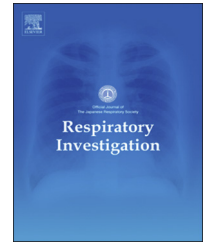


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Rigid bronchoscopic intervention for endobronchial metastasis of renal cell carcinoma



Rie Tsuboi, M.D.* , Masahide Oki, M.D., Hideo Saka, M.D.,
Yoshihito Kogure, M.D., Saori Oka, M.D., Masashi Nakahata, M.D.,
Kazumi Hori, M.D., Yasushi Murakami, M.D., Yuko Ise, M.D.,
Shimaa Nour Moursi Ahmed, M.D., Meimei Tao, M.D.,
Chiyo Kitagawa, M.D.

Department of Respiratory Medicine, Nagoya Medical Center, 4-1-1, Sannomaru, Naka-ku, Nagoya 460-0001, Japan

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ABSTRACT

Background: Renal cell carcinoma is one of the major endobronchial metastases, and it occasionally causes life-threatening airway obstruction. Rigid bronchoscopy is useful as a palliative intervention; however, its utility for metastatic renal cell carcinoma has not been elucidated. The purpose of this study was to evaluate the safety and efficacy of rigid bronchoscopic treatment for endobronchial metastasis of renal cell carcinoma.

Methods: Among 550 patients who underwent rigid bronchoscopic intervention at a single center from January 2005 to June 2015, 9 with metastatic renal cell carcinoma were retrospectively reviewed. Procedures were performed with rigid and flexible bronchoscopes under general anesthesia.

Results: In total, 20 procedures were performed on 9 patients who underwent stent implantation. Bleeding was observed in 12 (60%) procedures while severe hypoxia was observed in 2 (10%). The required amount of supplemental oxygen successfully decreased after all the 10 procedures (100%) in patients who previously needed it. Median survival after the first procedure was of 260 days (range, 63–913 days).

Conclusions: Rigid bronchoscopic intervention for endobronchial metastasis of renal cell carcinoma is feasible with safety and effectiveness for palliation of airway obstruction, if one prepares sufficiently for massive intraoperative bleeding.

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Abbreviations: RCC, renal cell carcinoma; APC, argon plasma coagulation; EWS, Endobronchial Watanabe Spigot; PCPS, percutaneous cardio-pulmonary support; O₂, oxygen; BAE, bronchial artery embolization

*Corresponding author. Tel.: +81 52 951 1111; fax: +81 52 951 0664.

E-mail addresses: riems215@hotmail.com (R. Tsuboi), masahideo@aol.com (M. Oki), saka@med.nagoya-u.ac.jp (H. Saka), yo-kogure@umin.ac.jp (Y. Kogure), saorioka.a@gmail.com (S. Oka), nakahtms1231@gmail.com (M. Nakahata), flavored_coffee10@yahoo.co.jp (K. Hori), konyasu222@gmail.com (Y. Murakami), yuko0525ise@hotmail.co.jp (Y. Ise), drshaimaa76@gmail.com (S.N. Moursi Ahmed), taomeimei1981585@sina.com (M. Tao), kitagawc@nnh.hosp.go.jp (C. Kitagawa).

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1. Introduction

Central airway stenosis often causes life-threatening symptoms such as dyspnea, hemoptysis, and impending suffocation. Several benign or malignant diseases trigger airway stenosis, and metastatic diseases are one of the causes [1-3]. Renal cell carcinoma (RCC) as well as breast, colorectal, or gastric cancer [1-4] is one of the major metastatic neoplasms that lead to airway stenosis. It causes severe airway obstruction or massive hemoptysis that leads to decreased survival [5]; therefore, immediate and appropriate treatment is necessary. Palliative bronchoscopic treatments such as electrocautery, argon plasma coagulation (APC), and cryotherapy have been provided to patients who experience symptoms [6,7]. Especially, stent implantation is universally accepted as a useful procedure owing to its ability to reestablish airway patency immediately and definitely [8-12]. However, RCC is known to be a hypervascular and hemorrhagic tumor that often causes massive bleeding during biopsy or other surgical procedures; hence, special precautions against bleeding are necessary. Additionally, the metastatic region is hemorrhagic and significant bleeding can develop [13-15]. Therefore, during bronchoscopic treatment for RCC metastasis, extreme caution for massive bleeding and severe respiratory insufficiency is necessary. Sufficient preparation such as advanced bronchial artery embolization (BAE) or stand-by percutaneous cardio-pulmonary support (PCPS) is preferable [16]. To our knowledge, only some case reports and limited studies [1,16-22] are available about bronchoscopic treatment for airway obstruction due to RCC metastasis; therefore, the actual safety and efficacy are not clear. The purpose of this study was to clarify these two factors and validate the role of bronchoscopic treatment for airway obstruction due to metastatic RCC.

2. Patients and methods

2.1. Patients

From January 2005 to June 2015, we performed 740 rigid bronchoscopic interventions in 550 patients with airway obstruction. Of these patients, 9 with airway obstructions due to RCC were retrospectively reviewed. All the patients and/or their family members provided written informed consent before stent implantation. The institutional review board of Nagoya Medical Center approved this retrospective study (approval date: October 10, 2014; identifier: 2014-795).

For patient selection, the indication criteria for bronchoscopic intervention were: (1) appearance of severe life-threatening symptoms that were caused by airway stenosis and were expected to be ameliorated by intervention, (2) tolerance for general anesthesia, and (3) patient's hope for the operation. Interventions for patients with advanced cancer are often performed for palliative reasons and not for prolonging life; therefore, the indication criteria were less strict than those for the usual operations were, even if the performance status was poor or the disease had progressed with multiple metastases.

Anesthetic tolerance was confirmed by the anesthesiologist's evaluation and several examinations such as electrocardiography, cardiac ultrasonography, pulmonary function test, and artery blood gas analysis; the final adaptation was decided by the operator.

2.2. Procedures

Bronchoscopic treatment for RCC was performed using rigid and flexible bronchoscopes under general anesthesia. As needed, electrocautery, APC, cryotherapy, or high-pressure balloon were used to recanalize the airway, and stents were used to maintain airway patency. In cases of massive bleeding, we mainly performed APC for hemostasis. Endobronchial Watanabe Spigot (EWS), high-pressure balloon, and direct occlusion with a bronchoscope were additionally used for managing continuous bleeding from the peripheral airway. Two major kinds of stents, a silicone stent (Dumon Stent, Novatech, Grasse, France) and a self-expanding metallic stent (Ultraflex, Boston Scientific, Natick, MA), were used. An appropriate stent device was selected to fit each patient's condition and anatomical location.

All the operations were performed under general anesthesia induced by anesthesiologists. After the induction with fentanyl, remifentanyl, propofol, and rocuronium, a rigid bronchoscope was inserted by the operator; subsequently, anesthesia was maintained with air, oxygen (O₂), and propofol. During the operation, mechanical ventilation was mainly used. During coagulation or when experiencing ventilation difficulty owing to airway obstruction, ventilation was provided by hands spontaneously.

2.3. Clinical data collection

Based on the medical records, each patient's data (age, sex, time from initial diagnosis to stenting, details of stenting, and clinical course after stenting) were collected. Stent implantation details were reviewed with video recordings.

2.4. Assessments

The safety of each bronchoscopic treatment was examined for both the intra-postoperative complications and clinical course of patients after intervention. Bleeding, which occurred mostly as an intraoperative complication, was considered significant when it caused vision impairment or hypoxia that disturbed the procedure. Efficacy was determined as changes before and after treatment in the grades of dyspnea, oxygenation, and other symptoms. Grade of dyspnea was evaluated with the following dyspnea indices: 0, asymptomatic while climbing stairs; 1, symptomatic while climbing stairs; 2, symptomatic after walking 100 m on level ground; 3, symptomatic with the least effort (e.g., talking, getting dressed, etc.); and 4, symptomatic in bed, at rest.

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