Rare cause of emphysema

Tobias Matthieu Benoit,[1] Rahel Schwotzer,[1] Didier Schneiter,[2] Jan Hendrik Rüschoff,[3] Daniel Peter Franzen[4]

[1]Department of Medical Oncology and Haematology, University Hospital Zurich, Zurich, Switzerland
[2]Department of Thoracic Surgery, University Hospital Zurich, Zurich, Switzerland
[3]Department of Pathology and Molecular Pathology, University Hospital Zurich, Zurich, Switzerland
[4]Department of Pulmonology, University Hospital Zurich, Zurich, Switzerland

Correspondence to
Dr Tobias Matthieu Benoit, Department of Medical Oncology and Haematology, University Hospital Zurich, Zurich, 8091, Switzerland; tobias.benoit@usz.ch

Received 16 June 2020
Revised 13 October 2020
Accepted 26 October 2020

CASE PRESENTATION

A 52-year-old man with chronic obstructive pulmonary disease GOLD 4, group D, and severe, heterogeneous pulmonary emphysema (figure 1) and marked hyperinflation was treated with bronchoscopic lung volume reduction (LVR) using endobronchial valves (EBVs) and, 6 months thereafter, bilateral thoracoscopic lung volume reduction surgery (LVRS), both after multidisciplinary team consensus. The interventions individually resulted in a clear but only short-term success due to rapid progression of emphysema and hyperinflation. After EBV treatment, forced expiratory volume in one second (FEV1) improved from 0.86 L (23% predicted) to 1.16 L (31% predicted), and residual volume (RV) improved from 5.14 L (219% predicted) to 4.93 L (210%). Only 4 months thereafter, FEV1 dropped to 0.68 L (18%), while RV increased to 5.84 L (266% predicted). At 3 months after LVRS, FEV1 increased again to 0.87 L (23% predicted), and RV decreased to 5.40 L (227% predicted). However, chest CT revealed progressive emphysematous changes, and the patient experienced increasing dyspnoea again. Negligible past tobacco consumption (4 pack-years) and normal alpha-1 antitrypsin levels indicated an uncommon aetiology of pulmonary emphysema. Histopathological analysis of the removed lung tissue proved extensive diffuse parenchymal pulmonary amyloidosis with abundant detection of free light-chain lambda amyloid perivascular and in the alveolar septa (figure 2).

The patient had been diagnosed with plasma cell myeloma type IgD lambda and consecutive systemic amyloid light-chain (AL) amyloidosis-related cardiomyopathy and neuropathy in the past. He was treated with immunochemotherapy containing a proteasome inhibitor, lenalidomide and dexamethasone for a total of 10 cycles, resulting in a stringent complete response. No measurable disease activity was detected at the time of both LVR procedures.

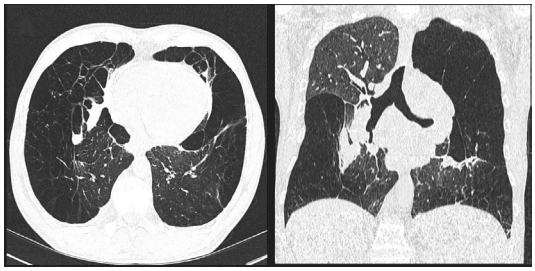

Figure 1 CT scan showing severe, heterogeneous pulmonary emphysema.

DISCUSSION

Diffuse parenchymal pulmonary amyloidosis, also known as diffuse alveolar–septal amyloidosis, is characterised by the presence of amyloid deposits in the alveolar septa and vessel walls. Usually, all lung lobes are involved. Only a few cases of diffuse parenchymal pulmonary amyloidosis have been described, and none of them resulted in pulmonary emphysema.[1] Therefore, pathogenesis of severe emphysematous changes due to amyloid deposition remains unclear. Possibly, the amorphous material in the small bronchial walls might work as a check valve, causing emphysematous changes and promoting inflammation, but systematic studies or even larger case series on this hypothesis are not available as of today. In general, the therapeutic objective in AL amyloidosis is to stop further production of the amyloidogenic light chain, thereby improving organ function and ultimately prolonging survival. Current treatment approaches derive from immunochemotherapy schemes developed for plasma cell myeloma.[2] In addition, common treatment guidelines for the respective organ complications are implied. Since AL amyloidosis is frequently a systemic disease affecting multiple organs, a solid organ transplantation is only performed in a very selected patient group with a single-organ involvement. In the presented case, LVR was the only remaining treatment option. Nevertheless, both LVR procedures showed only

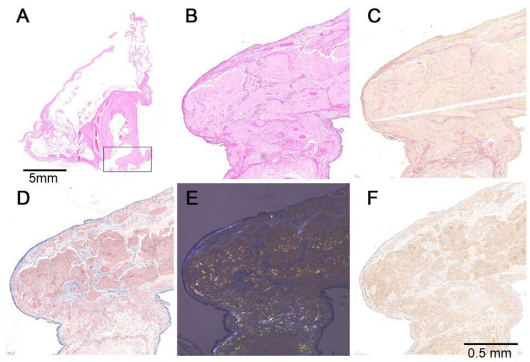

Figure 2 Histology of emphysematous lung tissue with septal and perivascular amyloid deposits. Overview (A) and detail (B) of H&E-stained lung parenchyma showing eosinophilic amorphous material. Elastica van Gieson stain revealed a yellow (C), an unpolarised Congo red staining a red colour (D) of the deposits. Congo red staining under polarised light demonstrates an apple-green birefringence (E). Positive immunohistochemistry for free light-chain lambda (AL lambda antibody, clone HAR, 1:5 dilution, amYmed) is shown in F. (A) Scale bar 5 mm, (B–F) scale bar 0.5 mm.

To cite: Benoit TM, Schwotzer R, Schneiter D, *et al*. *Thorax* Epub ahead of print: [*please include* Day Month Year]. doi:10.1136/thoraxjnl-2020-215561

short-term improvement of the dyspnoea, although the conditions for LVR with heterogeneous emphysema distribution and absent collateral ventilation for EBV treatment were met.

To the best of our knowledge, this is the first reported case of a severe pulmonary emphysema associated with diffuse parenchymal pulmonary amyloidosis in a patient with systemic AL amyloidosis and IgD plasma cell myeloma. There is merely one similar case of an isolated nodular parenchymal pulmonary AL amyloidosis with multiple emphysematous bullae, though associated with Sjögren's disease.[3]

In summary, diffuse parenchymal pulmonary amyloidosis presenting as bullous emphysema is exceptional. However, severe symptoms due to hyperinflation might be treated according to GOLD recommendations, including LVR.

Acknowledgements The authors thank the patient and the staff at Swiss Amyloidosis Network involved in their care.

Contributors TMB, RS, DS, JHR and DF wrote the paper. TMB contributed figure 1. JHR contributed figure 2.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon request.

REFERENCES

1 Liu Y, Jin Z, Zhang H, *et al*. Diffuse parenchymal pulmonary amyloidosis associated with multiple myeloma: a case report and systematic review of the literature. *BMC Cancer* 2018;18:802.
2 Milani P, Basset M, Russo F, *et al*. The lung in amyloidosis. *Eur Respir Rev* 2017;26. doi:10.1183/16000617.0046-2017. [Epub ahead of print: 30 Sep 2017].
3 Schlegel J, Kienast K, Störkel S, *et al*. Primary pulmonary nodular amyloidosis and multiple emphysematous bullae in Sjögren syndrome. *Pneumologie* 1992;46:634–7.