

Feasibility and Utility of Chest-X ray on Portable Normothermic Perfusion System

Marco Schiavon, MD, PhD,¹ Guido Di Gregorio, MD, PhD,² Giuseppe Marulli, MD, PhD,¹ Alessandro Rebusso, MD,¹ Michele Battistel, MD,³ Francesca Lunardi, PhD,¹ Diego Miotto, MD,³ Fiorella Calabrese, MD,¹ and Federico Rea, MD¹

Ex Vivo Lung Perfusion (EVLP) represents a unique platform for donor lung assessment and reconditioning.¹

Graft assessment during EVLP is a complex process based on different parameters. In addition to standard parameters, radiologic evaluation is acquiring great importance in its ability to identify small unrecognized inflammatory/infectious processes that can complicate the postoperative outcome.²

However, so far, the portable Organ Care System (OCS) Lung³ does not seem to allow radiographic investigation during preservation/reconditioning.

We present the first case of lung X-ray performed in the OCS system for a 61-year-old female donor with an Eurotransplant donor score of 9⁴ (3 days in intensive care unit, slight smoking history, negative chest X-ray, bronchoscopy and bronchial cultures, and a pressure of arterial oxygen/fraction of inspired oxygen ratio of 511 mm Hg).

At the retrieval time, surgical lung exploration was satisfactory but after lung flushing, the final inspection revealed a large area of consolidation in the right lower lobe. Therefore, we decided to use the OCS device for better lung reconditioning and assessment.

Bronchoscopy revealed the presence of several secretions in the right lower bronchus and the visual inspection confirmed a partial consolidation of the right lower lobe with no improvement during perfusion. Then, a lung X-ray on the device was performed, placing a pediatric size film enclosed in a sterile pouch below each single lung in the organ chamber. Although the left lung appeared normal (Figure 1A), the right lung (Figure 1B) showed a parahilar opacity.

Based on this finding, a single lung transplant procedure was performed on a 57-year-old woman affected by secondary pulmonary fibrosis. The right lung was sent for pathologic examination which confirmed a basal area of congestion with an increasing attenuation from hilar to subpleural area (Figure 1C).

The histology of more consolidated areas showed increased edema, blood extravasation, and significant inflammatory infiltration, mainly represented by neutrophils without germ contamination (Figure 1D).

The patient was transferred to an intensive care unit, extubated after 27 hours, and discharged from the hospital after 62 days. At 5-month follow-up, the patient was alive with a satisfactory condition.

Our case demonstrates the feasibility and utility of performing lung X-ray in the OCS, a method that could be applied even at the donor's hospital, allowing early assessment of the lung especially in marginal cases.

Radiography performed on an EVLP system allows pulmonary parenchyma to be more accurately studied than conventional chest X-ray, thus avoiding the overlap of both osseous and soft tissue structures.

Early detection of lung abnormalities is extremely useful in the EVLP field for many reasons. In the first instance, as in our case, it may influence the surgical procedure (single vs double); second, performing it on the OCS lung, it allows to adapt early on the preservation strategy in terms of ventilation, perfusion, and drug treatment to optimize the organ repair processes.

For all these reasons, we believe that lung X-rays on the OCS device will allow an increased monitoring of retrieved organs, especially for reconditioning marginal cases thus providing an additional parameter of safety guarantee for our recipient patients.⁵

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¹ Department of Cardio-Thoracic and Vascular Sciences, University of Padova, Padova, Italy.

² Department of Anesthesia and Intensive Care, University of Padova, Padova, Italy.

³ Department of Medicine, University Radiology, University of Padova, Padova, Italy.

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M.S. developed the study and wrote the article. G.D.G. contributed to write the article. G.M. contributed to develop the study and revised the article. A.R. contributed to develop the study. M.B. revised the article especially concerning radiological aspects. F.L. contributed to histological evaluation. D.M. revised the article especially concerning radiological aspects. F.C. contributed to histological evaluation. F.R. contributed to develop the study and revised the article.

Correspondence: Marco Schiavon, MD, PhD, Department of Cardio-Thoracic and Vascular Sciences, Division of Thoracic Surgery, University of Padova, Via Giustiniani, 2-35128 Padova, Italy. (marco.schiavon@unipd.it).

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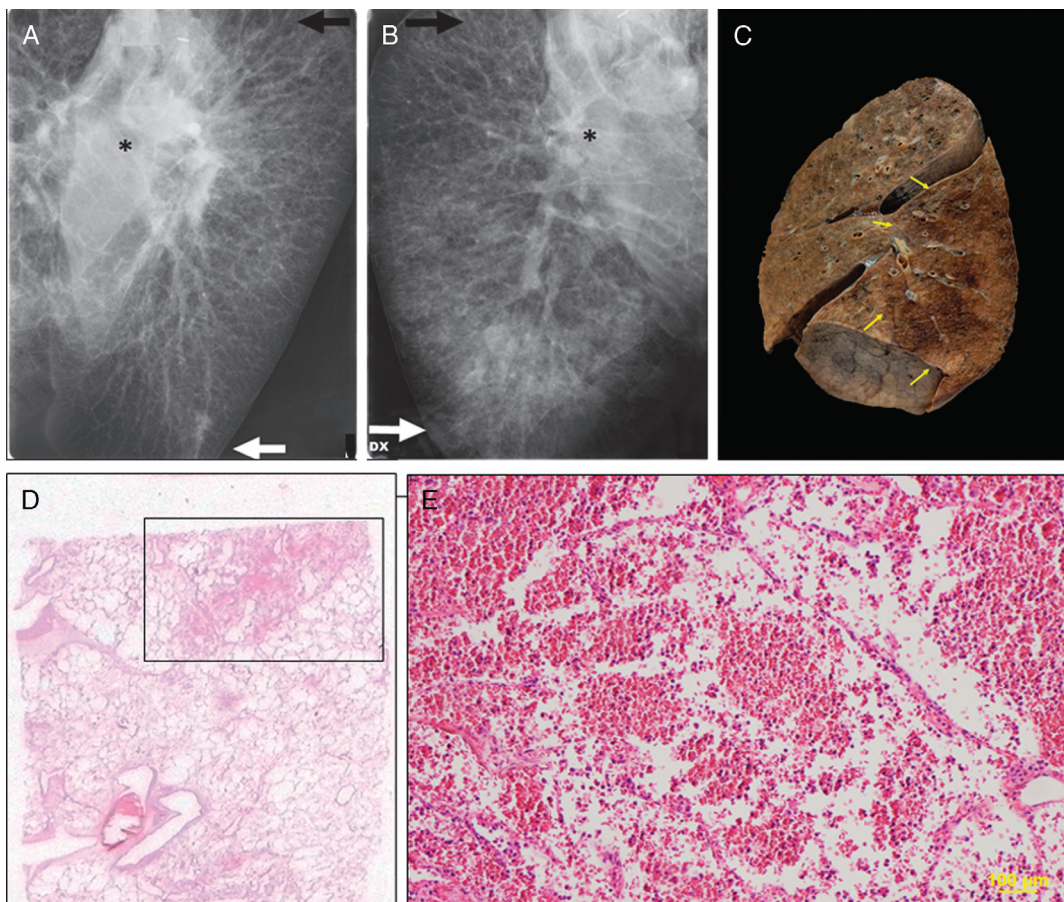


FIGURE 1. A, Lung X-ray performed on OCS lung device showing the normal transparency of the left lung parenchyma without bronchovascular alterations. *Trachea and left hilum; white arrow: basal part of the lower lobe; black arrow: apex of the lung. B, On the right side, a lower parahilar opacity is present with signs of congestion of the whole lower lobe. *Trachea and right hilum; white arrow: basal part of the lower lobe; black arrow: apex of the lung. C, The gross examination showing a basal area of congestion with an increasing attenuation from hilar to subpleural area. Yellow arrows mark the borders of the inflammatory processes. D, The panel shows a panoramic view of lung samples with area of increased consolidation. E, The histology of more consolidated area (indicated in the panel D) showed blood extravasation and inflammatory infiltration.

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