



Clinical image

Innovative Use of 3D Reconstruction Models of the Pulmonary Artery for Preoperative Planning

Uso innovador de modelos de reconstrucción 3D de la arteria pulmonar para la planificación preoperatoria

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16-Year-old male patient with a significant medical history, including osteosarcoma of the right lower extremity, which was treated surgically with knee replacement on December 2022. The patient also underwent left video-assisted thoracic surgery for metastasectomy and received multiple sessions of chemotherapy.

On March 2024, the patient presented with symptoms suggestive of pulmonary embolism. A chest computed tomography (CT) angiogram revealed extensive pulmonary embolism occluding the pulmonary trunk and the bilateral main pulmonary arteries (PA) with completely unopacified segmental and subsegmental branches on the right and minimal residual flow on the left lingular and lower branches. A 3D reconstruction model of the pulmonary artery ([Video 1](#)) was created to guide preoperative planning in order to visualize properly the extension of the PA involvement.

This complex clinical scenario highlights the need for meticulous preoperative planning in patients with chronic thromboembolic pulmonary hypertension (CTEPH)¹ or intravascular tumoral disease² such in this case. 3D reconstruction models of the PA allow to better understand the anatomical changes and guide the surgical approach, enhancing the safety and efficacy of the upcoming surgical intervention.

Informed consent

The authors have obtained the informed consent of the patient referred to in the article. This document is held by the corresponding author.

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Authors' contributions

All authors contributed to the conceptualization and design of the study, the drafting of the manuscript, the generation of 3D images using specialized software, as well as the review and approval of the final manuscript.

Conflicts of interest

The authors state that they have no conflict of interests.

Appendix A. Supplementary data

Supplementary data associated with this article can be found in the online version available at <https://doi.org/10.1016/j.opresp.2024.100380>.

References

1. Zicans M, Kazoka D, Pilmane M, Skride A. The importance of topographical recognition of pulmonary arteries in diagnostics and treatment of CTEPH, based on an analysis of a dissected case model – a pilot study. *Diagnostics (Basel)*. 2024;14:1684.
2. Mahajan NN, Cicek SM, McGregor CGA, Boland JM, Morris JM, Okuno SH, et al. A case series of long-term surgical outcomes of primary pulmonary artery sarcomas with opportunities for 3D-printed models in surgical planning. *Innovations (Phila)*. 2021;16:94–100.

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