Mucous membrane pemphigoid (MMP) is a rare, chronic autoimmune disease that involves various mucous membranes, most commonly the eyes and mouth. It is characterized by subepithelial blistering lesions with linear deposition of immunoglobulins (IgG and IgA) and complement (C3) seen on immunofluorescence microscopy. Central airway involvement is exceptionally rare, with just 7 previous reports. Although airway compromise associated with central MMP is very rare and associated with mortality, neither emergent treatment, nor follow-up have been discussed in previous reports. We describe a case with central airway obstruction due to a severe case of MMP and the emergent treatment of acute airway compromise with rigid bronchoscopy, utilizing LASER and mechanical resection.

CASE REPORT

A 24-year-old woman with a chronic tracheostomy performed 4 years ago, presented to the emergency department with acute respiratory distress. Erythematous plaques and areas of scarring were noted on the upper extremities but no bullae on the skin were visualized (Fig. 1). A chest x-ray showed bibasilar atelectasis without other acute findings.

Four years before presentation, the patient was extensively worked up for oropharyngeal ulcers and...
hoarseness. A laryngeal mass at the level of the cri-
coid cartilage was found that encased the glottic and
supraglottic spaces, requiring a tracheostomy to
relieve upper airway obstruction. A biopsy of the
mass showed nonspecific, chronic, ulcerative inflam-
mation, and laboratory testing for tuberculosis, and
connective tissue disease was negative. A diagnosis
could not be reached and the patient subsequently
suffered recurrent pulmonary infections requiring
several courses of antibiotics.

In the emergency department, a bedside fiberoptic
bronchoscopy through the patient’s tracheostomy
revealed a near-total occlusion of the trachea
approximately 4 cm proximal to the carina by a
pedunculated, inflamed mass with extensive fibrous
tissue, that moved with respirations causing a ball
valve-like obstruction (Fig. 2A). The patient was taken
emergently to the operating room for rigid broncho-
scopy with intent of restoring airway patency.

Rigid bronchoscopy performed via the oro-
pharynx revealed complete destruction of the vocal
cords; therefore, the rigid bronchoscope was
advanced through the tracheostomy stoma after
removal of the tracheostomy tube. The discolored,
highly inflamed, abnormal mucosa of trachea, and
the obstructing endotracheal mass were visualized.
LASeR was performed to coagulate the mobile
endotracheal mass, followed by mechanical resection
(Fig. 2B). A stenotic left main stem lesion was also
seen on airway inspection (Fig. 3A) but due to the
friable nature of the lesion, further interventions were
deferred. The tracheostomy tube was replaced after
resection of the central airway mass and the patient
was admitted to the intensive care unit for supportive
care. Pathology of the central airway mass revealed
ulcerated squamous mucosa (Fig. 4A) with
methicillin-sensitive Staphylococcus aureus (MSSA)
growth on bacterial culture. Immunofluorescence
showed linear IgG and C3 deposition along the
basement membrane.

Skin lesions were also biopsied and sent for
direct immunofluorescence, also revealing linear
deposition of IgG and C3 along the basement mem-
brane (Fig. 4B). Tuberculosis, connective tissue dis-
ease, and vasculitides were ruled out by repeat testing
and the patient was diagnosed with a variant of
pemphigoid disease termed MMP. Intravenous anti-
biotics for MSSA and a prolonged prednisone
(0.75 mg/kg) taper over 3 months were initiated.
Because of deficiency of thiopurine-methyltransferase
activity (below 0.11 nmol/mL) posing an increased
risk of side effects from azathioprine, the patient was
started on immunosuppression with mycophenolate.

One month following intensive care unit dis-
charge, a rigid bronchoscopy was repeated to treat
the left main stem bronchial stenosis. Holmium
LASeR was used in contact mode to cut the cir-
cumferential web-like stenosis followed by sequential
mechanical dilatations with the small rigid bronchial
tubes (8 mm to a maximum of 11 mm). Several small
pemphigoid-related lesions were observed during the
bronchoscopy at different levels in the tracheobron-
chial tree (Fig. 3B). Successful restoration of airway
patency was accomplished.

Oral mycophenolate mofetil was prescribed in
increasing doses up to 1000 mg twice a day, with
appropriate monitoring of complete blood count and
complete metabolic panel for the next year.

**FIGURE 2.** A, Pedunculated, inflamed mass with extensive fibrous tissue, that moved with respirations causing a ball
valve-like obstruction. B, Patent trachea after LASeR and mechanical resection of the obstructing mass.
Surveillance bronchoscopy was performed every 3 months for the first 6 months, then at 1-year post-treatment initiation showing stable disease. The patient suffered a single mild bacterial infection of the tracheobronchial tree, treated as an outpatient with oral doxycycline. No further pulmonary infections or exacerbations of her MMP were detected on surveillance bronchoscopy during the 1-year follow-up period. Pulmonary function tests could not be performed due to patient’s tracheostomy and supraglottic scarring failing to detect a quantitative improvement.

Mycophenolate was well tolerated, no adverse events were seen and no disease progression was observed. The patient also reported a decrease in the frequency of skin and oropharyngeal lesions.

**DISCUSSION**

MMP is a rare autoimmune disease that infrequently affects the respiratory tract. It is
characterized by mucosal, subepithelial blister formation that may result in scarring with immunopathologic findings defined by the deposition of immunoglobulins and complement within the subepithelial basement membrane. The usual course is benign with chronic lesions that cause scarring, hence also known as “cicatricial” pemphigus.1

MMP lesions are prone to infection causing fibrosis and granulation tissue formation. Coinfection with MSSA was witnessed in our case as well as in a previous report.6 Scarring involving the upper and lower airways may lead to acute respiratory compromise and fatal sequelae similar to this case.

Reports of MMP with tracheobronchial involvement are very rare. It is worth mentioning that a majority of cases reported, including our case, involved younger adults. This is in contrast to MMP as a whole, which commonly arises in older adults between 60 and 80 years of age.1 This suggests that age may be a possible predictor of airway involvement, perhaps warranting screening bronchoscopies in that population of patients to prevent high-risk consequences. Furthermore, sex may also play a role in predicting lower airway involvement, noting that most cases reported with tracheobronchial involvement have been in female patients.

To our knowledge, only 7 cases of MMP with tracheobronchial involvement have been reported. All cases showed a tendency of central airway involvement and some with left main stem stenosis as in our case. Four cases presented with respiratory failure that resulted in mortality.2,4,5,7 Our patient had near-fatal respiratory failure from the valve-like pedunculated mass that may have resulted in mortality without emergent resection. Table 1 summarizes the findings of prior reports of respiratory tract MMP.

MMP is generally diagnosed with a combination of clinical findings characterized by subepithelial blister formation, and immunopathologic findings of immunoglobulins and complement within the subepithelial basement membrane. Direct immunofluorescence is considered the gold standard for diagnosis.

Immunosuppression with azathioprine and a prolonged prednisone taper has been the mainstay of therapy for many years9,10 with no reports on managing tracheobronchial MMP with mycophenolate.11

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**TABLE 1. A Summary of the Prior Reports on MMP With Tracheobronchial Involvement**

| References          | Age (Y) | Sex  | Bronchoscopic Description                        | Coexistent Lesions                                      | Treatment                                      | Outcome                  |
|---------------------|---------|------|--------------------------------------------------|---------------------------------------------------------|-----------------------------------------------|--------------------------|
| Derbes et al2       | 20      | Male | Tracheal stenosis starting 2 cm proximal to carina| Ocular, larynx and tracheobronchial lesions              | None                                          | Death                    |
| Müller and Salzer3  | 22      | Male | Left main stem bronchial stenosis                | Skin, oral lesions, and laryngeal stricture             | Sleeve resection and end-to-end anastomosis   | Relief of the stenosis with 8 wk follow-up | Death                    |
| De Carvalho et al4  | 20      | Female | Tracheal ulcers surrounded by scarring          | Cornea, oral cavity, esophagus, vulva, bullous skin lesions | Triamcinolone, dapsone, cyclophosphamide, azathioprine | Death                    |
| Gamm et al5         | 17      | Female | Subglottic, tracheal, and severe left main stem bronchial stenosis | Skin, conjunctiva, and oral cavity | Left main stem bronchus stent placement, dapsone, and prednisone | Death                    |
| Bonifazi et al6     | 73      | Female | Extensive ulcerative tracheitis/bronchitis with fibrinous exudates | Bullous skin lesions | High-dose prednisone, antibiotic not specified | Death at 1 y from ischemic heart disease | Death                    |
| Kato et al7         | 76      | Female | Scarred mucosa in the trachea and left bronchus, severe airway edema | Conjunctiva, oral mucosa, bullous skin lesions | Prednisone, cyclophosphamide | Death                    |
| Minaie and Surani8  | 34      | Female | Entire tracheal mucosa replaced by thick whitish-gray mucosa, abruptly stops at the carina | Cornea, oropharynx | Prednisone, methotrexate, rituximab, vancomycin | Responded to therapy, no follow-up mentioned |
Our patient could not be treated with azathioprine due to deficiency of thiopurine-methyltransferase activity posing an increased risk of side effects from azathioprine, thus mycophenolate proved to be an effective treatment for our patient.

CONCLUSIONS

The possibility of tracheobronchial MMP should be considered in young women with skin lesions and blister-like lesions of the tracheobronchial tree. Submission of fresh tissue by the bronchoscopist for immunofluorescence can be vital in confirming this diagnosis. Noting that most reported cases of tracheobronchial MMP were in young females, they may benefit from closer follow-up to prevent complications and mortality.

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ERRATUM

Erratum: Cynthia Diane Ray, MD, August 28, 1970—April 5, 2017

In the July 2017 issue, the name of the author of the In Memoriam article entitled “Cynthia Diane Ray, MD, August 28, 1970—April 5, 2017” (J Bronchol Intervent Pulmonol 2017;24(3):186–187) was misspelled. The author’s name should have appeared as Michael J. Simoff, MD. The publisher sincerely regrets this error.

REFERENCE

Simo MJ. Cynthia Diane Ray, MD, August 28, 1970—April 5, 2017. J Bronchol Intervent Pulmonol. 2017;24:186-187.