Embolia polmonare: dall'anticoagulante alle opzioni interventistiche

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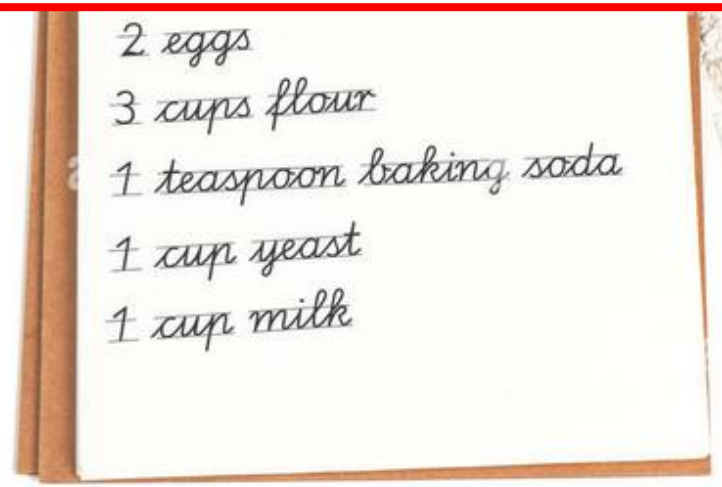
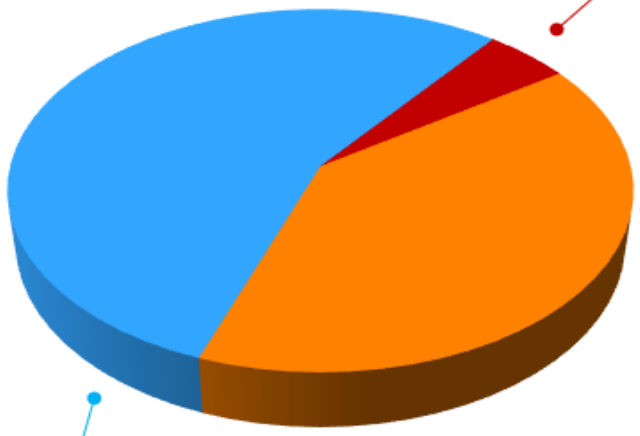
Quali sono gli «ingredienti» giusti per avviare un programma di trattamento invasivo della EP?



Conosciamo la dimensione del problema?

TEP: DIMENSIONE DEL PROBLEMA

Terza causa di morte per patologia CV
Patologia ad ampio spettro di gravità di presentazione
Fondamentale la stratificazione del rischio



MASSIVE PE
[High risk]
5% PE population
58%[1] **mortality** @ 3 months

SUBMASSIVE PE
[Moderate/Intermediate risk]
40% PE population
2-3%[2,3] **mortality** to
21%[1] **mortality** @ 3 months

MINOR PE
[Low risk]
55% PE population
Good prognosis
Low mortality rate

1. Goldhaber SZ et al. Acute pulmonary embolism: clinical outcomes in the International Cooperative Pulmonary Embolism Registry (ICOPER). Lancet 1999;353:1386-1389
2. Meyer G et al. Fibrinolysis for Patients with Intermediate Risk Pulmonary Embolism. New Engl J Med 2014; 370: 1402-11
3. Casazza F et al. Clinical features and short term outcomes of patients with acute pulmonary embolism. The Italian Pulmonary Embolism Registry (IPER). Thrombosis Research 2012; 130:847-852

Sappiamo come stratificare il paziente?

STRATIFICAZIONE «MULTIMODALE» DEL RISCHIO

Rischio di mortalità precoce		Segni di instabilità emodinamica (almeno un criterio presente)			PESI – sPESI	Parametri strumentali	Parametri di laboratorio
Rischio alto		RCP all'esordio	PAS <90 mmHg oppure necessità di impiegare vasopressori per ottenere una PAS ≥90 mmHg nonostante un'adeguata idratazione + segni di ipoperfusione sistemica*	PAS <90 mmHg oppure riduzione della PAS ≥40 mmHg per più di 15 min**	Valutazione non necessaria	VD/VS ≥1 TAPSE <16 mm Presenti ma non necessari	Troponine T o I positive ma non necessarie
Rischio intermedio	Intermedio-alto	Assenti			PESI ≥III sPESI ≥1	VD/VS ≥1 TAPSE <16 mm	Positive
	Intermedio-basso	Assenti			PESI ≥III sPESI ≥1	Presenza di uno o nessuno dei due parametri	
Rischio basso		Assenti			PESI <III sPESI =0	Assenti	Negative

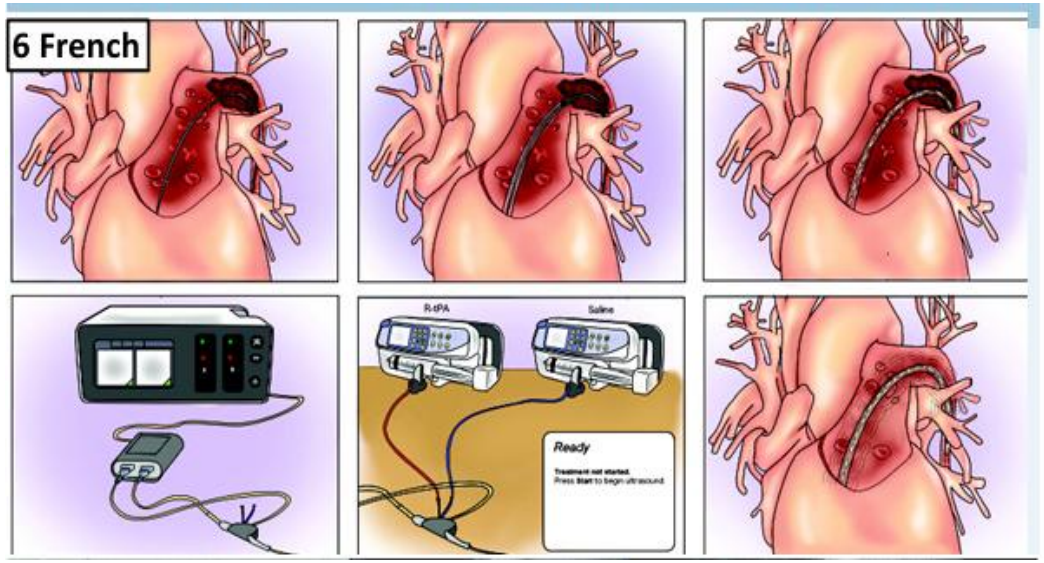
PAS, pressione arteriosa sistolica; PESI, Pulmonary Embolism Severity Index; sPESI, versione semplificata cel Pulmonary Embolism Severity Index; RCP, rianimazione cardiopolmonare; TAPSE, escursione sistolica del piano anulare tricuspidale; VD/VS, rapporto ventricolo destro/ventricolo sinistro.
*Stato mentale alterato, cute sudata, oliguria/anuria, aumento dei lattati.
**Esclusa causa aritmica, ipovolemia e setticemia.

ESC 2019 eG Ital Cardiol 2024;25(11 Suppl 3):5S-23S

Abbiamo delle tecnologie transcatetere adeguate?

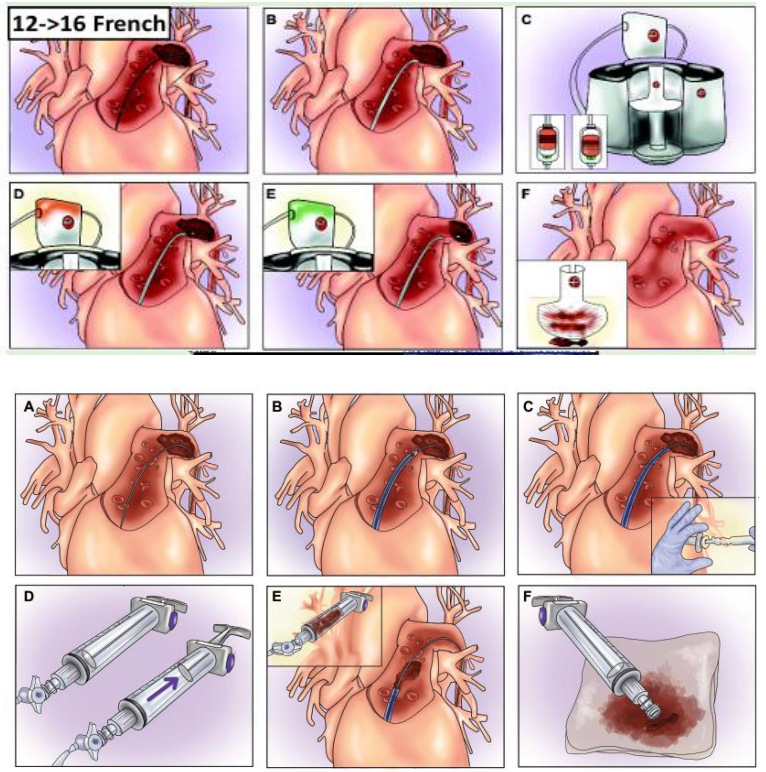
TROMBOLISI LOCO-REGIONALE ASSISTITA DA ULTRASUONI

- Target: trattamento trombosi prevalentemente distali
- Infusione 12h di bassa dose di trombolitico loco-regionale
- Adatto in pazienti con profilo emodinamico «stabile» senza controindicazioni a trombolisi
- Accesso vena femorale 6F, rapida esecuzione, rapido training operatore



TROMBECTOMIA MECCANICA PERCUTANEA

- Target: trattamento trombosi prossimali, massive, a cavaliere
- Rapidamente risolutiva, pazienti emodinamicamente instabili
- Non richiede trombolitico ma comporta blood loss da aspirazione
- Accesso venoso femorale di > dimensione (12->24F)
- Talora procedure più lunghe, maggior training operatore



Abbiamo delle evidenze a supporto del loro utilizzo?

EMBOLIA POLMONARE

6.6 Recommendations for acute-phase treatment of high-risk pulmonary embolism[a]

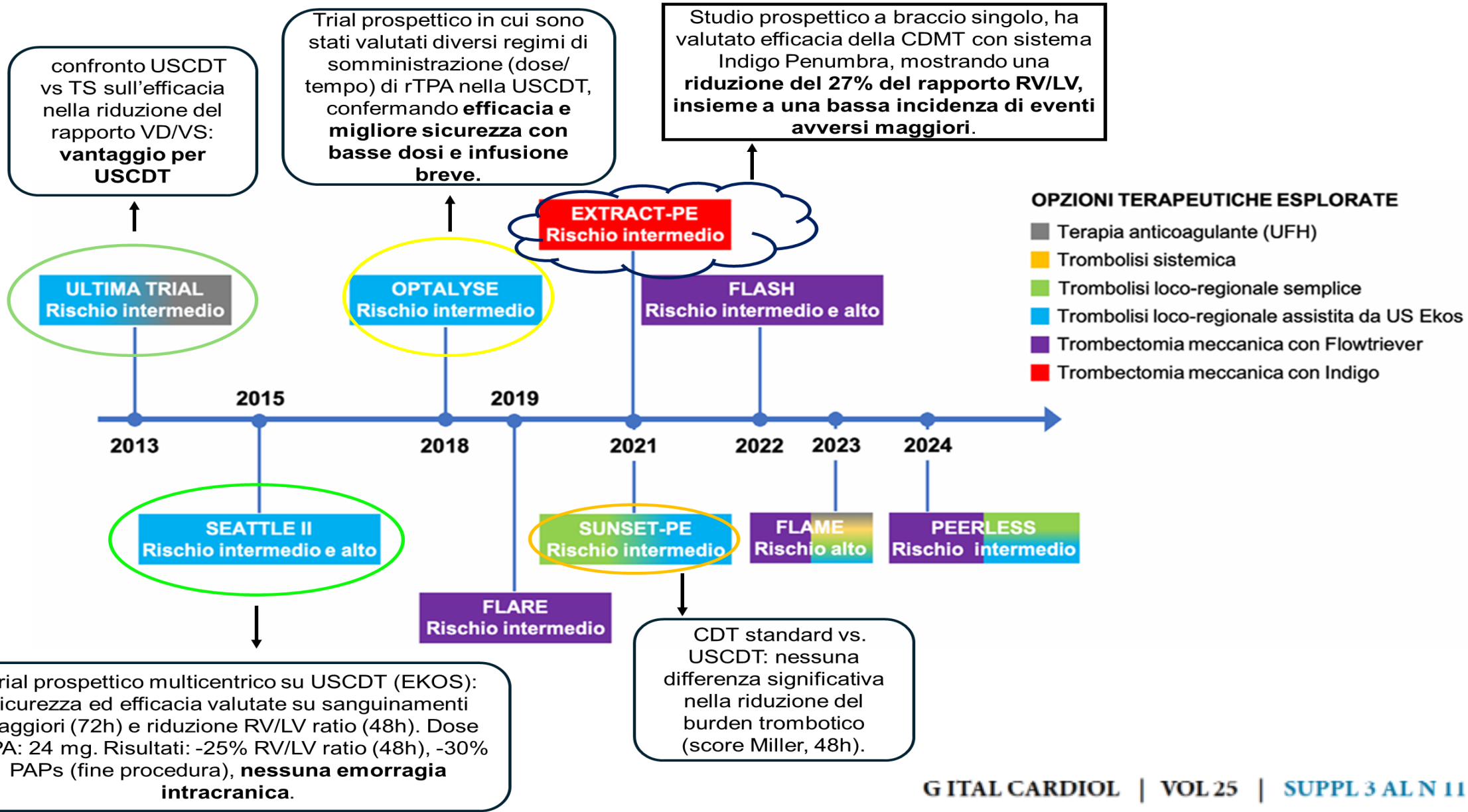
Recommendations	Class[b]	Level[c]
It is recommended that anticoagulation with UFH, including a weight-adjusted bolus injection, be initiated without delay in patients with high-risk PE.	I	C
Systemic thrombolytic therapy is recommended for high-risk PE. [282]	I	B
Surgical pulmonary embolectomy is recommended 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

6.7 Recommendations for acute-phase treatment of intermediate- or low-risk pulmonary embolism

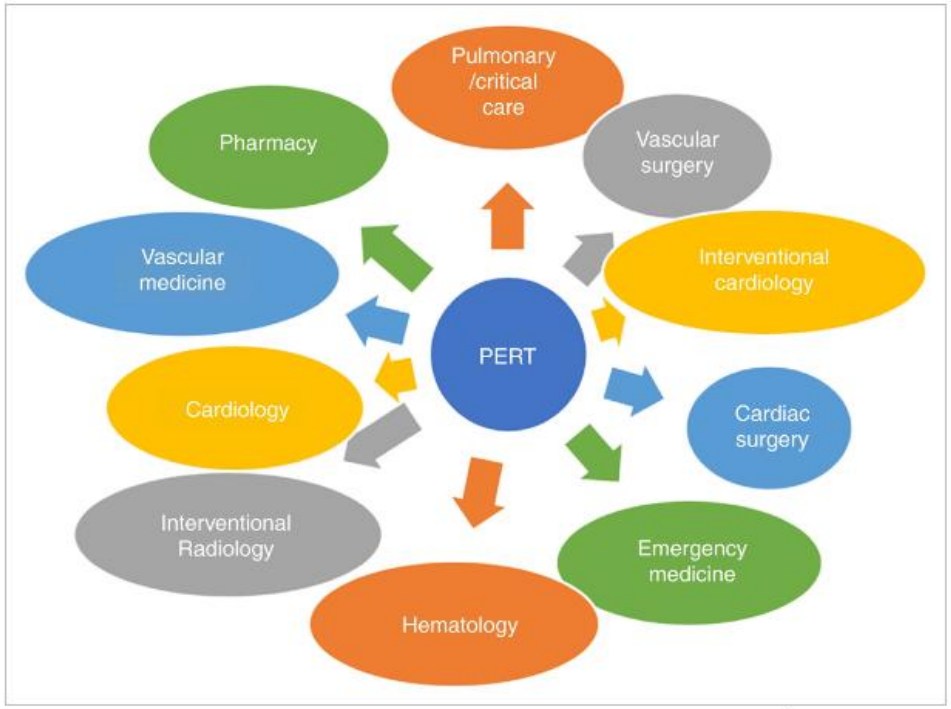
Recommendations	Class[a]	Level[b]
Initiation of anticoagulation		
Initiation of anticoagulation is recommended without delay in patients with high or intermediate clinical probability of PE,[c] while diagnostic workup is in progress.	I	C
If anticoagulation is initiated parenterally, LMWH or fondaparinux is recommended (over UFH) for most patients. [262,309–311]	I	
When oral anticoagulation is started in a patient with PE who is eligible for a NOAC (apixaban, dabigatran, edoxaban, or rivaroxaban), a NOAC is recommended in preference to a VKA. [260,261,312–314]	I	A
When patients are treated with a VKA, overlapping with parenteral anticoagulation is recommended until an INR of 2.5 (range 2.0–3.0) is reached. [315,316]	I	A
NOACs are not recommended in patients with severe renal impairment,[d] during pregnancy and lactation, and in patients with antiphospholipid antibody syndrome. [260,261,312–314]	III	C
Reperfusion treatment		
Rescue thrombolytic therapy is recommended for patients with haemodynamic deterioration on anticoagulation treatment. [282]	I	B
As an alternative to rescue thrombolytic therapy, surgical embolectomy[e] or percutaneous catheter-directed treatment[e] should be considered for patients with haemodynamic deterioration on anticoagulation treatment.	IIa	C
Routine use of primary systemic thrombolysis is not recommended in patients with intermediate- or low-risk PE.[c,f] [179]	III	B

ESC GL 2019

STUDI SU EFFICACIA DI TROMBOLISI US ASSISTITA E TROMBECTOMIA MECCANICA



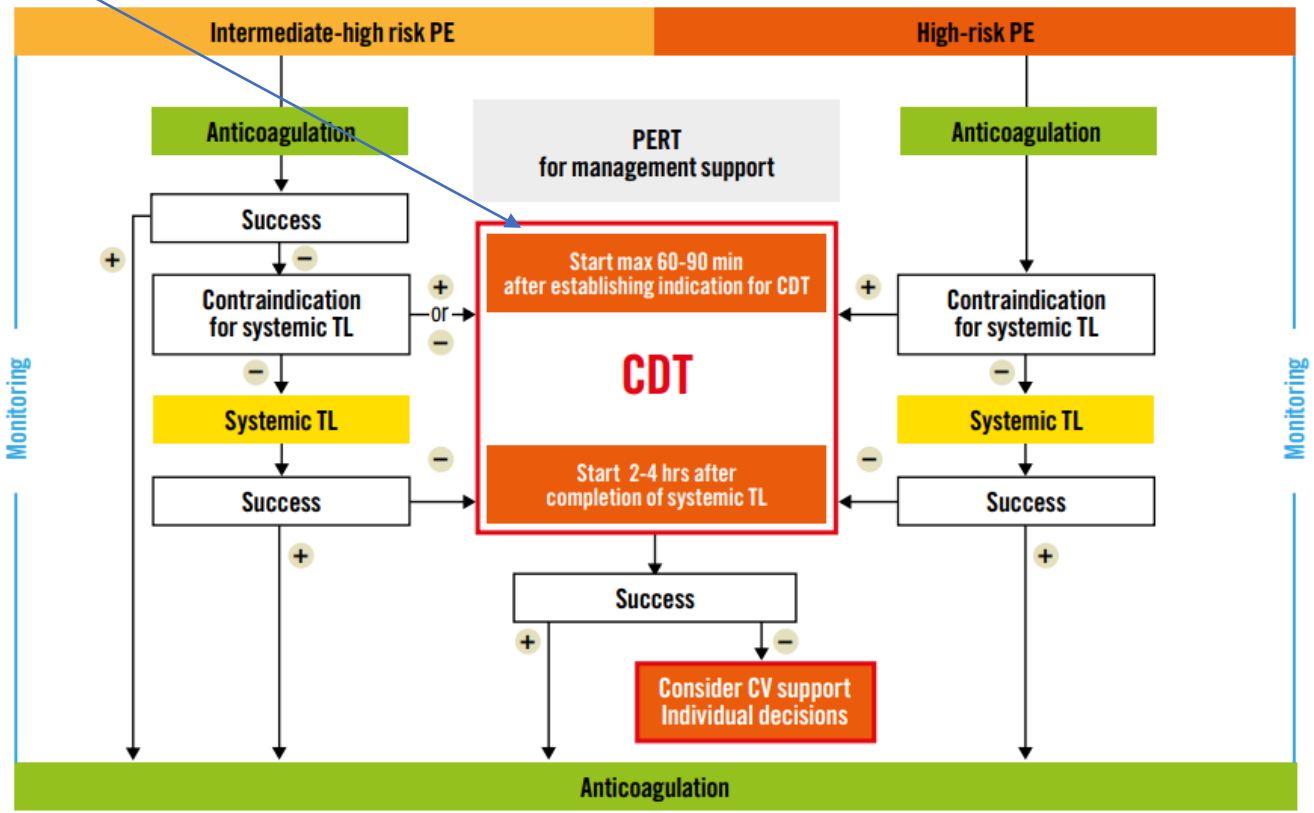
PERT=
TEAM DI RISPOSTA PER L'EMBOLIA POLMONARE



CATHETER DIRECTED THERAPIES

EuroIntervention

CENTRAL **ILLUSTRATION** Proposed algorithm and timelines of catheter-directed therapies (CDT) in high-risk and intermediate-high risk pulmonary embolism (PE).



CV: cardiovascular; PERT: Pulmonary Embolism Response Team; TL: thrombolysis

EuroIntervention 2022;18: e623- e63

G Ital Cardiol 2022;23(7 Suppl 2):13S-21S

Randomized Controlled Trial

Circulation OTTOBRE 2024

CUI

RESEARCH ARTICLE | Originally Published 29 October 2024 | Check for updates

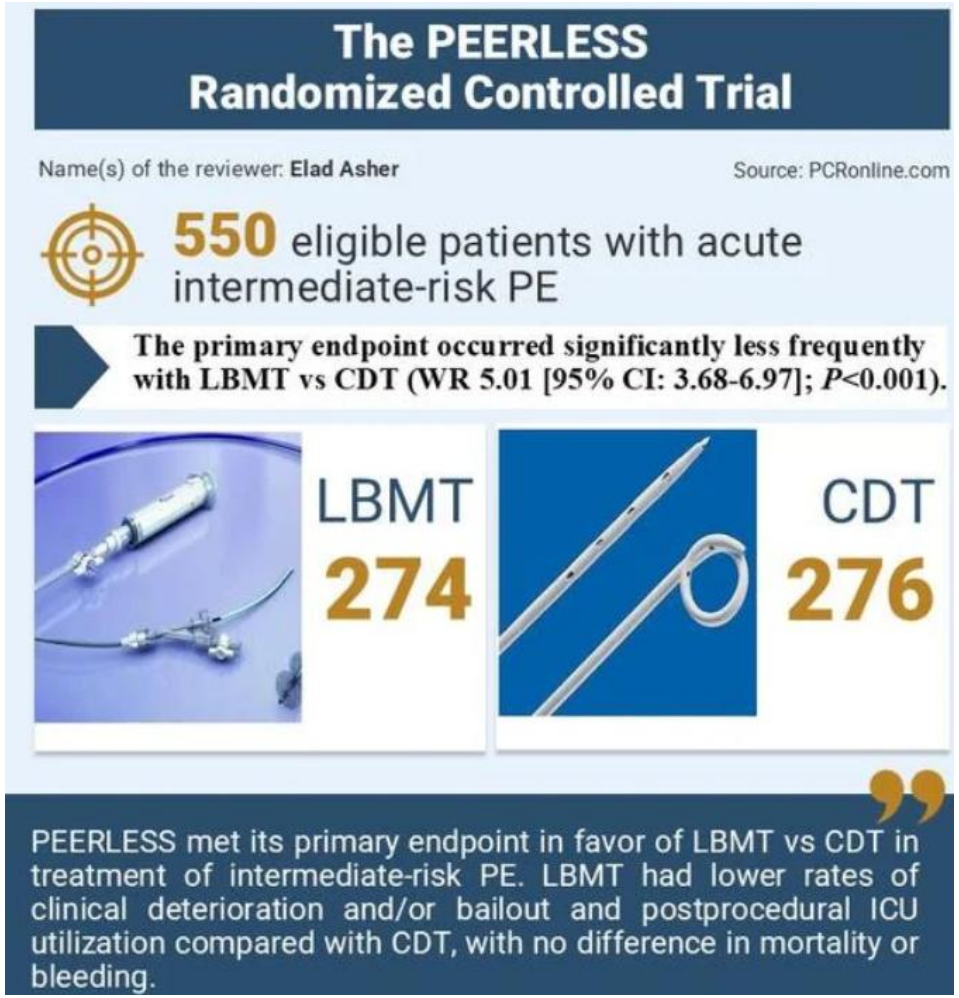
Large-bore Mechanical Thrombectomy Versus Catheter-directed Thrombolysis in the Management of Intermediate-risk Pulmonary Embolism: Primary Results of the PEERLESS Randomized Controlled Trial

Wissam A. Jaber, Carin F. Gonsalves, Stefan Stortecky, Samuel Horr, Orestis Pappas, Ripal T. Gandhi, Keith Pereira, Jay Giri, Sameer J. Khandhar, Khawaja Afzal Ammar, David M. Lasorda, Brian Stegman, Lucas Busch, David J. Dexter II, Ezana M. Azene, Nikhil Daga, Fakhir Elmasri, Chandra R. Kunavarapu, Mark E. Rea, Joseph S. Rossi, Joseph Campbell, Jonathan Lindquist, Adam Raskin, Jason C. Smith, Thomas M. Tamlyn, Gabriel A. Hernandez, Parth Rali, Torrey R. Schmidt, Jeffrey T. Bruckel, Juan C. Camacho, Jun Li, Samy Selim, Catalin Toma, Sukhdeep Singh Basra, Brian A. Bergmark, Bhavraj Khalsa, David M. Zlotnick, Jordan Castle, David J. O'Connor, and C. Michael Gibson for the PEERLESS Committees and Investigators SHOW FEWER AUTHOR INFO & AFFILIATIONS

Circulation • New online • https://doi.org/10.1161/CIRCULATIONAHA.124.072364

Primo RCT
INARI vs CDT/ USCDT

Limiti:
Open-label
CDT non standardizzato
Follow-up 30 giorni



Randomized Controlled Trial

Study name	Comparison	Inclusion	Estimated number	Primary outcomes	Expected completion date	ClinicalTrials.gov identifier
HI-PEITHO [54]	Ultrasound-facilitated CDT+anticoagulation *versus* anticoagulation alone	Intermediate-high-risk+additional clinical criteria of risk for death or haemodynamic collapse	406	Composite: PE-related death, cardiorespiratory collapse, non-fatal PE recurrence within 7 days	August 2026	NCT04790370
PE-TRACT [53]	CBT (CDT or aspiration thrombectomy)+anticoagulation *versus* anticoagulation alone	Intermediate-risk with main or lobar PE and RV/LV ratio >1	500	Peak oxygen consumption at 3 months, NYHA class at 12 months, major bleeding at 7 days	January 2027	NCT05591118
PEERLESS II [51]	Aspiration thrombectomy with FlowTriever system *versus* anticoagulation alone	Intermediate-risk with main or lobar PE, RV dysfunction, additional clinical risk factors	1200	Composite endpoint as win ratio: clinical deterioration (within 30 days or until discharge), hospital readmission, bailout therapy, dyspnoea at 48 h	July 2026	NCT06055920
PEITHO-3 [46]	Alteplase (reduced dose 0.6 mg·kg^{-1} maximum 50 mg) *versus* placebo	Intermediate-high-risk+either SBP ≤110, RR >20, history of heart failure	650	Death from any cause, haemodynamic decompensation, recurrent PE within 30 days	August 2027	NCT04430569
STORM-PE [52]	Aspiration thrombectomy (Indigo device)+anticoagulation *versus* anticoagulation alone	Intermediate-high-risk PE with main or proximal lobar location	100	Change in RV/LV ratio at 48 h	October 2026	NCT05684796

CBT: catheter-based therapies; CDT: catheter-directed thrombolysis; NYHA: New York Heart Association; RV: right ventricle; LV: left ventricle; SBP: systolic blood pressure; RR: respiratory rate.

NUOVE EVIDENZE

Journal of *Clinical Medicine*

Review

Advanced Management of Patients Undergoing Transcat Treatment for Pulmonary Embolism: Evidence-Based Str for Optimized Patient Care

Francesco Costa [1,2], Alfonso Jurado-Román [3], Gabriele Carciotto [2], Victor Becerra-Munoz [1], Daniel Tébar Márquez [3], Felix Götzinger [4], Enrico Cerrato [5], Shantum Misra [6,7], Marco Spissu [5], Marco Pavani [5], Marco Mennuni [8], Fernando Carrasco Chinchilla [1], Antonio Dominguez-Franco [1], Antonio Muñoz-Garcia [1], Rocio Sanchez Navarrete [1], Ferdinando Varbella [5], Pablo Salinas-Sanguino [1], Eric A. Secemsky [6,7], Felix Mahfoud [4], Antonio Micari [2], Juan Horacio Alonso-Briales [1] and Manuel Jimenez Navarro [1,*]

Catheter-based Techniques for Pulmonary Embolism Treatment

EuroIntervention

Official Journal of EuroPCR and the European Association of Percutaneous Cardiovascular Interventions (EAPCI)

Francesco Costa[1-2], MD, PhD; Pablo Salinas[3], MD, PhD; MD; Mario Iannaccone[4], MD; Enrico Cerrato[5], MD, PhD; Daniel Tébar Márquez[6], MD; Shantum Misra[7-8], MD; Felix Götzinger[9-10], MD; Gabriele Carciotto[2], MD; Salvatore Silipigni MD[2], Victor Manuel Becerra-Munoz[1], MD, PhD, Marco Mennuni[11], MD, Alberto Stagno MD,[2] Antonio Bottari,[2] MD Marco Pavani[5] MD, MD; Ferdinando Varbella[5], MD; Juan Horacio Alonso-Briales[1], MD; Alfonso Jurado-Román[6], MD, PhD; Eric A. Secemsky[7-8], MD, PhD; Felix Mahfoud[9-11], MD, PhD; Antonio Micari[2], MD, PhD

1 Área del Corazón, Hospital Universitario Virgen de la Victoria, CIBERCV, IBIMA Plataforma BIONAND, Departamento de Medicina UMA,Spain, Centro de Investigación Biomédica en Red de Enfermedades Cardiovasculares (CIBERCV);

2 Department of Biomedical and Dental Sciences and of Morphological and Functional Images, University of Messina, 98122 Messina, Italy

3 Servicio de Cardiología, Hospital Universitario Clínico San Carlos, Instituto de Investigación Sanitaria del Hospital Clínico San Carlos (IdISSC), Madrid, Spain

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d Rivoli Infermi Hospital, Turin, Italy;

Documento di posizione della Società Italiana di Cardiologia Interventistica (SICI-GISE): Gestione integrata dell'embolia polmonare acuta ed opzioni di trattamento transcatetere

Chiara Fraccaro[1], Mario Iannaccone[2], Giacomo Giovanni Boccuzzi[2], Annalisa Boscolo Bozza[3,4], Gianpaolo Carrafiello[5], Andrea Dell'Amore[4], Luigi Di Serafino[6], Sofia Martin Suarez[7], Antonio Micari[8], Andrea Rolandi[9], Filippo Russo[10], Stefano Carugo[5], Antonio Di Lascio[11], Francesco Germinal[12], Simona Pierini[13], Alberto Menozzi[14], Massimo Fineschi[15], Tiziana Attisano[16], Marco Contarini[17], Carmine Musto[18], Federico De Marco[19], Alfredo Marchese[20], Giovanni Esposito[6], Giuseppe Tarantini[1], Francesco Saia[21]

DIAGNOSI CERTA ✅

STRATIFICAZIONE RISCHIO DI MORTALITA': INTERMEDIO ✅

↓

Strategia terapeutica interventistica percutanea

Stratificazione del rischio

Sig.A (84 aa)

PESI V (>125 points)
s-PESI 5

Sig.ra B. (38 aa)

PESI II (78 points)
s-PESI 2

Entrambi
ECOTT+
Tropo+

Table 7 Original and simplified Pulmonary Embolism Severity Index

Parameter	Original version[226]	Sig. A.	Sig. B.	Simplified version[229]
Age	Age in years	X		1 point (if age >80 years)
Male sex	+10 points	X		–
Cancer	+30 points			1 point
Chronic heart failure	+10 points			1 point
Chronic pulmonary disease	+10 points	X		
Pulse rate ≥110 b.p.m.	+20 points	X	X	1 point
Systolic BP <100 mmHg	+30 points	X		1 point
Respiratory rate >30 breaths per min	+20 points	X		–
Temperature <36°C	+20 points			–
Altered mental status	+60 points			–
Arterial oxyhaemoglobin saturation <90%	+20 points	X	X	1 point

PESI	s-PESI
Risk strata[a]	
Class I: ≤65 points very low 30 day mortality risk (0–1.6%)	**0 points** = 30 day mortality risk 1.0% (95% CI 0.0–2.1%)
Class II: 66–85 points low mortality risk (1.7–3.5%)	
Class III: 86–105 points moderate mortality risk (3.2–7.1%)	**≥1 point(s)** = 30 day mortality risk 10.9% (95% CI 8.5–13.2%)
Class IV: 106–125 points high mortality risk (4.0–11.4%)	
Class V: >125 points very high mortality risk (10.0–24.5%)	

Stratificazione del rischio

Rischio di mortalità precoce		Segni di instabilità emodinamica (almeno un criterio presente)			PESI – sPESI	Parametri strumentali	Parametri di laboratorio
Rischio alto		RCP all'esordio	PAS <90 mmHg oppure necessità di impiegare vasopressori per ottenere una PAS ≥90 mmHg nonostante un'adeguata idratazione + segni di ipoperfusione sistemica*	PAS <90 mmHg oppure riduzione della PAS ≥40 mmHg per più di 15 min**	Valutazione non necessaria	VD/VS ≥1 TAPSE <16 mm Presenti ma non necessari	Troponine T o I positive ma non necessarie
Rischio intermedio	Intermedio-alto	Assenti			PESI ≥III sPESI ≥1	VD/VS ≥1 TAPSE <16 mm	Positive
	Intermedio-basso	Assenti			PESI ≥III sPESI ≥1	Presenza di uno o nessuno dei due parametri	
Rischio basso		Assenti			PESI <III sPESI =0	Assenti	Negative

PAS, pressione arteriosa sistolica; PESI, Pulmonary Embolism Severity Index; sPESI, versione semplificata del Pulmonary Embolism Severity Index; RCP, rianimazione cardiopolmonare; TAPSE, escursione sistolica del piano anulare tricuspidale; VD/VS, rapporto ventricolo destro/ventricolo sinistro.
*Stato mentale alterato, cute sudata, oliguria/anuria, aumento dei lattati.
**Esclusa causa aritmica, ipovolemia e setticemia.

PESI V
sPESI 5

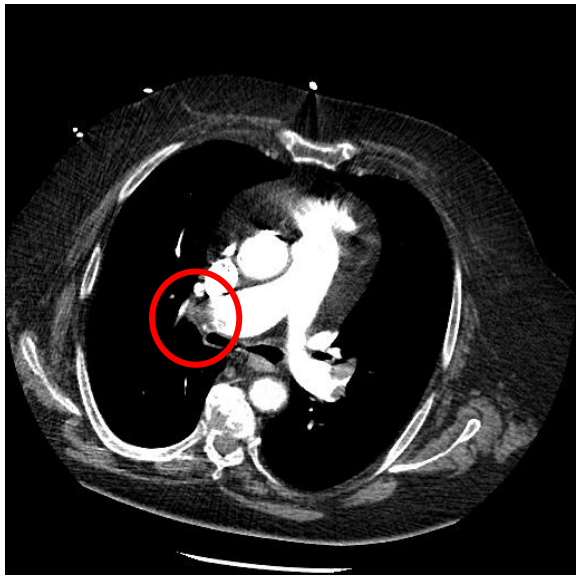
Sig.A (84 aa)

Sig.ra B 38aa)

PESI II
sPESI 2

Sig. Antonio (84 aa)

Si riconosce quadro di TEP massiva bilaterale, con evidenza di multipli difetti di riempimento a carico delle diramazioni principali, lobari e segmentarie delle arterie polmonari; in particolare si riconosce la presenza di mutipli difetti di riempimento con aspetto "a cavaliere" interessanti le diramazioni lobari delle a.polmonari da ambo i lati e presenza di difetti di riempimento pressoché completi ad interessare le diramazioni per il segmento apicale e anteriore di entrambi i lobi superiori; ulteriori difetti di riempimento parziale si riconoscono a carico di alcune diramazioni segmentarie d'ambo i lati.



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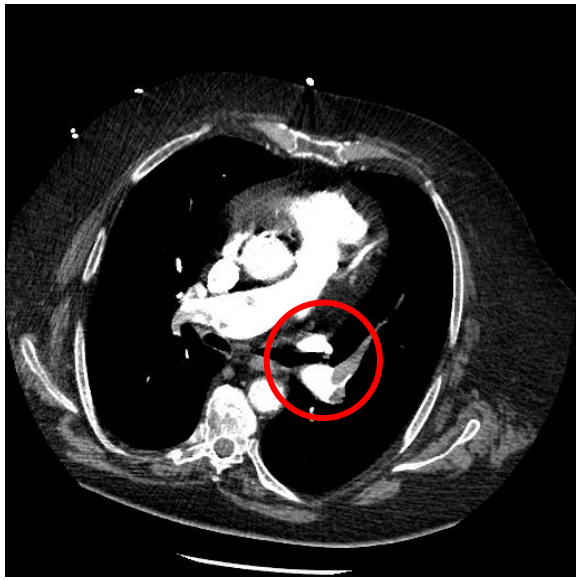
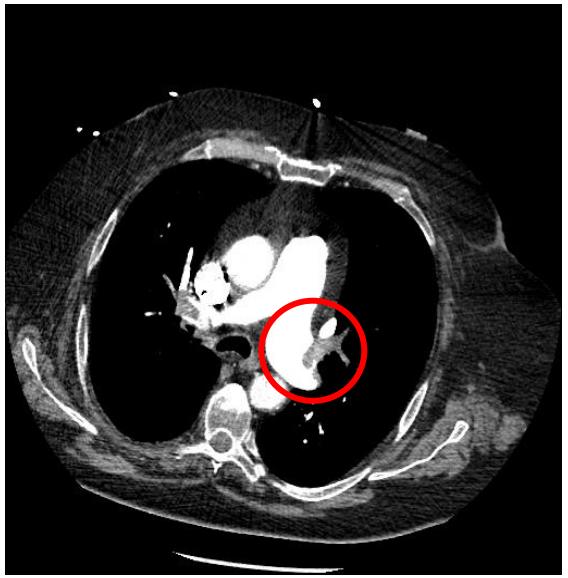


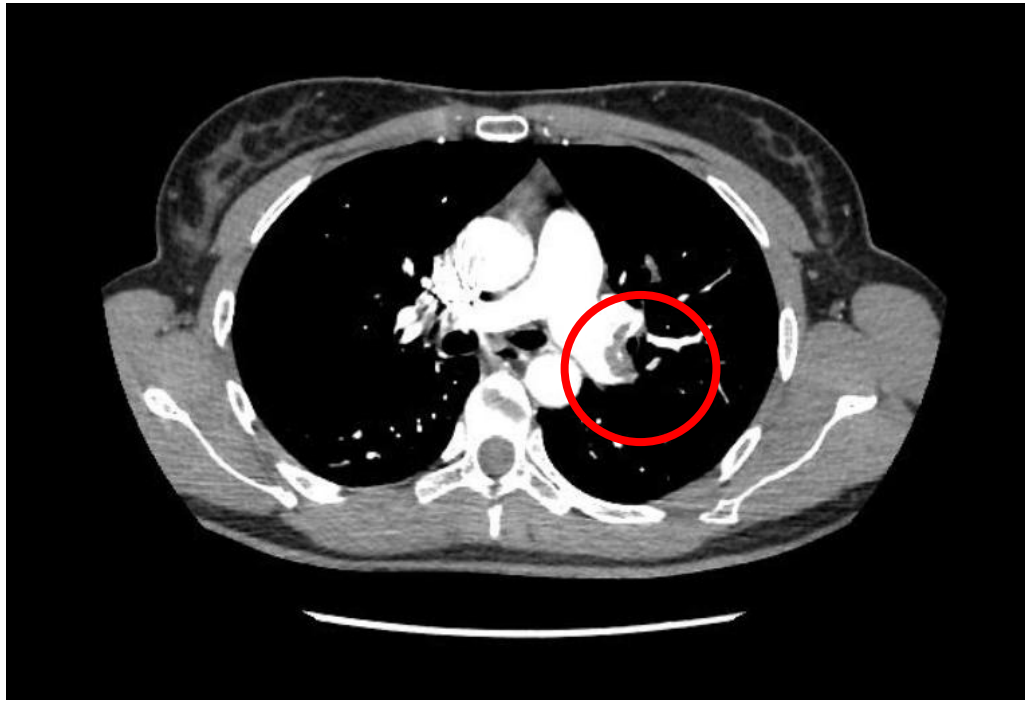


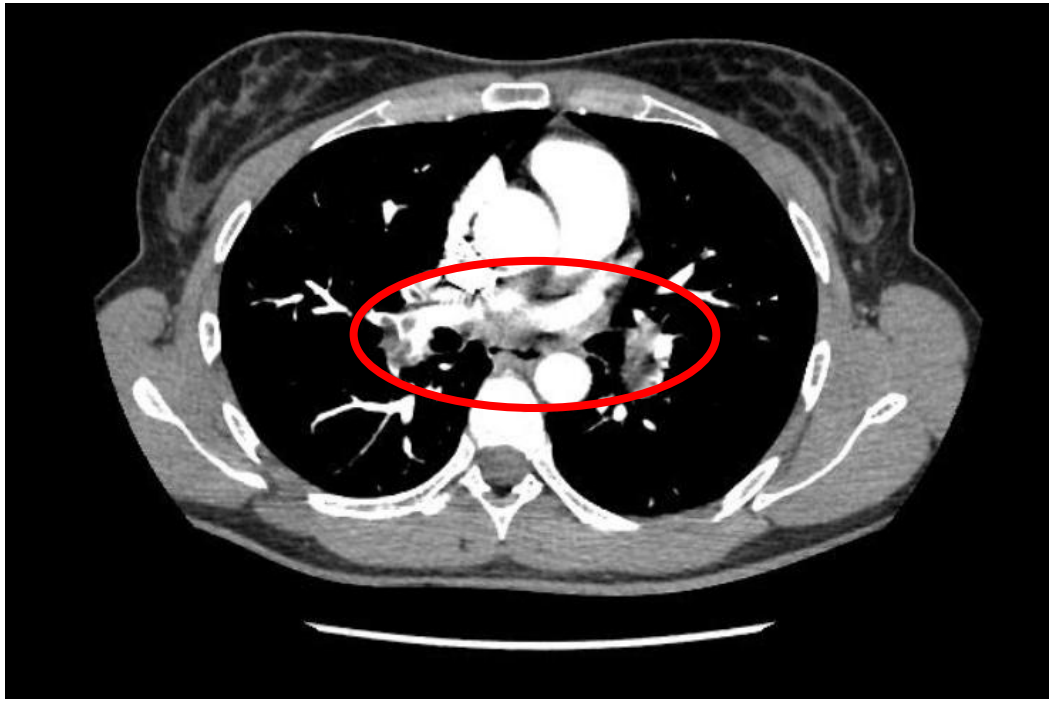
A SINISTRA

Sig.ra B. (38 aa)

ANGIO TC (CON APPARECCHIATURA SPIRALE, MONOSTRATO O MULTISTRATO)

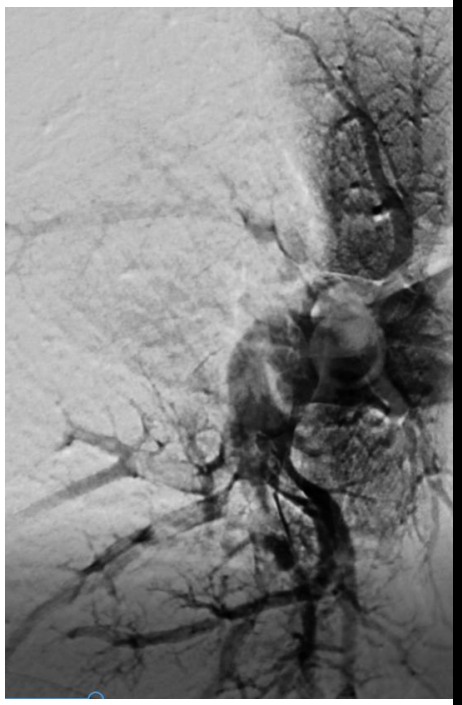
Apprezzabili difetti di riempimento endoluminali da riferire a fenomeni di tromboembolia polmonare a carico del tratto distale di entrambe le arterie polmonari con estensione a pressoché tutti i rami arteriosi lobari e a multipli segmentari e subsegmentari da ambo i lati segnalandosi arterie polmonari di calibro nei limiti di norma con lieve atteggiamento convesso del setto interatrioventricolare verso le cavità destre cardiache lievemente dilatate.

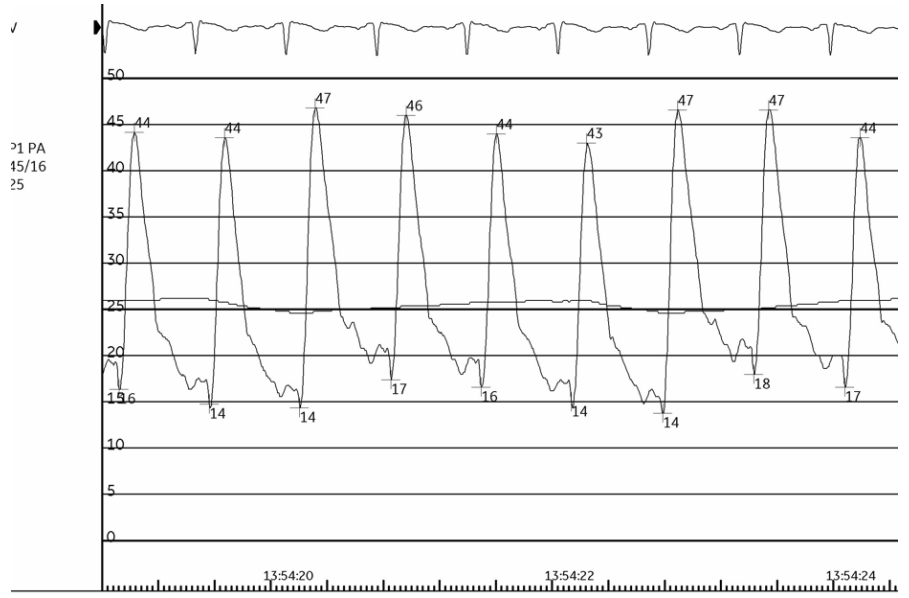


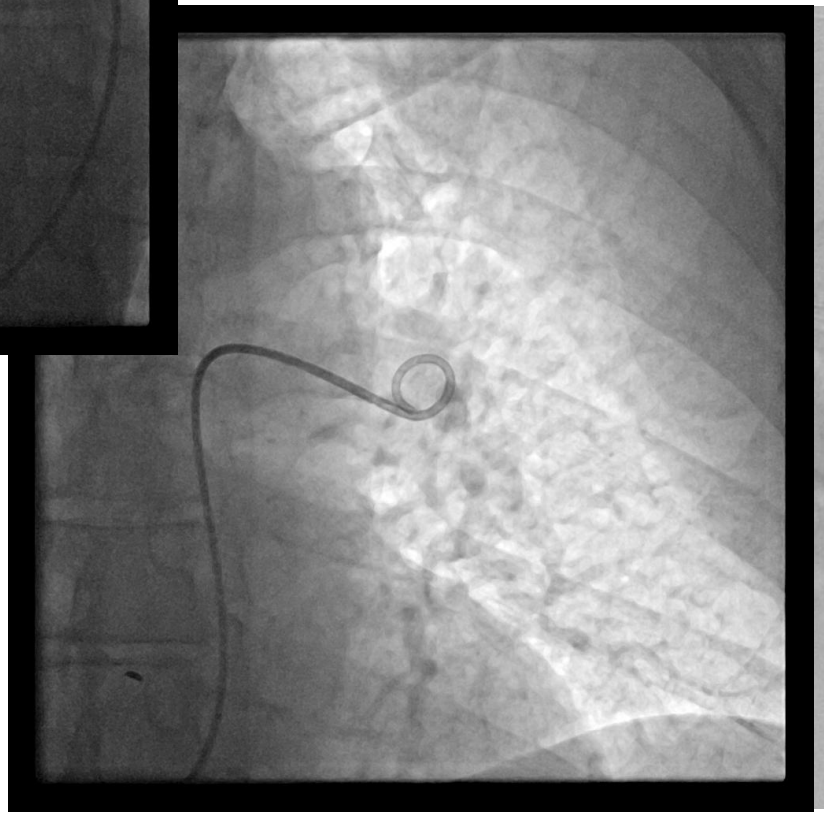


Sig. Antonio (84 aa)

Intermediate–high

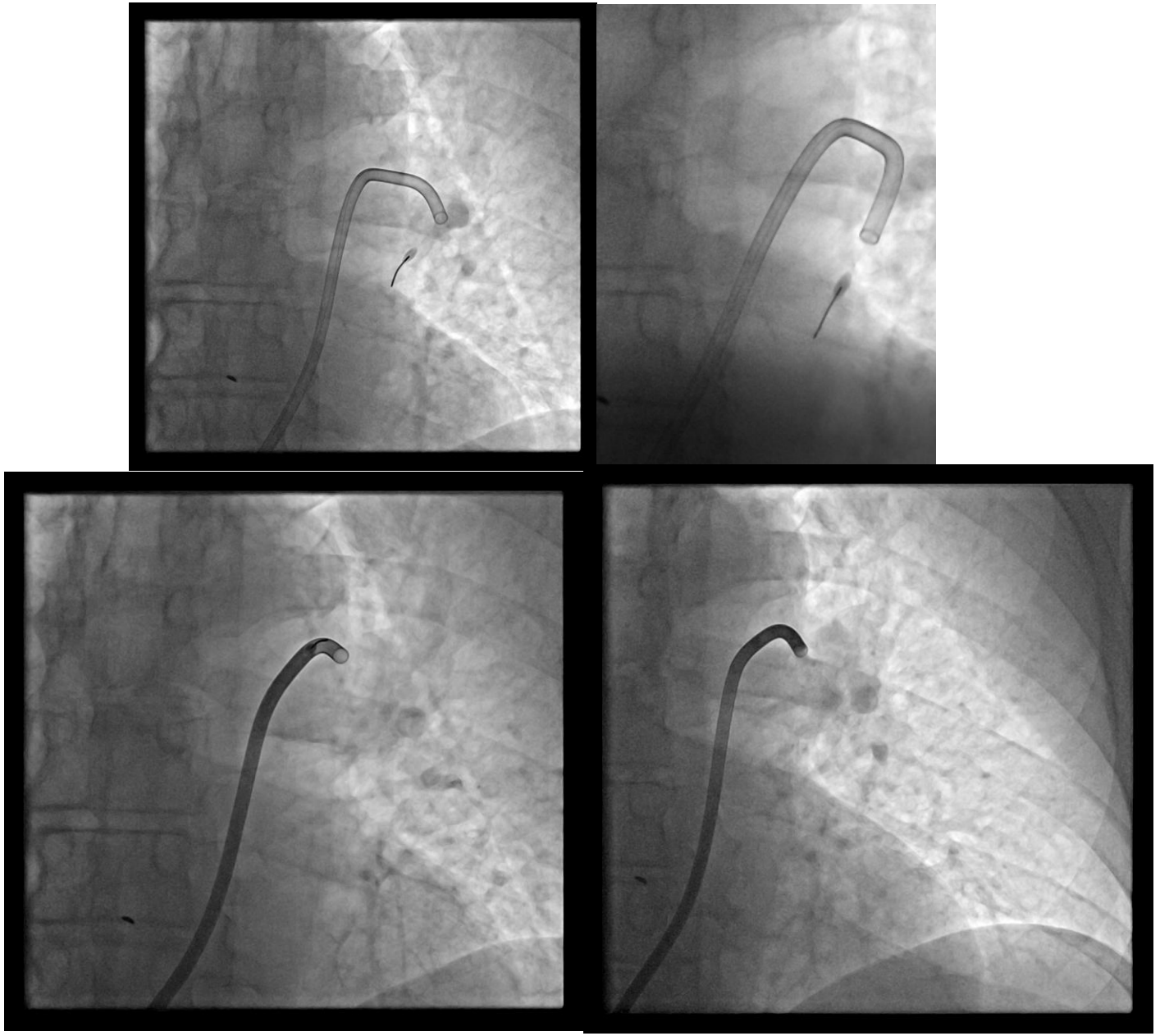






Sig. Antonio (84 aa) **Intermediate–high**

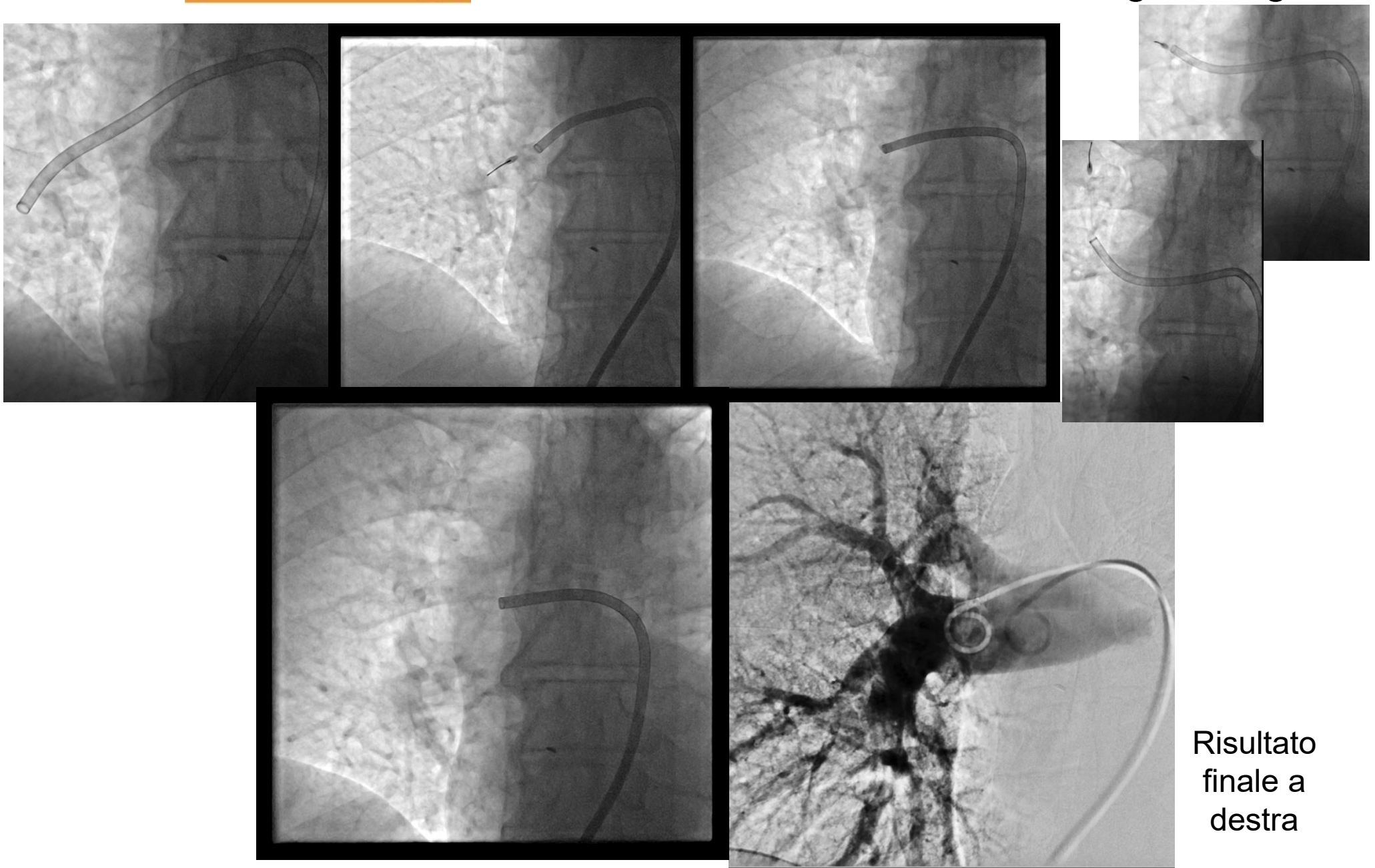
Sistema INDIGO PENUMBRA Lightening



Risultato finale a sinistra

Sig. Antonio (84 aa) **Intermediate–high**

Sistema INDIGO PENUMBRA Lightening

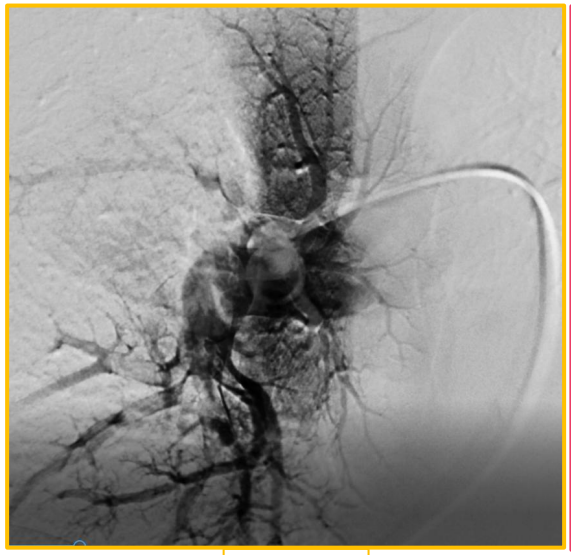


Risultato finale a destra

Sig. Antonio (84 aa)

Intermediate–high

Sistema INDIGO PENUMBRA Lightening



PRE

POST

PRE

POST

Avviato APIXABAN 10 mg x 2

PAPs da 70 a 32 mmHg

ECOCARDIOGRAMMA TT PREDIMISSIONE:

Alll'ecocadigramma: ventricolo sinistro normale per diametri e funzione. ventricolo destro lievemente dilatato, normocinetico (s' 12 cm/secTAPSE 24 mm). Lievi IM ed IT PAPs 32 mmHg (vel 2,6 m/sec). A dx lievemente ingrandito.

Tempo procedura 120'

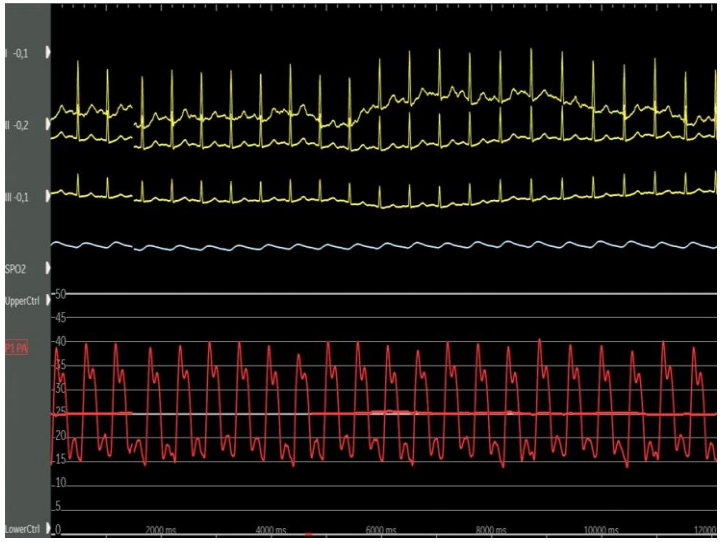
Aspirazione di 350 ml di sangue

Hb postprocedurale **11,9 g/l** (Hb pre 14,8) g/l)

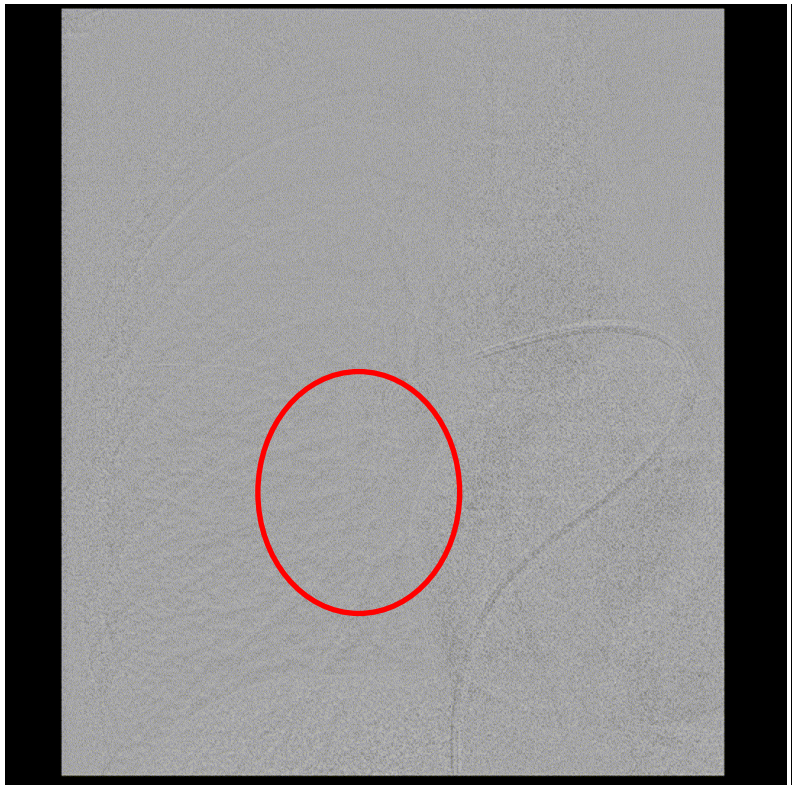
Sig.ra B. (38 aa)

ANGIOGRAFIA
A. Polmonari

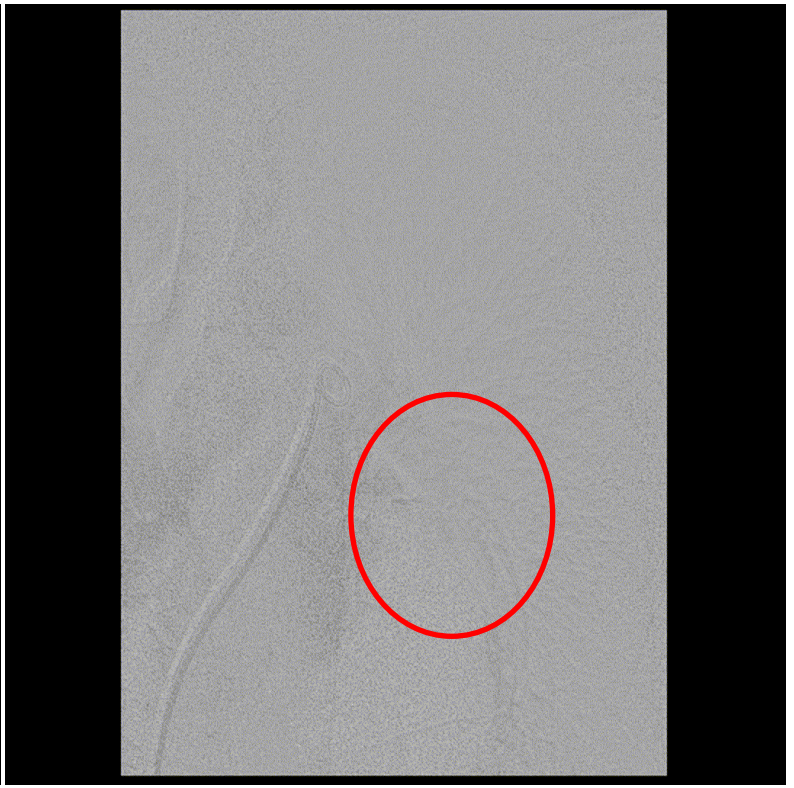
Cateterismo



DX



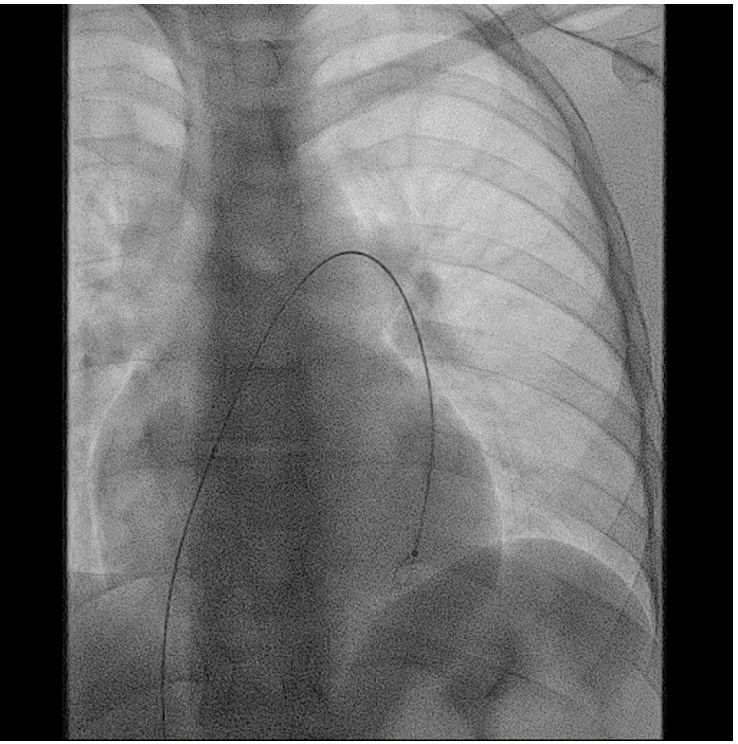
SN

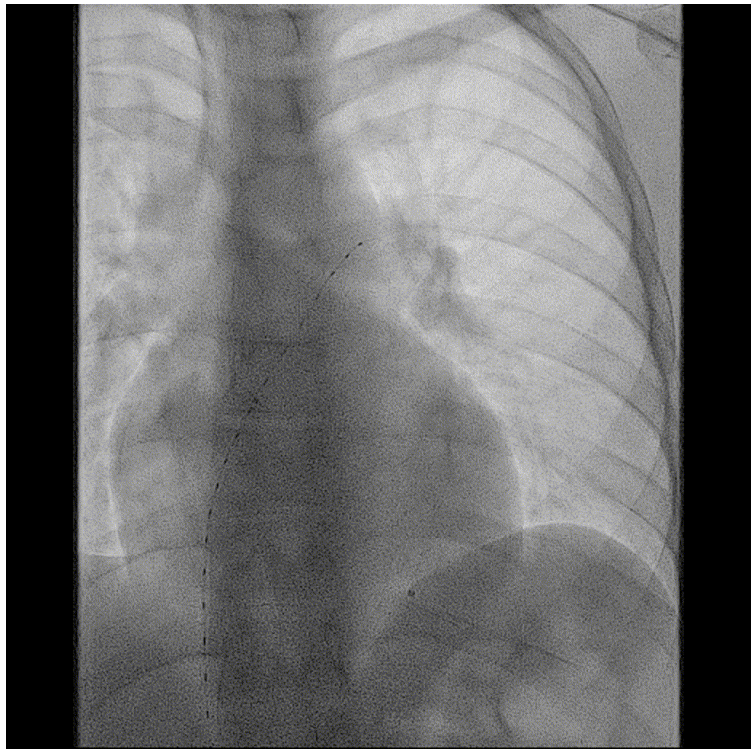


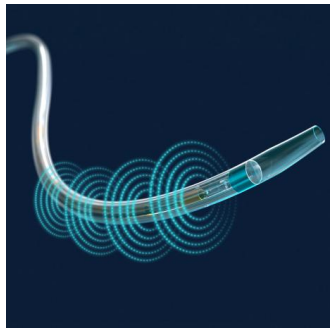
Sig.ra B. (38 aa)

TROMBOLISI LOCO-REGIONALE POTENZIATA DA US

EKOS™ Endovascular System 6F







Catetere infusivo: Trombolitico + S. fisiologica

\+

Catetere per emissione US

- Actylise 1 fl (20 mg) in SF 500 cc a 25 ml/h x 12 h (1 mg/h x 12 h).
- Coolant: SF a 25 ml/h.

Tempo procedura < 30’

Hb postprocedurale 10.9 g/l (Hb pre 11,3 g/l, noto trait talassemico)

in UTIC in osservazione mantenendo eparina ev per almeno altre 12 ore
Poi AVVIATO LIXIANA

Le metodiche sono sicure?

SICUREZZA CDT

Registro multicentrico internazionale

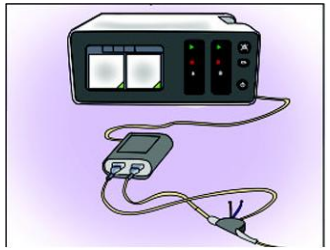
5
Aziende Ospedaliere

179
Pazienti con Embolia Polmonare

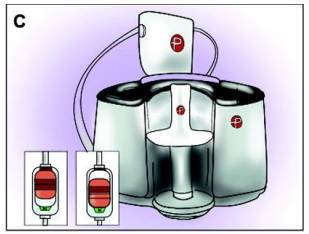
AOU S. Luigi
Osp. Rivoli

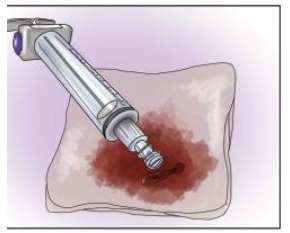
Osp. Galliera (Genova)

Osp.Univ C. San Carlos (Madrid)
Osp Univ G. Maranon (Madrid)
O.Uinv. La Paz (Madrid)



58 TRATTATI CON USCDT
Ultrasound Facilitated Catheter Directed Thrombolysis





121 TRATTATI CON CDMT
Catheter directed mechanical aspiration thrombectomy

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Sottomesso CRM Journal

CARATTERISTICHE DEI DUE GRUPPI

Caratteristiche basali	Totale	USCDT	CDMT	p-value
	179	**58**	**121**	
Uomini	100	36 (62.1%)	64 (52.9%)	0.247
Donne	79	22 (37.9%)	57 (47.1%)	
Età	**64.2 ± 14.2**	**67.7 ± 12.5**	**62.6 ± 14.6**	**0.03**
Motivo di accesso in PS				
Dispnea	105	37 (63.8%)	68 (57.1%)	0.449
Dolore toracico	17	6 (10.3%)	11 (9.2%)	
Sincope	34	10 (17.2%)	24 (20.2%)	
Arresto cardiaco	8	0	8 (6.7%)	
Combinazioni	7	3 (5.2%)	4 (3.4%)	
Altro	6	2 (3.4%)	4 (3.4%)	
Dati anamnestici				
Ipertensione arteriosa	103 (57.9%)	39 (67.2%)	64 (53.3%)	0.78
Tabagismo	17 (9.5%)	6 (10.3%)	11 (9.1%)	0.922
Diabete mellito	27 (15.1%)	7 (12.1%)	20 (16.5%)	0.435
Scompenso cardiaco	7 (3.9%)	1 (1.7%)	6 (5%)	0.296
BPCO	11 (6.1%)	4 (6.9%)	7 (5.8%)	0.772
Pregresso ictus cerebri (178)	11 (6.2%)	3 (5.2%)	8 (6.7%)	0.698
Insufficienza renale cronica (177)	15 (8.5%)	4 (6.9%)	11 (9.2%)	0.599
Storia di tumore	36 (20.1%)	10 (17.2%)	26 (21.5%)	0.507
Storia di TEP	16 (8.9%)	7 (12.1%)	9 (7.4%)	0.309
Storia di TVP (177)	32 (18.1%)	27 (46.6%)	5 (4.2%)	0.000
Recente intervento chirurgico	30 (16.8%)	8 (13.8%)	22 (18.2%)	0.462
Recente immobilizzazione	40 (22.3%)	5 (8.6%)	35 (28.9%)	0.002
Recente ricovero (178)	26 (14.6%)	4 (6.9%)	22 (18.3%)	0.043

PARAMETRI DI STRATIFICAZIONE DEL RISCHIO ALLA PRESENTAZIONE

STRATIFICAZIONE DEL RISCHIO SECONDO CLASSE PESI				
CLASSI	Tot	USCDT	CDMT	p-value
INTERMEDIO ALTO	115 (64.2%)	35 (63%)	80 (66.1%)	0.001
ALTO	39 (21.7%)	5 (8.6%)	34 (28%)	

Parametri	Totale (179)	USCDT (58)	CDMT (121)	p-value
PAS mmhg	116 ±24.8 mmhg	123 ±22.5 mmhg	112.8 ±25.3 mmhg	0.01
FC bpm	110 ± 19	107 ± 19	111 ± 19	0.1
SpO2%	90.6% ± 5.9	89% ±4.4	91% ± 6.4	0.2
Lattati mmol/l	2.7 ± 3	2 ± 1	3 ± 3.4	0.06
Troponina positiva (175)	121 (69.9%)	29 (50%)	92 (78.6%)	0.000
BNP positivo (144)	99 (68.8%)	21 (45.7%)	78 (79.6%)	0.000
Dilatazione VD (178)	73 (41%)	27 (47.4%)	46 (38%)	0.237
PAPs (119)	51.8 ± 11.8 mmhg	49.2 ± 10.4	53.88 ± 12.4	0.03
TAPSE (75)	15.19 ± 3.2 mm	15.18 ± 3.18 mm	15.2 ± 3.35 mm	
S1Q3T3 (161)	47 (29.2%)	7 (14%)	40 (36%)	0.004
Blocco di branca dx (164)	45 (27.4%)	7 (13.2%)	38 (34.2%)	0.005
Quadro radiologico (175)	**Totale**	**USCDT**	**CDMT**	**p-value**
Trombo a cavaliere	23 (13.1%)	18 (31%)	5 (4.3%)	0.000
Rami principali unilat.	25 (14.3%)	9 (15.5%)	16 (13.7%)	
Rami principali bilat.	116 (66.3%)	24 (41.4%)	92 (78.6%)	
Rami segmentari	11 (6.3%)	7 (12.1%)	4 (3.4%)	
Rischio EMORRAGICO secondo criteri ACR-HBR (177)	***82 (46.3%)***	***12 (20.7%)***	***70 (58.8%)***	***0.000***

Registro multicentrico internazionale

Analisi sulla sicurezza delle due metodiche

Rischio emorragico

- PERDITE EMATICHE CON RIDUZIONE DI Hb >3 g/dl
- DELTA COMPLESSIVO DELLA RIDUZIONE DI EMOGLOBINA
- NECESSITA' DI EMOTRASFUSIONI
- IDENTIFICAZIONE DEI SANGUINAMENTI MAGGIORI con scale ISTH e BARC in pz ad ALTO RISCHIO EMORRAGICO (criteri ARC/HBR)

ENPOINTS

Follow up

- DURATA MEDIA DELLA DEGENZA (calcolata in giorni di ricovero)
- MORTALITA' A 30 GIORNI DALLA PROCEDURA
- MORTALITA' A LUNGO TERMINE (follow up medio di 204 giorni)

ENDPOINT PRIMARIO: SAFETY

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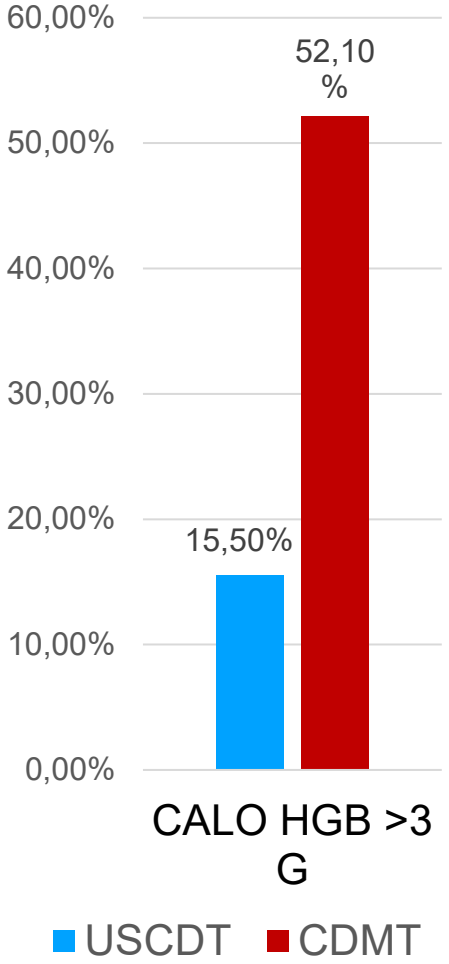

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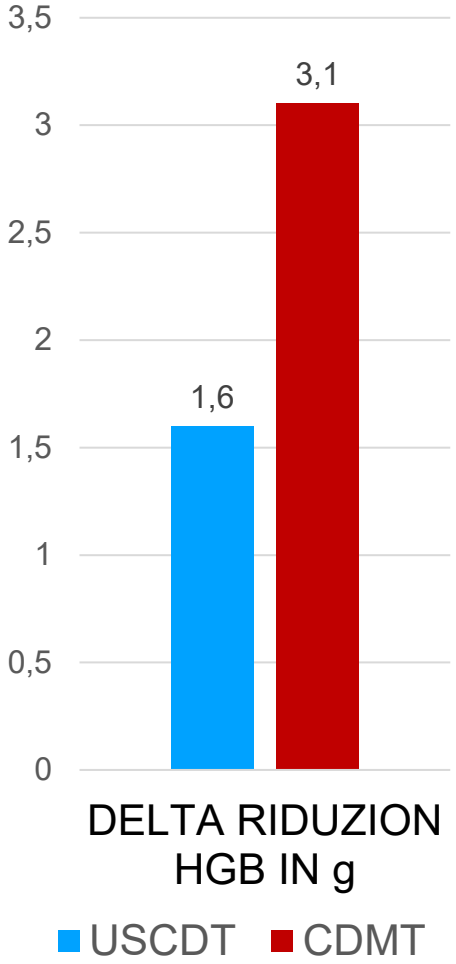

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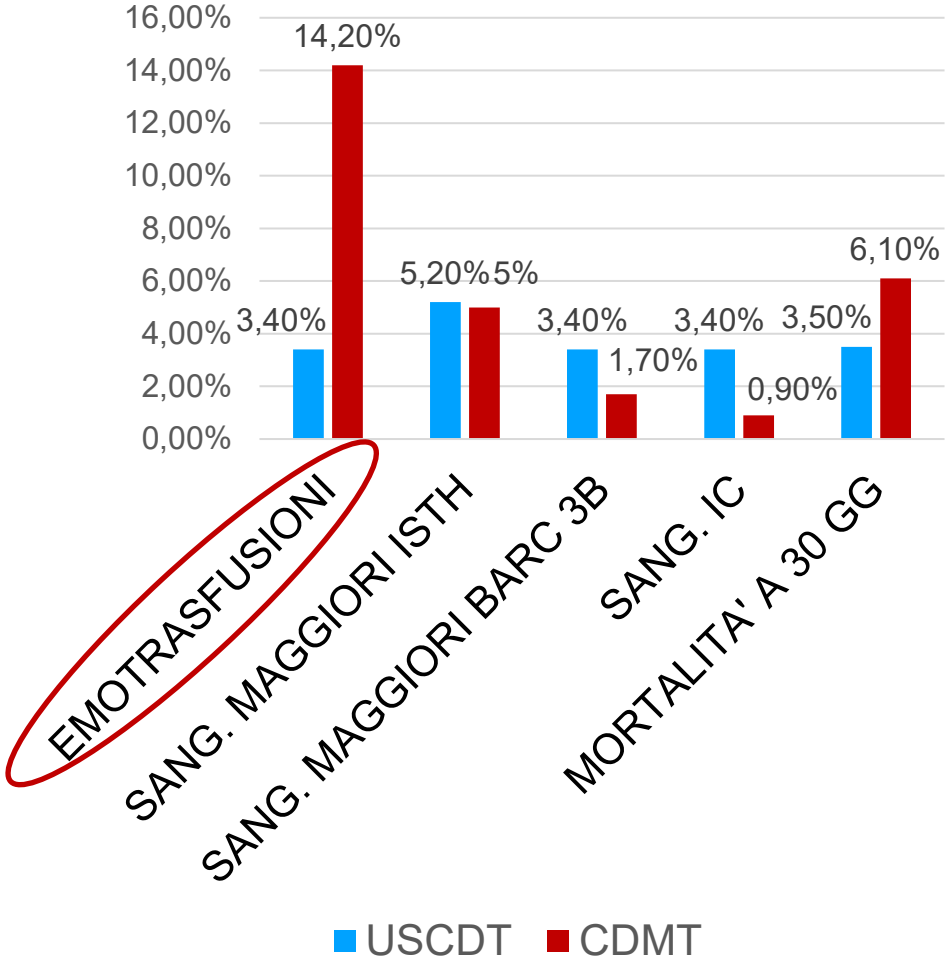

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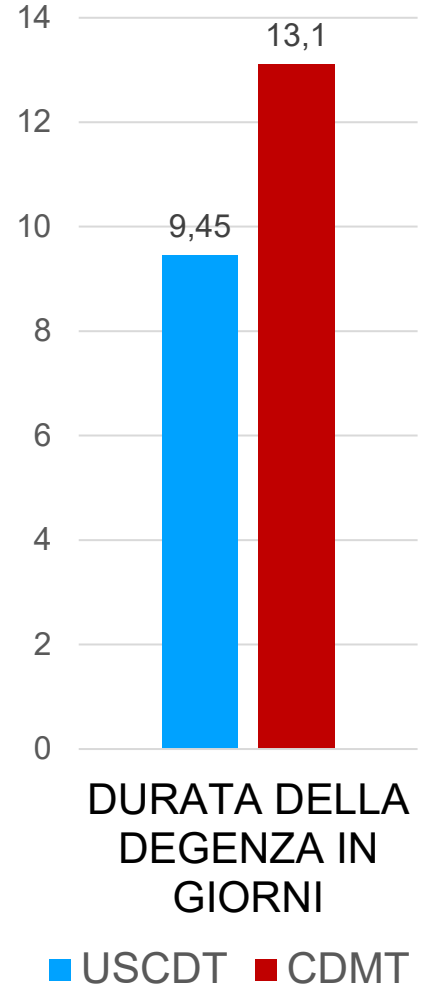
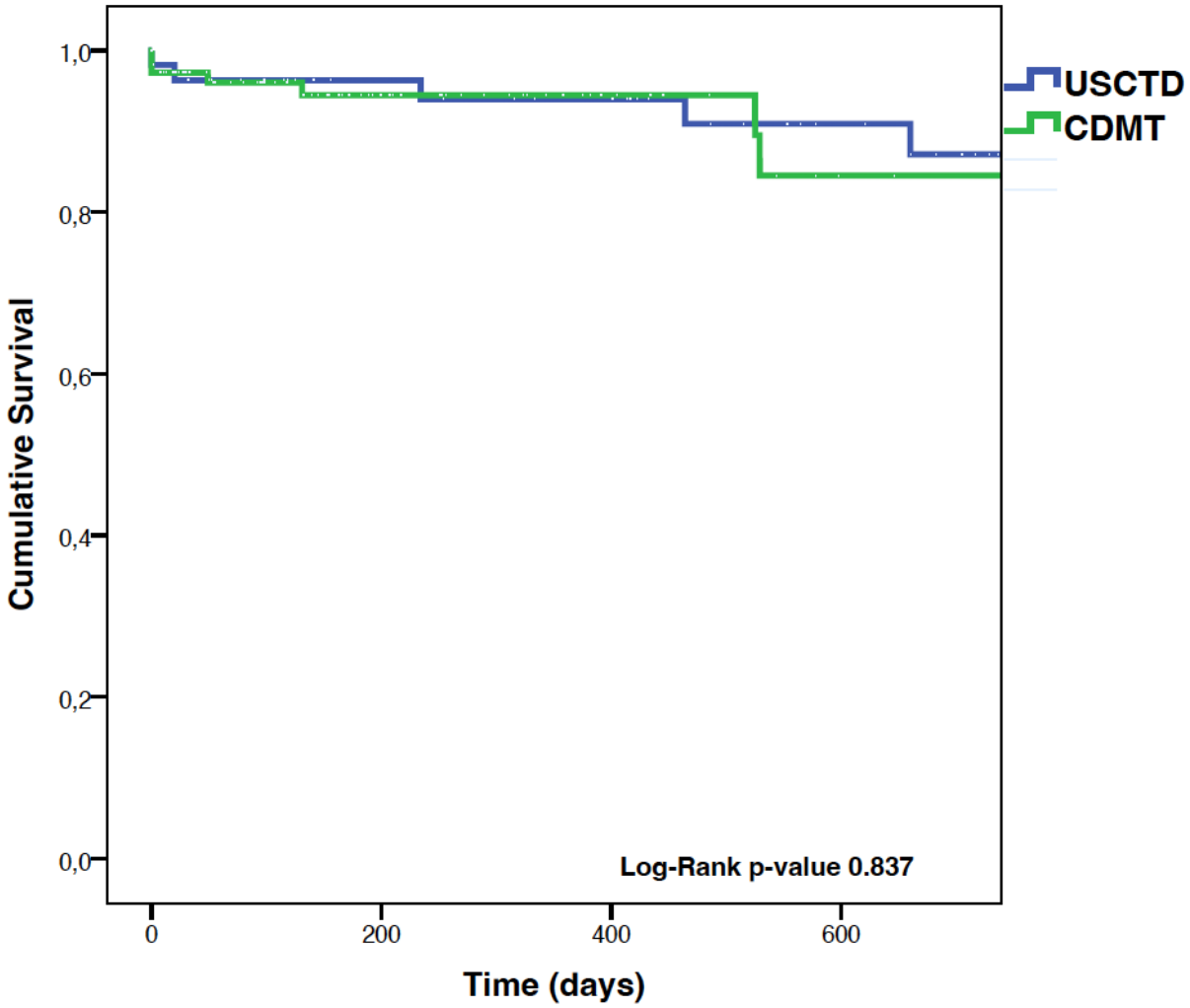


ENDPOINT SECONDARIO:EFFICACY



Curva di KM della mortalità a lungo termine (10.7% in CDTM vs 11.8% in USCDT; Log-rank p=0.837) ad un follow up medio di 204 giorni (IQR 69-486)

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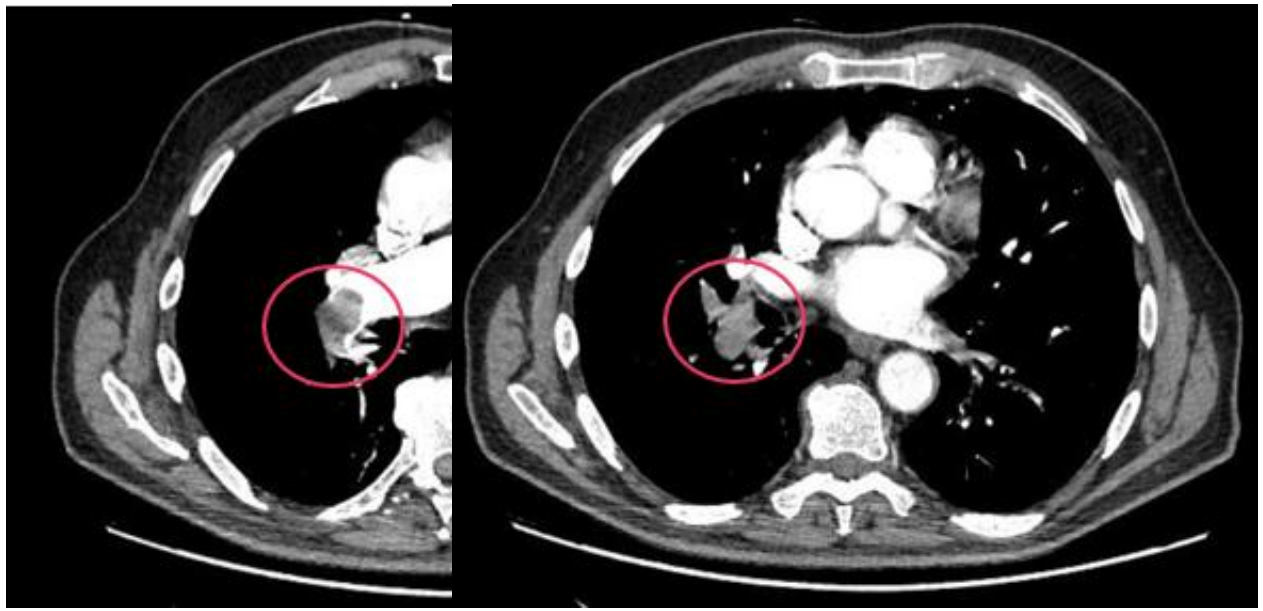
Considerazioni finali

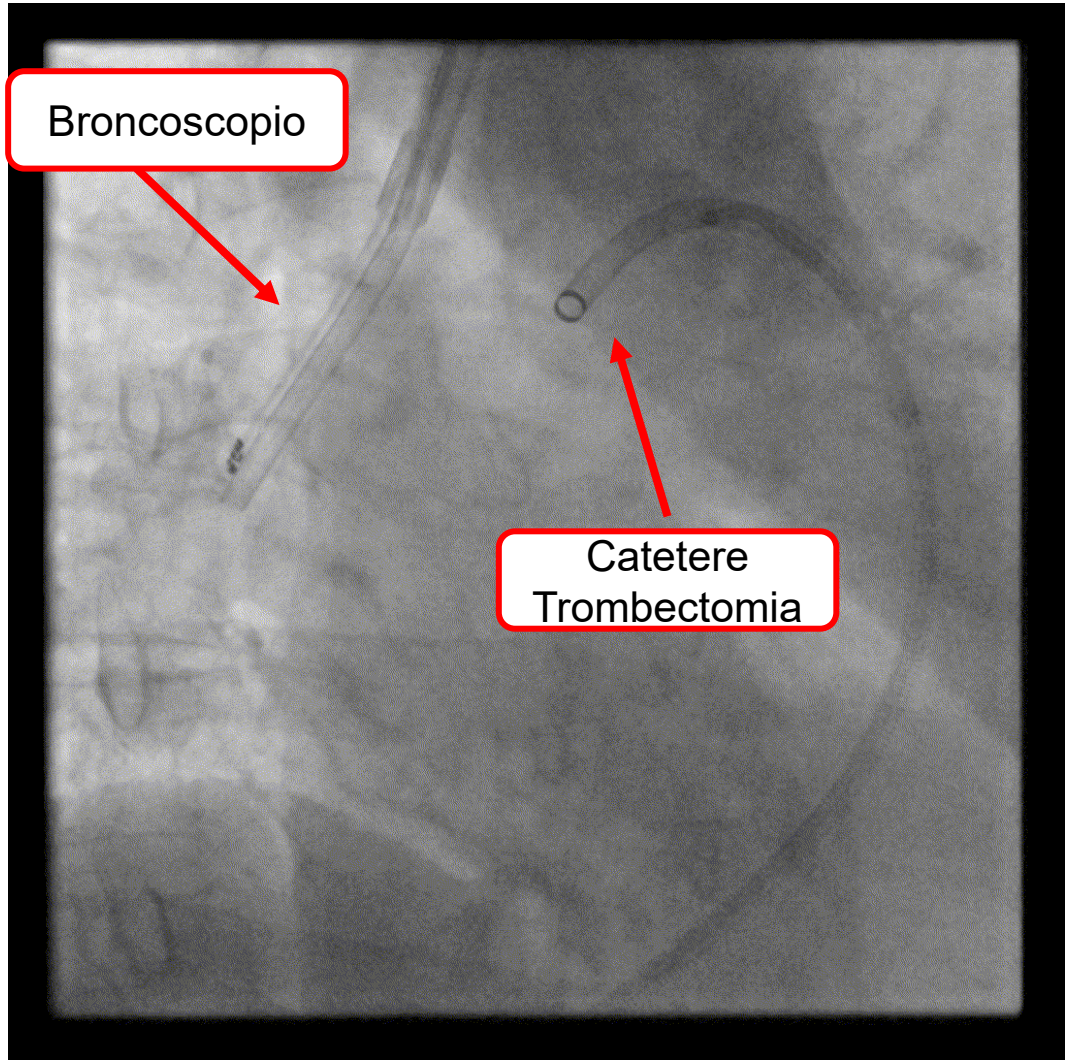
Dispositivi di ampio calibro: essere pronti alle complicanze

23/3/2023
Donna, 82 aa
sPESI 4 PESI 83 ECOTT+ TP+

Rischio intermedio - Alto



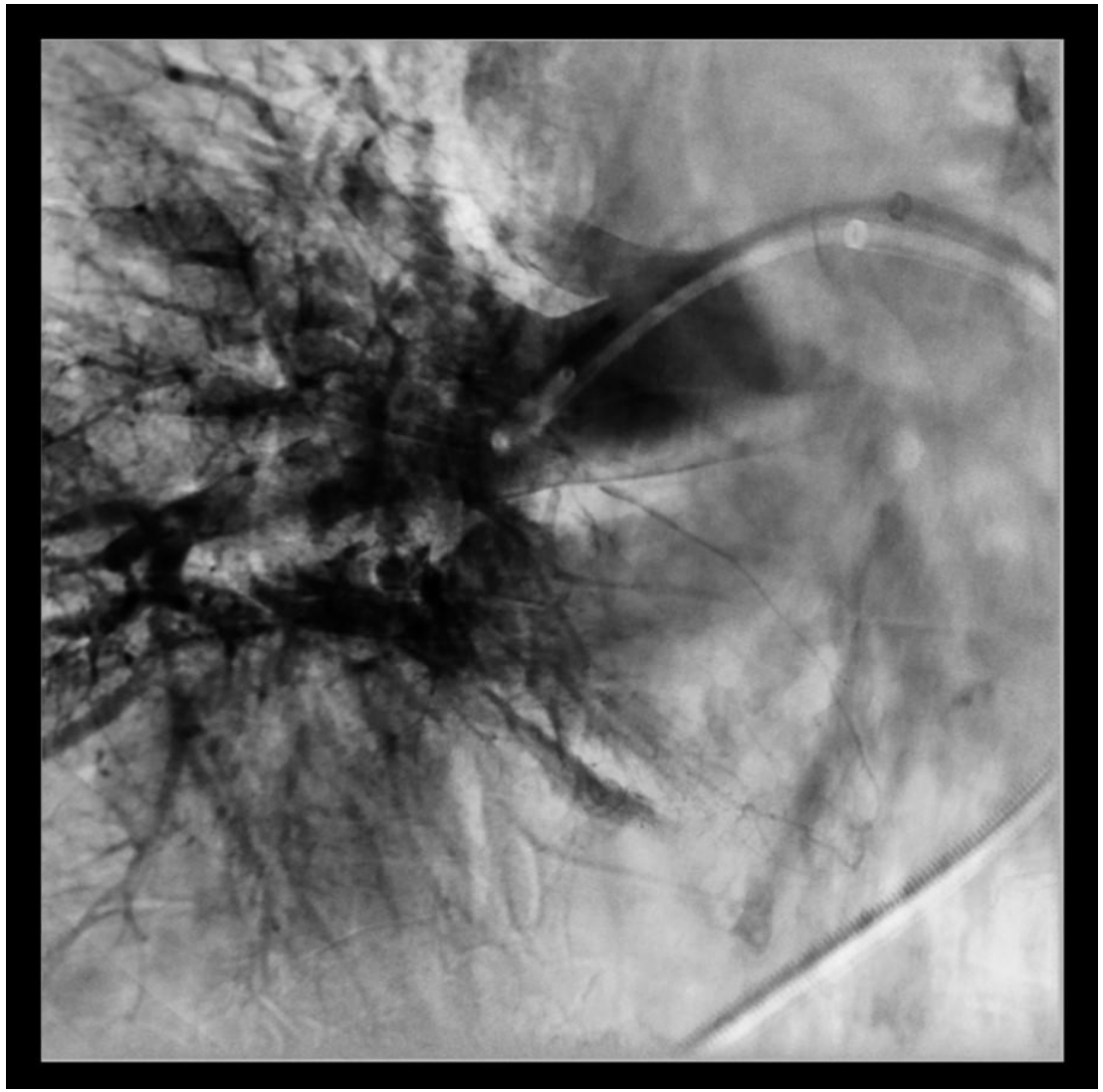
Utilizzare dispositivi di ampio calibro ma essere pronti alle complicanze



Emottisi improvvisa durante tromboaspirazione

Broncoscopia urgente in sala di emodinamica, instillazione epinefrina locale

Utilizzare dispositivi di ampio calibro ma essere pronti alle complicanze



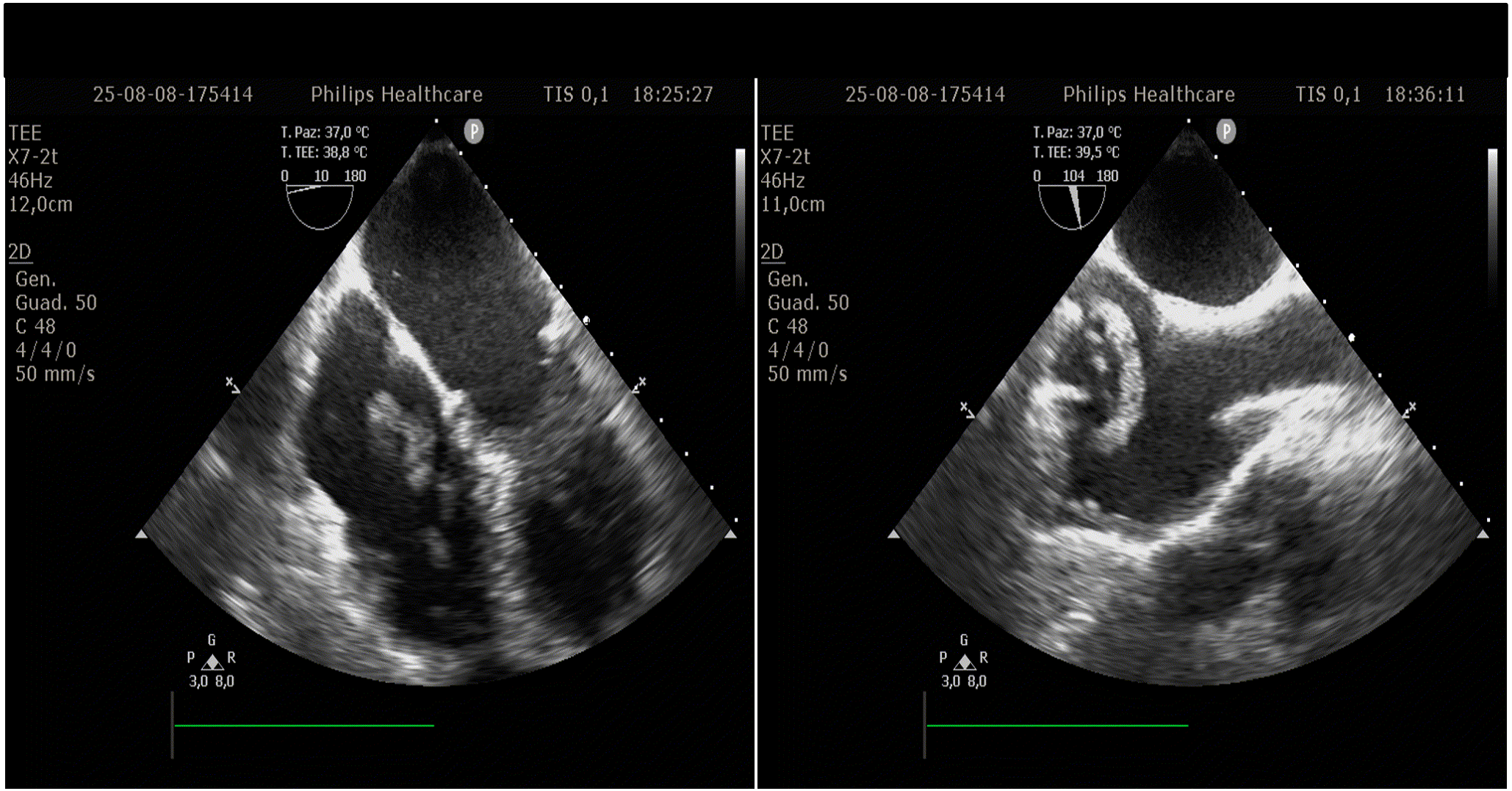
Hb 14.2 -> 11.7,
Emotrasfusa 2 sacche EC

PAPs 65 -> 45mmHg

Follow-up 1aa: no eventi

Dispositivi di tromboaspirazione: anche in altri distretti

8/2025 Trombo floccante in atrio dx



Dispositivi di tromboaspirazione anche in altri distretti

Penumbra Lightening 12F
+ guida TEE in sala

Al termine della procedura residua piccolo filamento in atrio destro.

CONCLUSIONI

- Necessario aumentare consapevolezza e standardizzazione di diagnosi e trattamento precoce interventistico della TEP

- Anche in assenza di evidenze definitive di superiorità del trattamento interventistico percutaneo, **l'adozione di tali metodiche è sicura ed è determinante nel miglioramento della prognosi** in alcuni scenari (trombolisi controindicata o fallita o in caso di insufficiente beneficio in terapia anticoagulante)

- Essenziale è in ogni presidio la **definizione di un PERT** e la **creazione di PDTA** con dinamica hub/spoke

Azienda Ospedaliero-Universitaria
San Luigi Gonzaga
di Orbassano

PDTA AZIENDALE

PROTOCOLLO OPERATIVO DEI PAZIENTI AFFERENTI ALLA AOU SAN LUIGI GONZAGA CON QUADRO DI EMBOLIA POLMONARE E POTENZIALE INDICAZIONE A TRATTAMENTO ENDOVASCOLARE

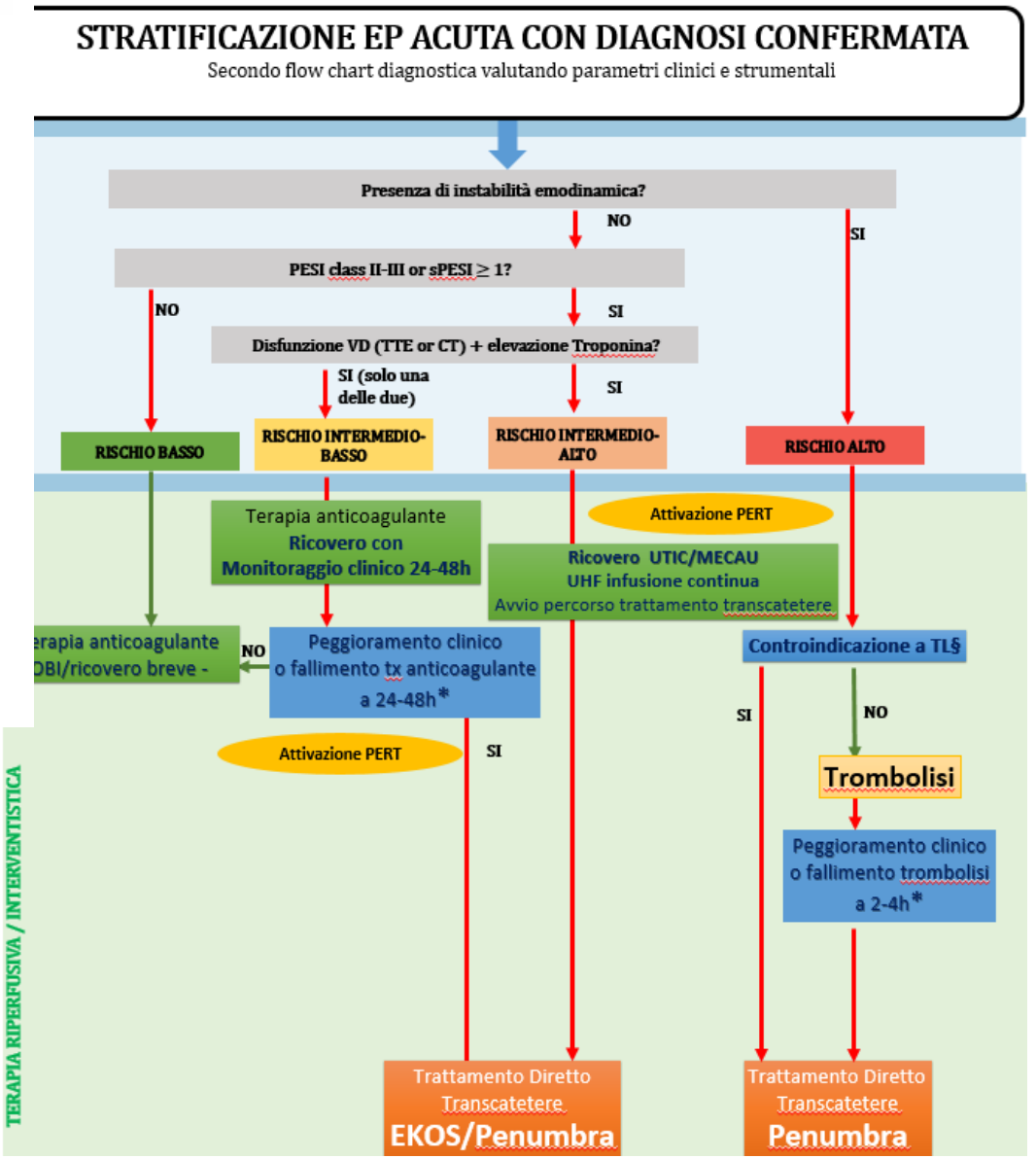
V.4.0 del 6-6-25

Protocollo Operativo

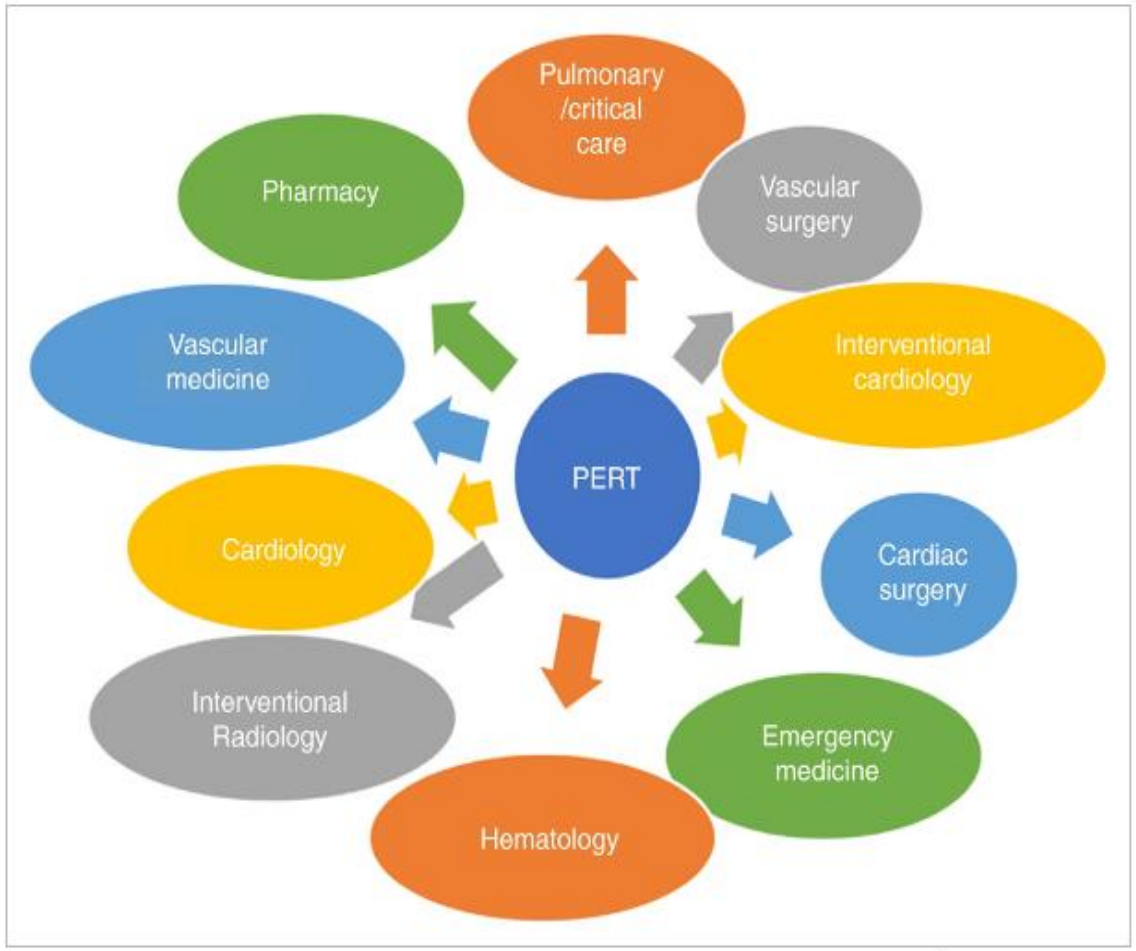
SCDO Cardiologia: Enrico CERRATO, Sandra TANTILLO, Alessandra CHINAGLIA

SCDO MECAU: Giovanni MUSSO, Adriana BOCCUZZI

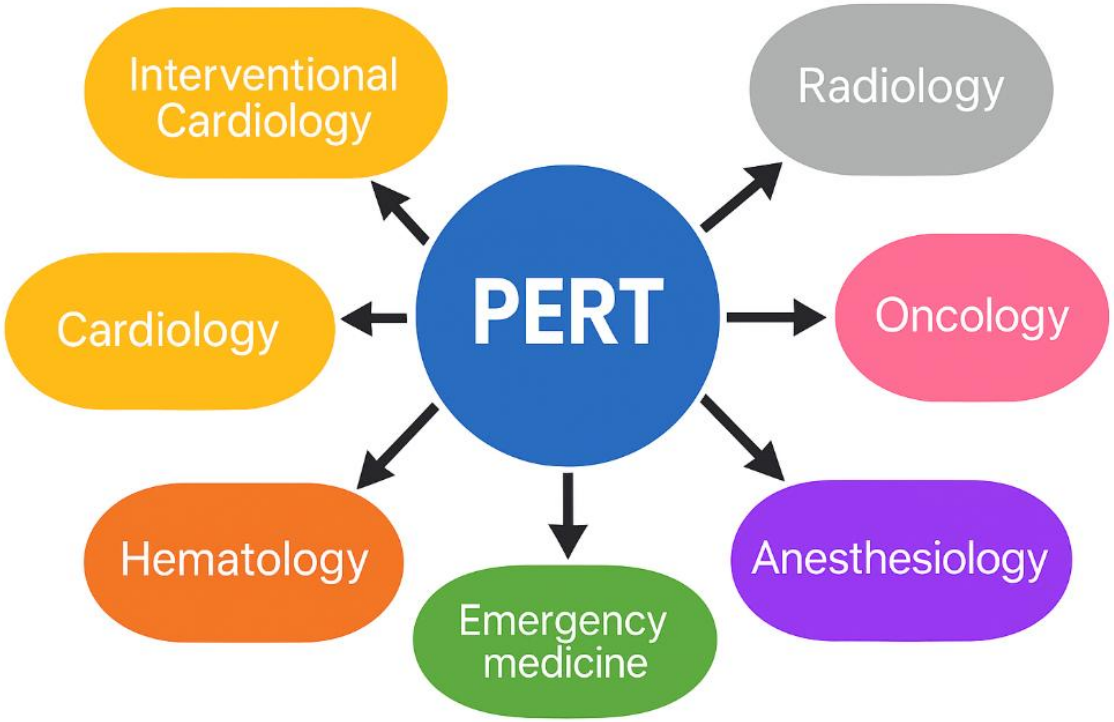
Collaboratori: Massimo SCAVIA - MECAU



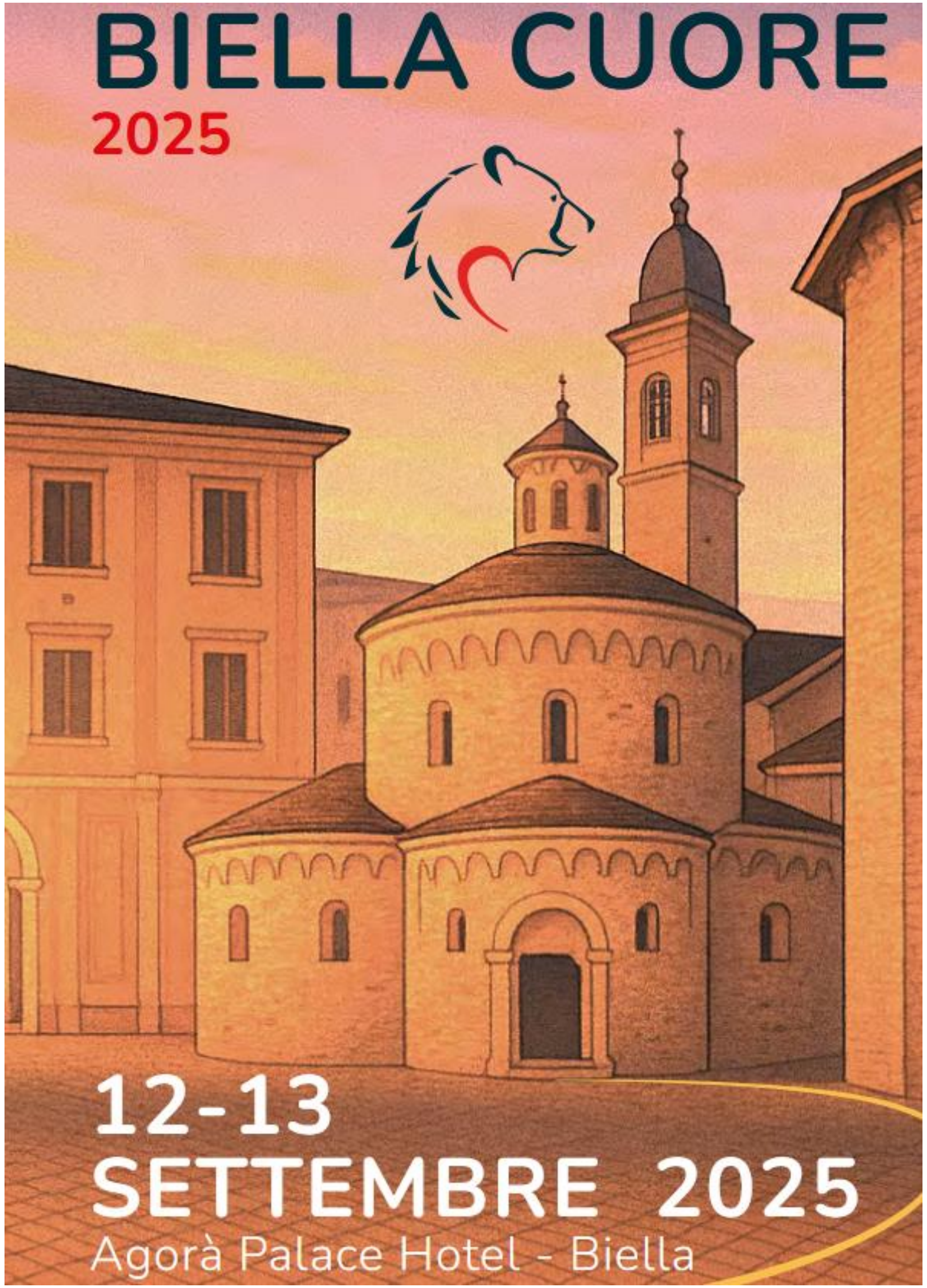
PDTA AZIENDALE



PERT secondo Linee guida



PERT PDTA AOU S. LUIGI



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