



XIII congresso nazionale

SIMEU

GENOVA 30 MAG - 1 GIU 2024



I.MEU

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BAL-LUS study

BAL-LUS: Bronchoalveolar lavage plus lung ultrasound. Correlazione eziopatologica delle polmoniti con la semeiotica ecografica del polmone.

Dott. Lorenzo Pelagatti

Dirigente Medico, SOD Medicina e Chirurgia d'accettazione e d'urgenza, AOU Careggi, Firenze
pelagattil@aou-careggi.toscana.it – lorenzo.pelagatti@unifi.it



Background

La polmonite è la causa principale di morte per malattia infettiva a livello mondiale. **L'ecografia toracica è ormai al secondo posto per sensibilità e specificità nella diagnostica per immagini del torace delle patologie infettive**, dopo la TC. Non è tuttavia chiaro se ci sia una chiara correlazione tra l'aspetto ecografico e l'agente patogeno e la sua classe.

Le **metodiche standard** per la diagnosi eziologica di polmonite (antigeni, emocolture, sierologia) arrivano ad **identificare l'agente patogeno in un 20-40% dei casi**, mentre le nuove metodiche molecolari associate ad **esami colturali su campioni respiratori arrivano ad una diagnosi eziologica nel 90-95% dei casi**; abbiamo quindi cercato di correlare l'aspetto della semeiotica ecografica con l'esito delle indagini microbiologiche su BAL. Non esistono ad ora studi simili in Pronto Soccorso.



Studio osservazionale prospettico monocentrico no-profit

Lorenzo Pelagatti¹, Simone Vanni², Gian Maria Rossolini³, Francesca Mangani³, Peiman Nazerian¹, Stefano Grifoni¹

1. *SOD Medicina e Chirurgia d'accettazione e d'urgenza, AOU Careggi, Firenze*
2. *SOD Inquadramento clinico integrato e percorsi intraospedalieri delle urgenze, AOU Careggi, Firenze*
3. *SOD Microbiologia e Virologia, AOU Careggi, Firenze*

Obiettivo

Valutare se esista una **correlazione tra l'agente eziopatogenetico (identificato direttamente su campioni respiratori mediante indagini molecolari su BAL)** delle polmoniti e **l'aspetto semeiologico ecografico** nei pazienti che accedono in PS per polmonite: In particolare si vuole valutare se ci siano differenze dal punto di vista della presentazione delle immagini ecografiche tra le polmoniti batteriche e quelle virali.

Criteri di inclusione ed esclusione

Inclusione

Tutti i pazienti con più di 18 anni sottoposti a BAL in DEA, con RANKIN < 5 che accedono in Pronto Soccorso con diagnosi di polmonite accertata mediante la presenza di criteri clinici e radiologici secondo le linee guida dell'IDSA.

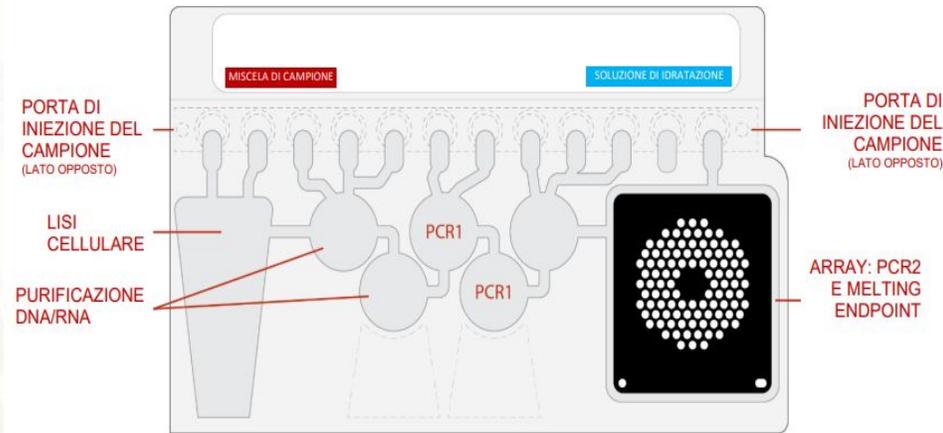
Almeno uno tra:

- necessità di O2 terapia ad alti flussi (VM35 o FiO2 superiori, Reservoir, HFNC, NIV, CPAP)
- IOT
- SOFA ≥ 2 (punteggio IR) o PSI > 85 (età 75 + IR)
- Indice di Horowitz (PaO2/FiO2) < 200
- paziente immunodepresso

Esclusione

- Mancato consenso
- Età < 18 anni e > 90 anni
- Gravidanza
- Aspettativa di vita < 3 mesi
- RANKIN ≥ 5

Diagnosi eziologica



Per la diagnosi del patogeno responsabile della polmonite sono stati presi in considerazione i pannelli molecolari sindromici **Film Array BIOFIRE Pneumonia Panel Plus**, il cui risultato è stato poi confrontato con:

- Emocolture
- Antigeni urinari
- Esami colturali su BAL, BAS, ETA
- TNF per COVID e Influenza

Batteri riportati con bin di 10^4 , 10^5 , 10^6 o $\geq 10^7$ copie/mL

Complesso <i>Acinetobacter calcoaceticus-baumannii</i>	<i>Klebsiella oxytoca</i>	<i>Serratia marcescens</i>
Complesso <i>Enterobacter cloacae</i>	Gruppo <i>Klebsiella pneumoniae</i>	<i>Staphylococcus aureus</i>
<i>Escherichia coli</i>	<i>Moraxella catarrhalis</i>	<i>Streptococcus agalactiae</i>
<i>Haemophilus influenzae</i>	<i>Proteus</i> spp.	<i>Streptococcus pneumoniae</i>
<i>Klebsiella aerogenes</i>	<i>Pseudomonas aeruginosa</i>	<i>Streptococcus pyogenes</i>

Batteri atipici

<i>Chlamydia pneumoniae</i>	<i>Legionella pneumophila</i>	<i>Mycoplasma pneumoniae</i>
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Virus

Adenovirus	Rhinovirus/Enterovirus umano	Coronavirus della Sindrome respiratoria mediorientale (MERS-CoV)
Coronavirus	Virus dell'Influenza A	Virus Parainfluenzale
Metapneumovirus umano	Virus dell'Influenza B	Virus Respiratorio Sinciziale

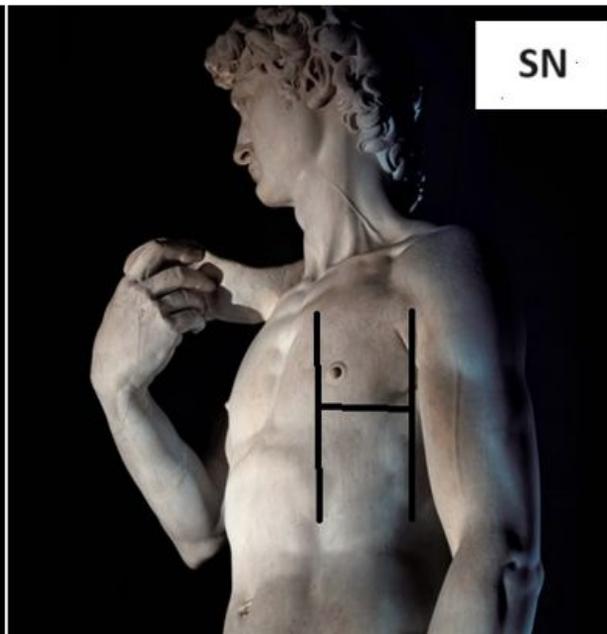
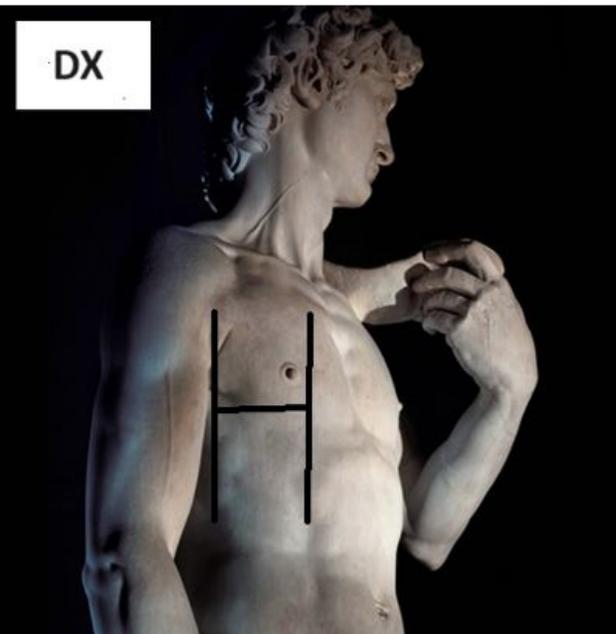
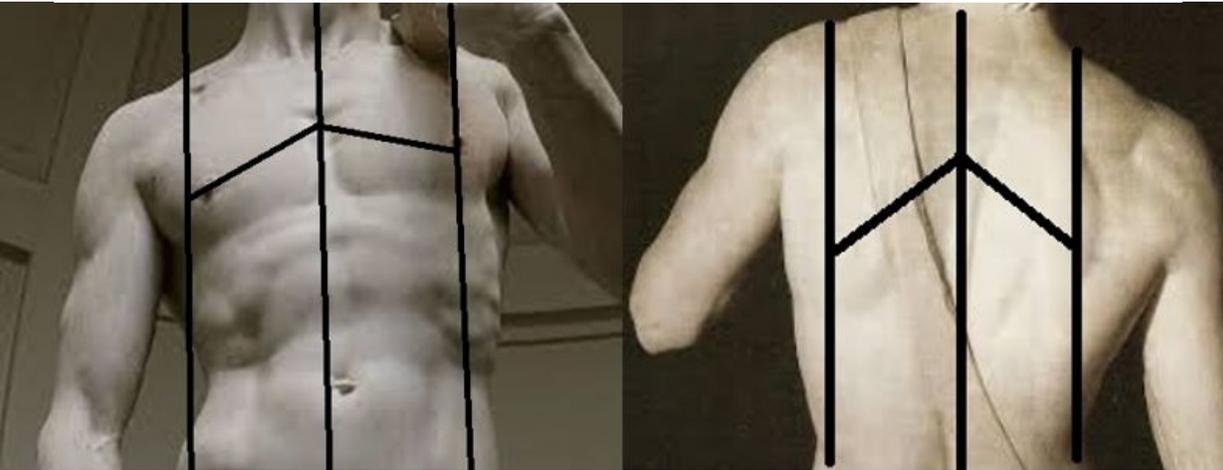
Geni di resistenza antimicrobica

CTX-M	NDM	<i>mecA/C</i> e MREJ (MRSA)
IMP	OXA-48-like	
KPC	VIM	



LUNG ULTRASOUND

Report Form



Legenda polmone:

- **Normale:** A lines e/o massimo 1 o 2 linee B per spazio intercostale
- **B1:** moderata perdita di areazione, 3 o più linee B ben separate tra loro che occupano <50% dello spazio intercostale
- **B2:** severa perdita di areazione, linee B coalescenti o linee B che occupano => 50% dello spazio intercostale
- **C:**
 - o **Ca:** consolidamento lobare o emilobare +/- broncogramma aereo statico (atelettasia)
 - o **Cb:** consolidamento con broncogramma aereo dinamico (polmonite)
 - o **Cc:** piccoli addensamenti ipo-anecoici centimetrici subpleurici (>0.5cm) senza broncogramma

Pleura:

- **Pr:** Regolare
- **Pi:** Irregolare

Versamento:

- **Vs:** Semplice
- **Vc:** Complicato

RISULTATI

Sono stati arruolati 66 pazienti da Settembre 2023 a Maggio 2024.

Età media 68.1 ± 14.0 ; 29 pazienti di sesso femminile (43.9%).

46 HCAP e 20 CAP.

L'eziologia:

- 11 virale (16.7%)
- 48 batterica (72.7%)
- 4 sovrainfezione batterica su virale (6.1%)
- 2 fungina (3.0%)
- 1 TBC (1.5%)

Indagine microbiologica	Positività n° (%)
Emocolture	9 (13.6%)
Antigeni urinari Legionella e Pneumococco	8 (12.1%)
Film Array BIOFIRE Pneumonia Panel Plus	66 (100%)
Esami colturali su BAL, BAS, ETA	37 (56.0%)
TNF per COVID e Influenza	17 (25.7%)

	Virali	Batteriche	P (<0.05)
Campi polmonari	6.2 ± 3.2	3.7 ± 2.6	p=0.03
C (a,b,c)	21/68 (30.8%)	153/180 (85.0%)	p<0.001
B (1,2)	52/68 (76.4%)	28/180 (15.5%)	p<0.001
Vs	3/68 (4.4%)	42/180 (23.3%)	p=0.02
Pi	4/68 (5.9%)	24/180 (13.1%)	P=0.56

Le polmoniti virali con coinfezione batterica avevano caratteristiche intermedie tra i due gruppi: con un ampio numero di campi polmonari coinvolti, una elevata prevalenza di sindrome interstiziale ed un numero di consolidamenti intermedio tra le polmoniti virali e quelle batteriche (**p non significative**).



DISCUSSIONE

La letteratura... pediatrica

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RESEARCH ARTICLE

WILEY

Can lung ultrasound differentiate between bacterial and viral pneumonia in children?

2.3 | Analysis of imaging findings

Deepawali Malla MD¹ | Vinita R:
Lalendra Upreti MD³

LUS was suggestive of alveolar or bacterial pneumonia in the presence of lung consolidation that is, echo poor/hypoechoic areas with or without air bronchograms (hyperechoic, linear or punctiform foci), shred sign or hepatization of the lung (Figure 2). Children with LUS suggestive of interstitial pneumonia were diagnosed as viral pneumonia on LUS. Interstitial pneumonia was indicated by the presence of

Results: LUS has a high sensitivity (91%; 95% CI [84-96]) and specificity (91.3%; 95% CI [84-96]) in diagnosing bacterial pneumonia with a high positive predictive value (91.9%; 95% CI [85-96]) and negative predictive value (90.3%; 95% CI [82-95]). For diagnosing viral pneumonia, the sensitivity of LUS was 78.4%; (95% CI [68-86]), specificity was high (90.4%; 95% CI [83-95]) and so was the positive predictive value (87.3%; 95% CI [78-94]) and negative predictive value (91.3%; 95% CI [84-96]).

Conclusion: LUS has a high accuracy in differentiating between bacterial and viral pneumonia in children and can help in their management by avoiding an ill-advised use of antibiotic therapy.



Article

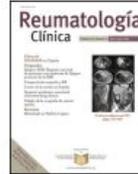
Differentiating Viral from Bacterial Pneumonia in Children: The Diagnostic Role of Lung Ultrasound—A Prospective Observational Study

Emil Robert Stoicescu^{1,2,3}, Roxana Iacob^{3,4,5,*}, Adrian Cosmin Ilie⁶, Emil Radu Iacob⁷, Septimiu Radu Susa⁵, Laura Andreea Ghenciu⁸, Amalia Constantinescu⁵, Daiana Marina Cocolea⁵, Cristian Oancea^{9,10} and Diana Luminita Manolescu^{1,9}

Table 2. The lung ultrasound findings analyzed between two groups.

LUS Findings	Number of Patients with Viral Pathologies (v = 74)	Number of Patients with Bacterial-Etiology Pathologies (b = 11)	Difference	Chi-Squared	Value
Sparse B-lines—Figure 3	55 (74.32%)	11 (100%)	25.68%	3.59	0.0579
Confluent B-lines—Figures 4–6	23 (31.08%)	10 (90.91%)	59.83%	14.26	0.0002
Pleural abnormalities—Figures 4 and 5	24 (32.43%)	9 (81.82%)	49.39%	9.72	0.001
Subpleural consolidation of < 1 cm—Figure 6	15 (20.27%)	9 (81.82%)	61.55%	17.69	<0.0001
Large consolidation of > 1 cm—Figure 7	0	5 (45.45%)	45.45%	35.31	<0.0001
Pleural effusion	0	1 (9.09%)	9.09%	6.72	0.009

of LUS in differentiating between viral and bacterial etiologies. Bacterial infections demonstrated more severe lung involvement, evident in significantly higher LUSS values compared with viral cases ($p < 0.0001$). The specific abnormalities found in bacterial superinfection can be integrated into diagnostic and management protocols for pediatric respiratory infections. Overall, this research



Brief Report

Impact of lung ultrasound during the SARS-CoV-2 pandemic: Distinction between viral and bacterial pneumonia[☆]



Yale Tung-Chen,^{a,b,*} Alejandro Giraldo Hernández,^a Alberto Mora Vargas,^b Laura Dorado Doblado,^b Patricia Elsa González Merino,^b Ángela Valencia Alijo,^b Jesús Herraiz Jiménez,^b Ángela Gutiérrez Rojas,^b Sonia García Prieto,^b Edith Vanesa Gutiérrez Abreu,^b Esther Montero Hernández^b

^a Facultad de Medicina, Universidad Alfonso X El Sabio, Madrid, Spain
^b Servicio de Medicina de Interna, Hospital Universitario Puerta de Hierro, Majadahonda, Madrid, Spain

Results: There were no differences in the 2 groups in terms of clinical and laboratory characteristics. The main ultrasound findings in the SARS-CoV-2 group were the presence of confluent B lines and subpleural consolidations and hepatization in the CAP group. Pleural effusion was more frequent in the CAP group. There were no normal lung ultrasound exams. Analysis of the area under the curve (AUC) curves showed an area under the curve for Lung Ultrasound of 89.2% (95% CI: 75.0–100%, $p < .001$) in the identification of SARS-CoV-2 pneumonia. The cut-off value for the lung score of 10 had a sensitivity of 93.3% and a specificity of 80.0% ($p < .001$).

Discussion: The combination of the findings of the Lung Ultrasound, with a Lung Score greater than 10, added to the rest of the additional tests, can be an excellent tool to predict the aetiology of the pneumonia.

Article

Lung Ultrasound and Neutrophil Lymphocyte Ratio in Early Diagnosis and Differentiation between Viral and Bacterial Pneumonia in Young Children

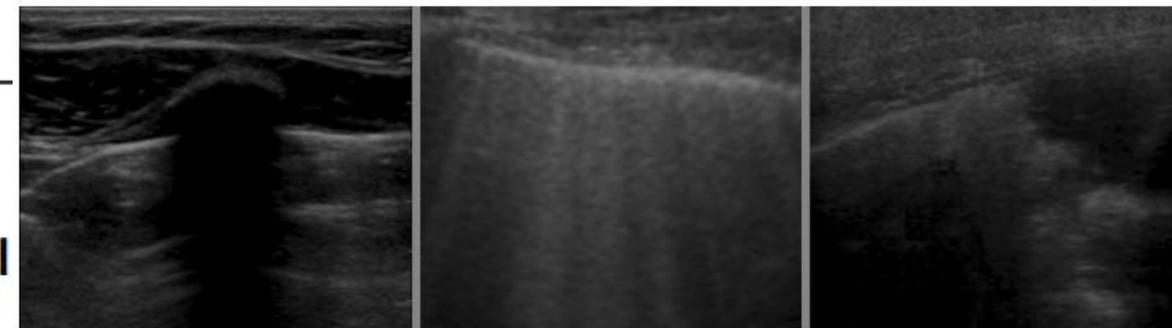
Ahmed Omran^{1,*}, Heba Awad¹, Mostafa Ibrahim², Sonya El-Sharkawy³, Samar Elfiky¹ and Ahmed R. Rezk⁴

pneumonia (CAP) underwent LUS and the NLR. LUS and the NLR strongly differentiated children with viral from those with bacterial pneumonia. For the early diagnosis and differentiation between viral and bacterial pneumonia in young Egyptian children, LUS was proven to be a noninvasive and reliable method. Combining the NLR with LUS increased the diagnostic accuracy when evaluating children suspected of having pneumonia.

		Bacterial Pneumonia (n = 34) Mean ± SD	Viral Pneumonia (n = 18) Mean ± SD	p-Value
Demographic data				
Age (Months)		7.4 ± 6.8	12 ± 8.3	0.03 *
	Gender	14 (41.2%)	10 (55.5%)	0.5
Weight (Kg)	Male	20 (58.8%)	8 (44.5%)	
	Female	7.6 ± 3.5	8.8 ± 2.2	0.19
Average hospital stay (days)		5.7 ± 2.3	4.5 ± 2.1	0.07
Complaint				
Cough		30 (88.2%)	10 (55.5%)	0.02 *
	Fever > 38	25 (73.5%)	8 (44.4%)	0.07 *
	RD	25 (73.5%)	16 (88.8%)	0.8
	Feeding difficulties	20 (58.8%)	15 (83.3%)	0.13
Chest examination				
Diminished air entry		30 (88.2%)	4 (22.2%)	<0.0001 *
	Fine crepitation	29 (85.2%)	7 (38.8%)	<0.0001 *
	Wheezes	11 (32.3%)	16 (88.8%)	0.0003 *
Laboratory findings				
TLC (mean)		14,000/cmm	8000/cmm	<0.0001 *
NLR (mean)		1.8	0.66	<0.0001 *
CRP (mean)		13 mg/L	5 mg/L	<0.0001 *
Positive sputum culture		24 (70.5%)	0 (0%)	<0.0001 *
PCR for respiratory viral testing		0 (0%)	18 (100%)	<0.0001 *

RD: respiratory distress; TLC: total leucocytic count; NLR: neutrophil/lymphocyte ratio; CRP: C-reactive protein; PCR: polymerase chain reaction. * $p < 0.05$.





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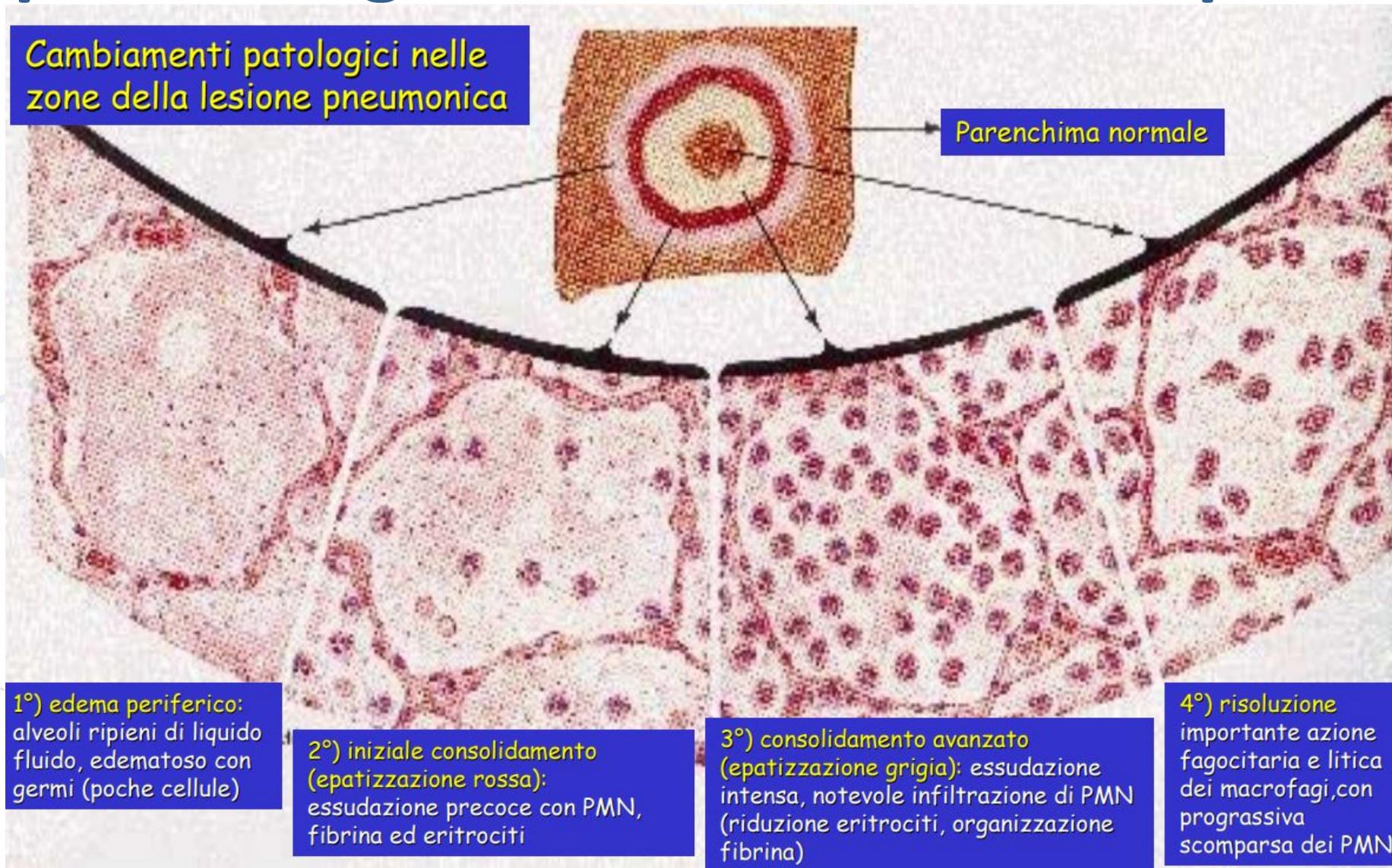
Point-of-care ultrasound (PoCUS) in the early diagnosis of novel coronavirus 2019 disease (COVID-19) in a first-level emergency department during a SARS-CoV-2 outbreak in Italy: a real-life analysis

Simone Bianchi^{1,5}  · Caterina Savinelli¹ · Elisa Paolucci² · Lorenzo Pelagatti² · Erica Sibona² · Natalia Fersini² · Michele Buggea² · Camilla Tozzi¹ · Germana Allescia³ · Diana Paolini⁴ · Michele Lanigra¹

Abstract

In December 2019, the severe acute respiratory syndrome coronavirus 2 (SARSCoV-2) spread worldwide, challenging emergency departments (EDs) with the need of rapid diagnosis for appropriate allocation in dedicated setting. Many authors highlighted the role of lung ultrasound (LUS) in management of the novel coronavirus disease 2019 (COVID-19). **The study aims to analyze the performance of LUS in the early identification of COVID-19 patients in ED during a SARS-CoV-2 outbreak.** We prospectively collected consecutive adult patients admitted to a first-level ED in Powered by Editorial Manager[®] and ProduXion Manager[®] from Aries Systems Corporation Florence with history or symptoms suggestive for COVID-19 that underwent LUS during the ED management. **LUS findings were categorized in 6 discrete main etiological patterns. “A”, “Cardiogenic B” and “Typical C” patterns were referred as non-COVID-19-suggestive, while “Atypical” B or C patterns, “Multiple Consolidations” pattern and “ARDS” pattern were referred as COVID-19-suggestive.** The primary outcome was the diagnosis of SARS-CoV-2 infection. From 12 March to 12 May 2020, 360 patients were enrolled. **COVID-19 suggestive LUS findings were significantly associated with final COVID-19 diagnosis (86% in COVID-19 vs 29% in non-COVID-19, $p < 0.001$).** The presence in ED of at least one in positive swab OR a COVID-19-suggestive LUS showed a **sensitivity of 97% and a negative predictive value (NPV) of 98%.** In patients with known SARS-CoV-2 exposition in the last 14 days, a COVID-19-suggestive pattern at LUS had a **positive predictive value (PPV) of 97% for COVID-19 diagnosis.** Point-of-care ultrasound (PoCUS) is a valuable tool for diagnostic stratification during COVID-19 outbreaks. LUS can help physicians in identifying false-negative RT-PCR, improving its diagnostic sensitivity in ED.

L'aspetto ecografico cambia nel tempo ?



Conclusioni

Esistono pattern ecografici suggestivi delle polmoniti batteriche piuttosto che di quelle virali: Le polmoniti virali sono solitamente associate ad un *interessamento di un maggior numero di campi polmonari* ed alla presenza di *sindrome interstiziale* al contrario delle polmoniti batteriche che sono solitamente associate all' *interessamento di un numero limitato di campi polmonari*, alla presenza di *consolidamenti parenchimali* e a *versamento pleurico*.

Obiettivi futuri

- Valutare prospettivamente il VPP e VPN dell'ecografia
- Correlazione tra tempo d'insorgenza dei sintomi – aspetto ecografico e natura della polmonite
- Identificare markers laboratoristico-strumentali e clinico-anamnestici che siano in grado di implementare la capacità dell'ecografia di identificare con maggiore accuratezza la natura del patogeno

Coming soon...

2025 – Corso di Broncoscopia flessibile in Emergenza Urgenza

Dott. Lorenzo Pelagatti – DEA, AOU Careggi

Dott. Gabriele Viviani – DEA, AOU Careggi

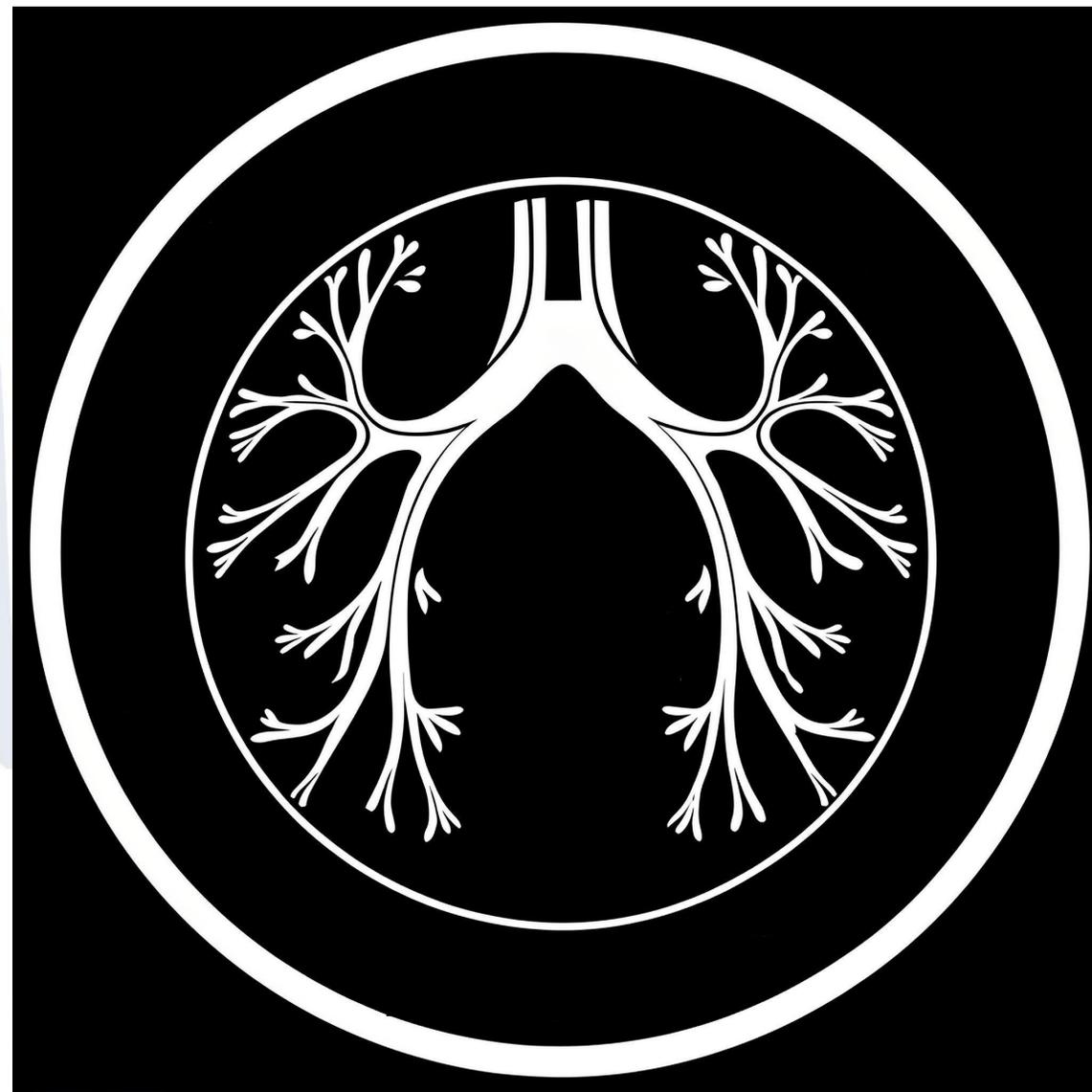
*Prof. Lorenzo Corbetta – Pneumologia
Interventistica, AOU Careggi*

*Dott. Marco Trigiani - Pneumologia
Interventistica, AOU Careggi*



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