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CORRELAZIONE CAVAL INDEX-SHOCK Index. STUDIO “CASH”: ANALISI COMPARATIVA CON TEST DI STUDENT PER VARIABILI CONTINUE IN 30 PAZIENTI CON TROMBOEMBOLISMO VENOSO. TRIENNALE ESPERIENZA (2012-2014)

INTRODUZIONE:

Lo studio “CASH”, acrostico derivante da “CAval index – SHock index”, ha arruolato 30 pazienti, di età compresa tra 48 e 82 anni, con tromboembolismo venoso (embolia polmonare centrale) ricoverati nella Struttura Semplice “Breve Osservazione” e “Sub-Intensiva C” della Struttura Complessa “Medicina Interna per l’Urgenza” nel triennio gennaio 2012-dicembre 2014. Il quadro clinico di esordio era caratterizzato in tutti i pazienti da grave insufficienza respiratoria (valore emogasanalitico arterioso di $pO_2 < 60$ mmHg) eventualmente associata a dolore toracico, stato confusionale, instabilità emodinamica ($PAS < 90$ mmHg) secondo le American College of Chest Physicians Evidence-Based Clinical Practice Guidelines (9th Edition)⁶ Tutti i pazienti sono stati sottoposti a: TC toraco-addomino-pelvica con mdc (Foto 1-2-3); angiografia polmonare (Foto 4) con fibrinolisi loco-regionale secondo il protocollo previsto dall’UKEP Study⁷ (2000 UI/Kg/h per 24 ore + eparina sodica) modificato da noi a 1000 UI/Kg/h per 48-72 ore fino a dimostrazione angiografica (Foto 5 – 6 - 7) della risoluzione del trombo previi controlli angiografici seriatì ogni 24 ore e previi controlli seriatì del fibrinogeno ogni 6 ore, in associazione ad eparina sodica, in vena periferica, inizialmente alla dose di 18 U/kg/h o 1.300 U/h, aggiustando poi la velocità infusionale in base ai valori di PTT seriatì ogni 6 ore, associata a trombectomia meccanica (Foto 8-9-10) come previsto dalle American College of Chest Physicians Evidence-Based Clinical Practice Guidelines (9th Edition)⁶ del 2012; ecocardiografia pre-lisi; ecocolordoppler venoso arti inferiori ed eventuale elastocompressione; ricerca markers trombotici e neoplastici. In tutti i pazienti, è stato misurato pre-lisi lo SHOCK INDEX⁴⁹ (SI = Heart Rate/Sistolic Blood Pressure, VN 0,5-0,7)) (Tabella 1) ed è stato misurato il CAVAL INDEX pre-lisi^{47,48} (IVCd exp-IVCd insp/IVCd exp, VN a riposo in inspirazione da 0 a 14 mm, in espirazione a riposo da 15 a 20 mm) i cui valori sono stati riportati nella Tabella 2.

Pertanto, è stato creato un database con Microsoft Access© denominato “CASH”. Il database conteneva i seguenti campi:

- 1) **Numero del paziente,**
- 2) **CAVAL INDEX pre-lisi^{47,48},**
- 3) **SHOCK INDEX pre-lisi⁴⁹.** Tutti i pazienti sono stati analizzati, durante il reclutamento, secondo i suddetti 3 campi, raccolti di volta in volta in maschere create in modalità “visualizzazione struttura” e “visualizzazione foglio dati” come consentito dal programma database. E’ stata eseguita un’analisi comparativa^{1,2,3,4,5} per variabili continue con test parametrico “t” di Student per verificare se esiste una relazione significativa tra i valori del CAVAL INDEX pre-lisi^{47,48} e dello SHOCK INDEX pre-lisi⁴⁹.

SCOPO DEL LAVORO :Lo studio “CASH” si propone i seguenti obiettivi:

- 1) verificare eventuali relazioni esistenti tra i valori del CAVAL INDEX pre-lisi^{47,48} e dello SHOCK INDEX pre-lisi⁴⁹ nei 30 pazienti arruolati nello studio “CASH” durante il triennio gennaio 2012 – dicembre 2014;
- 2) verificarne la significatività statistica riscontrata applicando come test di analisi comparativa per variabili continue il test parametrico “t” di Student^{1,2,3,4,5} per stabilire se le relazioni delle variabili considerate siano dovute al caso.

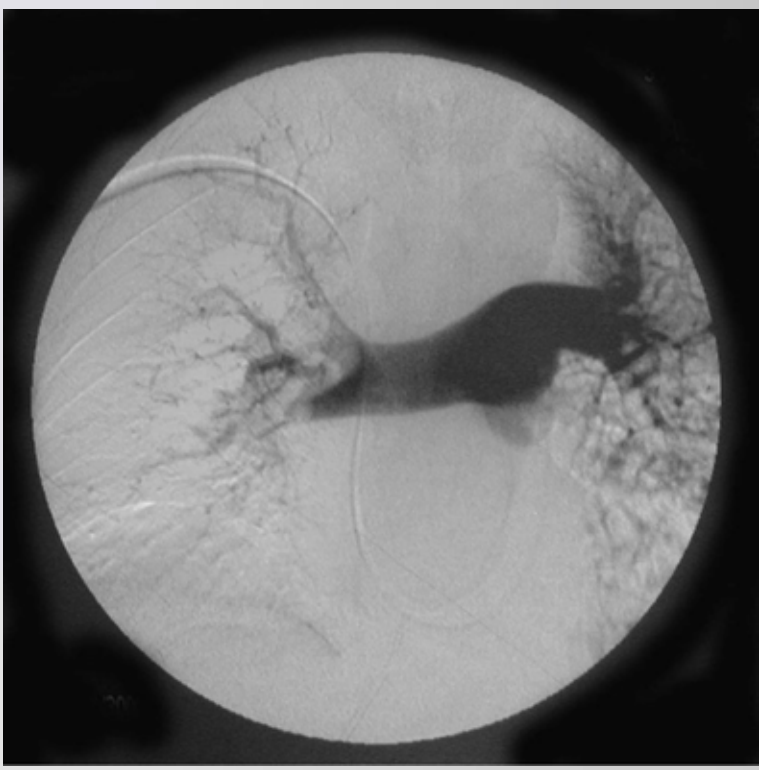
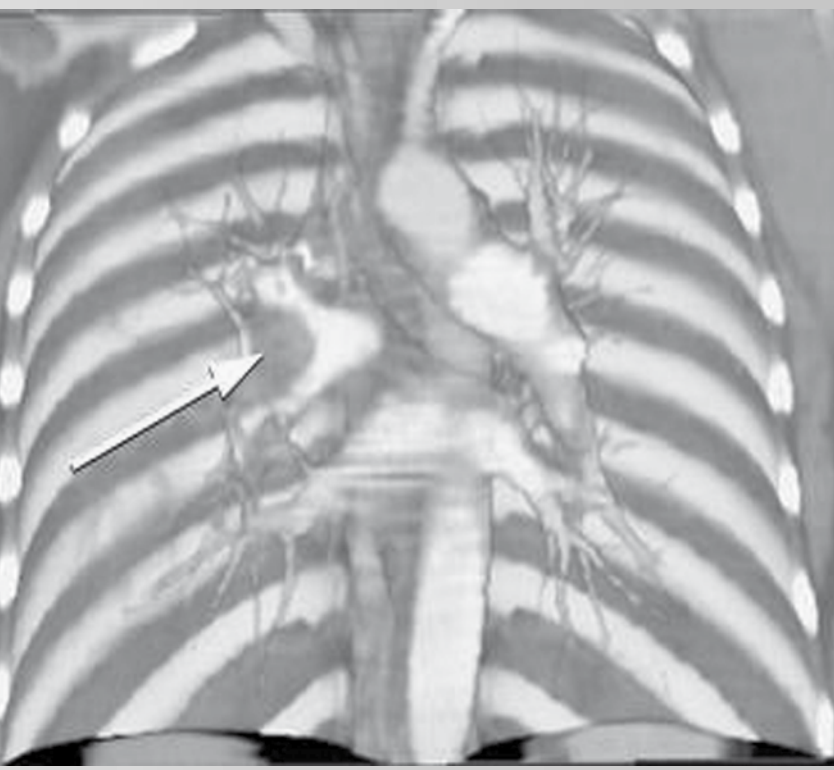


Foto 1

Foto 2

Foto 3

Foto 4

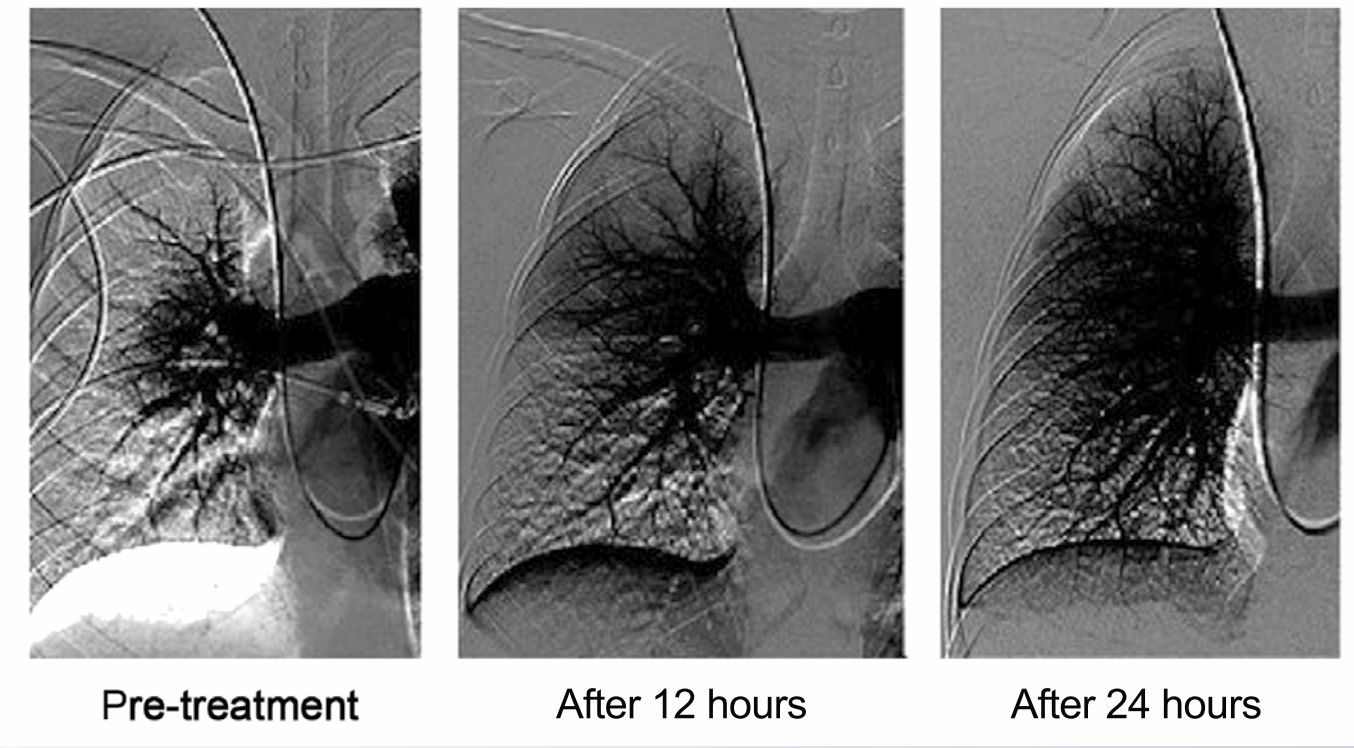


Foto 5

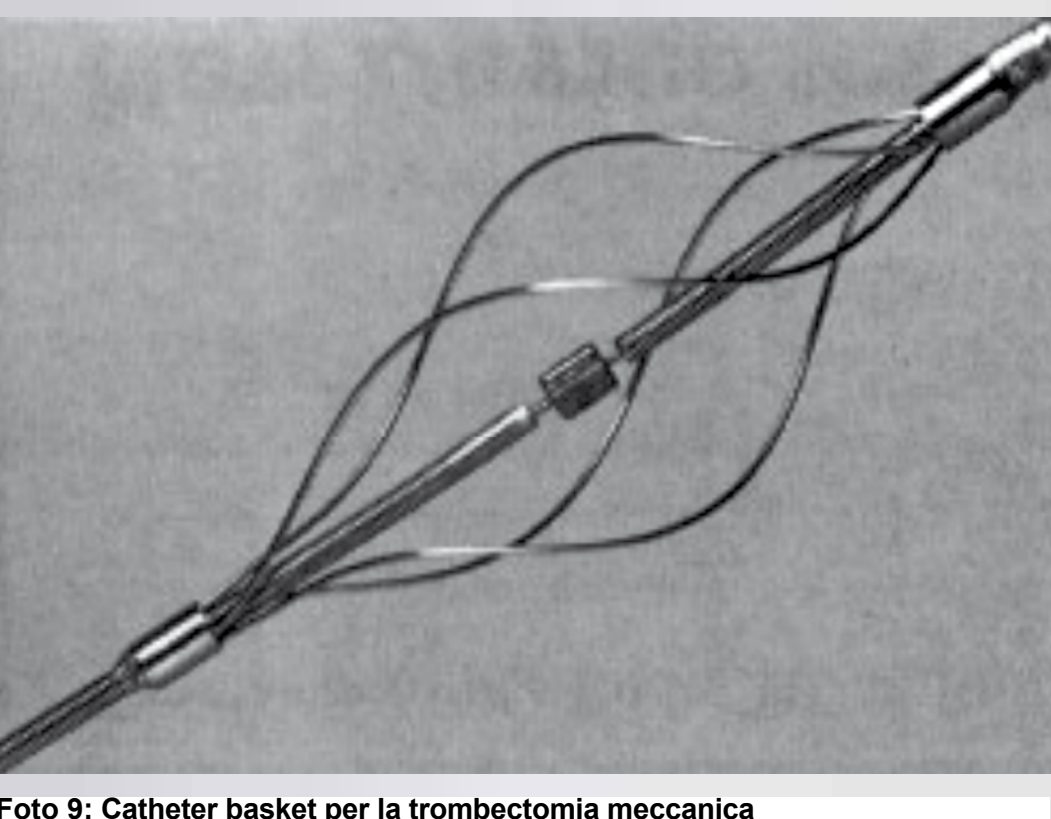


Foto 9: Catheter basket per la trombectomia meccanica

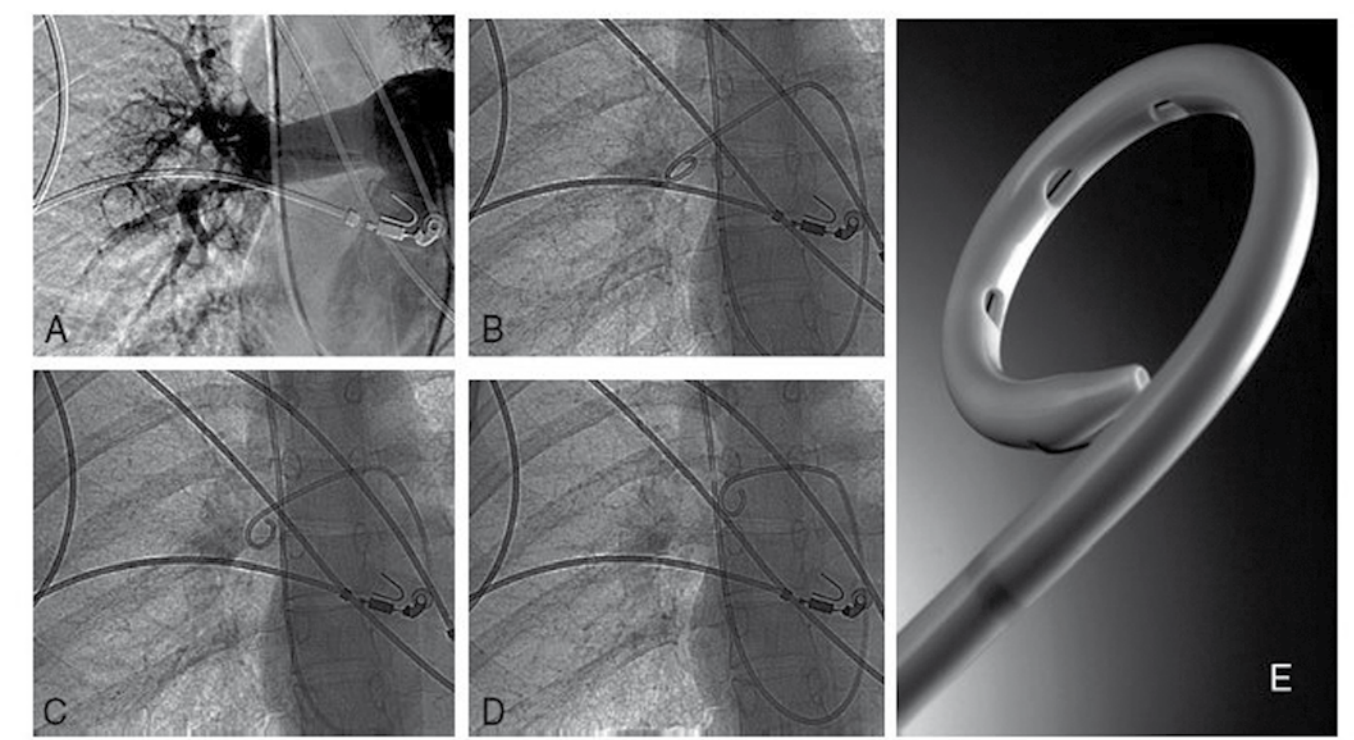


Foto 6

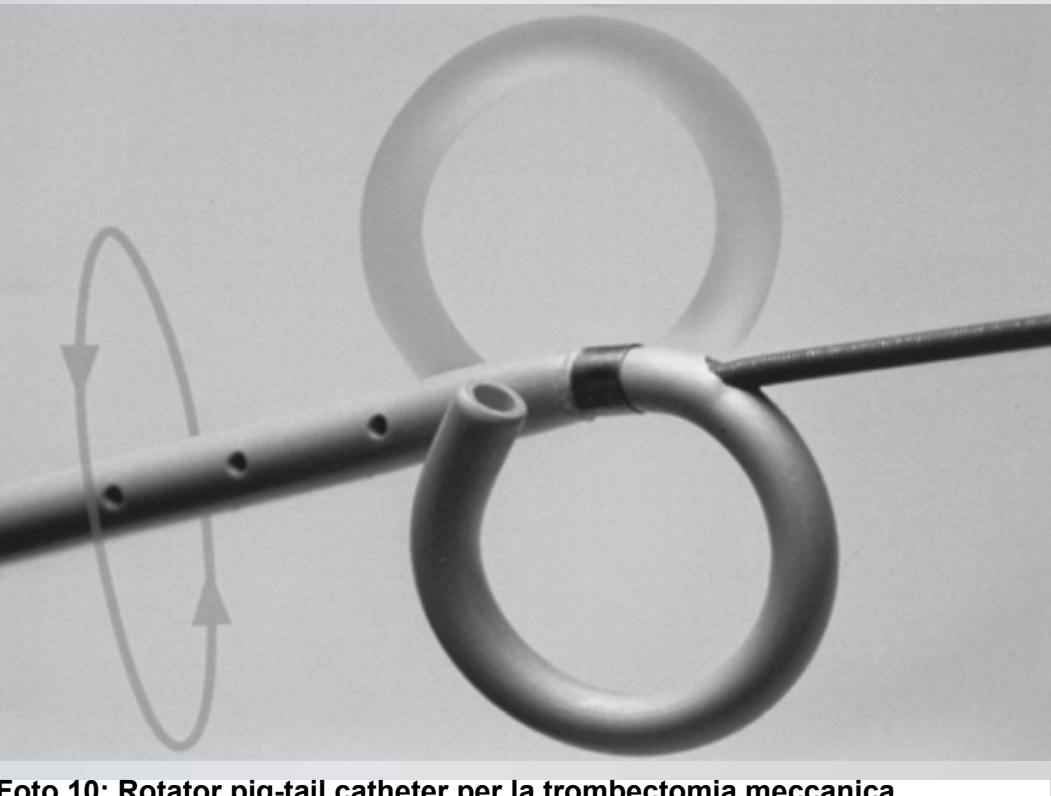


Foto 10: Rotator pig-tail catheter per la trombectomia meccanica

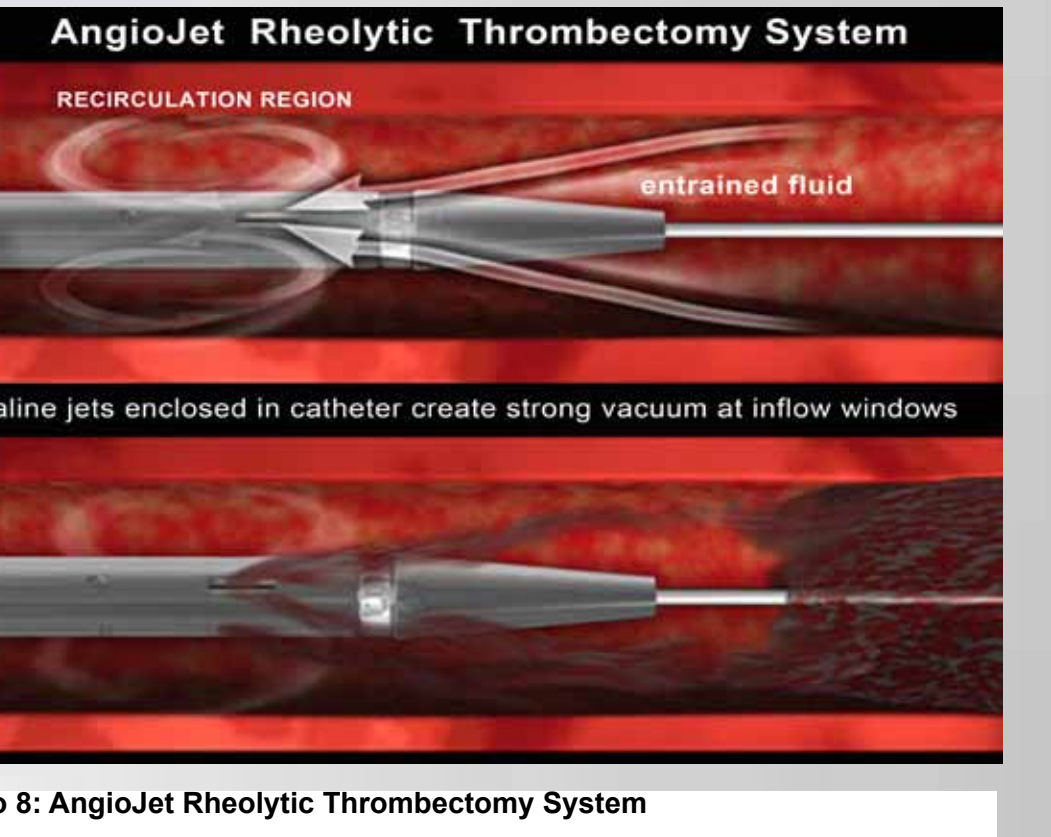


Foto 8: AngioJet Rheolytic Thrombectomy System

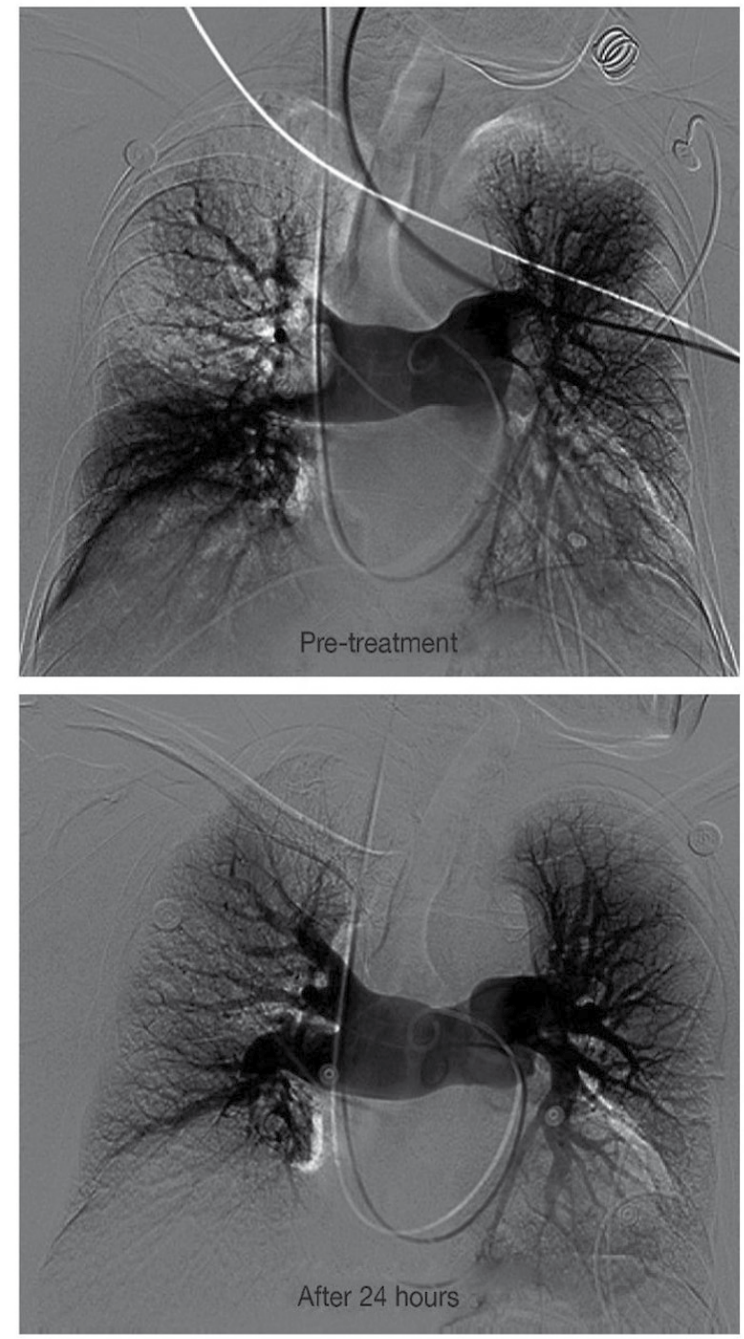


Foto 7

Paziente	Shock Index
1	1,1
2	1,1
3	1,1
4	1,1
5	1,3
6	1,3
7	1,3
8	1,3
9	1,3
10	1,3
11	1,3
12	1,3
13	1,3
14	1,3
15	1,3
16	1,3
17	1,3
18	1,3
19	1,9
20	1,9
21	1,9
22	1,9
23	1,9
24	1,9
25	1,9
26	1,9
27	1,9
28	1,9
29	1,9
30	1,9

Tabella 1: Valori di Shock Index misurati nei 30 pazienti arruolati nello studio “CASH”

Paziente	Caval Index (in %)
1	24
2	24
3	24
4	22
5	20
6	19
7	19
8	19
9	19
10	18
11	18
12	18
13	18
14	17
15	17
16	17
17	17
18	16
19	16
20	16
21	16
22	16
23	15
24	15
25	15
26	15
27	15
28	14
29	14
30	13

Tabella 2: Valori di Caval Index misurati nei 30 pazienti arruolati nello studio “CASH”

Pazienti	Caval Index (in %)	Shock Index
1	24	20
2	24	20
3	24	20
4	22	20
5	20	10
6	19	10
7	19	10
8	19	10
9	19	10
10	18	10
11	18	10
12	18	10
13	18	10
14	17	10
15	17	10
16	17	10
17	17	10
18	16	0
19	16	0
20	16	0
21	16	0
22	16	0
23	15	0
24	15	0
25	15	0
26	15	0
27	15	0
28	14	0
29	14	0
30	13	0

Tabella 3: Valori di Shock Index e Caval Index nei 30 pazienti arruolati nello studio “CASH”

Category of shock	Cardiac Function	IVC	Treatment
Septic	Hyperdynamic left ventricle Hypodynamic in late sepsis	Narrow IVC, Collapses with inspiration	IV fluid, Pressors
Cardiogenic	Hypodynamic left ventricle	Dilated IVC, little or no collapse with inspiration	Inotropic medications
Hypovolemic	Hyperdynamic left ventricle	Narrow IVC Collapses	Evaluation of cause, IV fluids and blood replacement
Obstructive (cardiac tamponade)	Pericardial effusion Diastolic collapse right ventricle	Dilated IVC, no collapse with inspiration	Pericardiocentesis
Obstructive (pulmonary embolus)	Dilated right ventricle Dilated right atrium	Dilated IVC Minimal collapse	Thrombolytics

Tabella 4: Approccio ecografico al paziente con shock: variazioni del caval index

MATERIALE E METODO:

I 30 pazienti arruolati con embolia polmonare centrale sono stati esaminati secondo i campi del database creato con Microsoft Access© denominato “CASH”. E’ stata creata la Tabella 3 elaborata con Microsoft Excel©, che confronta i valori di CAVAL INDEX pre-lisi^{47,48} con i valori dello SHOCK INDEX pre-lisi⁴⁹ nei 30 pazienti arruolati. Il test “t” di Student confronta l’uguaglianza tra le due medie (M1 ed M2), ponendo come ipotesi nulla che la differenza tra M1 ed M2 sia 0. Se la differenza tra M1 ed M2 è diversa da 0 si valuta se la ipotesi nulla vada rifiutata ed accettata l’ipotesi alternativa che tra i due campioni vi sia una differenza significativa con una probabilità P non superiore al 5%, a significare che la differenza trovata ha non più del 5% di probabilità di essere dovuta al caso. Il test calcola, quindi, il valore relativo (VR) dell’indice t da associare alla differenza trovata secondo la seguente formula: $t = (M1-M2) / \sqrt{DS1^2 / N1 + DS2^2 / N2}$. Pertanto, il valore di “t” ottenuto con Gradi di Libertà (GL)=29 è di 4,14. Essendo il Valore Critico (VC) di “t” 3,659 con GL=29 per $p=0,001$, il Valore Relativo (VR) di “t” pari a 4,14 esprime una concordanza positiva assoluta della covariazione tra i valori delle due variabili considerate (CAVAL INDEX e SHOCK INDEX pre-lisi) che è altamente significativa con $p<0,001$.

DISCUSSIONE:

I dati conseguiti suggeriscono che la covariazione inversa dei valori del CAVAL INDEX pre-lisi^{47,48} e dello SHOCK INDEX pre-lisi⁴⁹ nei 30 pazienti arruolati nello studio “CASH” esprima una differenza altamente significativa il cui significato clinico risiede nel sovraccarico delle sezioni destre cardiache, in presenza di elevati regimi pressori pressori imputabili al quadro embolico polmonare, riduzione della pressione arteriosa sistolica, aumento della frequenza cardiaca, valutati con lo SHOCK INDEX⁴⁹ pre-lisi, cui consegue una ridotta collassabilità della cava inferiore, valutata con il CAVAL INDEX pre-lisi^{47,48}. Dalla disamina della letteratura emergono le seguenti esperienze che, seguito, proponiamo. Lyon⁴⁷ ed Atkinson⁴⁸ impiegano il CAVAL INDEX nell’approccio in emergenza al paziente con shock indifferenziato (Tabella 4). Liu⁴⁹ valuta lo shock index all’interno di un dipartimento di emergenza e la sua correlazione con il tasso di mortalità.

CONCLUSIONI:

Lo studio “CASH” ha dimostrato come nel gruppo di 30 pazienti con tromboembolismo venoso (embolia polmonare centrale) vi sia una correlazione altamente significativa tra le due variabile considerate: CAVAL INDEX pre-lisi^{47,48} e SHOCK INDEX pre-lisi⁴⁹. Tale correlazione mostra una concordanza positiva assoluta secondo il test “t” di analisi comparativa di Student ed è espressione non di una associazione casuale ma di una stretta correlazione tra i valori del CAVAL INDEX pre-lisi^{47,48} ed i valori dello SHOCK INDEX pre-lisi⁴⁹ nei 30 pazienti con embolia polmonare centrale. Confrontando le esperienze in letteratura, lo studio “CASH” propone dei dati che integrano quelli forniti dagli studi di Lyon⁴⁷, Atkinson⁴⁸ e Liu⁴⁹

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