INTERNÍ KARDIOLOGICKÁ KLINIKA
FN BRNO a LF MU

Katetrizační léčba plicní embolie

Petr Kala
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FAKULTNÍ NEMOCNICE BRNO
MUNI MED

Petr Kala

	Nemám konflikt zájmů	Mám konflikt zájmů	Specifikace konfliktu (vyjmenujte subjekty, firmy či instituce, se kterými Vaše spolupráce může vést ke konfliktu zájmů)
Zaměstnanecký poměr	X		
Vlastník / akcionář	X		
Konzultant	X		Abbott, Boston Scientific
Přednášková činnost		X	
Člen poradních sborů (advisory boards)		X	Boston Scientific, Medtronic
Podpora výzkumu / granty		X	Novartis
Jiné honoráře (např. za klinické studie či registry)		X	

Katetrizační léčba trombembolie

Lokální trombolýza hluboké žilní trombózy

Lokální trombolýza plicní embolie

Katetrizační léčba PE bez trombolýzy

Risk klasifikace PE

Early mortality risk		Indicators of risk			
		Haemodynamic instability[a]	Clinical parameters of PE severity and/ or comorbidity: PESI class III–V or sPESI ≥I	RV dysfunction on TTE or CTPA[b]	Elevated cardiac troponin levels[c]
High		+	(+)[d]	+	(+)
Intermediate	Intermediate–high	-	+[e]	+	+
	Intermediate–low	-	+[e]	One (or none) positive	
Low		-	-	-	Assesment optional; if assessed, negative

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Guidelines ESC 2019

Recommendations	Class[b]	Level[c]
It is recommended that anticoagulation with UFH, including a weight-adjusted bolus injection, be initiated without delay in patients with high-risk PE.	I	C
Systemic thrombolytic therapy is recommended for high-risk PE. [282]	I	B
Surgical pulmonary embolectomy is recommended for patients with high-risk PE, in whom thrombolysis is contraindicated or has failed.[d] [281]	I	C
Percutaneous catheter-directed treatment should be considered for patients with high-risk PE, in whom thrombolysis is contraindicated or has failed.[d]	IIa	C
Norepinephrine and/or dobutamine should be considered in patients with high-risk PE.	IIa	C
ECMO may be considered, in combination with surgical embolectomy or catheter-directed treatment, in patients with PE and refractory circulatory collapse or cardiac arrest.[d] [252]	IIb	C

Percutaneous catheter-directed treatment should be considered for patients with high-risk PE, in whom thrombolysis is contraindicated or has failed.[d] IIa C

ECMO may be considered, in combination with surgical embolectomy or catheter-directed treatment, in patients with PE and refractory circulatory collapse or cardiac arrest.[d] [252] IIb C

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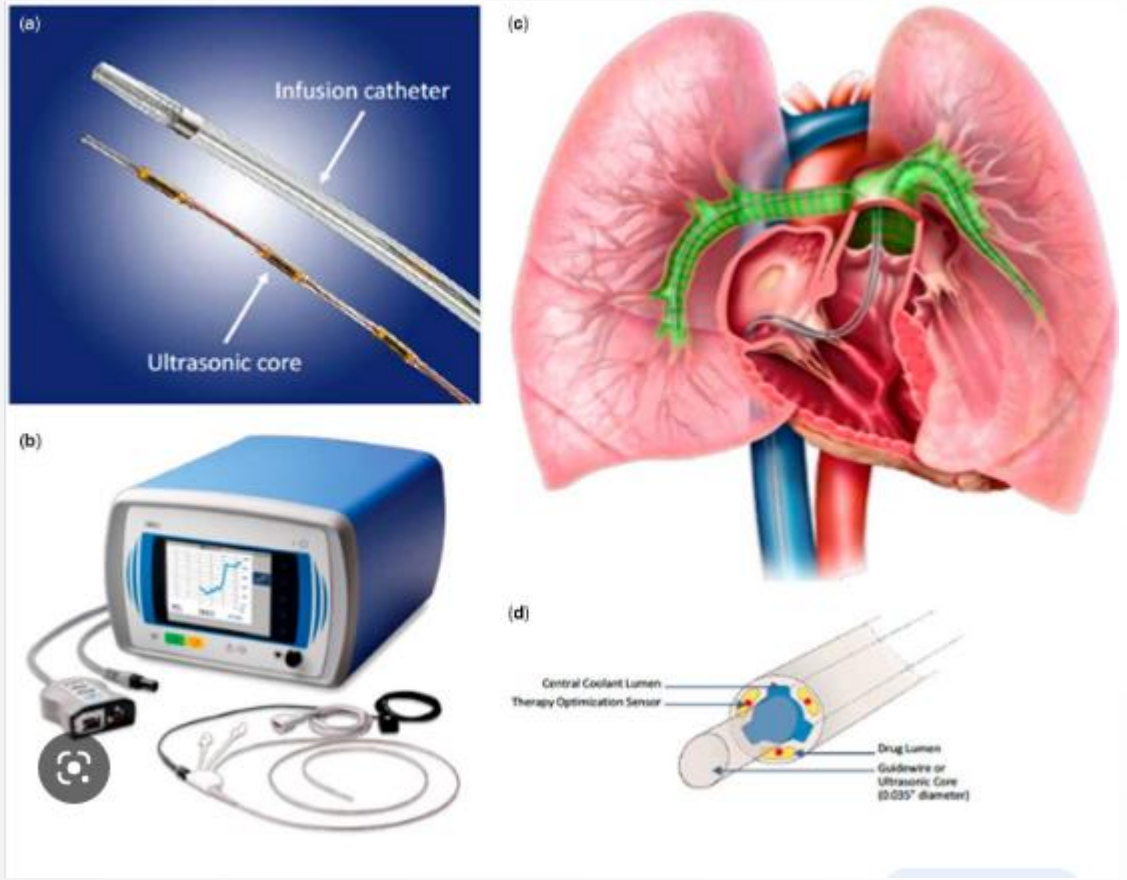
JACC GUIDELINE COMPARISON

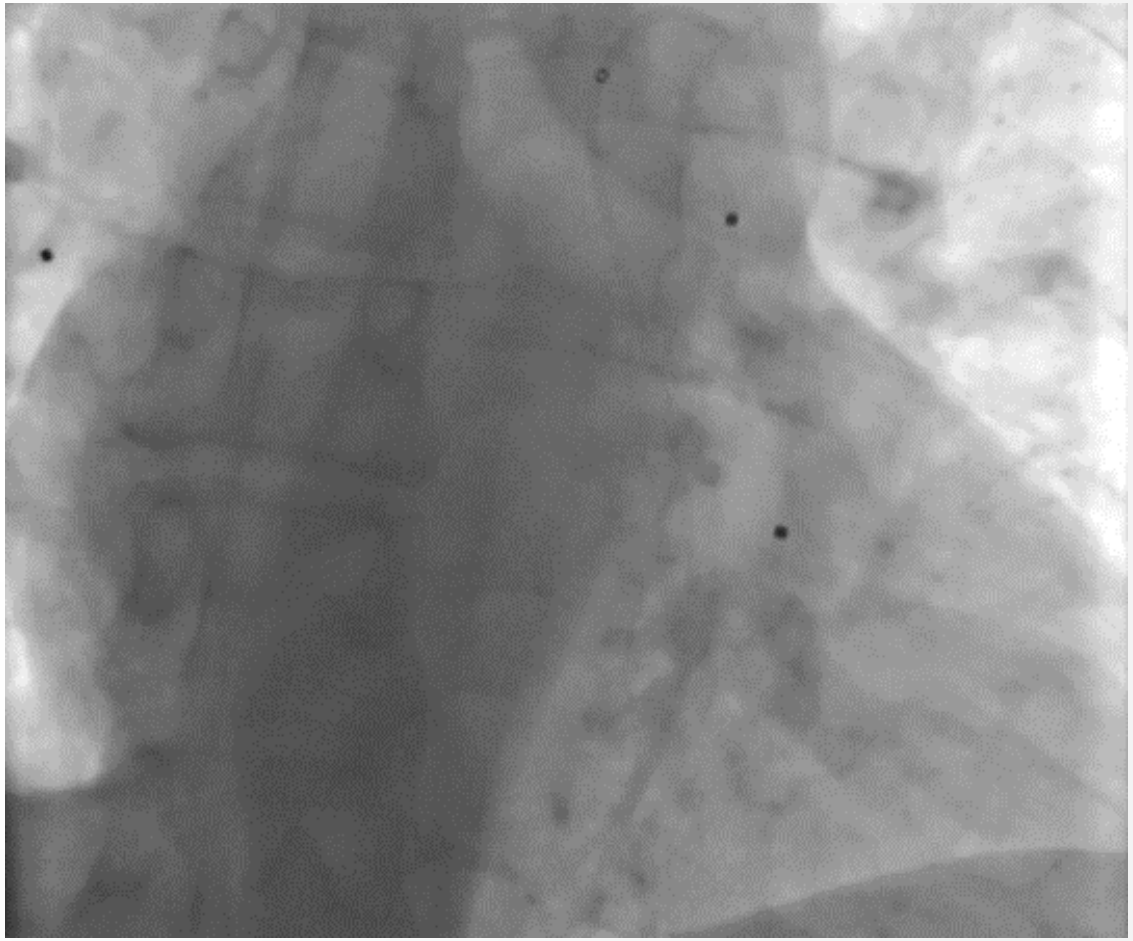
International Clinical Practice Guideline Recommendations for Acute Pulmonary Embolism

Harmony, Dissonance, and Silence

✓ Suggested ⚠ Not Addressed ✗ Not Recommended	ESC/ERS[2]	PERT[12]	CHEST[13]	AHA[14]	ASH[15]	NICE[20]
Recommendation for risk stratification	✓	✓	⚠ a	✓	⚠	⚠
Definition provided for low-risk PE	✓	✓	✓	✓	✓	⚠
Definition provided for intermediate-risk (submassive) PE	✓	✓	⚠	✓	✓	⚠
Definition provided for intermediate-low risk PE	✓	✓	⚠	⚠	⚠	⚠
Definition provided for intermediate-high risk PE	✓	✓	⚠	⚠	⚠	⚠
Surgical embolectomy in hemodynamically unstable PE patients	✓	✓	⚠	⚠	⚠	✓ e
CDIs in hemodynamically unstable PE patients in whom systemic fibrinolysis has failed or is contraindicated	✓	✓	✓	✓	✓ c	⚠ f
CDIs in hemodynamically stable experiencing hemodynamic and/or respiratory worsening	✓	✓	✓	✓	⚠ d	⚠ f
Extracorporeal Membrane Oxygenation (ECMO)	✓ a	✓	⚠	⚠	⚠	⚠

Katetrizační terapie





INTERNÍ KARDIOLOGICKÁ KLINIKA FN BRNO a LF MU

Intermediate risk PE – PEARLESS RCT

Circulation

CIRCULATION. 2024; [PUBLISHED ONLINE AHEAD OF PRINT] DOI: 10.1161/CIRC

LARGE-BORE MECHANICAL THROMBECTOMY VERSUS CATHETER-DIRECTED THR
OF INTERMEDIATE-RISK PULMONARY EMBOLISM: PRIMARY RESULTS OF THE PE
TRIAL

WISSAM A. JABER, MD; CARIN F. GONSALVES, MD; STEFAN STORTECKY, MD; MPH; SAMUEL HORR, MD;
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COMMITTEES AND INVESTIGATORS

CIRCULATION

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Trial design

Eligibility criteria

Inclusion

- SBP > 90 mmHg + central clot + RV dysfunction
- Symptom onset within 14 days
- Intervention planned within 72 hours
- + ≥ 1 additional clinica
  - Elevated cardiac troponin
  - History of heart failure
  - History of chronic lung dis
  - Heart rate ≥ 110 bpm
  - SBP < 100 mmHg

Exclusion

- Unable to receive AC
- Right heart clot in tran
- Life expectancy < 30 d
- CTEPH/CTED
- sPAP ≥ 70 mmHg on

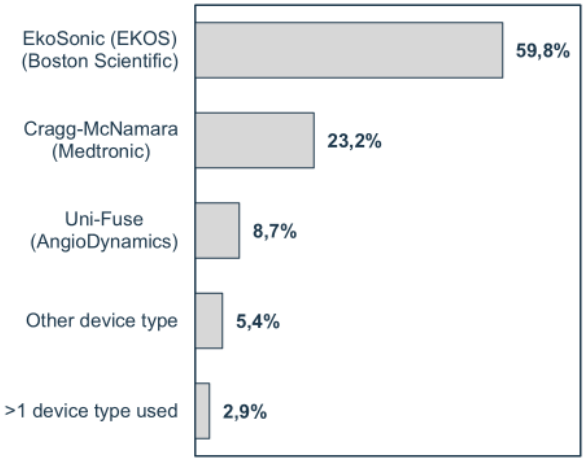
Treatment and follow-up

Absolute contraindication to thrombolytics? → Yes → **Parallel LBMT registry (FlowTriever System)**

No

Device and procedure information

CDT device used



	CDT N = 276
tPA infusion rate per lung, mg/hour	1.0 [0.5, 1.0]
tPA infusion duration per lung, hours	12.0 [6.0, 15.6]
Total tPA dose per patient, mg	16.0 [12.0, 24.0]

Values reported as median [IQR].
tPA infusion rate and duration per lung: N=242.
Total tPA dose: N=261.

	CDT N = 276	LBMT N = 274
Procedure time, minutes	65.3 ± 42.5	93.2 ± 36.1
Treatment catheter dwell time, minutes	915.7 ± 464.7	47.9 ± 27.2
Estimated blood loss, mL	14.4 ± 22.2	87.7 ± 87.6
Time from admission to therapy, hr	22.3±17.7	24.8±19.6

Values reported as mean ± SD.
Procedure time: N=274 CDT, N=272 LBMT.
Treatment catheter dwell time: N=269 CDT, N=272 LBMT.
Estimated blood loss: N=228 CDT, N=245 LBMT.

INTERNÍ KARDIOLOGICKÁ KLINIKA FN BRNO a LF MU

Intermediate risk PE – PEARLESS RCT

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CIRCULATION

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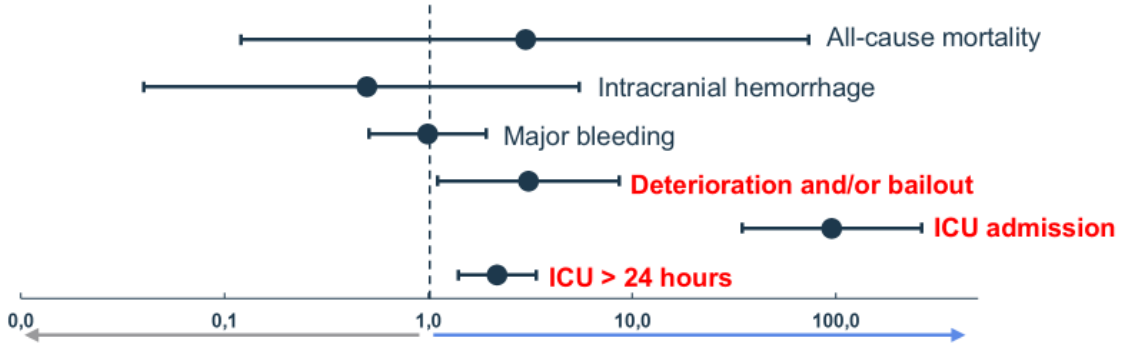
Results: Win ratio endpoints

Primary endpoint
(LBMT wins / CDT wins)
5.01

Results: Win ratio components



	CDT events	LBMT events	Odds ratio [95% CI]	*P* value
All-cause mortality	1 (0.4)	0 (0.0)	2.99 [0.12–73.70]	1.00
Intracranial hemorrhage	1 (0.4)	2 (0.7)	0.50 [0.04–5.51]	0.62
Major bleeding	19 (6.9)	19 (6.9)	0.99 [0.51–1.92]	1.00
Clinical deterioration and/or escalation to bailout therapy	15 (5.4)	5 (1.8)	3.09 [1.11–8.63]	**0.038**
Postprocedural ICU admission	272 (98.6)	114 (41.6)	95.4 [34.6–263.6]	**< 0.001**
ICU stay > 24 hours*	178 (65.4)	53 (46.5)	2.18 [1.40–3.40]	**< 0.001**

Values reported as n (%) or OR [95% CI]. *P* values calculated using two-sided Fisher's exact test. ICH: N=275 CDT. *Percentages reported out of patients with postprocedure ICU admission.

Prague 26 RCT

Srovnání katetrizační léčby (lokální trombolýzy) intermediate-high risk plicní embolie se standardní antikoagulační léčbou

Cílem 558 pacientů v průběhu dvou let

8 center aktivních

Aktuálně: 320 pacientů, (110 ve FN Brno)

Randomizace 1:1

Ideálně do 24h od prezentace, procedura do 3h od randomizace

High risk PE - Guidelines

Recommendations	Class[b]	Level[c]
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IIa

C

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IIb

C

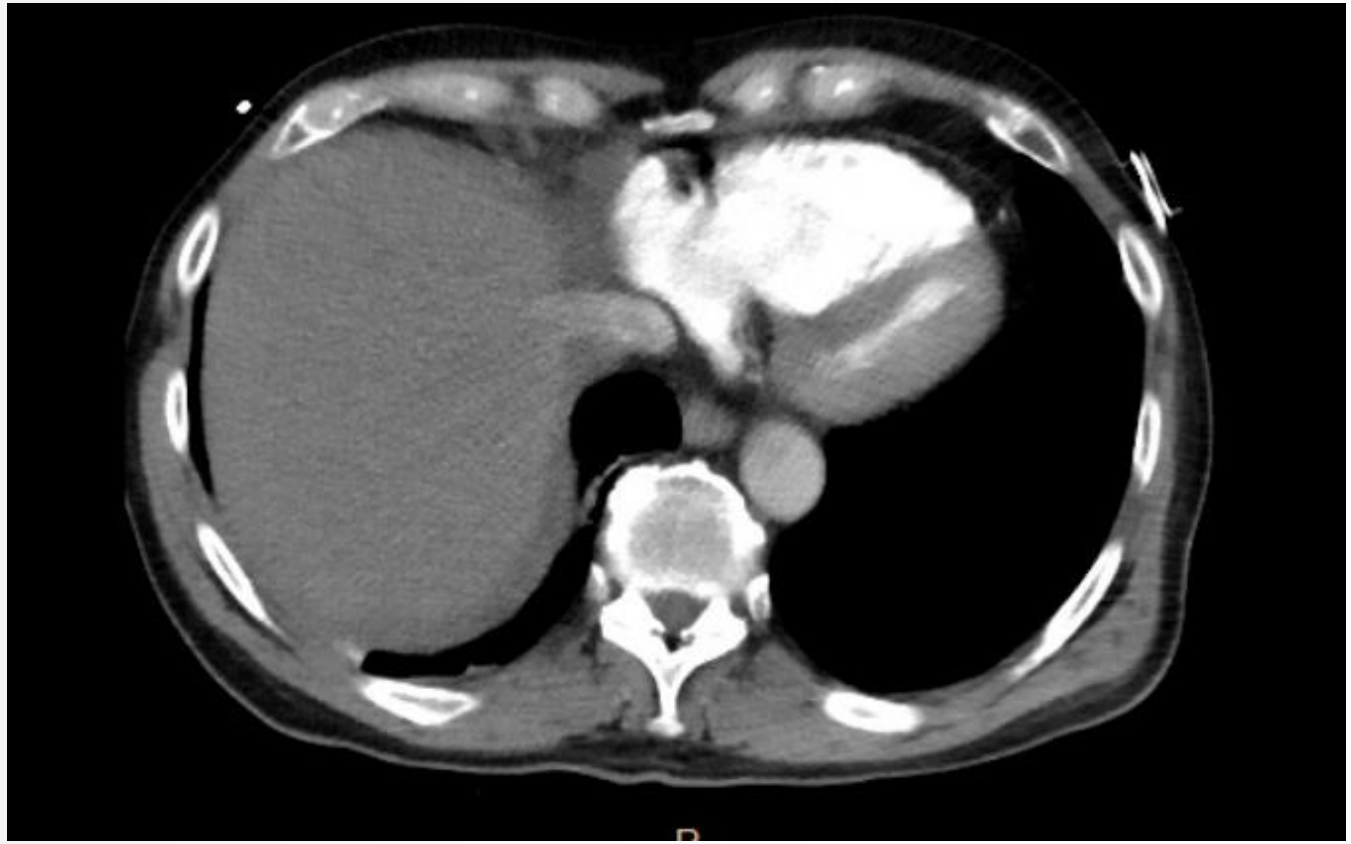
High risk plicní embolie

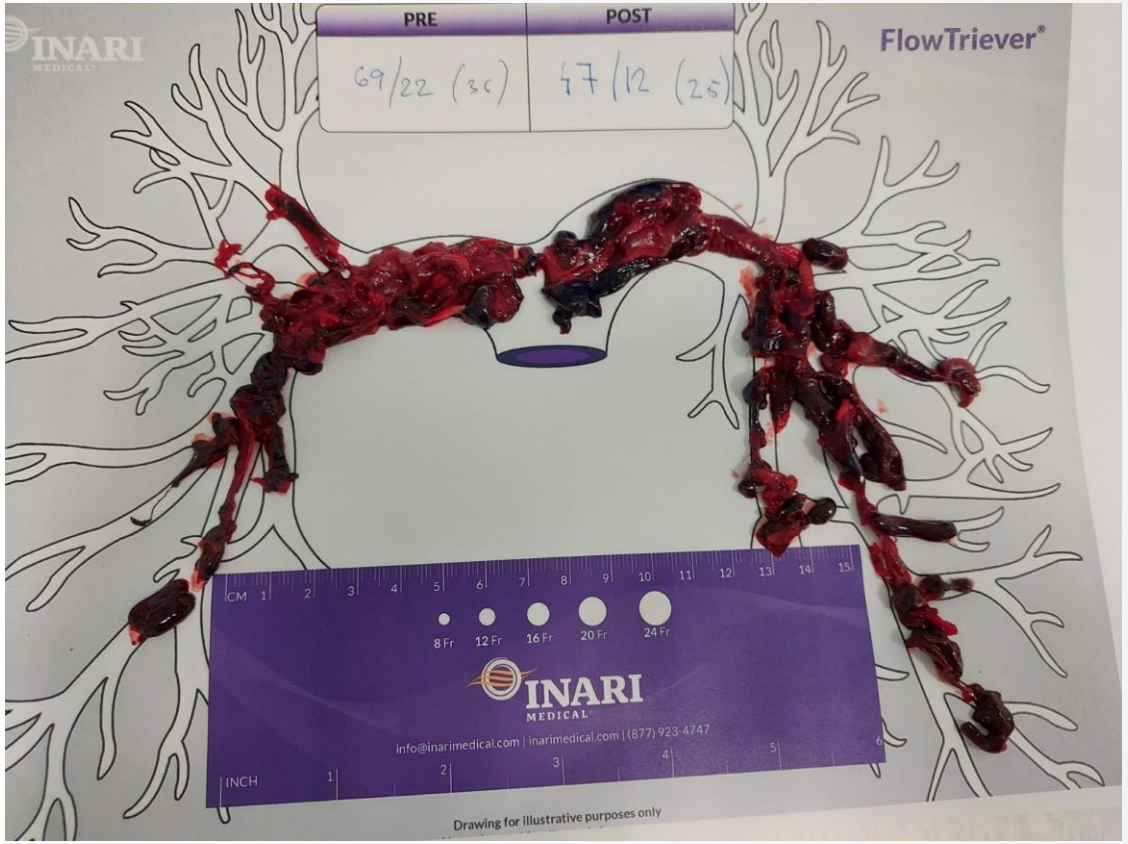
Muž 1953, 10dní po OS femuru, kolaps v rámci rehabilitace, krátká KPCR

Transfer k nám, hraniční oběhová stabilizace na katecholaminech, při KI systémové trombolýzy rozhodnuto o katetrizační léčbě

Při zahájení intervence zhroucení oběhu, KPCR, OTI, rescue trombolýza, napojení ECMO

Dokončení trombektomie




PRE
POST
69/22 (30)
47/12 (25)
INARI
MEDICAL
FlowTriever®
CM
8 Fr
12 Fr
16 Fr
20 Fr
24 Fr
INARI
MEDICAL
info@inarimedical.com | inarimedical.com | (877) 923-4747
INCH
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INTERNÍ KARDIOLOGICKÁ KLINIKA FN BRNO a LF MU

High risk plicní embolie

Muž 1953, 10dní po OS pro fr. prox. femuru, kolaps v rámci rehabilitace, krátká KPCR

Transfer k nám, zde hraniční oběhová stabilizace na katecholaminech, při KI systémové trombolýzy rozhodnuto o katetrizační léčbě

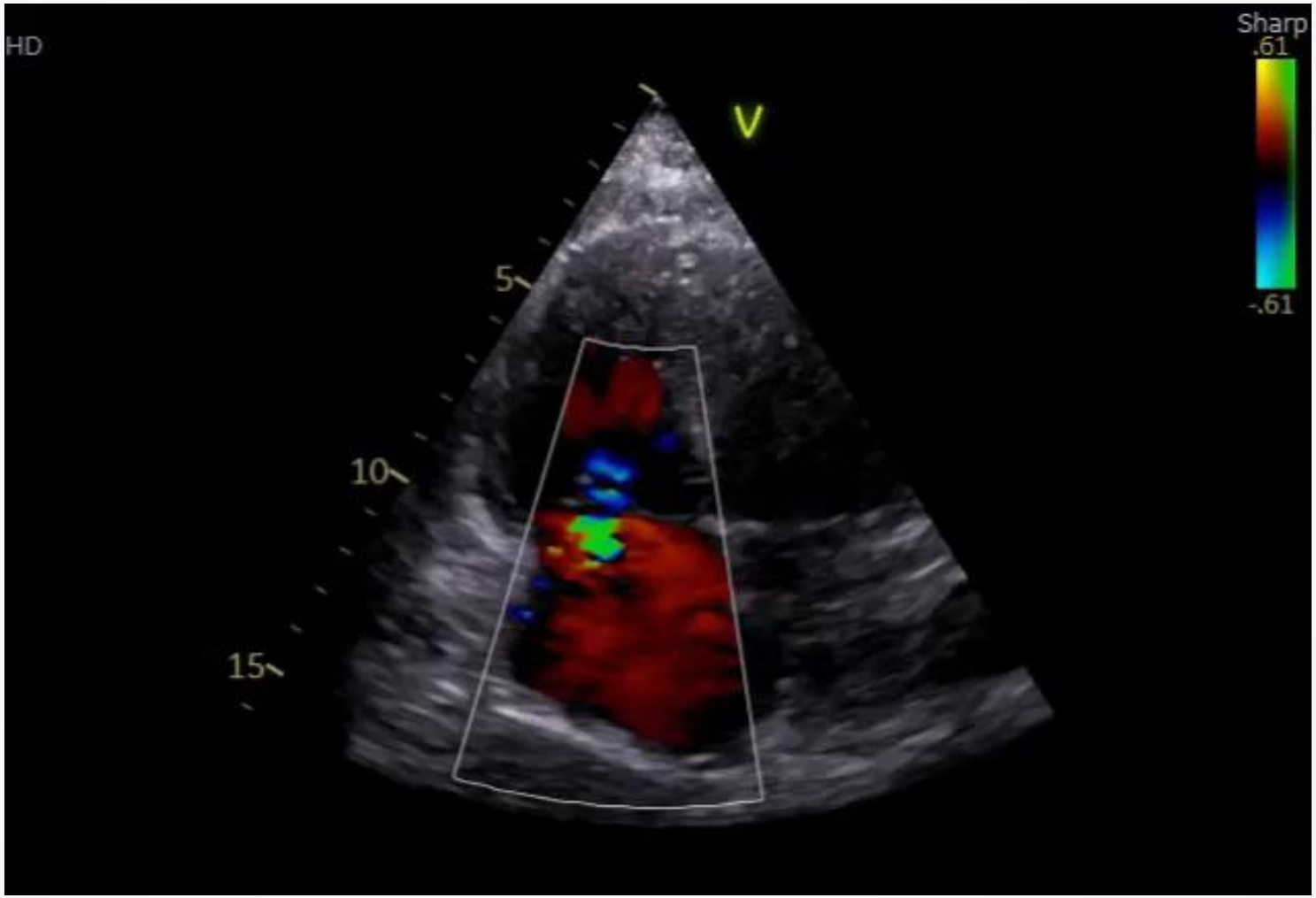
Při zahájení intervence zhroucení oběhu, KPCR, OTI, rescue trombolýza, napojení ECMO

Dokončení embolektomie

ECMO 4 dny, ÚPV týden, stabilizace stavu, propuštění domů

INTERNÍ KARDIOLOGICKÁ KLINIKA FN BRNO a LF MU

High risk plicní embolie



High risk plicní embolie

Systémová trombolýza

Kardiochirurgická embolektomie

Katetrizační léčba bez trombolytika

- pacienti s kontraindikací trombolýzy (pooperační stavy, po úrazech, po neurochirurgii, po SC, traumatickém porodu, po iktu, anamnéza ICH, ..)
- pacienti celkově rizikoví (věk, onkologie, trombocytopenie, koagulopathie, celková křehkost, …)
- selhání systémové trombolýzy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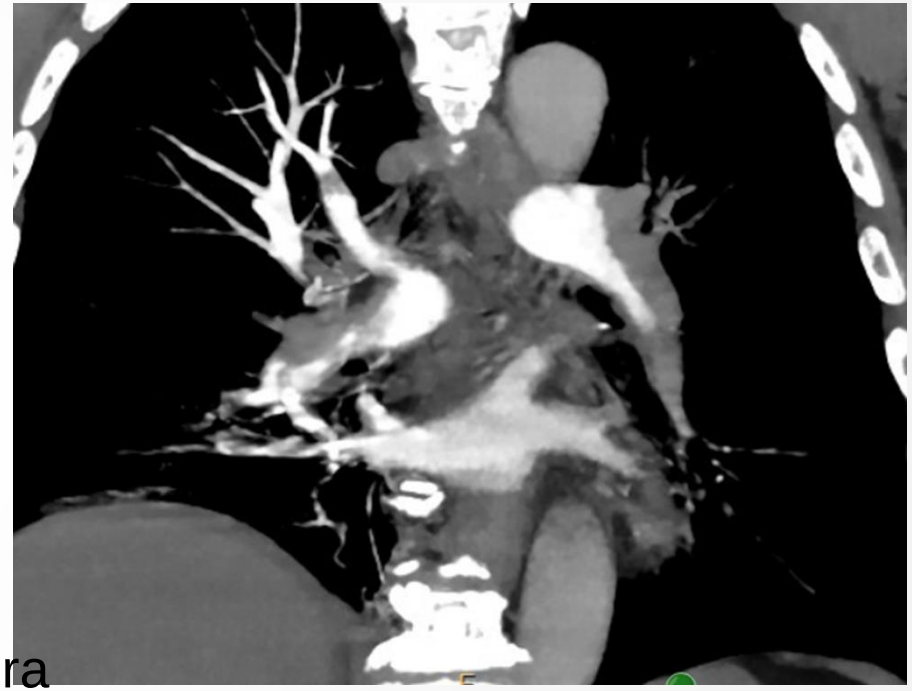
High risk plicní embolie

Systémová trombolýza
Kardiochirurgická embolektomie
Katetrizační léčba bez trombolytika
- pacienti s kontraindikací trombolýzy (pooperační stavy, po úrazech, po neurochirurgii, po SC, traumatickém porodu, po iktu, anamnéza ICH, ..)
- pacienti celkově rizikoví (věk, onkologie, trombopenie, koagulopathie, celková křehkost, …)
- selhání systémové trombolýzy, ECMO

PERT (Pulmonary Embolism Response Teams)
- kardiolog, intenzivista, intervenční kardiolog

Katetrizační léčba PE - SHRNUTÍ

1. **PERT tým** *(intermediate-high / high risk PE)*
2. **Komplexní zhodnocení pacienta**
   - Klinika, Echo, CTPA…laktát?, jiné?
3. **MSP – ECMO**
4. **Intermediate/intermediate-high risk PE**
   1. CDL - lokální TL *(různé režimy a instrumentárium)*
   2. USCDL – lokální TL UZ asist.
   3. Aspirační trombektomie bez TL
   4. Lokální TL vs UFH
5. **High-risk PE (time matters..)**
   1. Systémová TL
   2. Mechanická trombektomie bez TL – Flowtriever/Penumbra
6. **Zkušenost**
7. **24/7 dostupnost?**



Katetrizační léčba PE - SHRNUTÍ

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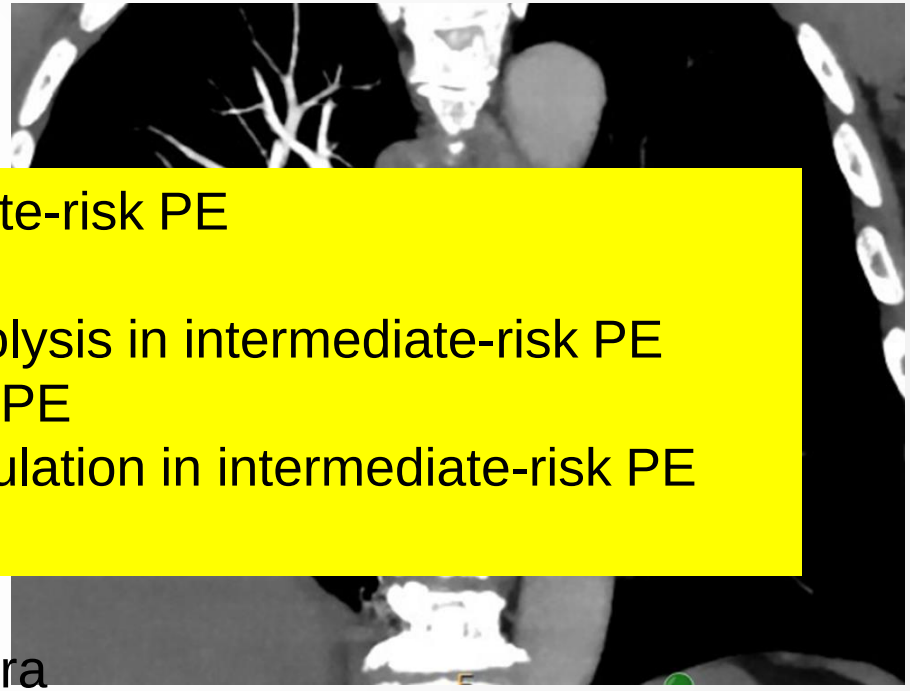
2. **Komplexní zhodnocení pacienta**
   - Klinika, Echo, CTPA…laktát?, jiné?
3. **MSP – ECMO**
4. **I**
5. **I**
   1. Systémová TL
   2. Mechanická trombektomie bez TL – Flowtriever/Penumbra
6. **Zkušenost**
7. **24/7 dostupnost?**



PEERLESS II: FlowTriever vs anticoagulation in intermediate-risk PE
STORM-PE: Indigo CAT16 vs anticoagulation
STRATIFY: USCDL vs anticoagulation vs systemic thrombolysis in intermediate-risk PE
HI-PEITHO: USCDL vs anticoagulation in intermediate-risk PE
PE-TRACT: CDL or mechanical thrombectomy vs anticoagulation in intermediate-risk PE
PRAGUE-26

Hodně štěstí!