CASE REPORT

Bronchoscopic Thermal Vapor Ablation with a single-use bronchoscope

BRONCHOSCOPIC THERMAL VAPOR ABLATION IN EMPHYSEMA

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PATIENT HISTORY

A 59-year-old male, presented with symptoms consistent with stage IV chronic obstructive pulmonary disease (COPD) and no other significant comorbidities. The patient had a history of smoking but quit five years prior to presentation and had been receiving triple inhaled therapy. However, the patient was unable to continue taking Daxas. In 2018, the patient underwent treatment with valves placed in the right upper lobe (RUL) and reported overall improvement in his condition. The achieved atelectasis continued. Subsequently, the patient developed mild elevations in IgE (37-60) and eosinophil (300-400) concentrations, as well as a nickel allergy, which was not previously reported. Valves are made of nitinol, which contains approximately 50% nickel, but there were no polyps observed around the RUL orifice. As nickel allergy is a common condition, it could not be determined with certainty if the patient's allergy was caused by the valves. The patient decided against removing the valves. The possibility of the valves being a potential source of the allergy could not be ruled out.

The patient's 6-minute walk test (6MWT) distance decreased from 360m in 2019 to 120m at presentation. Pulmonary function tests revealed a residual volume of 226% predicted despite atelectasis in the RUL, representing an increase of 33% predicted or 1 liter in volume compared to prior measurements in 2019 and 2020. Due to the patient's allergy, the decision was made to proceed with Bronchoscopic Thermal Vapor Ablation (BTVA – Uptake Medical Technology, Inc. San Jose, CA) due to the lack of an implant required for the procedure. The BTVA system (catheter and generator) was used in the left upper lobe (LUL) as computed tomography (CT) scans revealed a heterogeneity index (HI) of 2.3 and 2.6 in two subsegments of the LUL, with a total lung capacity (TLC) of 1200ml. Perfusion was reduced in the left upper zone, accounting for 17% of the total 6 zones evaluated. Diffusion capacity (TLCO) was over 65% predicted and blood gas analysis revealed normal values, with a decrease of 7mmHg in partial pressure of oxygen (paO2) during the 6MWT to 60mmHg and a maintained partial pressure of carbon dioxide (paCO2) of 39mmHg.

PROCEDURE

The procedure was performed under deep general sedation with local anesthesia using lidocaine 1% under superimposed nasal high-flow jet ventilation (SHFJV®, generated by TwinStream™, Carl Reiner GmbH) with remifentanil and propofol for perfusion and a 5mg IV bolus.

The procedure was completed with a single-use bronchoscope (SUB) from Ambu®, utilizing the Seldinger technique for nasal jet-ventilation. The maneuverability, angulation, and visualization with the vapor balloon catheter inside the SUB were comparable to those of reusable bronchoscopes (RUB) represented in this lab by the newest Pentax series. The procedure took approximately 17 minutes to complete and a total of 28 minutes for the patient from on to off the procedure table.

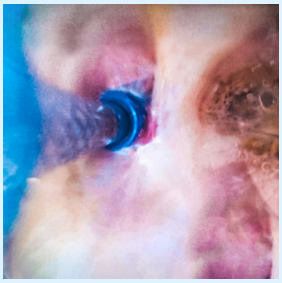

Figure 1: BTVA catheter in endoscopic view

OUTCOME

The patient was discharged from the hospital the following day. There have been no reported complications to date. Three months post-procedure, the patient's 6MWT distance had improved by 62m to 188m. The residual volume had decreased by 420ml, and further reductions of 600-800ml are expected.

CONCLUSION

The use of Ambu® aScope™ 5 Broncho for this type of interventional procedure has shown to be feasible and at least not inferior to standard RUBs. The ready-to-use feature of the SUBs may result in greater overall satisfaction compared to RUBs.

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