

[CASE REPORT]

Sudden Respiratory Failure due to Tracheobronchomalacia by Relapsing Polychondritis, Successfully Rescued by Multiple Metallic Stenting and Tracheostomy

Daisuke Oryoji¹, Nobuyuki Ono², Daisuke Himeji², Kyoko Yoshihiro², Yasufumi Kai², Motohiro Matsuda², Hiroshi Tsukamoto¹ and Akira Ueda²

Abstract:

Relapsing polychondritis (RP) is a rare systemic autoimmune disease that affects cartilaginous structures. RP causes tracheobronchomalacia (TBM) by affecting the bronchial cartilage. TBM is a fatal condition characterized by excessive weakening of the walls of the trachea and bronchi. We herein report a case of a 73-year-old man who experienced sudden respiratory failure due to TBM caused by RP. Immunosuppressive treatment did not improve his respiratory failure. Multiple metallic stentings dramatically improved his severe airway symptoms. When the airway condition becomes lethal in RP patients, then metallic stenting can be a useful treatment option.

Key words: metallic stent, relapsing polychondritis, tracheobronchial stenosis, tracheobronchomalacia

(Intern Med 56: 3369-3372, 2017)

(DOI: 10.2169/internalmedicine.8778-16)

Introduction

Relapsing polychondritis (RP) is a rare multisystem disease that can be fatal. It is characterized by recurrent and potentially severe episodes of inflammation of cartilaginous structures of the external ear, nose, peripheral joints, larynx, and tracheobronchial tree (1). Other proteoglycan-rich structures can become involved, including the eyes, heart, blood vessels, and inner ear. Airway involvement with RP has been reported to portend a particularly poor prognosis.

Tracheobronchomalacia (TBM) is a critical condition characterized by excessive weakening of the walls of the trachea and bronchi (2). Malacic tracheobronchial airways demonstrate dynamic collapse with expiration. TBM in cases of RP, due to loss of the supportive cartilaginous scaffolding of the respiratory airways by recurrent inflammation, causes upper respiratory airway stenosis, which results in significantly high rates of mortality (3).

We herein report a patient suffering from severe TBM with RP who was rescued by immunosuppressive treatment

with multiple metallic stentings and tracheostomy.

Case Report

A 73-year-old man noted hyperemia with bilateral auricular swelling and redness and a saddle nose deformity in 2006. Three months later, he was diagnosed with RP by McAdam's criteria: bilateral auricular chondritis, nasal chondritis, respiratory tract chondritis, seronegative non-erosive arthritis, and ocular inflammation. The pathology of an auricle biopsy revealed marked infiltration of neutrophils in and around the cartilage with degeneration. He was treated with intravenous methylprednisolone pulse therapy followed by oral prednisolone at 30 mg daily. Since he experienced relapses during steroid tapering, immunosuppressive agents were added: methotrexate, cyclosporine A, cyclophosphamide, and azathioprine.

From 2009, he developed a cough, especially at night. Cervical computed tomography revealed that his tracheal lumen was gradually narrowing. One month before admission, he visited the hospital complaining of a cough but not respi-

¹Department of Medicine and Biosystemic Science, Kyushu University Graduate School of Medical Sciences, Japan and ²Department of Internal Medicine, Miyazaki Prefectural Miyazaki Hospital, Japan

Received: December 29, 2016; Accepted: April 10, 2017; Advance Publication by J-STAGE: October 11, 2017

Correspondence to Dr. Daisuke Oryoji, doryoji@intmed1.med.kyushu-u.ac.jp

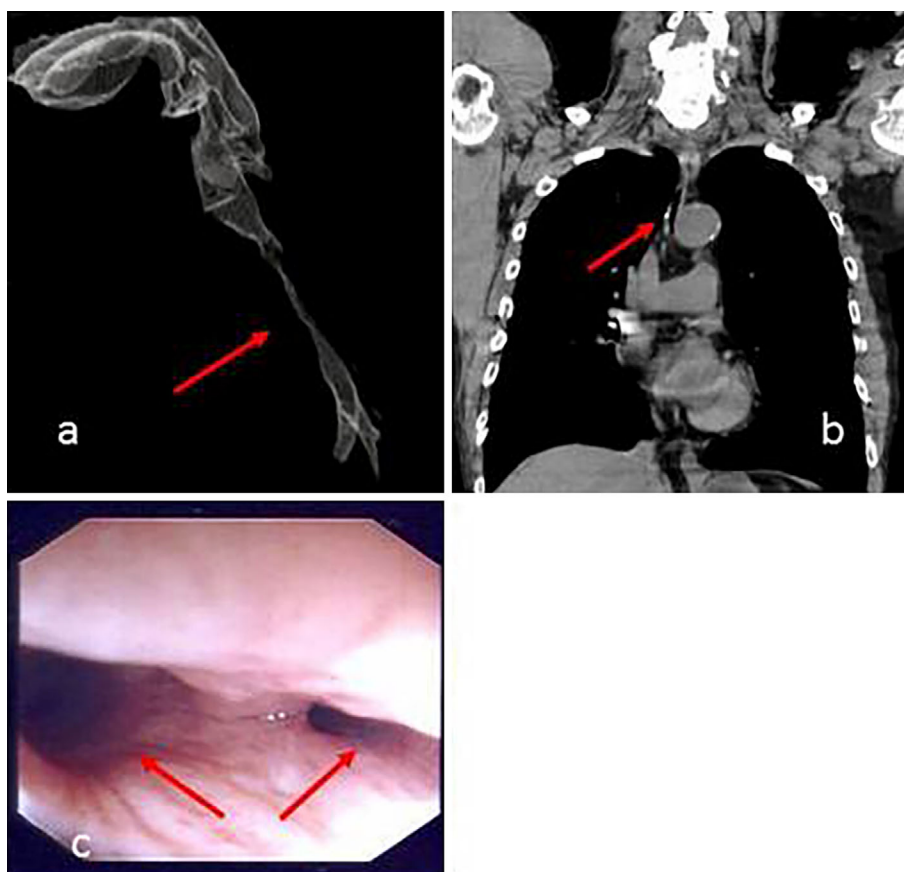


Figure 1. Cervical-chest computed tomography on admission. (a) The coronal view and (b) the three-dimensional reconstruction of cervical-chest computed tomography scan on admission revealed a narrowing glottis, and tracheal and each main bronchus lumen. (c) The view of main bronchus on expiratory phase by bronchoscopy revealed tracheobronchomalacia.

ratory comfort. He looked fair, but bilateral rhonchi were heard on his chest. Although he continued to receive prednisolone 12 mg with azathioprine 50 mg daily, a severe cough and dyspnea suddenly appeared in the morning of January 2011. He was brought to our hospital by ambulance because of his exacerbated dyspnea.

A physical examination revealed that his axillary temperature was 37.3°C, pulse rate was 120/min, respiration rate was 29/min, arterial oxygen saturation was 99%, and arterial blood pressure was 209/140 mmHg. A bilateral wheeze was heard in his chest. An examination of the musculoskeletal system revealed tenderness at the right shoulder. Laboratory tests of inflammation parameters showed C-reactive protein 0.05 mg/dL, erythrocyte sedimentation rate 17 mm/h, and white blood cell count 9,340 cells/ μ L. Rheumatoid factor, antinuclear antibodies, and anti-neutrophil cytoplasmic antibodies (MPO-ANCA and PR3-ANCA) were negative. The levels of antibodies to type II collagen were not elevated, and the C3 and C4 levels were normal. An arterial blood gas analysis breathing O₂ at 2 L/min revealed pH 7.22, PaO₂ 150.0 Torr, and PaCO₂ 62.2 Torr. Because of his respiratory acidosis, mechanical ventilation was immediately started after endotracheal intubation.

Cervical and chest computed tomography revealed that

the glottis and tracheal and each main bronchus lumen had become narrow due to TBM (Fig. 1a, b).

Bronchoscopy showed tracheobronchial stenosis, which was worsened during the expiratory phase (Fig. 1c). Steroid pulse therapy (methylprednisolone 1000 mg \times 3 days) followed by 1 mg/kg of prednisolone did not improve his respiratory failure due to TBM. Generally, we choose silicone stents for bronchial stenosis caused by benign diseases, such as RP. However, the insertion of a rigid bronchoscope was impossible because of the subglottic stenosis caused by RP. We therefore gave priority to tracheostomy after obtaining further informed consent.

After performing tracheostomy and inserting tracheal cannula, a bronchoscopic examination still showed marked stenosis at the lower portion of trachea. Two metallic non-covered Ultraflex stents were inserted into each main bronchus on days 36 and 41 (Fig. 2). Subsequently, a T-tube was inserted to maintain the tracheal lumen. However, the T-tube lumen became gradually covered with dried sputum that we had to remove. Since the lower portion of the trachea that was not covered by the tracheal cannula was still markedly stenotic, we inserted a spiral Z stent from the lower portion of the trachea to the right main bronchus on day 115, resulting in marked improvement of his severe airway symptoms

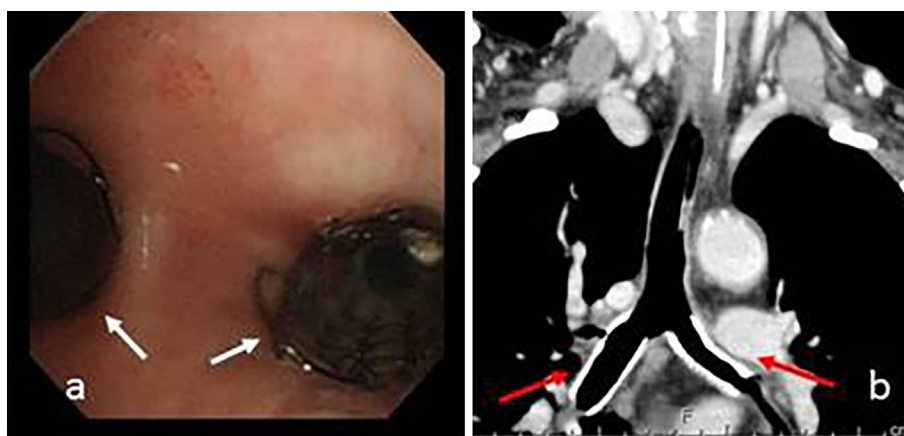


Figure 2. Bronchoscopy and cervical-chest computed tomography after inserting Ultraflex stent. Bronchoscopy (a) and cervical-chest computed tomography (b) showed that a non-covered Ultraflex stent was inserted into the each main bronchus.

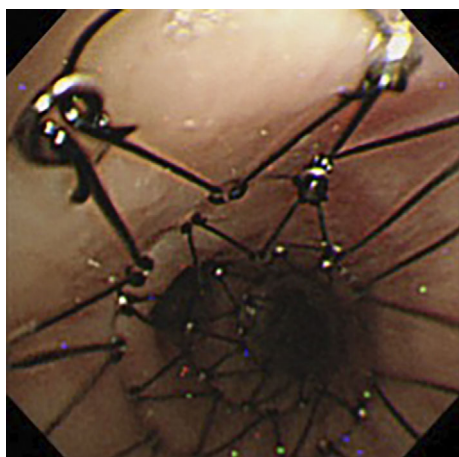


Figure 3. Bronchoscopy after inserting spiral Z stent. Bronchoscopy showed inserted spiral Z stent from lower portion of trachea to right main bronchus.

(Fig. 3). Prednisolone was tapered gradually, as shown in Fig. 4. On day 131, the tracheal cannula was changed to a speech cannula that allowed him to vocalize.

Although he required regular suctioning of persistent sputa, he was able to consume an oral diet and move in a wheel chair by himself. On day 175, he was transferred to another hospital to continue rehabilitation. Thereafter, he became able to walk by himself with a cane.

Discussion

Airway complication due to RP is the most serious manifestation of the disease and is known to be associated with a particularly poor prognosis. Indeed, up to 50% of RP patients die from respiratory tract complications (1). The most recent study found symptomatic airway involvement - occasionally severe - in 21% of RP patients. Of note, RP airway involvement is typically asymptomatic in the early phase (3). To relieve respiratory symptoms and prevent the progression of airway manifestations, both medications and

interventions are necessary.

One study showed that 40% of symptomatic patients required intervention, including balloon dilation, stenting, and tracheotomy (3). For stenting, expandable metallic stents and silicone stents are available. Silicone stents are useful for their durability and removability, but their insertion is limited due to technical difficulties with their manipulation. The advantages of expandable metallic stents are the ease of placement by bronchoscopy under local anesthesia, strong expandability, rare migration, and preservation of the mucociliary function. However, the use of these stents should be limited because of their insufficient durability and the difficulty associated with replacing them. Indeed, the US Food and Drug Administration published a warning letter concerning the use of metallic stents for benign disease in 2005, with silicone stenting recommended as the first-line intervention whenever feasible (4). In the present case, we were unable to place a silicone stent with a rigid bronchoscope because of the patient's subglottic stenosis caused by RP. We therefore inserted multiple metallic stents to rescue the patient.

As immunosuppressive treatment of RP patients results in the exacerbation of bacterial residency on artificial materials, the present patient now requires regular suctioning of sputa to keep his airways patent. Bronchial stenting causes cough, hemoptysis, and mucus plugging, and bronchial stenosis and stent rupture also appear in later phases. One report found that 4 RP patients with successful metallic stenting survived for 16 to 20 months, although 1 died due to respiratory failure (5). Another study found that the long-term prognosis of patients even with successful treatment by trancheobronchial stenting was relatively poor; the 5- and 6-year survival rates were 38% and 23%, respectively (5). Although we expect the development of new stent materials and endoscopic techniques that may result in a longer survival of TBM patients, we need to consider more effective treatment strategies for RP patients.

Because most patients with symptomatic airway involve-

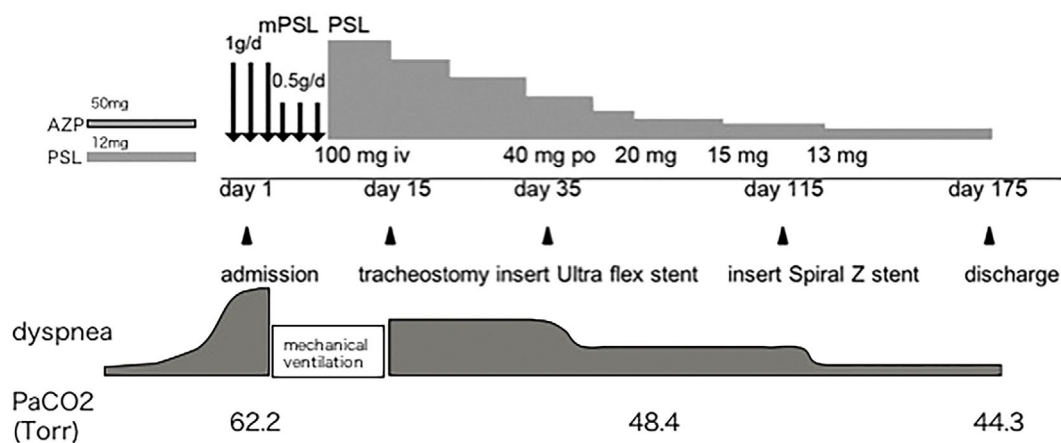


Figure 4. Clinical course of the present case. mPSL: methylprednisolone, PSL: prednisolone

ment require intervention, as mentioned before, both the early detection and the prevention of airway involvement during the asymptomatic phase are essential for improving the prognosis. Regular assessments of the pulmonary function and computed tomography scans are recommended for RP patients in order to detect the early phase of airway involvement (3). Lee et al. showed that expiratory CT was more effective for the assessment of RP patients than typical inspiratory CT (6). They also found that trachea vulnerability was the main cause of RP airway involvement, which leads to TBM.

Corticosteroid administration is the gold-standard therapy for RP. RP cases with airway involvement should be treated strictly with corticosteroids and immunosuppressants, even in patients without respiratory symptoms. Generally, immunosuppressive agents, such as cyclophosphamide, methotrexate, azathioprine, mycophenolate mofetil, and cyclosporine, are effective for severe or corticosteroids-resistant cases (1, 7, 8). While some biologics, such as infliximab (9), abatacept (10), and rituximab (11), have also been used for the treatment of RP with airway involvement, there is not enough evidence to support their general use. We need to accumulate more evidence to standardize RP treatment.

We encountered a refractory RP case with severe TBM. Although we rescued him by extensive intervention, his prognosis is likely limited. Careful control of the disease activity in RP patients with airway involvement is important to prevent progression to a severe airway condition. When the airway condition become lethal despite such careful management, we emphasize the utility of metallic stenting as a potential treatment option.

The authors state that they have no Conflict of Interest (COI).

References

1. Trentham DE, Le CH. Relapsing polycondritis. *Ann Intern Med* **129**: 114-122, 1998.
2. Nuutinen J. Acquired tracheobronchomalacia. *Eur J Respir Dis* **63**: 380-387, 1982.
3. Ernst A, Rafeq S, Boiselle P, et al. Relapsing polycondritis and airway involvement. *Chest* **135**: 1024-1030, 2009.
4. Lund ME, Force S. Airway stenting for patients with benign airway disease and the Food and Drug Administration advisory: a call for restraint. *Chest* **132**: 1107-1108, 2007.
5. Sarodia BD, Dasgupta A, Mehta AC. Management of airway manifestations of relapsing polycondritis: case reports and review of literature. *Chest* **116**: 1669-1675, 1999.
6. Lee KS, Ernst A, Trentham DE, Lunn W, Feller-Kopman DJ, Boiselle PM. Relapsing polycondritis: prevalence of expiratory CT airway abnormalities. *Radiology* **240**: 565-573, 2006.
7. Park J, Gowin KM, Schumacher HR Jr. Steroid sparing effect of methotrexate in relapsing polycondritis. *J Rheumatol* **23**: 937-938, 1996.
8. Goldenberg G, Sanguenza OP, Jorizzo JL. Successful treatment of relapsing polycondritis with mycophenolate mofetil. *J Dermatol Treat* **17**: 158-159, 2006.
9. Mpfu S, Estrach C, Curtis J, Moots RJ. Treatment of respiratory complications in recalcitrant relapsing polycondritis with infliximab. *Rheumatology (Oxford)* **42**: 1117-1118, 2003.
10. Moulis G, Sailler L, Astudillo L, Arlet P. Abatacept for relapsing polycondritis. *Rheumatology (Oxford)* **49**: 1019, 2010.
11. Leroux G, Costedoat-Chalumeau N, Brihaye B, et al. Treatment of relapsing polycondritis with rituximab: a retrospective study of nine patients. *Arthritis Rheum* **61**: 577-582, 2009.

The Internal Medicine is an Open Access article distributed under the Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License. To view the details of this license, please visit (<https://creativecommons.org/licenses/by-nc-nd/4.0/>).