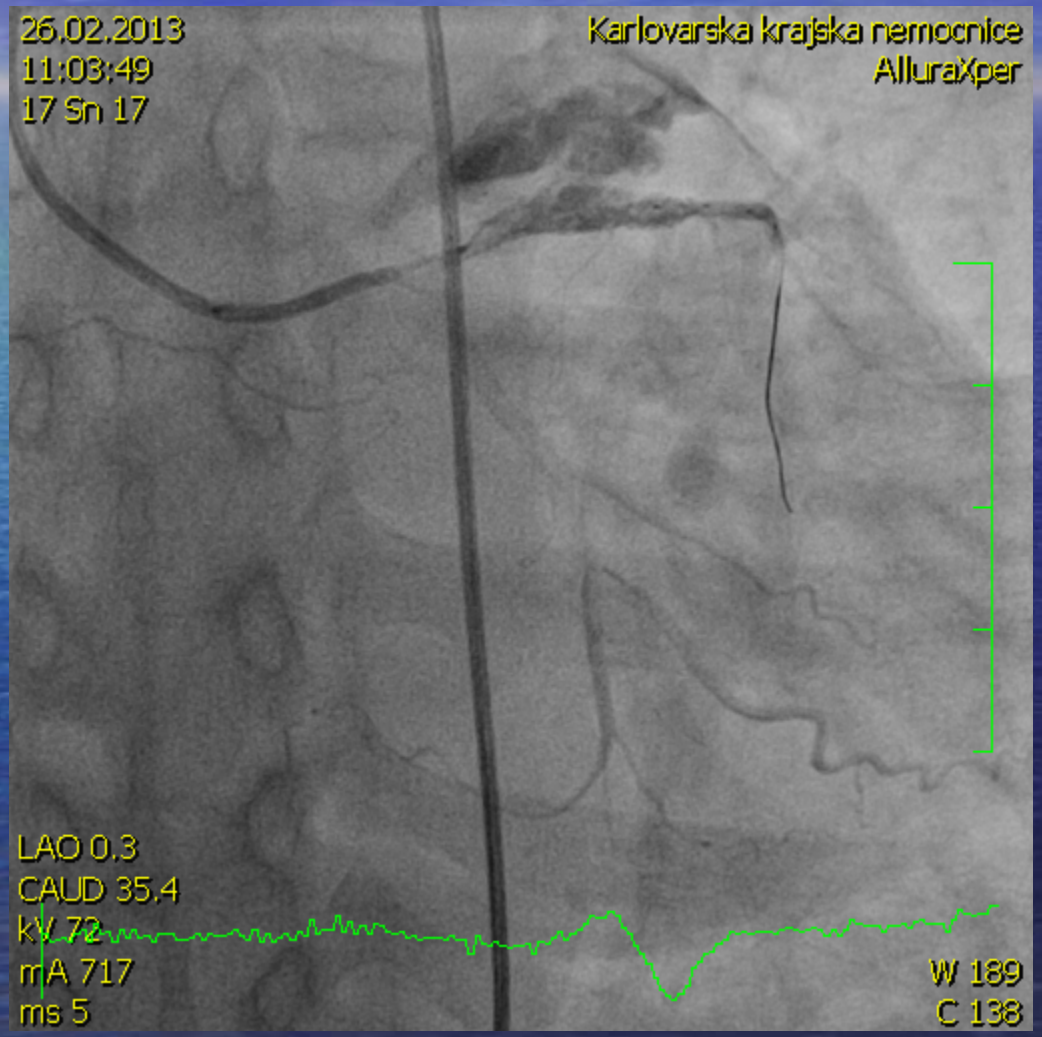
- Echocardiography showed pericardial effusions with tamponade, fast pericardiocentesis was done. Balloon from M guard stent was being inflated in LAD for the whole time of the crises. Technique of dual guiding was used to implant covered stent (graft master) - unsuccessfully.

Case report


26.02.2013
11:17:16
1 Sn 8
6755140007
Kardiologie KKN
MI 0,9
TIS 0,4
Kardiologie KKN
CX50
Adult Echo
S5-1
23Hz
23cm
2D
HGen
Gn 37
C 50
3/2/0
75 mm/s
P
R
1,6 3,2
W 256
C 128

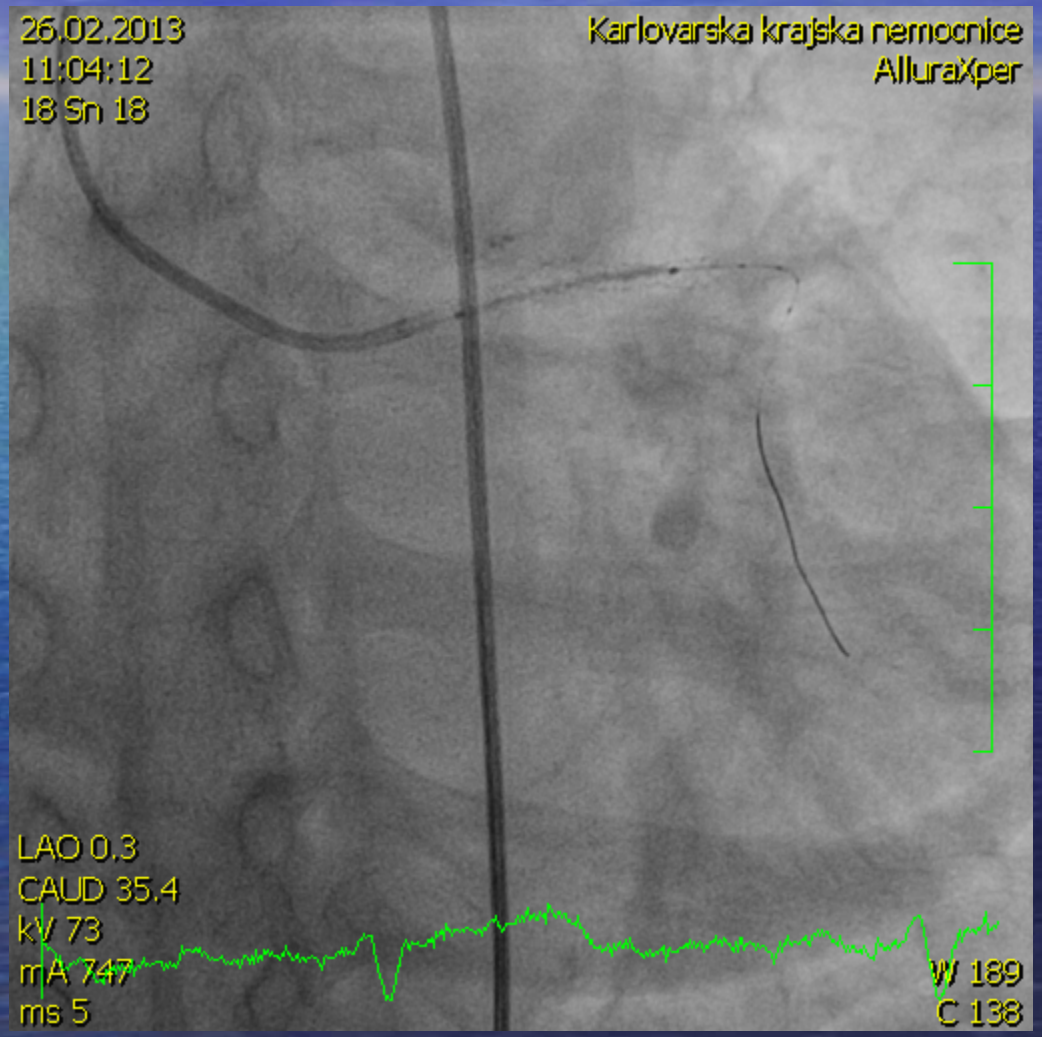
Karlovarská krajská nemocnice

Case report



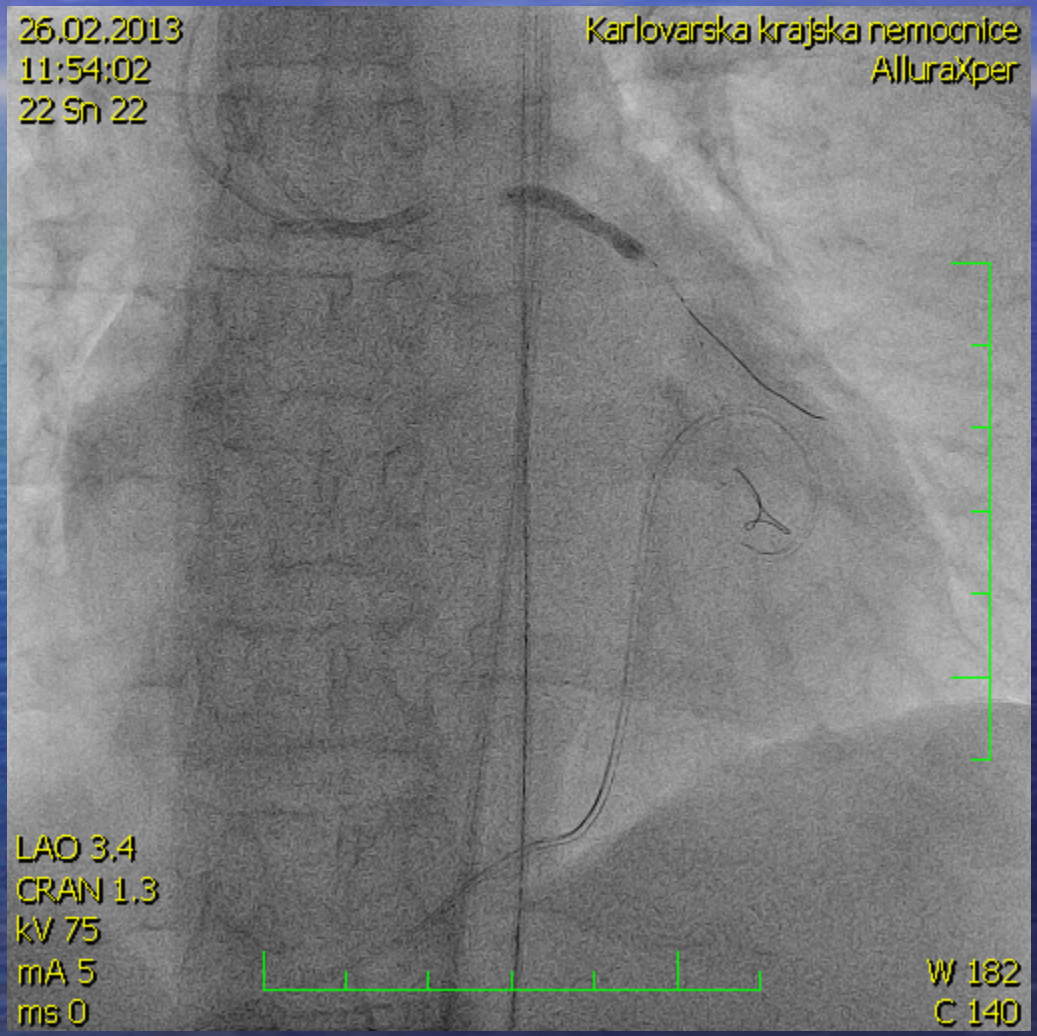
Karlovarská krajská nemocnice

Case report



Karlovarská krajská nemocnice

Case report



Karlovarská krajská nemocnice

Case report

- State of the patient was stabilized after volumoexpansion, while balloon was inflated in LAD, no exacarbation of fluid in pericardium.
- The patient was urgently transported to Prague (1 and1/2 hours drive) for surgery. CABG on LAD, OMB and RCA was performed. The surgery and whole course was uneventful and she was discharged 7 days after surgery.
- Postoperative echo showed hypokinesis of anterior wall and EF of 50%.

PCI induced CAP

Incidence- 0,1-0,6 % PCI

Mechanism of the complication- guiding cath., high balloon –vessel ratio, high inflantation pressure, hydrophilic coated wire, stiff wire, cutting balloon, atheroablative devices.

Risk factors- older age, female gender, character of the vessel (calcium, tortuosity, angulation, CTO...), ACS, venous grafts.

Classification for CAP (Ellis)

- Class I- focal extraluminal crater without extravasation. Risk of tamponade is 5-10% .
- Class II- with pericardial or myocardial blushing. Risk of tamponade is 10-20%.
- Class III- contrast streaming or cavity spilling. Risk of tamponade is 50-70%.

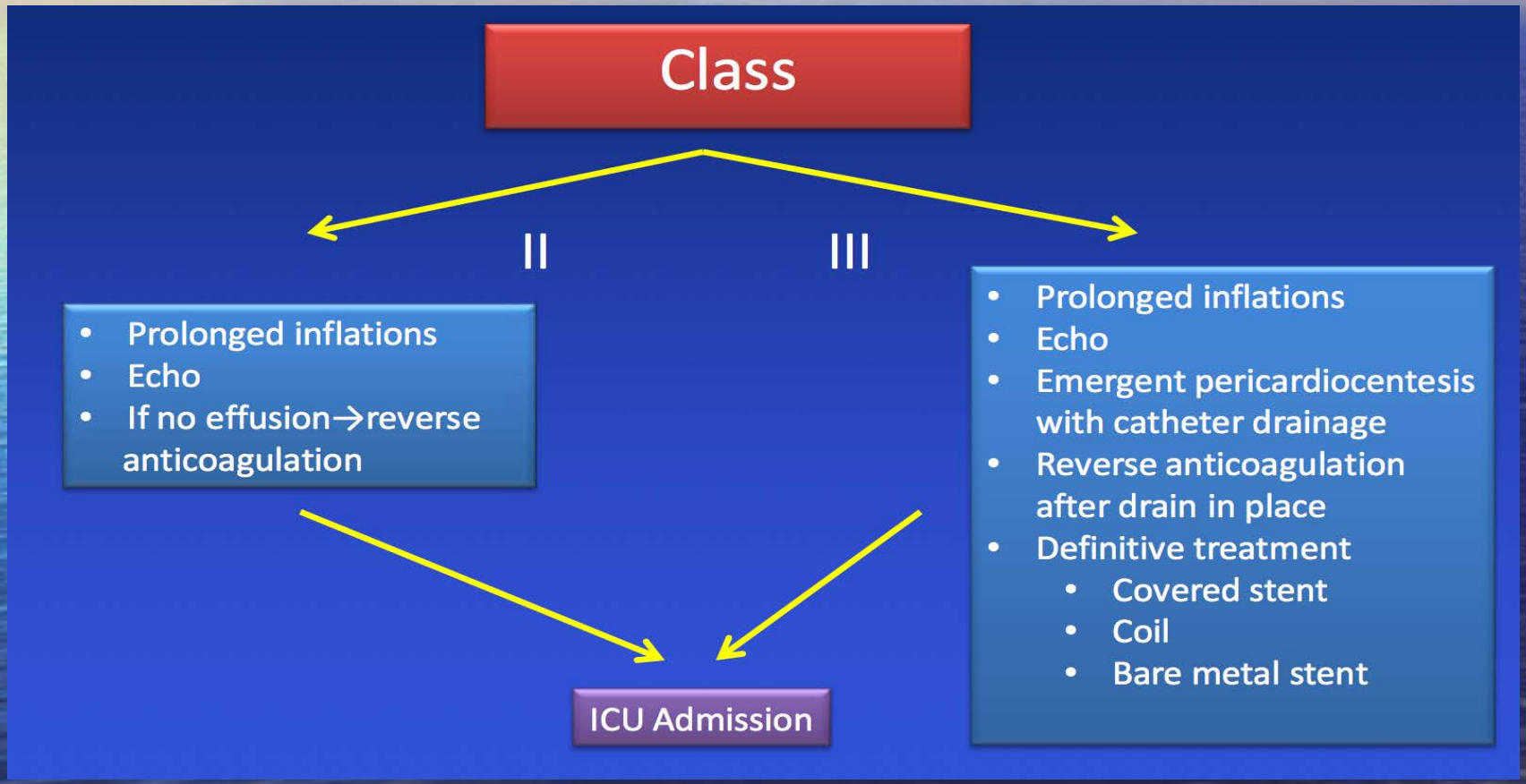
Karlovarská krajská nemocnice

Treatment of CAP

- Class I+II- prolonged balloon inflation, half reversal of anticoagulation by protamin sulfate. Observation on CCU for 48- 72 hours and sequential echocardiography studies.
- Class III- immediate prolonged ballon inflation(5-15 min.), complete reversal of anticoagulation by protamin, pericardiocentesis, covered stent, microcoils or gel foam embolization. Emergency surgery.

Karlovarská krajská nemocnice

Treatment of CAP



Karlovarská krajská nemocnice

Covered stents

Microcoils

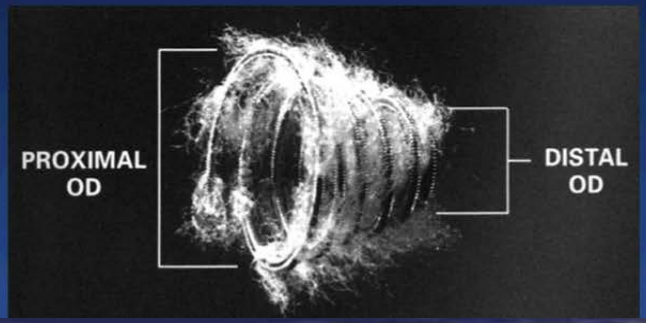
Cook: Embolization microcoils

Platinum with syntetic fibers

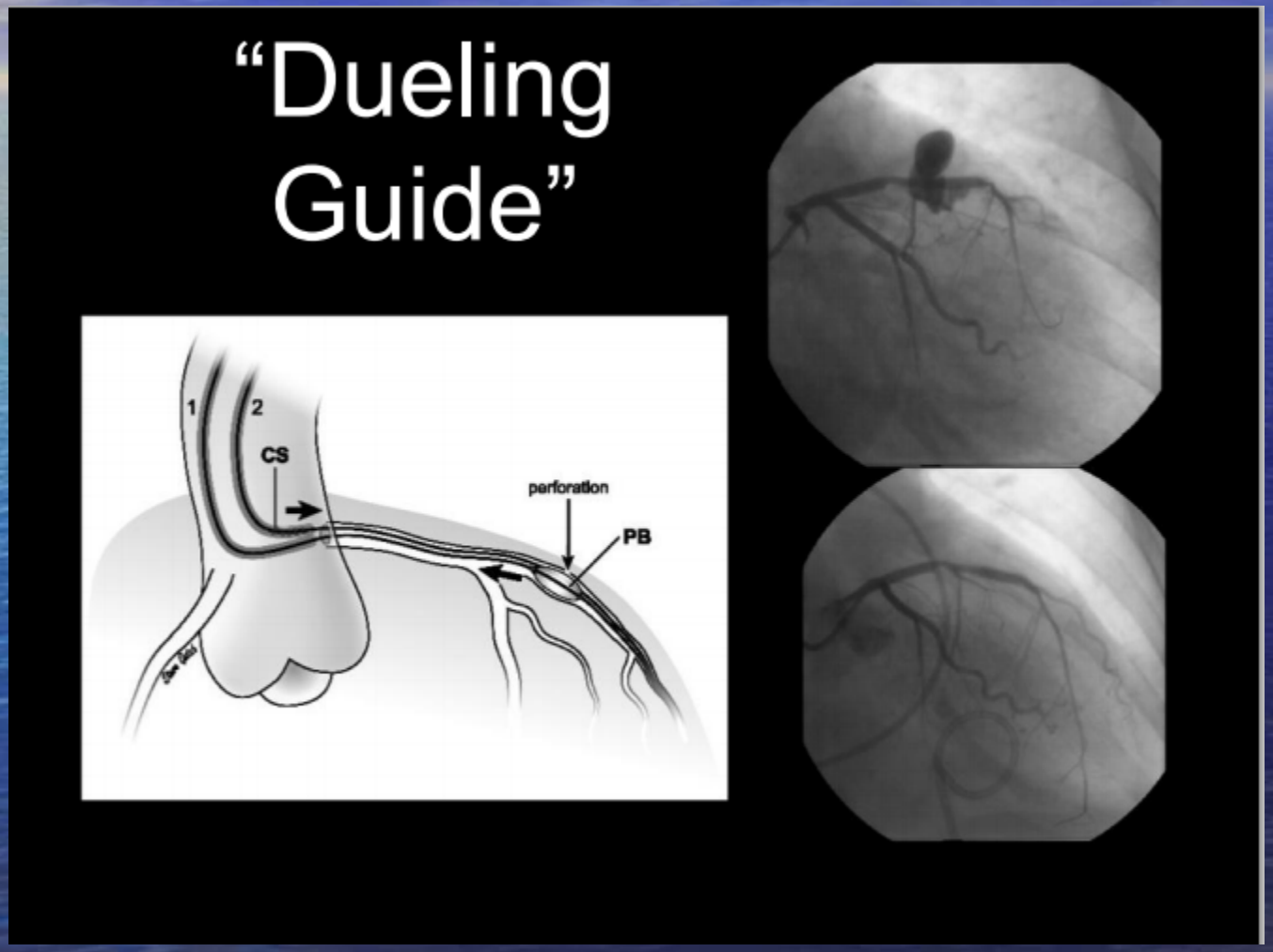
Compatible infusion catheters:

Inner diameter does not exceed 0.027 inch and accept 0.018 inch wire guides

Coil pusher: 0.018 inch



Dual guiding catheter technique

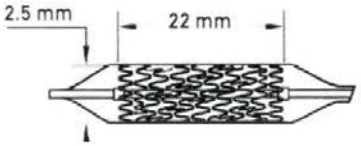


Tips

2.5mm

Guide Wire Diameter max. (inch)	Guiding Catheter Inner Diameter min. (inch)	Contents (pcs)
.014" (0.36 mm)	.056" (1.42 mm)	1

Caution: Federal (USA) law restricts this device to sale by or on the order of a physician.



Compliance Data

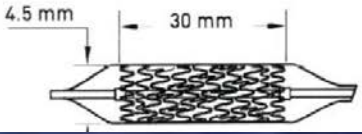
Pressure atm	Pressure (kPa)		Stent Inner Diameter (mm)
9	(912)	NP	2.50
10	(1013)		2.55
11	(1115)		2.59
12	(1216)		2.64
13	(1317)		2.69
14	(1419)		2.74
15	(1520)		2.78
16	(1621)	RBP	2.83

Δ = 0.24 mm (9.6%)

4.5mm

Guide Wire Diameter max. (inch)	Guiding Catheter Inner Diameter min. (inch)	Contents (pcs)
.014" (0.36 mm)	.056" (1.42 mm)	1

Caution: Federal (USA) law restricts this device to sale by or on the order of a physician.



Compliance Data

Pressure atm	Pressure (kPa)		Stent Inner Diameter (mm)
9	(912)	NP	4.50
10	(1013)		4.62
11	(1115)		4.74
12	(1216)		4.86
13	(1317)		4.99
14	(1419)	RBP	5.11

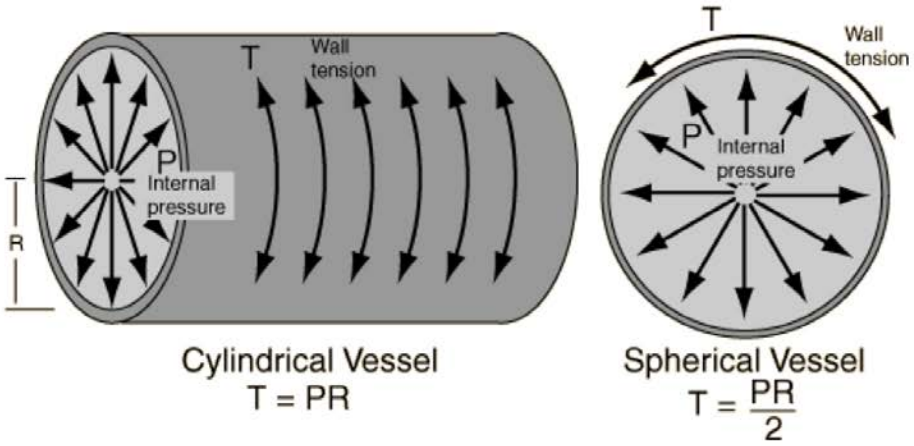
Δ = 0.61 mm (13.5%)

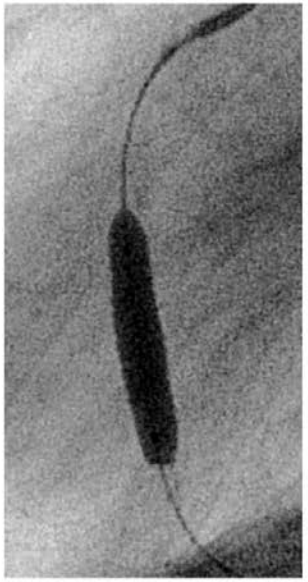
Karlovarská krajská nemocnice

Tips

LaPlace's Law

The larger the vessel radius, the larger the wall tension required to withstand a given internal fluid pressure.





In hospital clinical outcomes after CAP

In-hospital clinical outcomes	
	Coronary perforation N=20
Death (%)	0 (0%)
Myocardial infarction (%)	12 (60%)
Stroke (%)	1(5%)
Target lesion revascularisation	1 (5%)
Acute stent thrombosis (%)	0 (0%)
Length of stay (days)	7±6

- Mansour, Universite de Montreal, 2011

Long term clinical outcomes after CAP

Long term clinical outcomes (n=19)	
Median (days)	482 (29-1030)
Death (%)	1 (5%)
Myocardial infarction (%)	0 (0%)
Stroke (%)	0 (0%)
Target lesion revascularisation : PCI CABG	2 (10%) 1 1
Angina	3 (15%)

- Mansour, Universite de Montreal, 2011

Karlovarská krajská nemocnice

Conclusion

- Despite to using modern techniques (and sometimes because of) CAP is a rare, but potentionally fatal complication of PCI. The in hospital rate of MI is high but long term prognosis (if treated adequately) is good.
- Awarness of risk factors and prompt dealing with the complication with measures taken according to seriousness of the state are crucial. Awarness of possibility of delayed emergence of pericardial effusion is also important.
- Deployment of covered stents is prevailing method of choice in dealing with CAP.

Karlovarská krajská nemocnice

Thanks for the attention