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Gruppo di Ricerca
Ecografia Toracica nell'Anziano SIGG

Corso pre-congressuale
L'ecografia toracica nell'anziano

Firenze, 13/12/2023

Diagnostica ecografica dello scompenso cardiaco e dell'edema polmonare acuto

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Università degli Studi di Milano-Bicocca
PhD Fisiopatologia Clinica Cardio-Polmonare

Conflitti di interesse

DICHIARO

di avere avuto, negli ultimi due anni nessun rapporto commerciale o finanziario con soggetti portatori di interessi commerciali in campo sanitario

Boeringer

Outline

- Prima e dopo
- Le sonde ecografiche
- Sindrome interstiziale e Linee B
- Caso clinico 1
- La valutazione ecografica integrato nello scompenso cardiaco

PRIMA

Sindrome interstiziale su RX

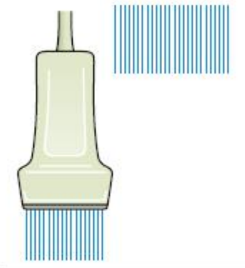
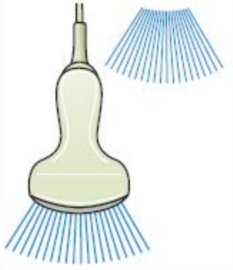
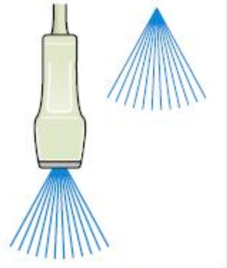
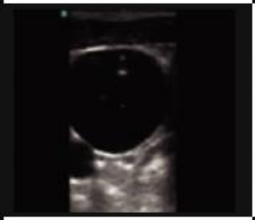
- C'è versamento?
  - *«possibile»*
- Quanto?
  - *«Abbondante, modesto, lieve…»*
- E' scompenso o ARDS?
  - *«Da correlare con quadro clinico anamnestico»*
- Monitoraggio del quadro clinico?
  - *«Rimandamelo giù tra 2 giorni, possibilmente ACCOMPAGNATO»*

DOPO (si spera…)

Sindrome interstiziale su RX

- C'è versamento?
  - Si / no /monolaterale, bilaterale
- Quanto?
  - *Circa 1200 cc / PEFS 4/ oltre 3 spazi*
- E' scompenso o ARDS?
  - *Sindrome interstiziale su base cardiogena*
- Monitoraggio del quadro clinico?
  - *Rivalutazione al letto del paziente tra 24 ore, con integrazione di esami ematici e clinica*

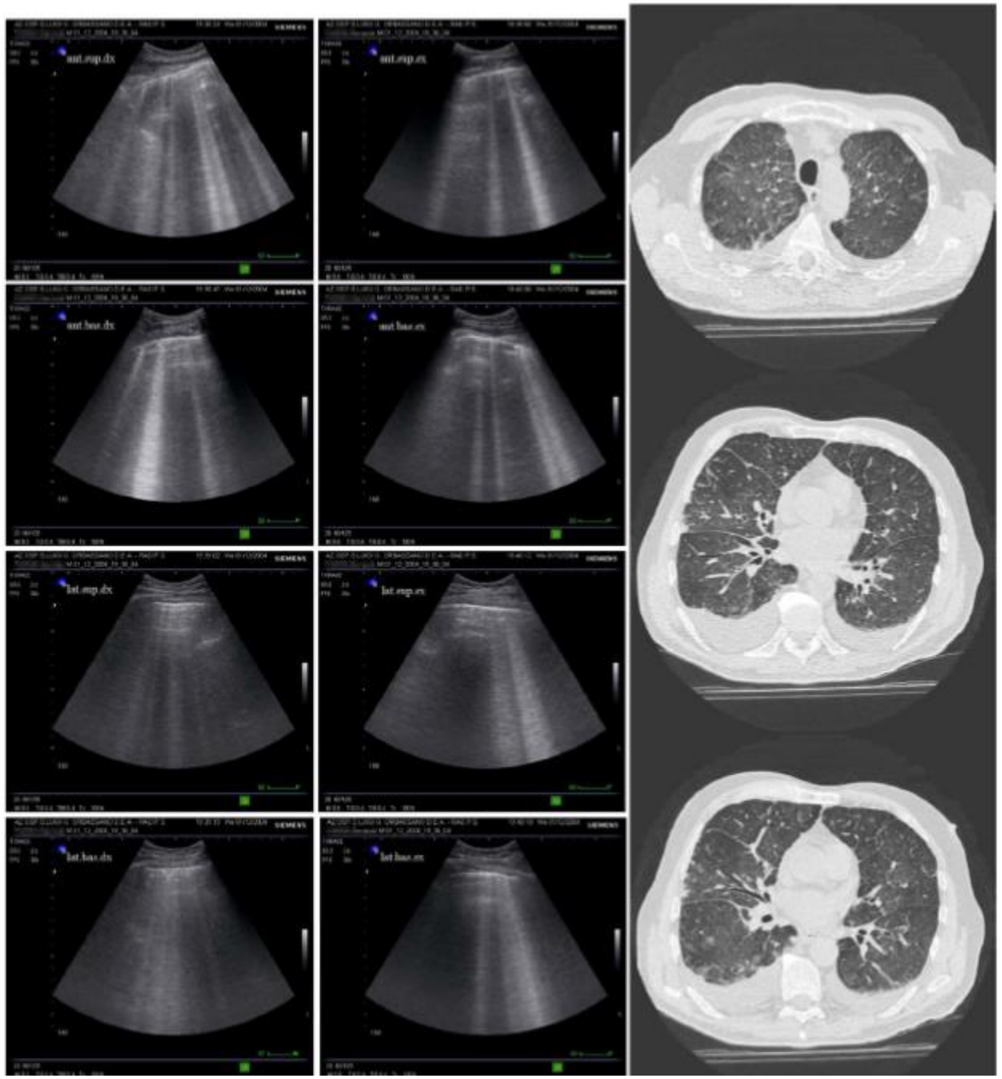
Interstiziopatia: QUALE SONDA UTILIZZARE?

Transducer type	Linear	Curvilinear	Phased array
			
Frequency range	5–10 MHz	2–5 MHz	1–5 MHz
Imaging depth	9 cm	30 cm	35 cm
Footprint			
Image			
Applications	Arteries/veins Procedures Pleura Skin/soft tissues Musculoskeletal Testicles/hernia Eyes Breast	Gallbladder Liver Kidney Bladder Abdominal aorta Abdominal free fluid Uterus/ovaries	Heart Inferior vena cava Lungs Pleura Abdomen

Sindrome interstiziale polmonare

La sindrome alveolo-interstiziale polmonare comprende molte condizioni patologiche eterogenee che hanno in comune un diffuso coinvolgimento dell'interstizio con riduzione della capacità di scambio alveolo-capillare.

Tali condizioni sono sia croniche (la fibrosi polmonare) sia acute (l'ARDS, l'edema polmonare, la polmonite interstiziale).



Volpicelli et al. Bedside lung ultrasound in the assessment of alveolar-interstitial syndrome, The American Journal of Emergency Medicine

Linee B (1)

The Comet-tail Artifact

An Ultrasound Sign of Alveolar-Interstitial Syndrome

DANIEL LICHTENSTEIN, GILBERT MÉZIÈRE, PHILIPPE BIDERMAN, AGNÈS GEPNER, and OLIVIER BARRÉ

Service de Réanimation Médicale and Service de Radiologie, Hôpital Ambroise-Paré, Boulogne (Paris), and Service de Réanimation Polyvalente, Centre Hospitalier Général, Saint-Cloud (Paris), France

Can ultrasound be of any help in the diagnosis of alveolar-interstitial syndrome? In a prospective study, we examined 250 consecutive patients in a medical intensive care unit: 121 patients with radiologic alveolar-interstitial syndrome (disseminated to the whole lung, n = 92; localized, n = 29) and 129 patients without radiologic evidence of alveolar-interstitial syndrome. The antero-lateral chest wall was examined using ultrasound. The ultrasonic feature of multiple comet-tail artifacts fanning out from the lung surface was investigated. This pattern was present all over the lung surface in 86 of 92 patients with diffuse alveolar-interstitial syndrome (sensitivity of 93.4%). It was absent or confined to the last lateral intercostal space in 120 of 129 patients with normal chest X-ray (specificity of 93.0%). Tomodensitometric correlations showed that the thickened sub-pleural interlobular septa, as well as ground-glass areas, two lesions present in acute pulmonary edema, were associated with the presence of the comet-tail artifact. In conclusion, presence of the comet-tail artifact allowed diagnosis of alveolar-interstitial syndrome. **Lichtenstein D, Mézière G, Biderman P, Gepner A, Barré O. The comet-tail artifact: an ultrasound sign of alveolar-interstitial syndrome.**

AM J RESPIR CRIT CARE MED 1997;156:1640–1646.

Linee B (1)

Lichstenstein D, The comet-tail artifact: an ultrasound sign of alveolar-interstitial syndrome. AM J Respir Crit Care Med 1997.

250 pazienti ricoverati in UTI

121 **CON** evidenza radiologica di sindrome interstiziale

89 pazienti su 92 avevano linee B diffuse
SENSIBILITA' 93%

Al controllo TC:

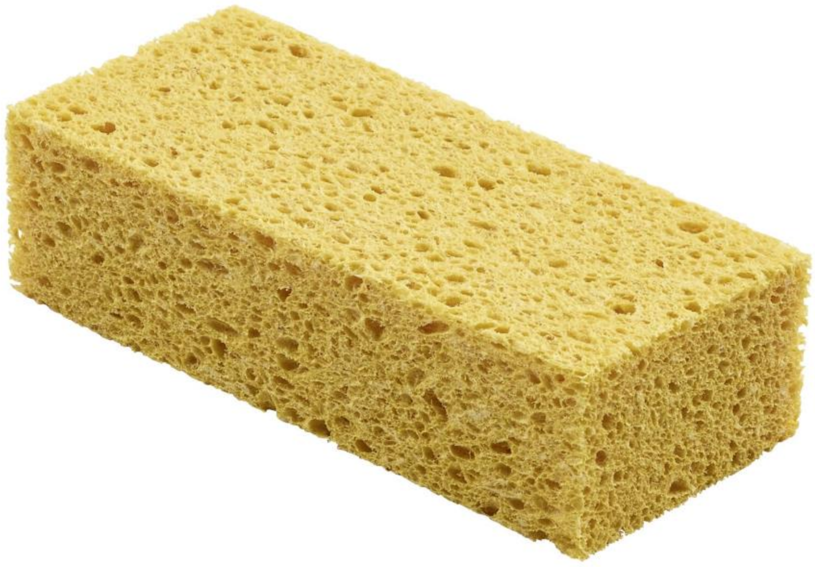
- Ispessimento dei setti interlobulari subpleurici
- Lesioni a vetro smerigliato

129 pazienti **SENZA** evidenza radiologica di sindrome interstiziale

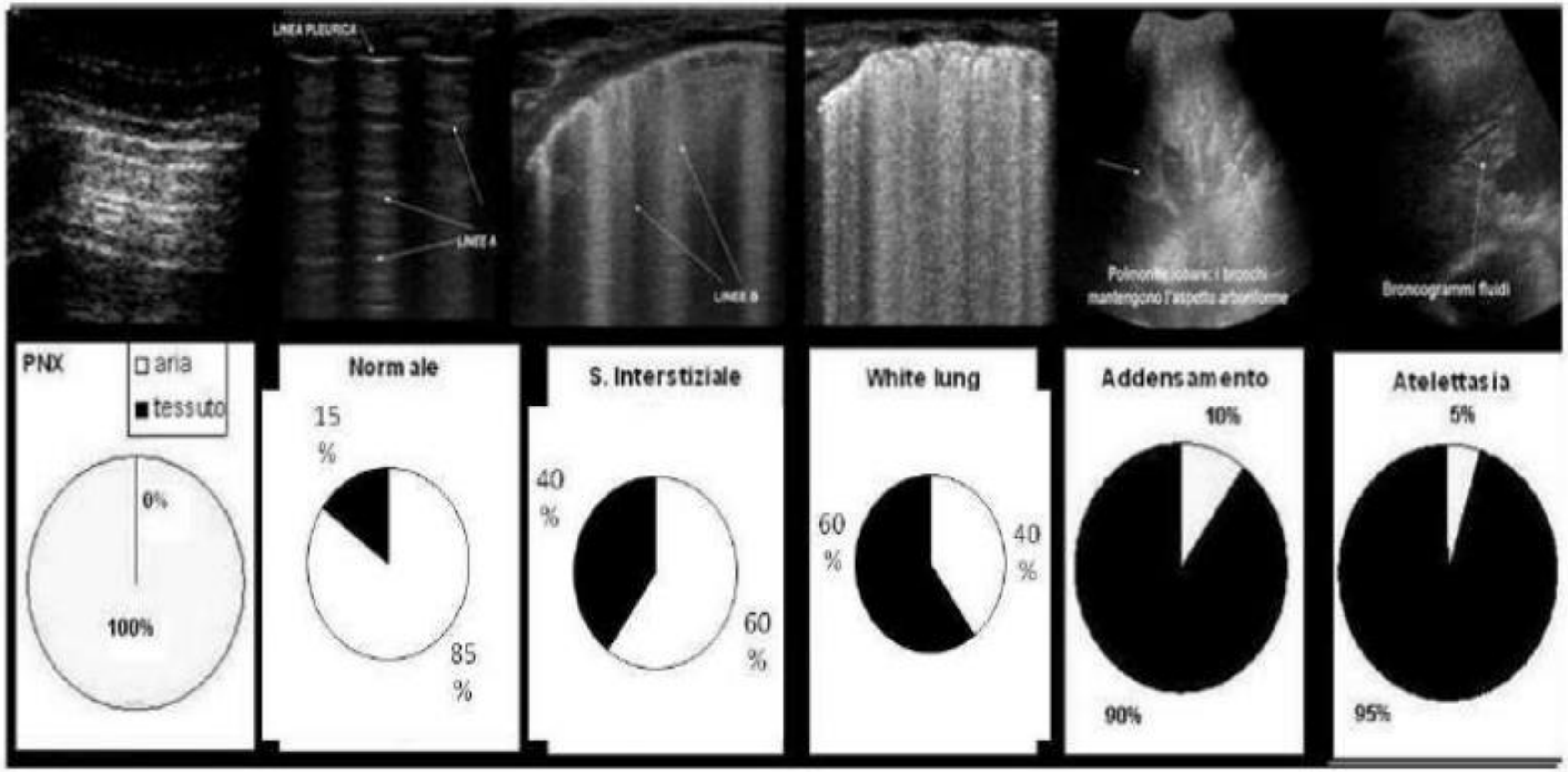
Solo 9 su 129 pazienti avevano linee B
SPECIFICITA' 93%

Linee B (3)

Le linee B sono l'epifenomeno dell'aumentata densità del polmone sottopleurico. Un aumento di densità si può avere per aumento del peso del tessuto (interstizio) o per riduzione del volume (componente aerea) o per combinazione dei due meccanismi



Linee B (3)

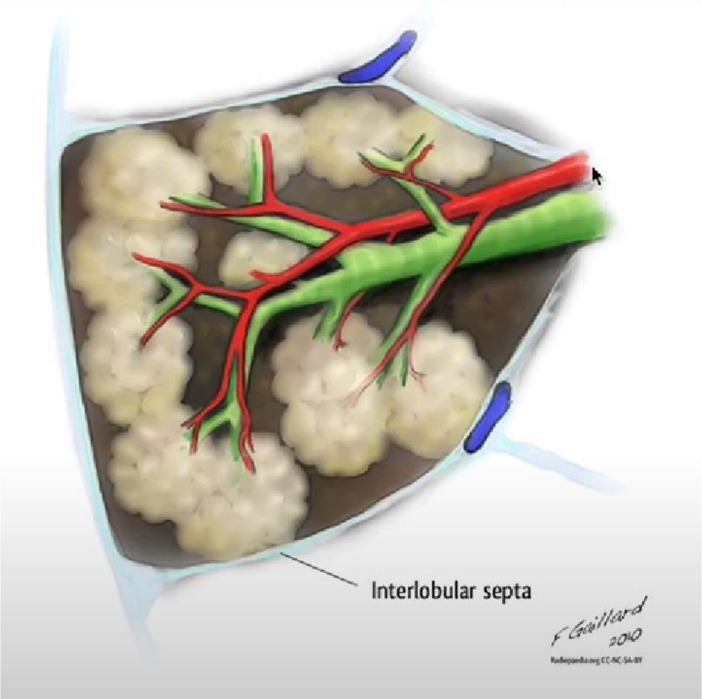


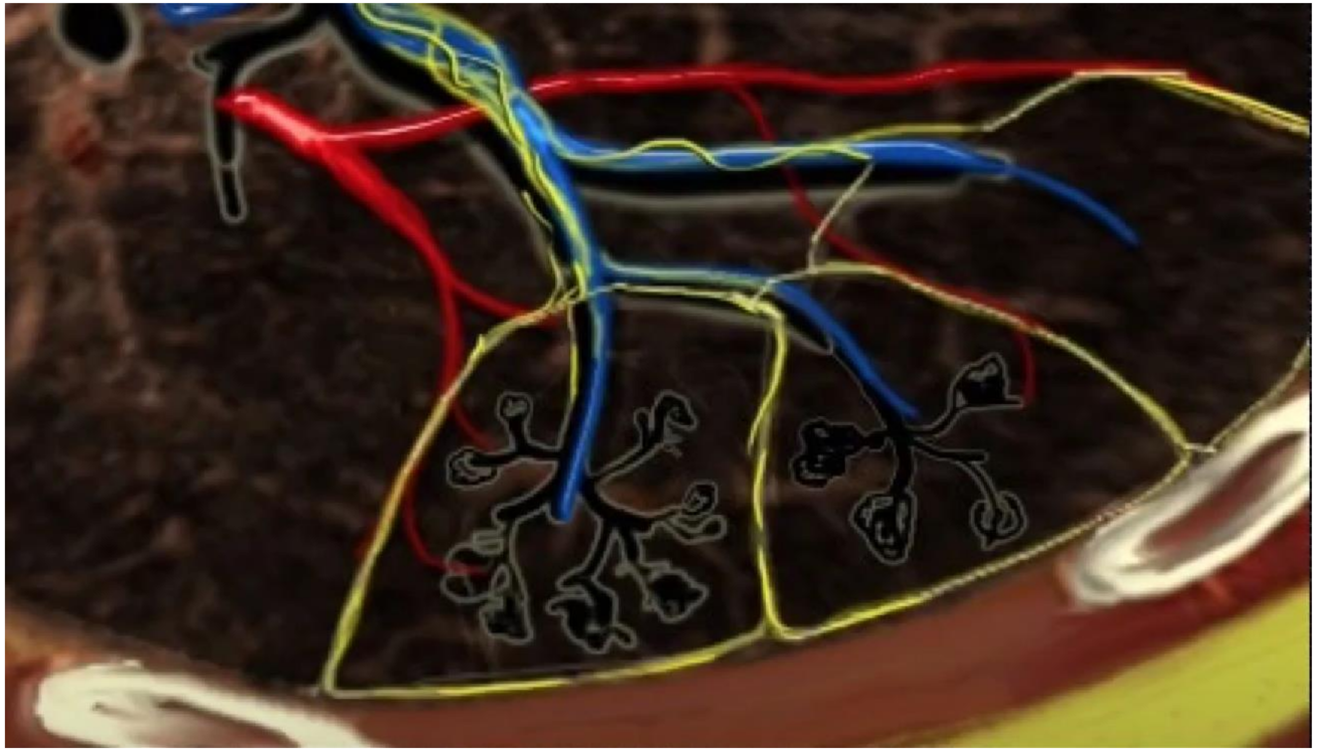
D:	0	0,15	0,40	0,60	0,90	0,95-1

D: densità corticale polmonare (g/ml)

sindrome interstiziopatica polmonare

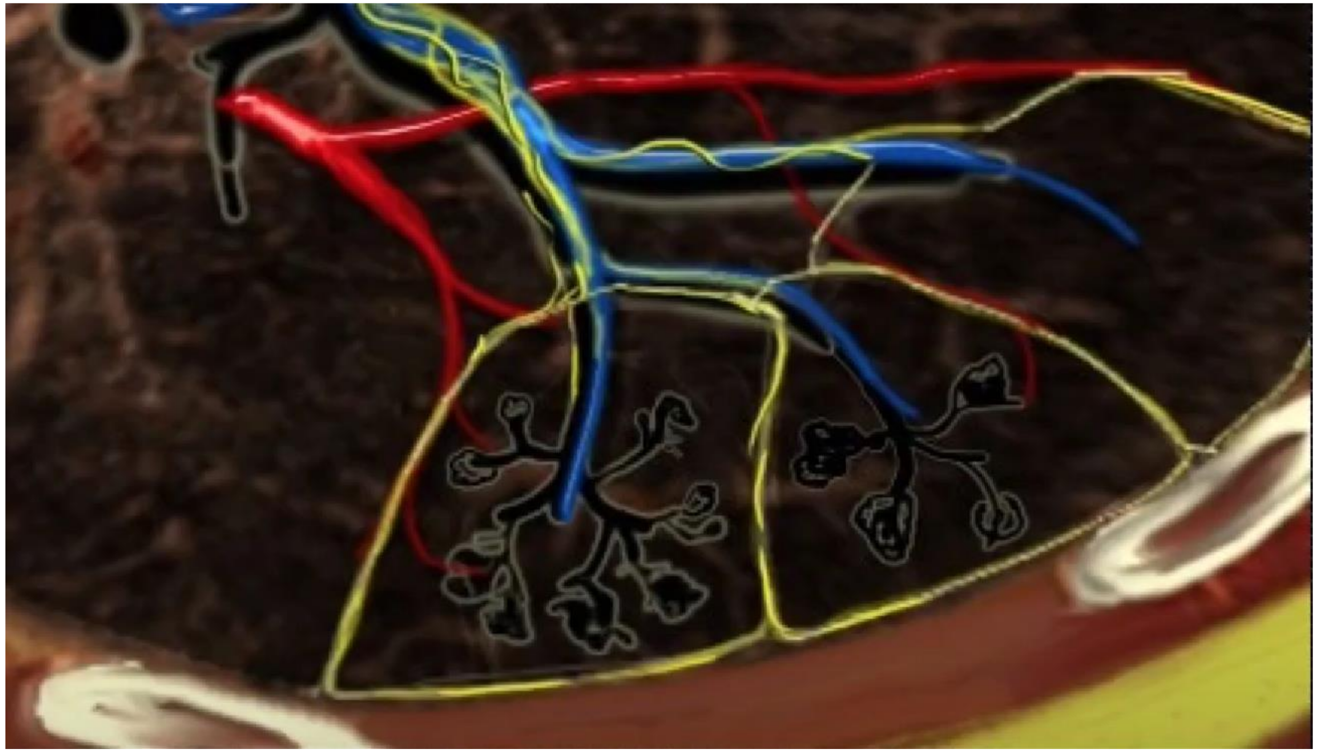
Lobulo polmonare secondario





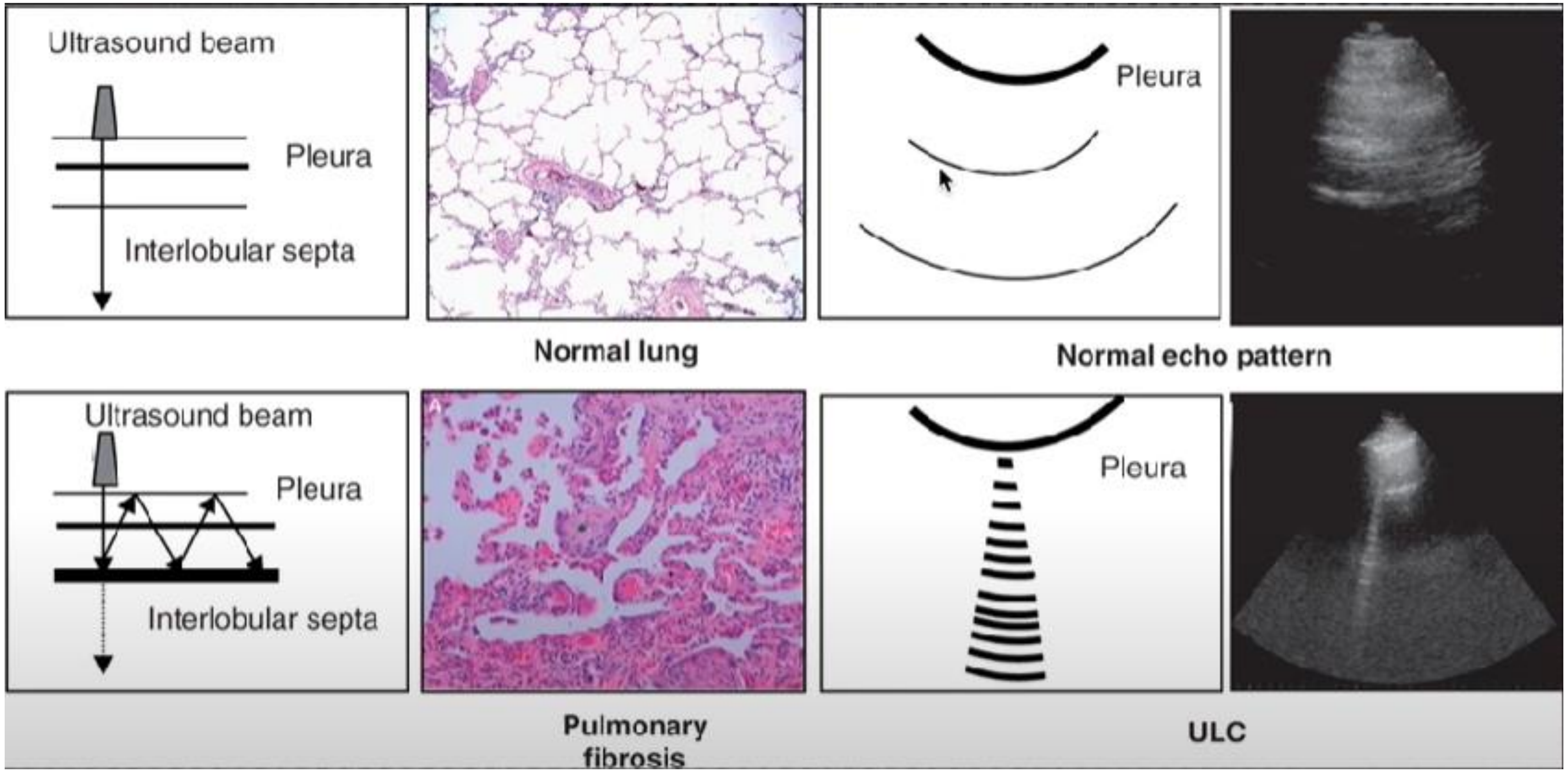
Silva Cl. JBP 2010 38(1)99:256

sindrome interstiziopatica polmonare



Silva Cl. JBP 2010 38(1)99:256

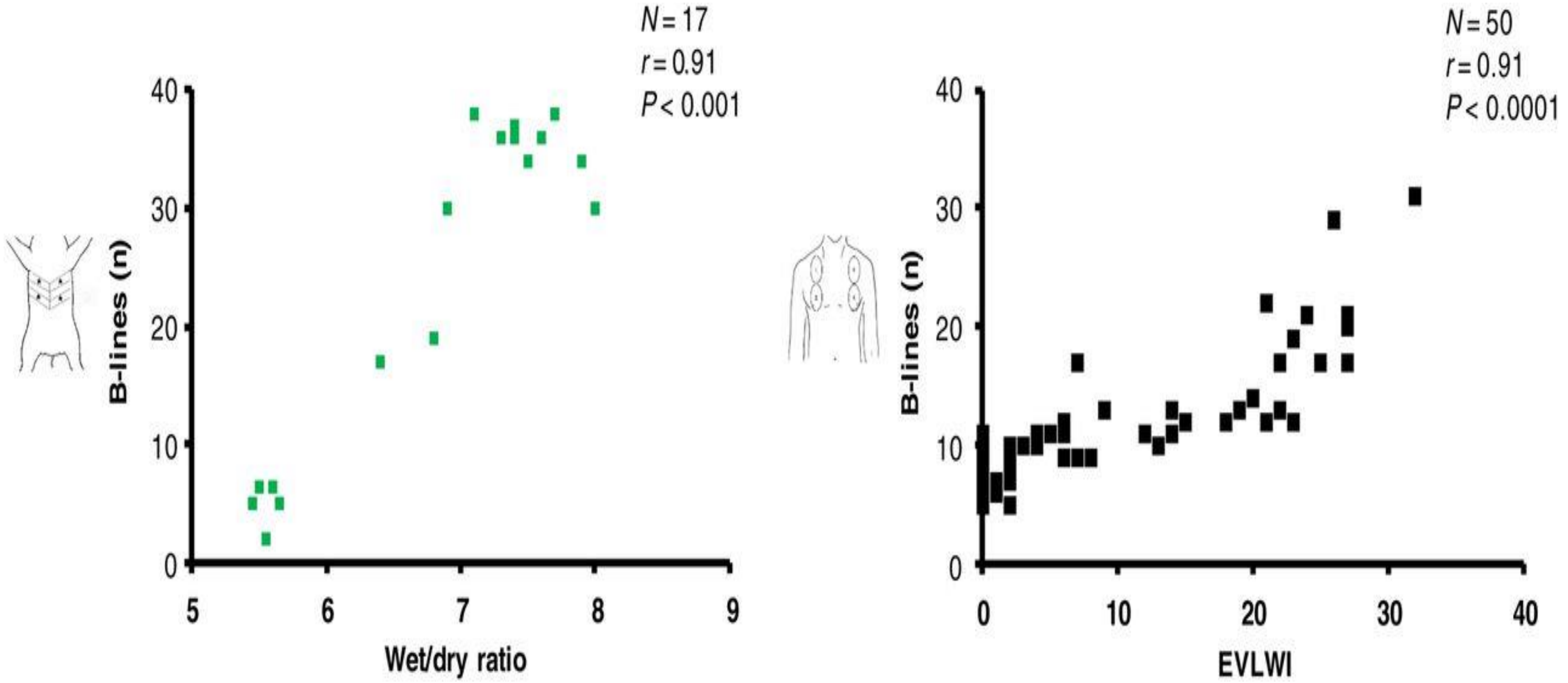
Sindrome interstiziopatia polmonare



Gargani et al. Reumatology 2009;48:1382-1387

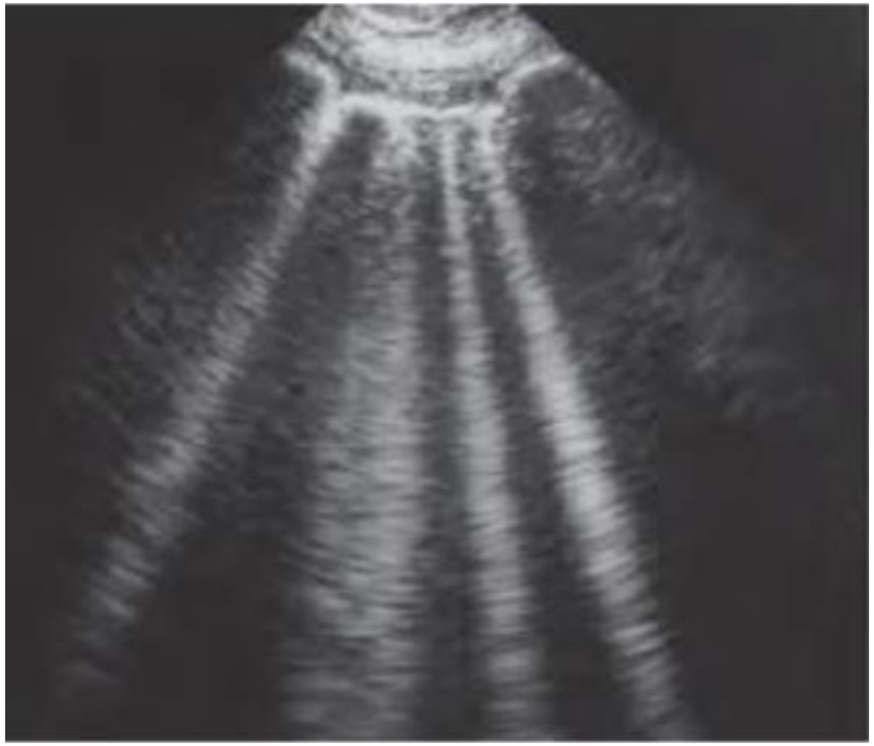
Valutazione integrata nel paziente scompensato

ESC
European Society
of Cardiology

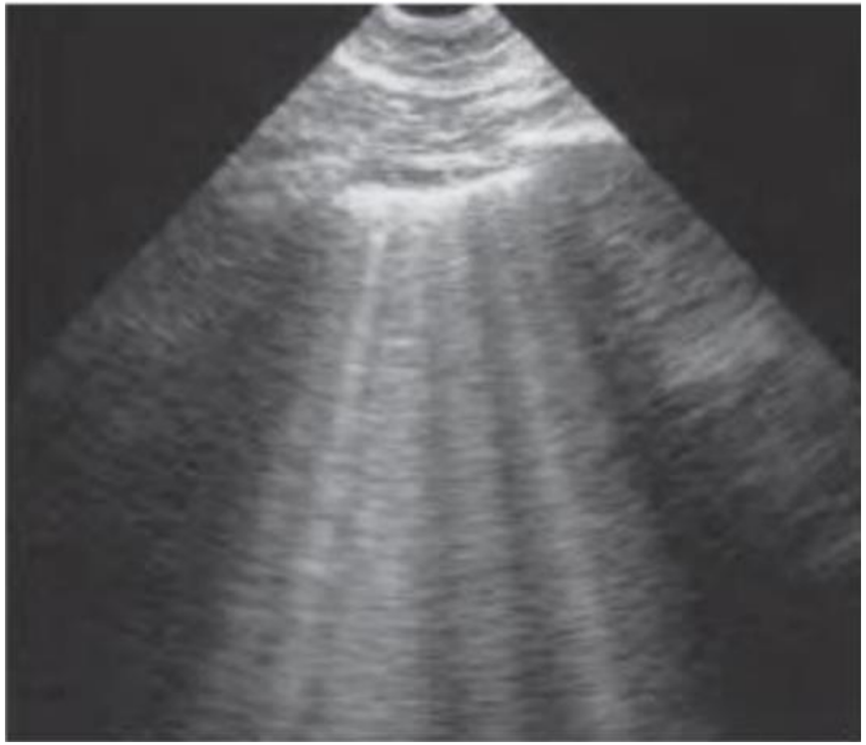


Eur Heart J, Volume 37, Issue 27, 14 July 2016, Pages 2097–2104, https://doi.org/10.1093/eurheartj/ehw164

Linee B (4)

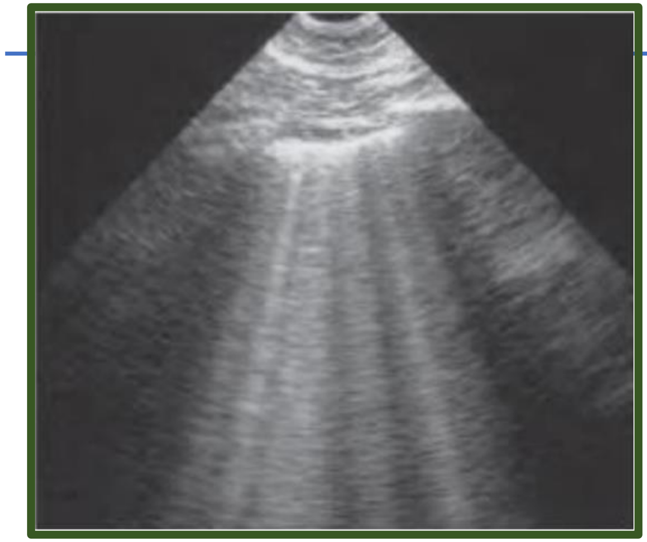


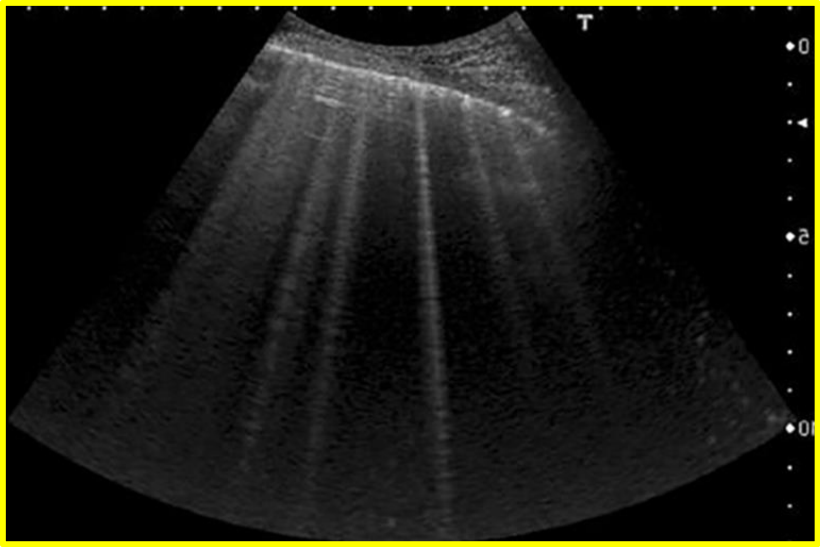
Three/four B lines between two ribs are called septal-rockets, correlating with thickened subpleural interlobular septa



Five B lines or more are called glass rockets, correlating with CT **ground-glass opacities**, indicating, severe interstitial syndrome. The label coalescent B lines, twice as long to say, is less descriptive.

Linee B (4)





	ADHF	ILD o polmonite atipiche	ARDS	FIBROSI
Aspetto delle Linee B	Fini>>>Coalescenti	Fini	Coalescenti	Fini
Distribuzione	Diffuse con andamento gravitazionale	Diffuse senza a.g. Multifocali>>Focali con aree di risparmio	Diffuse senza a.g/ con aree di risparmio	Sparse con aree di risparmio
Simmetria	Bilaterali	Monolaterali /Bilaterali	Bilaterali	Asimmetriche
Linea pleurica	Linea pleurica sottile	Linea pleurica frastagliata	Linea pleurica frastagliata con nodularità	Linea pleurica frastagliata con nodularità e placche
Versamento pleurico	Associate a versamento pleurico	Non associate a versamento pleurico	Non associate a versamento pleurico	Non associate a versamento pleurico

Linee B (4)

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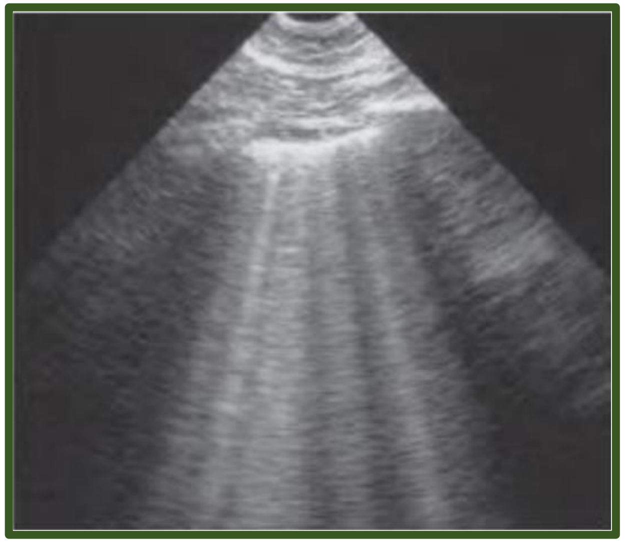

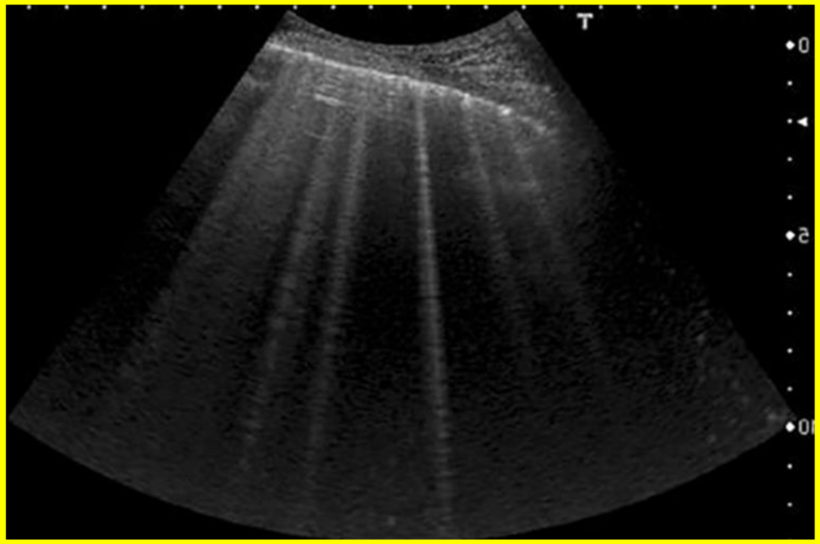

Okoye et al. BMC Geriatrics (2022) 22:166
https://doi.org/10.1186/s12877-022-02837-7

BMC Geriatrics

RESEARCH Open Access

Computed tomography findings and prognosis in older COVID-19 patients

Chukwuma Okoye[1], Panaiotis Finamore[2*], Giuseppe Bellelli[3], Alessandra Coin[4], Susanna Del Signore[5], Stefano Fumagalli[6], Pietro Gareri[7], Alba Malara[8], Enrico Mossello[6], Caterina Trevisan[4], Stefano Volpato[9], Gianluca Zia[5], Fabio Monzani[1] and Raffaele Antonelli Incalzi[2]

Abstract

Background: In older and multimorbid patients, chronic conditions may affect the prognostic validity of computed tomography (CT) findings in COVID-19. This study aims at assessing to which extent CT findings have prognostic implications in COVID-19 older patients.

Methods: Hospitalized COVID-19 patients aged 60 years or more enrolled in the multicenter, observational and longitudinal GeroCovid study who underwent chest CT were included. Patients were stratified by tertiles of age and pneumonia severity to compare CT findings. Hierarchical clustering based on CT findings was performed to identify CT-related classificatory constructs, if any. The hazard ratio (HR) of mortality was calculated for individual CT findings and for clusters, after adjusting for potential confounders.

Results: 380 hospitalized COVID-19 patients, with a mean age of 78 (SD:9) years, underwent chest CT scan. Ground glass opacity (GGO), consolidation, and pleural effusion were the three most common CT findings, with GGO prevalence decreasing from younger to older patients and pleural effusion increasing. More severe the pneumonia more prevalent were GGO, consolidation and pleural effusion. HR of mortality was 1.94 (95%CI 1.24–3.06) for pleural effusion and 13 (95%CI 6.41–27) for cluster with a low prevalence of GGO and a high prevalence of pleural effusion ("LH"), respectively. Out of the three CT based clusters, "LH" was the only independent predictor in the multivariable model.

Conclusions: Pleural effusion qualifies as a distinctive prognostic marker in older COVID-19 patients. Research is needed to verify whether pleural effusion reflects COVID-19 severity or a coexisting chronic condition making the patient at special risk of death.

Trial registration: ClinicalTrials.gov: NCT04379440

Keywords: SARS-CoV-2, Oldest, Old, Tomography, X-ray computed, Pleural

Valutazione integrata nel paziente scompensato

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ESC European Society of Cardiology
European Journal of Heart Failure (2019)
doi:10.1002/ejhf.1379
RESEARCH ARTICLE

Lung ultrasound integrated with clinical assessment for the diagnosis of acute decompensated heart failure in the emergency department: a randomized controlled trial

Emanuele Pivetta[1,2*], Alberto Goffi[3,4,5], Peiman Nazerian[6], Davide Castagno[7], Camilla Tozzetti[8], Pietro Tizzani[2,9], Maria Tizzani[2], Giulio Porrino[2], Enrico Ferreri[2], Valeria Busso[2], Fulvio Morello[2], Cristina Paglieri[2], Monica Masoero[10], Elisa Cassine[11], Federica Bovaro[10], Stefano Grifoni[6], Milena M. Maule[1], and Enrico Lupia[2,12], on behalf of the Study Group on Lung Ultrasound from the Molinette and Careggi Hospitals[†]

	CXR/NT Pro BNP Arm	Lung Ultrasound
Clinical Evaluation	7.2	9.46
	0.21	0.17
Integrated Evaluation	8.0	20.9
	0.17	0.07

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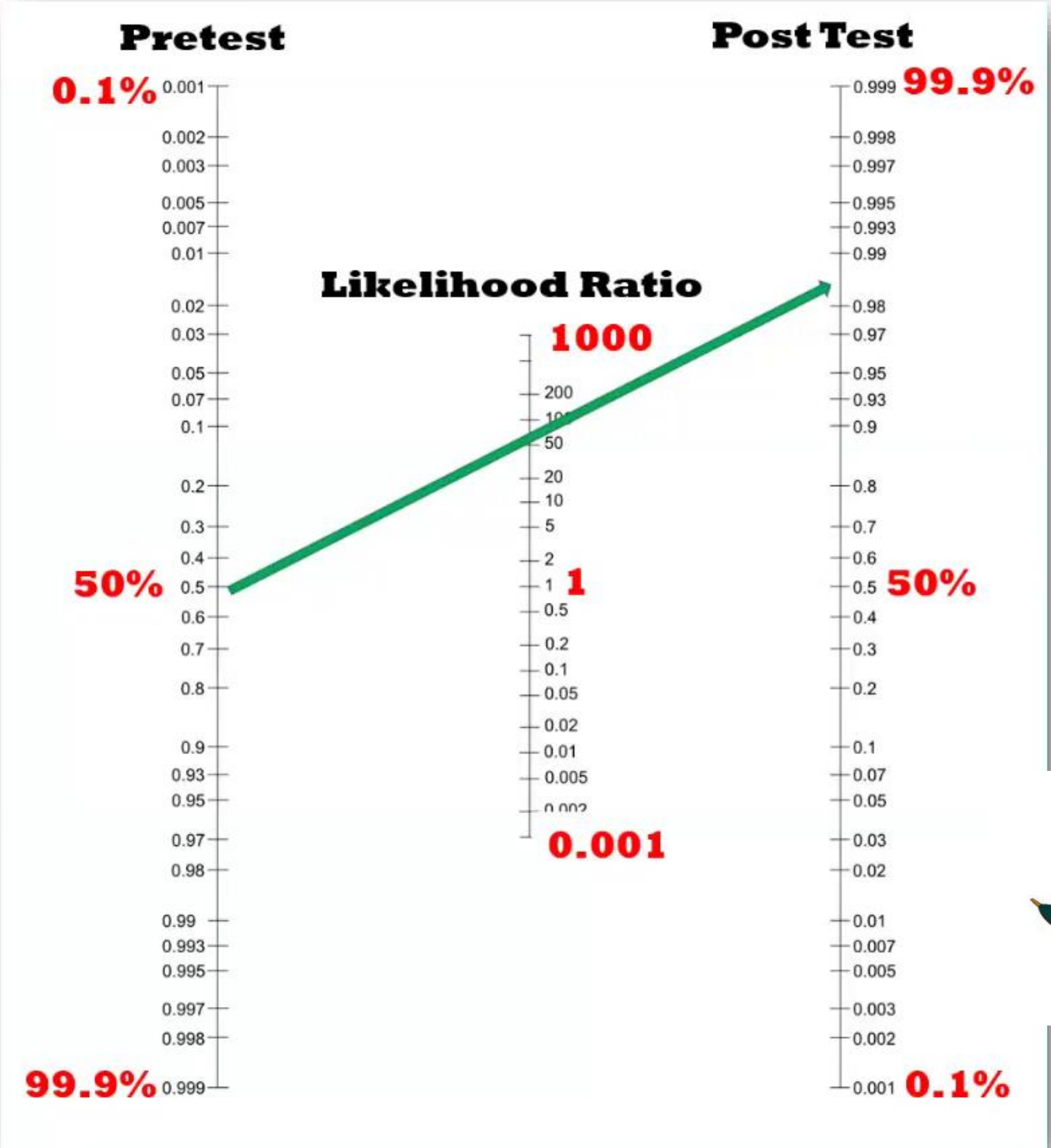


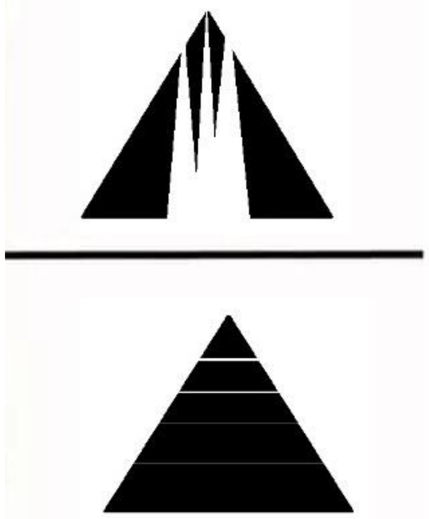
	CXR/NT Pro BNP Arm	Lung Ultrasound
Clinical Evaluation	7.2	9.46
	0.21	0.17
Integrated Evaluation	8.0	20.9
	0.17	0.07

104 minuti

5 minuti

Facile. O No?

In sintesi:
Linee Orizzontali: **Buono**
Linee Verticali Triangolariformi: **no buono**



Comuni errori nell'esecuzione dell'esame

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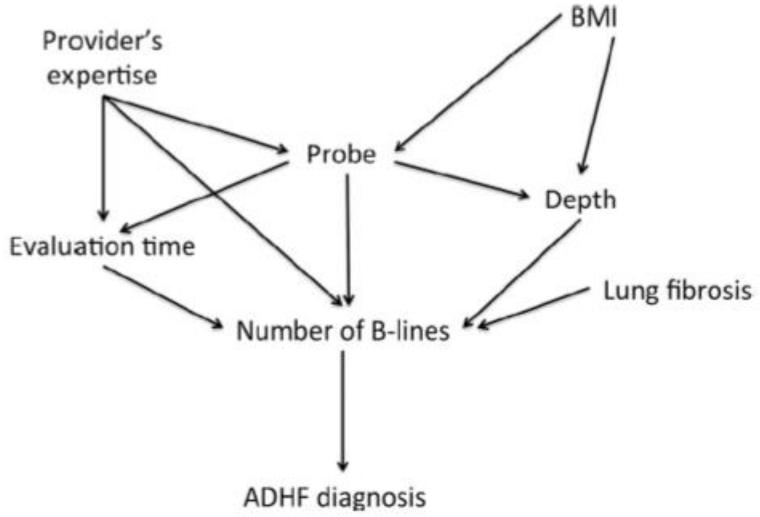
● *Original Contribution*

SOURCES OF VARIABILITY IN THE DETECTION OF B-LINES, USING LUNG ULTRASOUND

EMANUELE PIVETTA,[*,†] FEDERICO BALDASSA,[†,‡] SERENA MASELLIS,[†,‡] FEDERICA BOVARO,[†,§] ENRICO LUPIA,[†] and MILENA M. MAULE[*]
* Cancer Epidemiology Unit and CRPT, Department of Medical Sciences, University of Turin, Turin, Italy; † Division of Emergency Medicine, Department of Medical Sciences, University of Turin, Turin, Italy; ‡ School of Medicine, University of Turin, Turin, Italy; and § Residency Program in Emergency Medicine, University of Turin, Turin, Italy

(*Received 22 November 2017; revised 23 February 2018; in final form 27 February 2018*)



METHODS
«Two operators (F.B. and E.P.) collected LUS videos for each patient, using a 4-zones-for-hemitorax scanning protocol, as suggested by the international recommendations for POC LUS (Volpicelli et al. 2012). Each patient was evaluated with a curvilinear and a phased array probe, at scanning depths of 10 and 19 cm, and a 7-s sonographic clip was recorded. After enrollment, two copies of each clip were made, which were then cut at 2 and 4 s from the beginning of the recording (which occurred randomly in the diagnostic process) to investigate the diagnostic value of various recording lengths.»

DISCUSSION
To our knowledge, this is the first study evaluating several sources of LUS variability, using both qualitative and quantitative approaches, including multilevel regression models, to assess their relative importance.We found that the operator's expertise, the type of probe and the clip duration affect the detection of B-lines in a cohort of dyspneic patients suspected of suffering from acute heart failure.

Comuni errori nell'esecuzione dell'esame

Minerva Anestesiologica 2022 April;88(4):308-13
DOI: 10.23736/S0375-9393.22.16195-X

EXPERTS' OPINION

Ten conditions where lung ultrasonography may fail: limits, pitfalls and lessons learned from a computer-aided algorithmic approach

Francesco CORRADI [1, 2] *, Luigi VETRUGNO [3, 4], Alessandro ISIRDI [1],
Elena BIGNAMI [5], Patrizia BOCCACCI [6], Francesco FORFORI [1]

TABLE I.—*Ten conditions potentially affecting lung ultrasound reliability.*

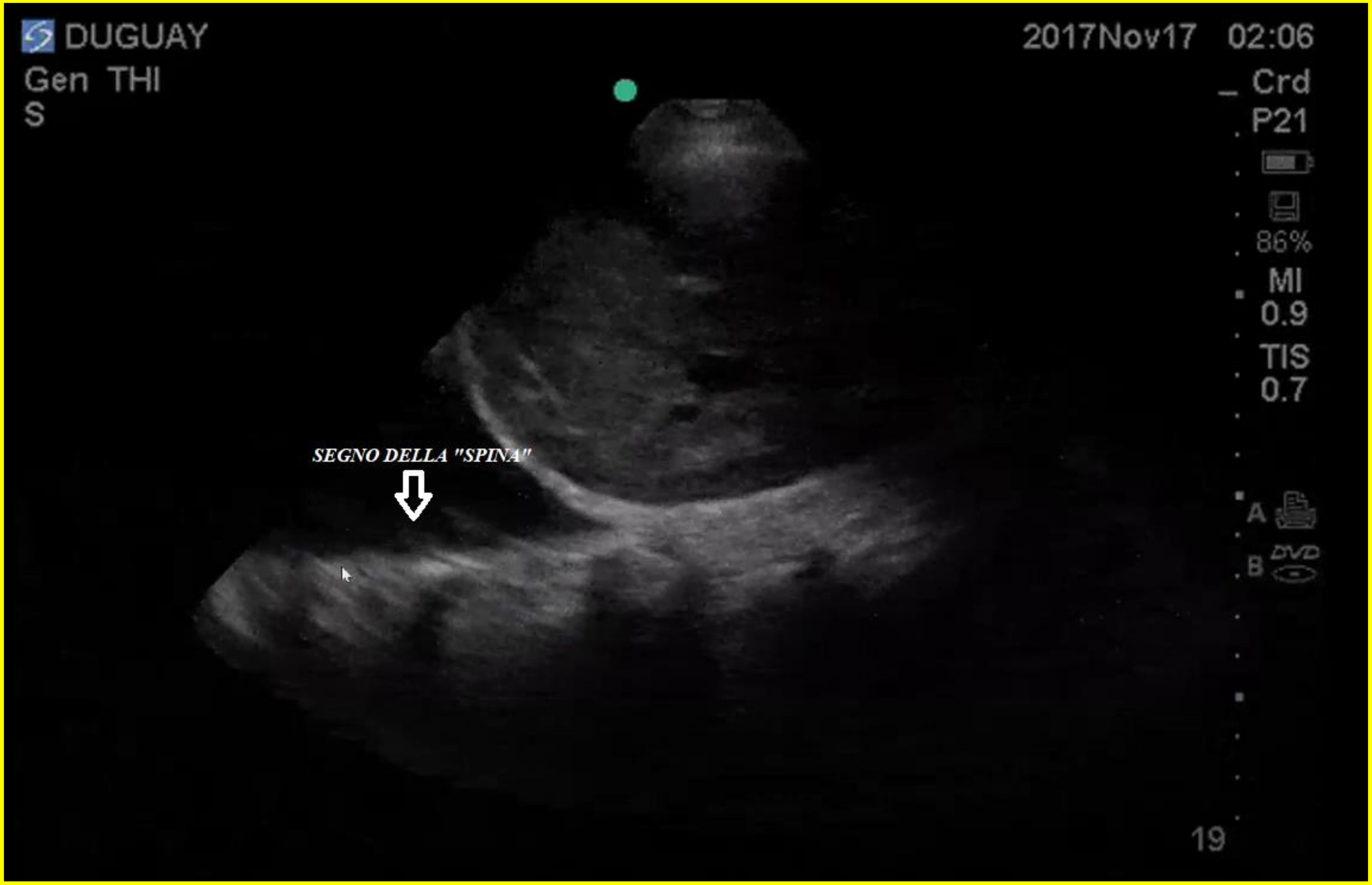
Condition affecting LUS reliability	Cause of inaccuracy	Type of inaccuracy
Different acquisition protocols	Single frame *vs.* multi-frame evaluation	Over/Underestimation
Multiple scoring systems	Scores based on the number of B-lines Scores based on the assessment of the screen occupied by B-lines Scores based on the detection of coalescent B-lines	Over/Underestimation Over/Underestimation Overestimation
Inter- and intra-observer variability	Poor to moderate reproducibility	FP/FN
Ventilator settings	Mechanical ventilation with high PEEP	FN
Lung hyperinflation	Cannot be assessed and quantified	FN
Chronic pulmonary diseases	Asthma/COPD: peripheral bullae, hyperinflation, auto-PEEP	FN
Interstitial pulmonary fibrosis	Cannot differentiate increased lung water from increased tissue content in lung disorders	FP
Consolidations in deep parenchyma	Interposition of aerated parenchyma between pleural line and consolidations	FN
Chronic heart failure	Alveolar basal membrane thickening leads to reduced capillary filtration and increased lymphatic drainage causing higher threshold for the development of pulmonary edema despite elevated cardiac filling pressure	FN
Different types of pulmonary edema	Unable to differentiate the etiology	FP/FN

PEEP: positive end-expiratory pressure; COPD: chronic obstructive pulmonary disease; FN: false negative results; FP false positive results

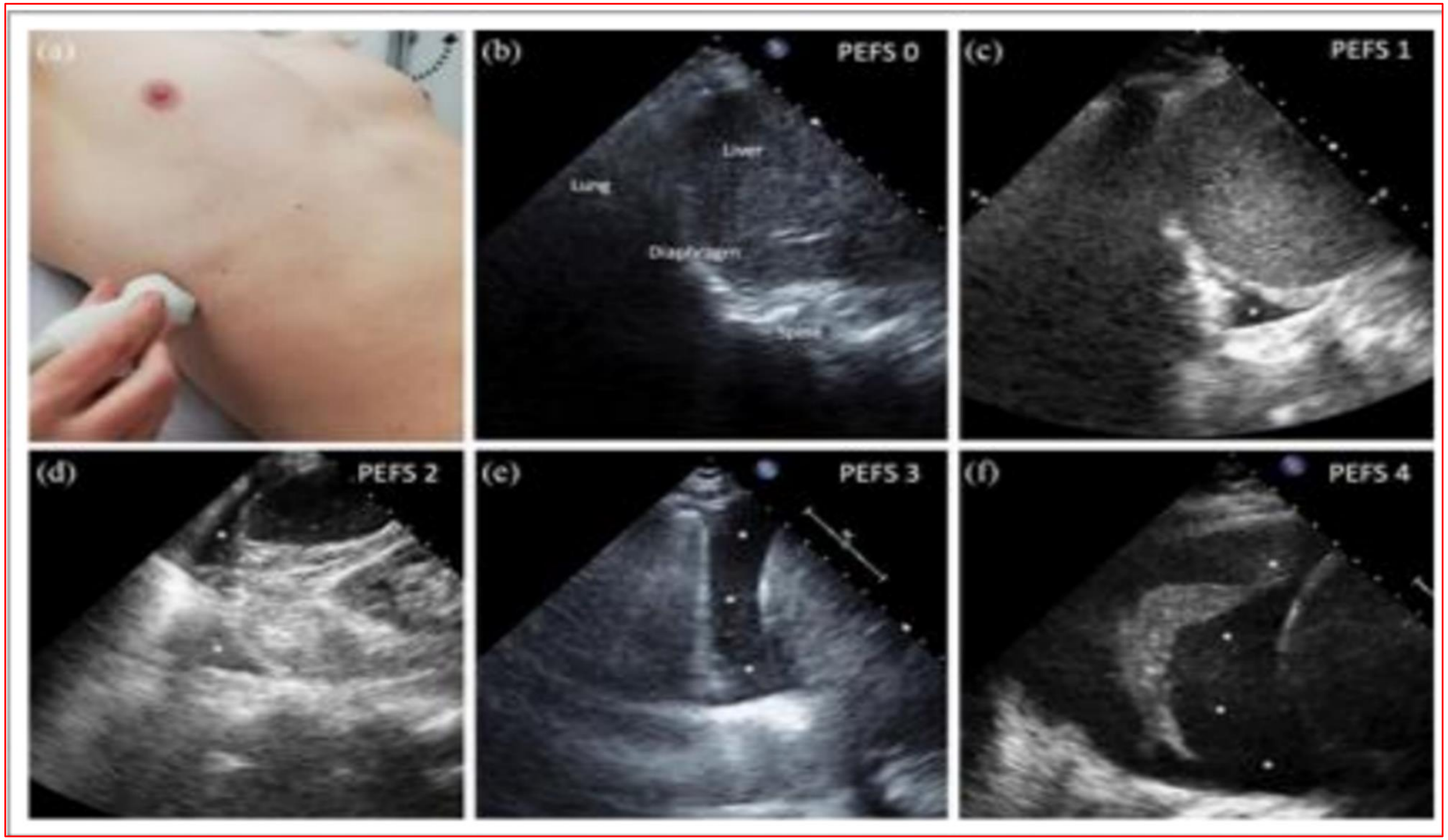
E’ necessario un approccio integrato

- Ecografia toracica
- Valutazione del versamento pleurico
- Valutazione vena cava
- FOCUS
- Ecografia diaframmatica

Versamento pleurico

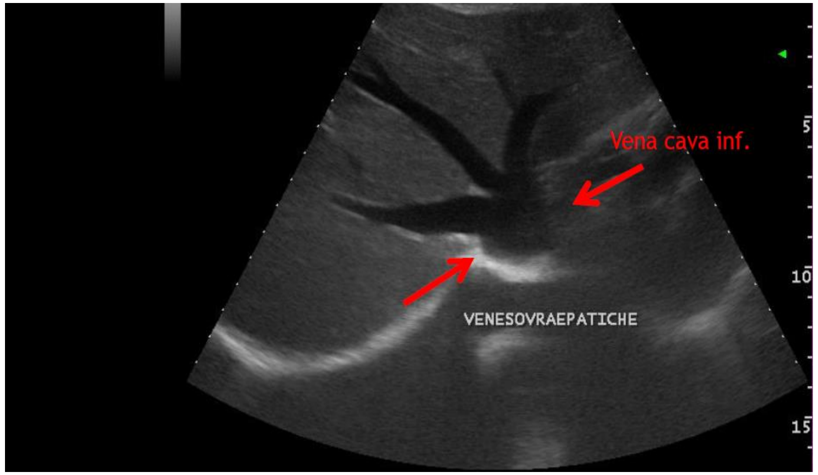


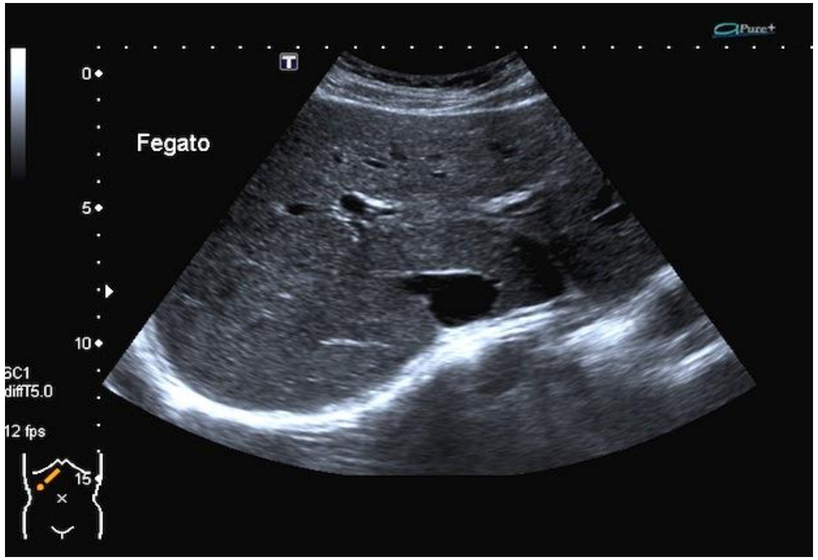
Versamento pleurico

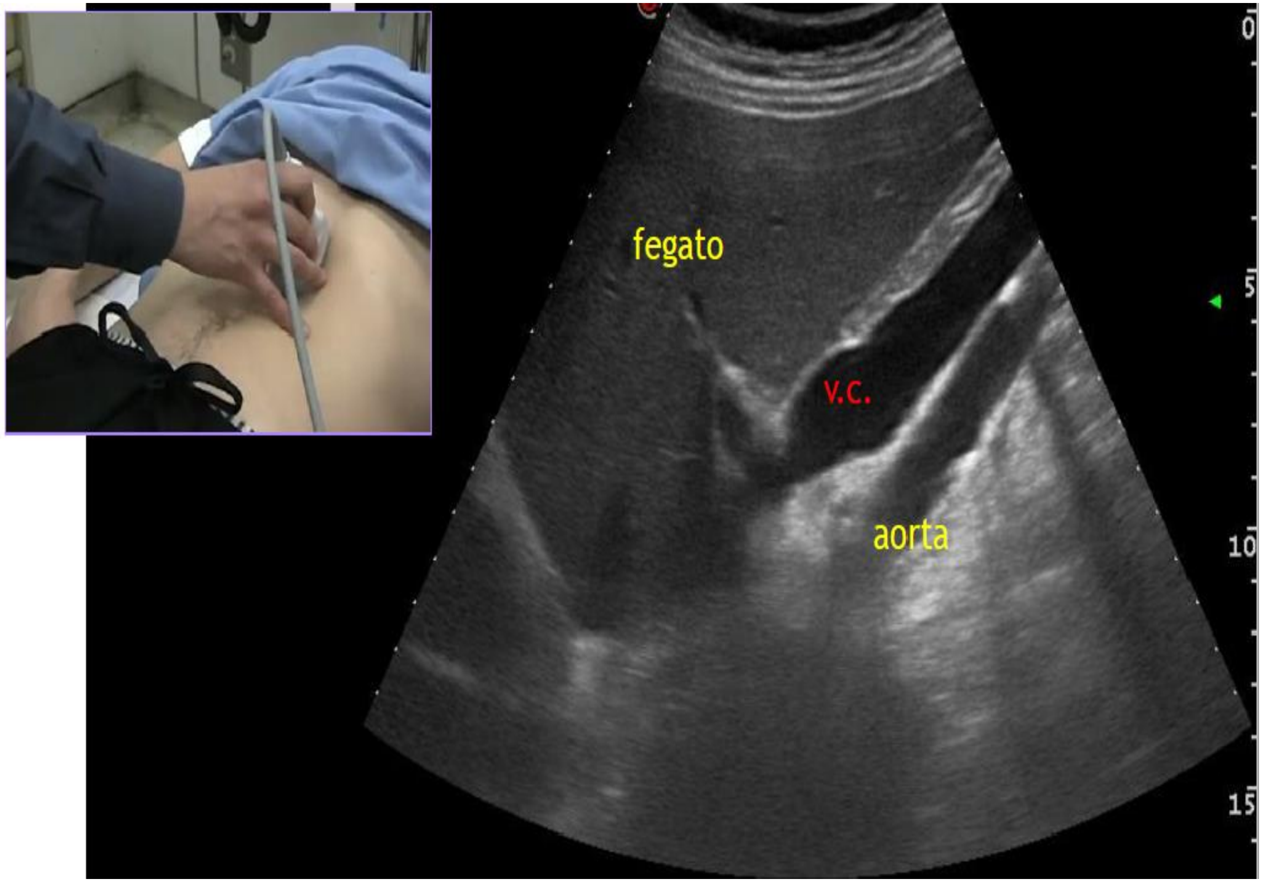


Lindner, M.; Thomas, R.; Claggett, B.; Lewis, E.F.; Groarke, J.; Merz, A.A.; Silverman, M.B.; Swamy, V.; Rivero, J.; Hohenstein, C.; et al. Quantification of Pleural Effusions on Thoracic Ultrasound in Acute Heart Failure. *Eur. Heart J. Acute Cardiovasc. Care* **2020**, *9*, 513–521.

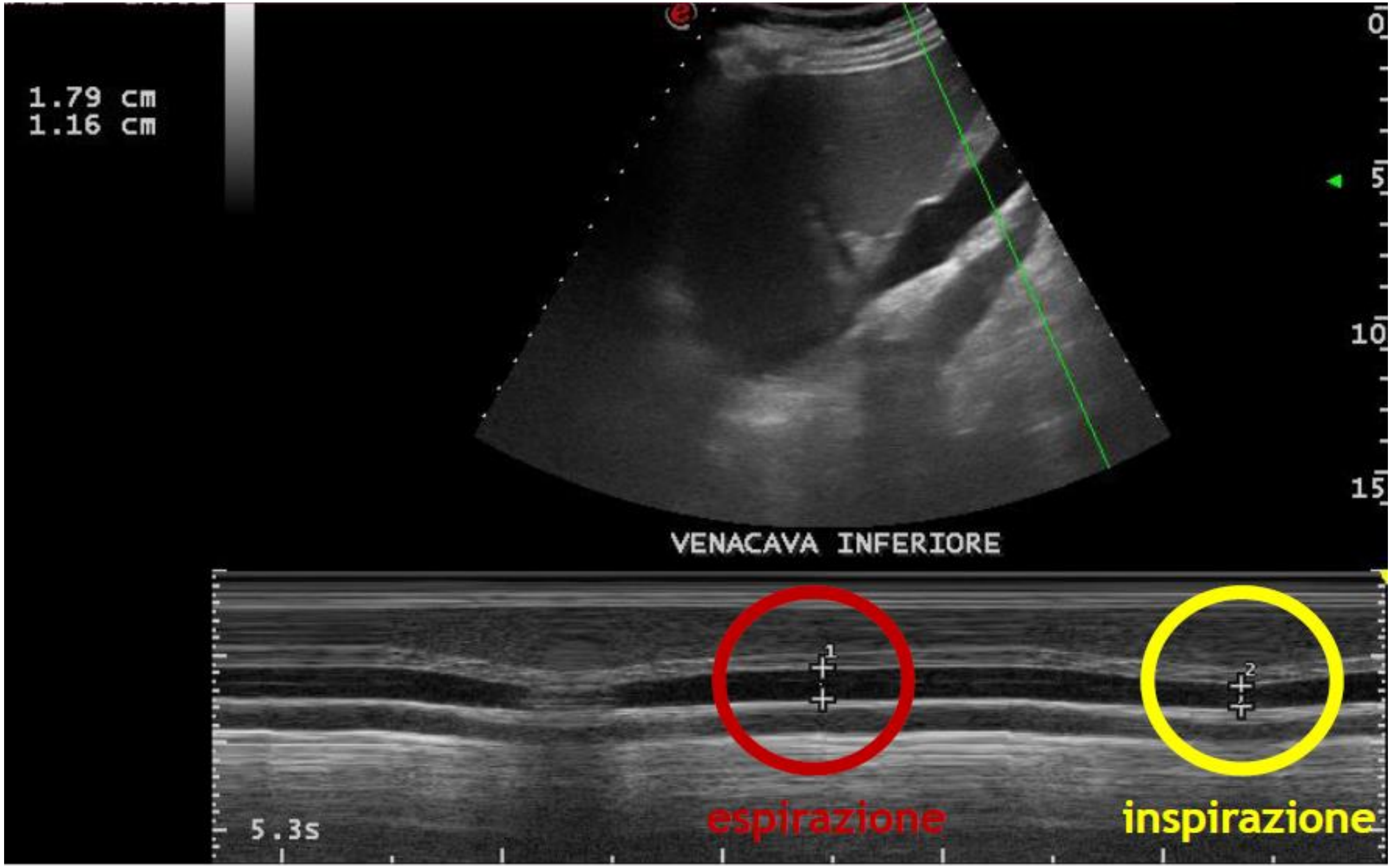
Valutazione vena cava



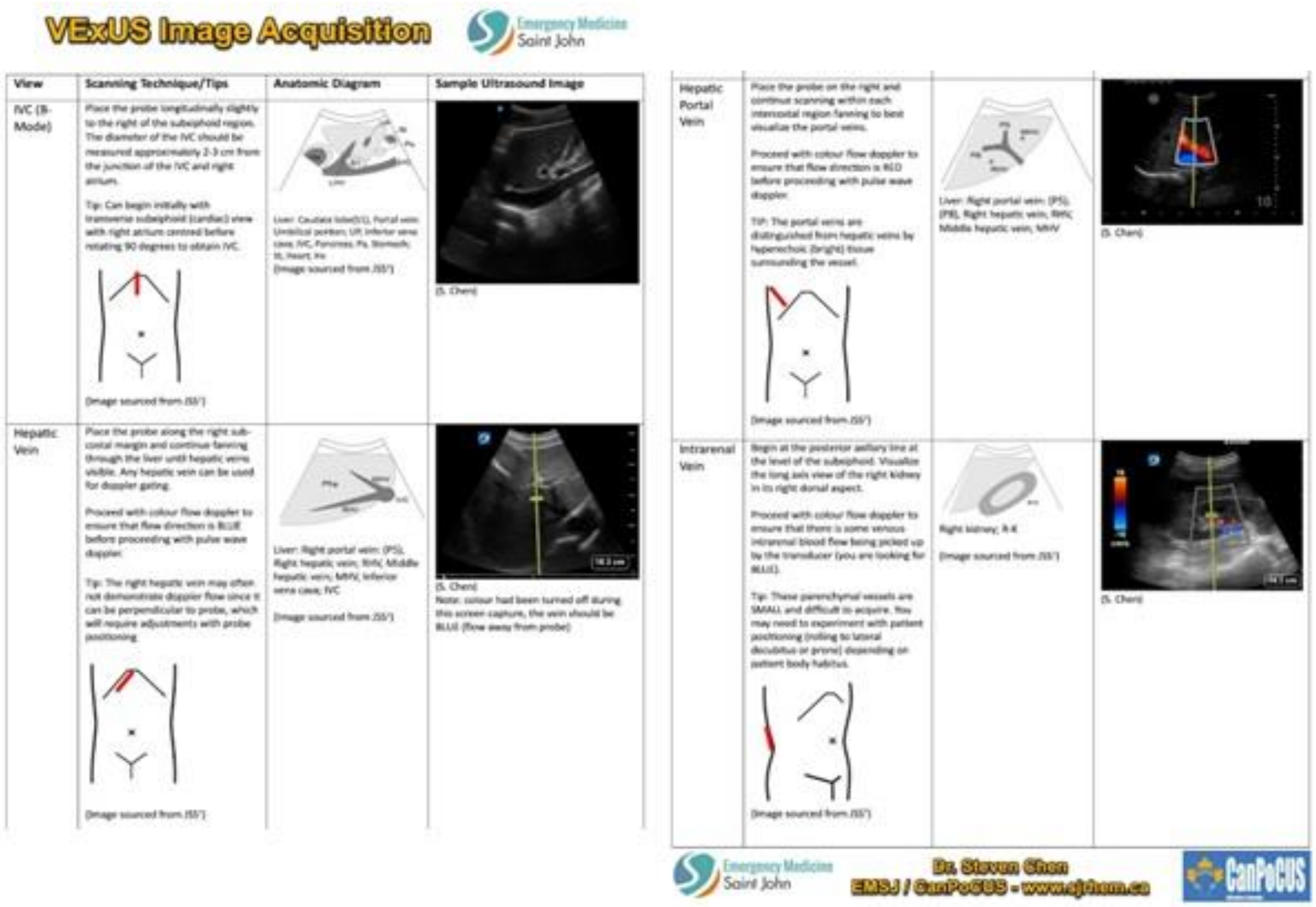




Valutazione vena cava



Valutazione vena cava: caso clinico



VExUS Image Acquisition

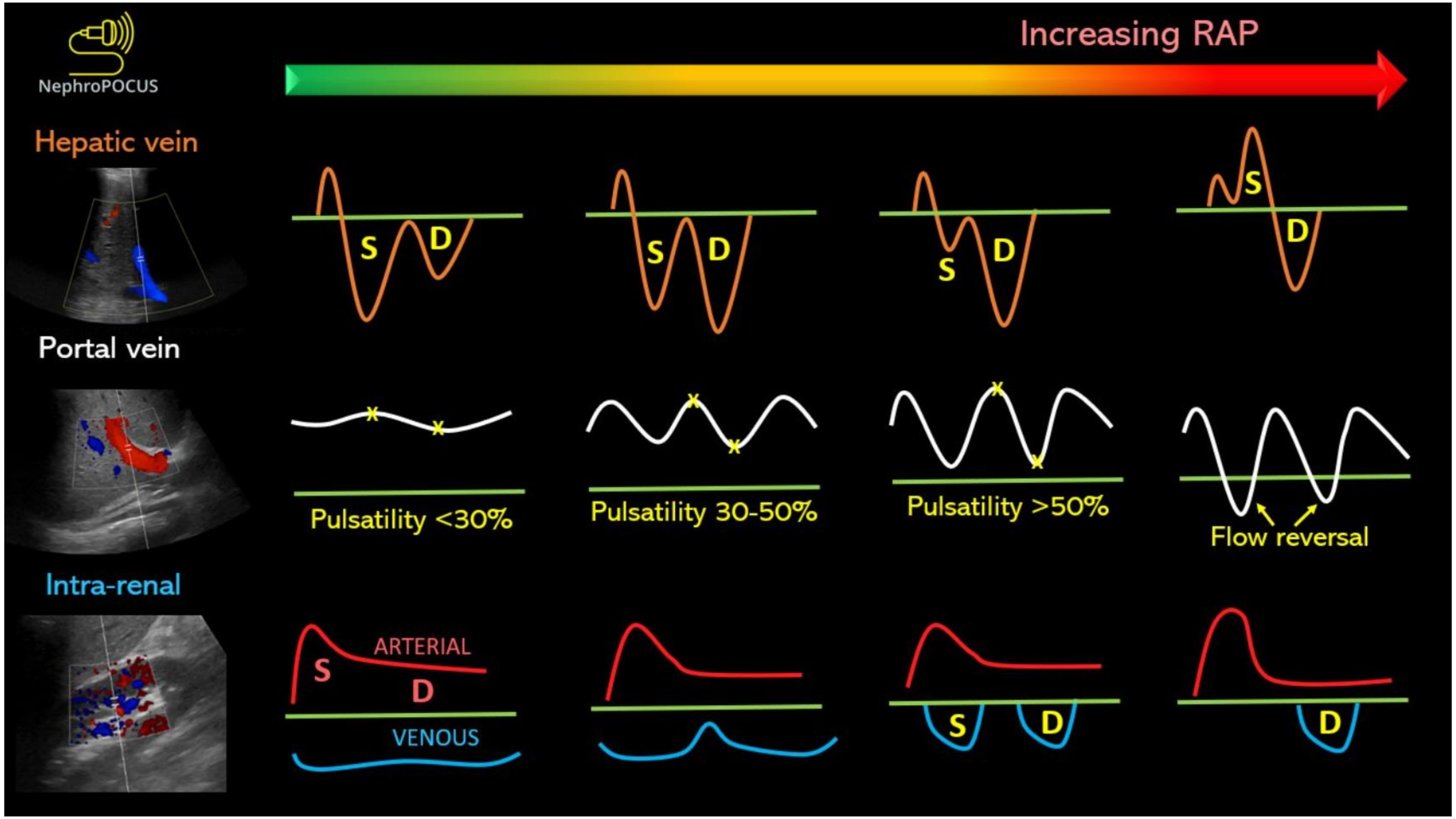
Emergency Medicine Saint John

View	Scanning Technique/Tips	Anatomic Diagram	Sample Ultrasound Image
IVC (B-Mode)	Place the probe longitudinally slightly to the right of the subxiphoid region. The diameter of the IVC should be measured approximately 2-3 cm from the junction of the IVC and right atrium. Tip: Can begin initially with transverse subxiphoid (cardiac) view with right atrium centred before rotating 90 degrees to obtain IVC. (Image sourced from JSS^)	Liver: Caudate lobe(S1), Portal vein: Umbilical portion; UP, Inferior vena cava; IVC, Pancreas: Pa, Stomach: St, Heart: He (Image sourced from JSS^)	(S. Chen)
Hepatic Vein	Place the probe along the right sub-costal margin and continue fanning through the liver until hepatic veins visible. Any hepatic vein can be used for doppler gating. Proceed with colour flow doppler to ensure that flow direction is BLUE before proceeding with pulse wave doppler. Tip: The right hepatic vein may often not demonstrate doppler flow since it can be perpendicular to probe, which will require adjustments with probe positioning. (Image sourced from JSS^)	Liver: Right portal vein: (P5), Right hepatic vein; RHV, Middle hepatic vein; MHV, Inferior vena cava; IVC (Image sourced from JSS^)	(S. Chen) Note: colour had been turned off during this screen capture, the vein should be BLUE (flow away from probe)
Hepatic Portal Vein	Place the probe on the right and continue scanning within each intercostal region fanning to best visualize the portal veins. Proceed with colour flow doppler to ensure that flow direction is RED before proceeding with pulse wave doppler. TIP: The portal veins are distinguished from hepatic veins by hyperechoic (bright) tissue surrounding the vessel. (Image sourced from JSS^)	Liver: Right portal vein: (P5), (P8), Right hepatic vein; RHV, Middle hepatic vein; MHV	(S. Chen)
Intrarenal Vein	Begin at the posterior axillary line at the level of the subxiphoid. Visualize the long axis view of the right kidney in its right dorsal aspect. Proceed with colour flow doppler to ensure that there is some venous intrarenal blood flow being picked up by the transducer (you are looking for BLUE). Tip: These parenchymal vessels are SMALL and difficult to acquire. You may need to experiment with patient positioning (rolling to lateral decubitus or prone) depending on patient body habitus. (Image sourced from JSS^)	Right kidney; R-K (Image sourced from JSS^)	(S. Chen)

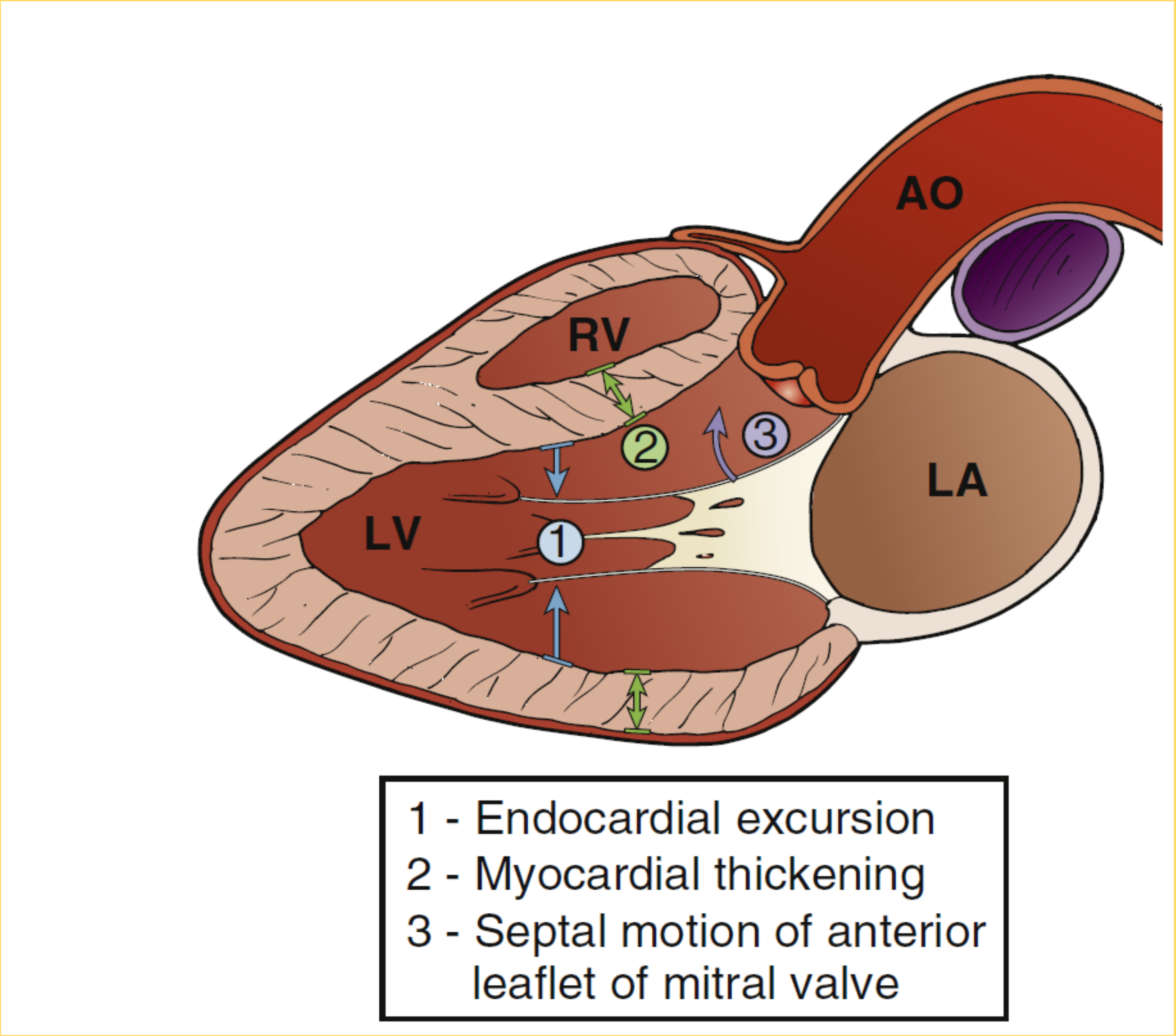
Emergency Medicine Saint John — Dr. Steven Chen — EMSJ / CanPoCUS - www.sjrhem.ca — CanPoCUS

VExUS-Technique-1.png (1400×3689) (sjrhem.ca)

Protocollo VEXUS



Cenni di FOCUS



Cenni di FOCUS

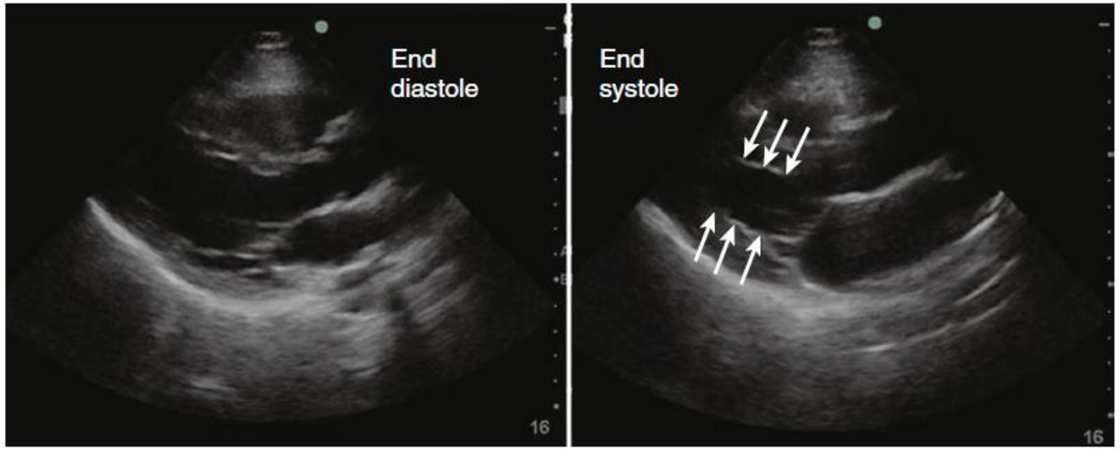


Figure 14.3 Parasternal long-axis view showing normal excursion of the left ventricular (LV) walls during systole. Endocardial resolution is excellent in this view, and thickening and excursion of LV walls can easily be appreciated.

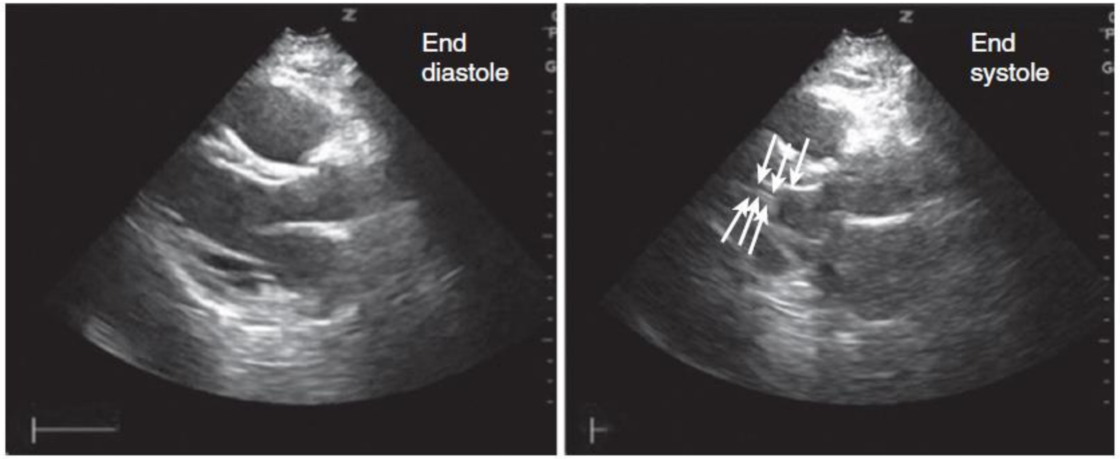
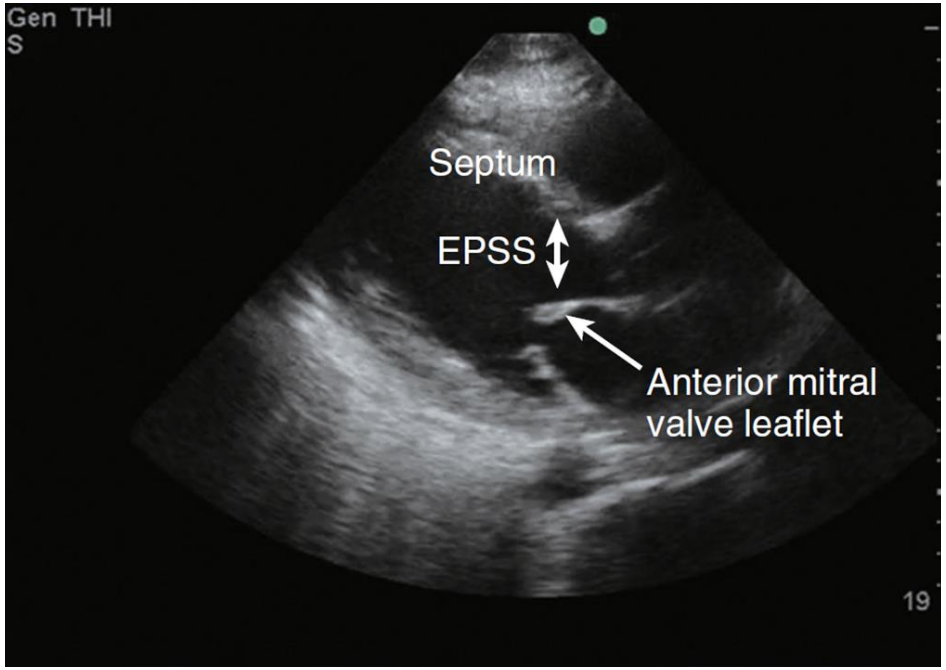
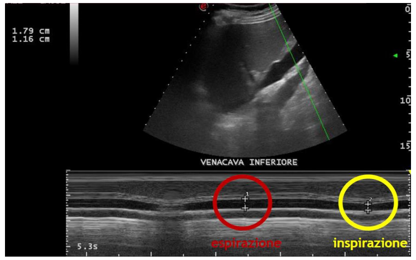


Figure 14.4 Parasternal long-axis view showing increased myocardial thickening and endocardial excursion during systole with obliteration of the left ventricular cavity.

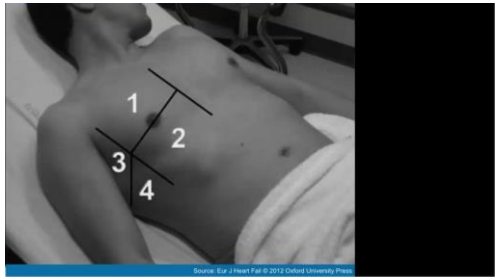


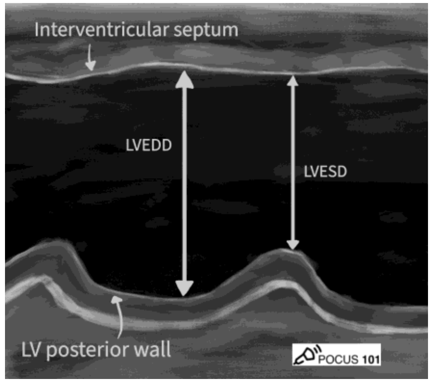
PAZIENTE RICOVERATO PER SCOMPENSO CARDIACO O CON COMPLICANZA DI SCOMPENSO



VALUTAZIONE CARDIO-GERIATRICA

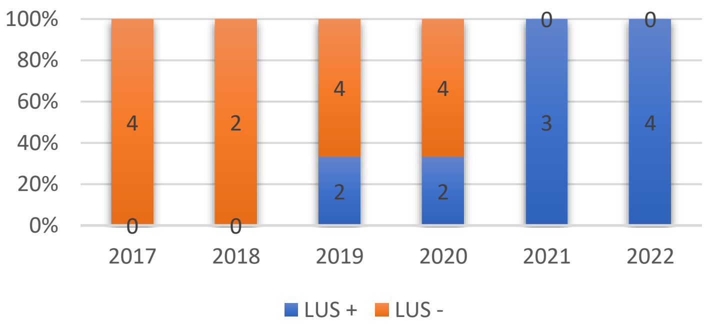
- CONTEGGIO LINEE B LUS 8 QUADRANTI
- VALUTAZIONE VENA CAVA
- FOCUS con EF
- VALUTAZIONE x EVTL ECOCARDIOGRAMMA DEDICATO IN AMBULATORIO





TIMING PRIMA VISITA AMBULATORIALE

Percentuale di specializzandi con LUS eseguite> 60



FA TACHIFREQUENTE	CFS 7-8 + BNP↑	CFS 4-6 + ↑ BNP	CFS 4-6 + ↓ BNP	CFS 2-3 + ↑ BNP	CFS 2-3 + ↓BNP	CFS 7-8 + ↓BNP

7 DAYS	10-14 DAYS	10-14 DAYS	> 21 DAYS	TELEVISITA

E durante l'ospedalizzazione?

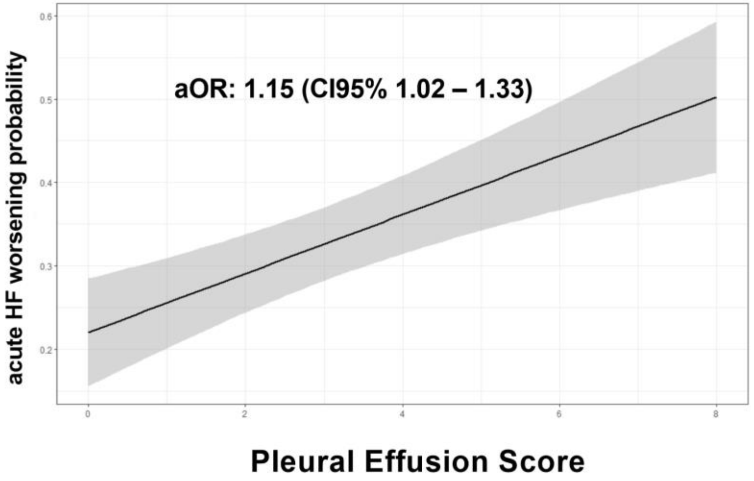

Journal of Clinical Medicine

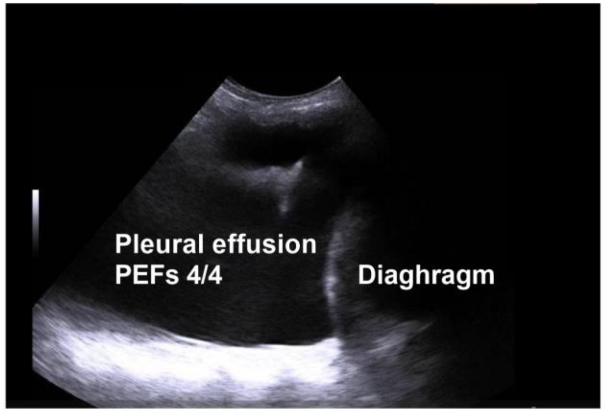
an Open Access Journal by MDPI

Predicting In-Hospital Acute Heart Failure Worsening in the Oldest Old: Insights from Point-of-Care Ultrasound

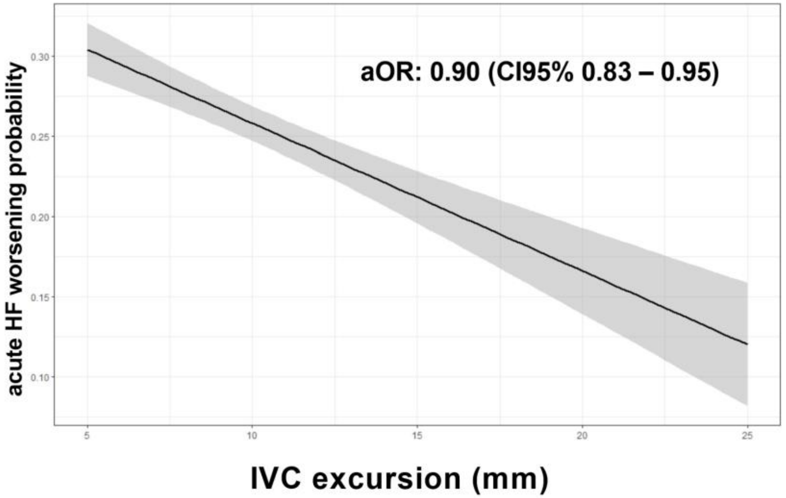
Tessa Mazzarone; Virginia Morelli; Andrea Giusti; Maria Giovanna Bianco; Lorenzo Maccioni; Cristina Cargiolli; Daniela Guarino; Agostino Virdis; Chukwuma Okoye

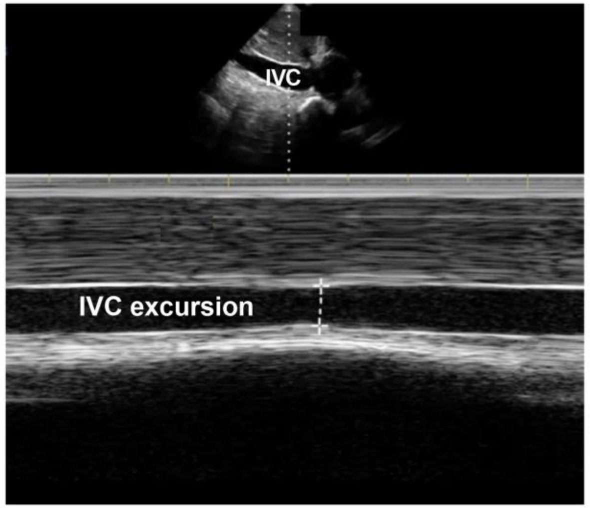
J. Clin. Med. **2023**, Volume 12, Issue 23, 7423



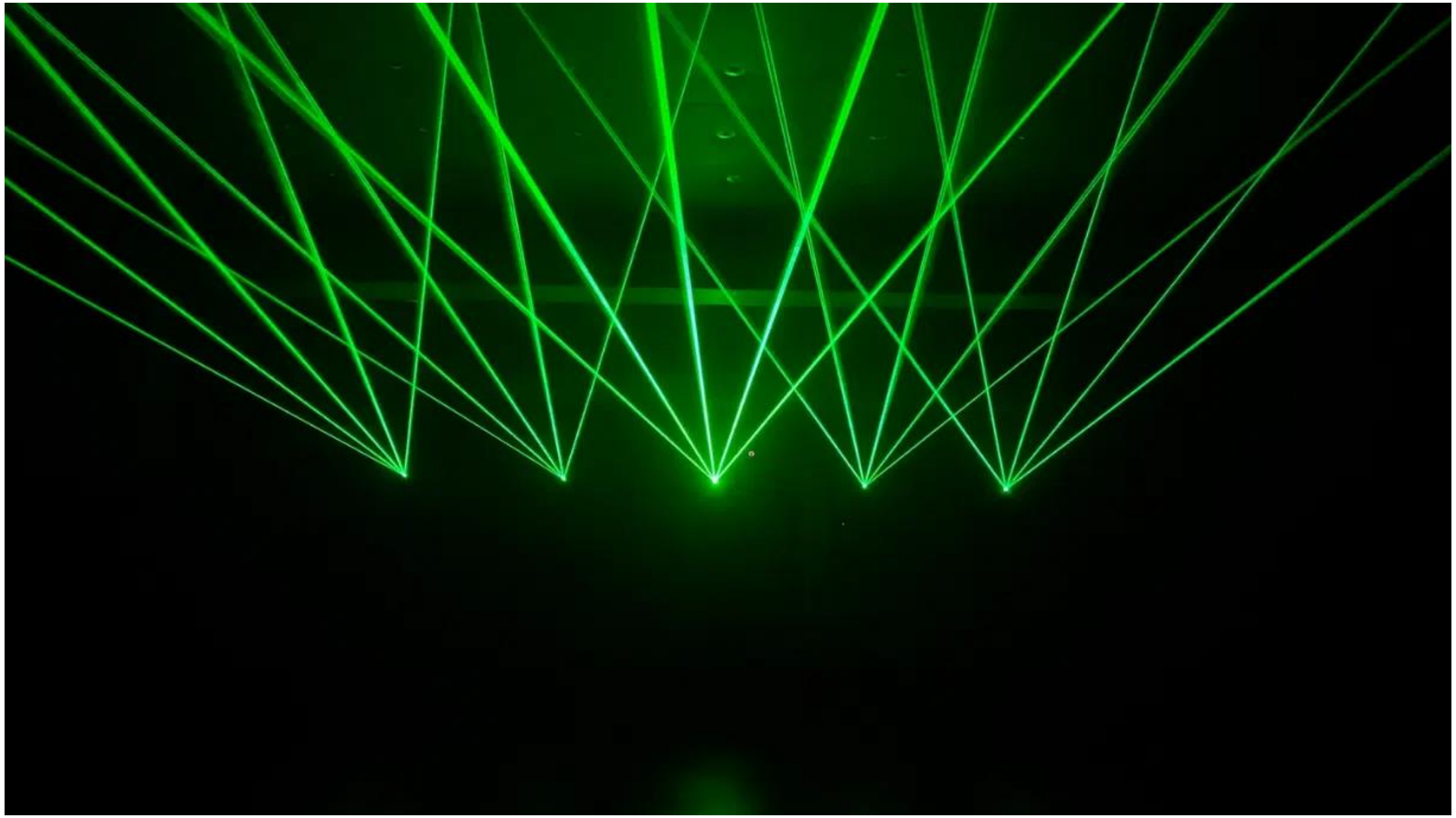


By multivariable logistic analysis, total Pleural Effusion Score (PEFs) [aO.R.: 1.15 (CI95% 1.02–1.33), $p = 0.043$] and IVC collapsibility [aO.R.: 0.90 (CI95% 0.83–0.95), $p = 0.039$] emerged as independent predictors of acute HF worsening after extensive adjustment for potential confounders. In conclusion, POCUS holds promise for enhancing risk assessment, tailoring diuretic treatment, and optimizing discharge timing for older patients with ADHF.





Caso clinico



B-lines in disco

Caso clinico

G.B. Paziente anziano, 88 aa

Ex muratore. Vive con la moglie. Necessita di parziale aiuto nelle BADL (4/6), IADL (2/8).
Anamnesi Patologica remota
Ipertensione arteriosa. Ipoacusia bilaterale, ipertrofia prostatica benigna, pregressa tromboflebite, iniziale declino cognitivo, scompenso cardiaco a FE preservata, obesità.

In data 8 Febbraio 2020 accesso in PS per persistenza di stato confusionale associato a febbricola non responsiva a terapia empirica con Ceftriaxone e trattamento psicoattivo.

In PS eseguiva: esami ematochimici (da segnalare Leucociti 11310, 82,4%, Hb 10 g/dl. PCT 1,25, PCR 6,8), BNP 230.

EGA all'ingresso (aa): pH 7,41 pO_2 88 mmHg pCO_2 30 mmHg SO_2 97% HCO^{3-} 25,5 mMol/L BE 10 mMol/L lattato 2,2 mMol/L.

Prima dell'invio in reparto per persistenza di stato confusionale, somministrato aloperidolo 1f + talofen 1 fl + midazolam ½ fl.

Anamnesi farmacologica:
Avodart 0,5 mg, Barnidipina/HCT, Ranitidina 300, Rocefin 2g (da 5 giorni), Simvastatina

Caso clinico

Gruppo di Ricerca
Ecografia Toracica nell'Anziano

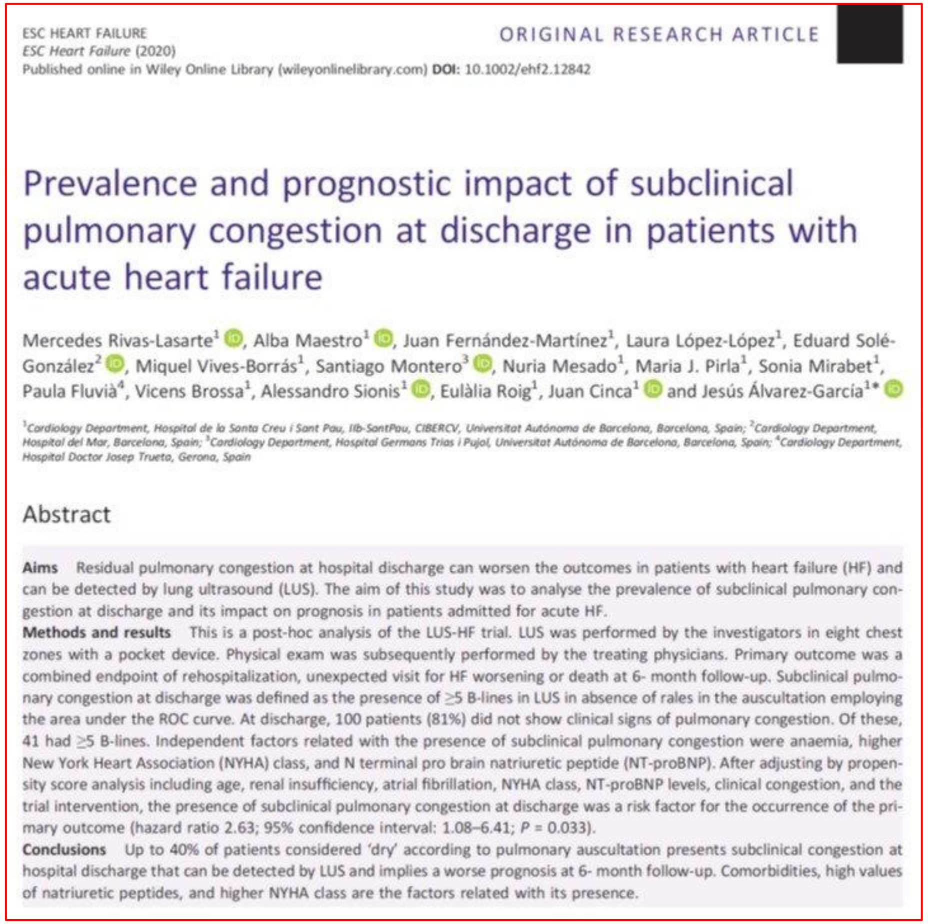
G.B. Paziente anziano, 88 aa

All' arrivo in reparto il paziente viene trovato agitato, marcatamente dispnoico.

SpO2 70% in aa.

Al torace rumore respiratorio ridotto con rumori discontinui tipo rantoli a medie bolle a partenza dai campi medi. Respiro addominale, addome trattabile non dolente né dolorabile peristalsi valida. Non edemi declivi

Valutazione integrata nel paziente scompensato


ESC HEART FAILURE ORIGINAL RESEARCH ARTICLE
ESC Heart Failure (2020)
Published online in Wiley Online Library (wileyonlinelibrary.com) **DOI:** 10.1002/ehf2.12842

Prevalence and prognostic impact of subclinical pulmonary congestion at discharge in patients with acute heart failure

Mercedes Rivas-Lasarte[1], Alba Maestro[1], Juan Fernández-Martínez[1], Laura López-López[1], Eduard Solé-González[2], Miquel Vives-Borrás[1], Santiago Montero[3], Nuria Mesado[1], Maria J. Pirla[1], Sonia Mirabet[1], Paula Fluvià[4], Vicens Brossa[1], Alessandro Sionis[1], Eulàlia Roig[1], Juan Cinca[1] and Jesús Álvarez-García[1]*

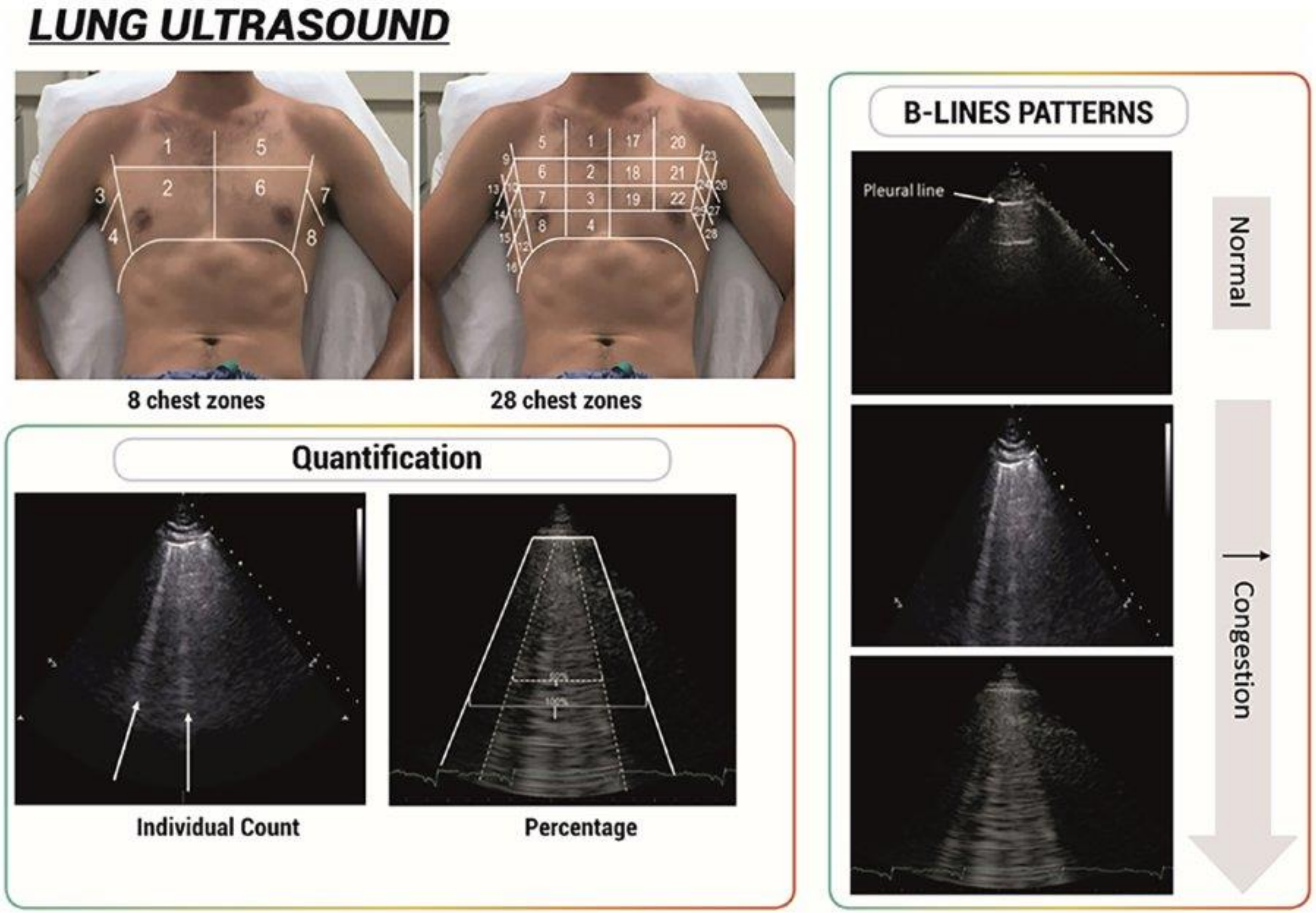
[1]*Cardiology Department, Hospital de la Santa Creu i Sant Pau, IIb-SantPau, CIBERCV, Universitat Autónoma de Barcelona, Barcelona, Spain;* [2]*Cardiology Department, Hospital del Mar, Barcelona, Spain;* [3]*Cardiology Department, Hospital Germans Trias i Pujol, Universitat Autónoma de Barcelona, Barcelona, Spain;* [4]*Cardiology Department, Hospital Doctor Josep Trueta, Gerona, Spain*

Abstract

Aims Residual pulmonary congestion at hospital discharge can worsen the outcomes in patients with heart failure (HF) and can be detected by lung ultrasound (LUS). The aim of this study was to analyse the prevalence of subclinical pulmonary congestion at discharge and its impact on prognosis in patients admitted for acute HF.

Methods and results This is a post-hoc analysis of the LUS-HF trial. LUS was performed by the investigators in eight chest zones with a pocket device. Physical exam was subsequently performed by the treating physicians. Primary outcome was a combined endpoint of rehospitalization, unexpected visit for HF worsening or death at 6- month follow-up. Subclinical pulmonary congestion at discharge was defined as the presence of ≥5 B-lines in LUS in absence of rales in the auscultation employing the area under the ROC curve. At discharge, 100 patients (81%) did not show clinical signs of pulmonary congestion. Of these, 41 had ≥5 B-lines. Independent factors related with the presence of subclinical pulmonary congestion were anaemia, higher New York Heart Association (NYHA) class, and N terminal pro brain natriuretic peptide (NT-proBNP). After adjusting by propensity score analysis including age, renal insufficiency, atrial fibrillation, NYHA class, NT-proBNP levels, clinical congestion, and the trial intervention, the presence of subclinical pulmonary congestion at discharge was a risk factor for the occurrence of the primary outcome (hazard ratio 2.63; 95% confidence interval: 1.08–6.41; $P = 0.033$).

Conclusions Up to 40% of patients considered 'dry' according to pulmonary auscultation presents subclinical congestion at hospital discharge that can be detected by LUS and implies a worse prognosis at 6- month follow-up. Comorbidities, high values of natriuretic peptides, and higher NYHA class are the factors related with its presence.



Caso clinico

Posizione R2

Posizione L2

Caso clinico

Proiezione longitudinale vena cava inferiore

Posizione PLAPS dx (e sx)

Conclusioni

- Le Linee B sono il segno cardine, ma non l’unico di interstiziopatia polmonare
- Rimangono comunque un Segno ASPECIFICO riconducibile a diverse condizioni cliniche
- Tuttavia vi sono alterazioni tipiche a seconda del tipo di interstiziopatia che possono aiutare nella diagnosi differenziale
- La corretta definizione della interstiziopatia congestizia da HF necessita una valutazione clinica ma anche ultrasonografica integrata
- Lo studio delle linee B può avere un significato clinico in termini di follow-up