

**Successful endoscopic dilatation to alleviate airway suffocation in a case with
esophageal cancer after stent implantation**

by

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Abstract

A case of esophageal cancer who suffered from tracheal stenosis at the tracheostomy after stent implantation is presented. The patient received a covered metallic tracheal stent to seal the esophago-respiratory fistulation. After six months, the tracheal retainer for his tracheostomy was difficult to insert into his trachea due to the growth of the cancer. Argon plasma coagulation (APC) has been successfully employed in the dilatation of tracheal stenosis at the tracheostomy. We herein describe the use of APC as an effective treatment for further palliative therapy of tracheal dilatation in order to treat tracheal stenosis by esophageal cancer after stent implantation.

Key words: airway dilatation, flexible bronchoscopy, argon plasma coagulation, esophageal cancer, palliative therapy

Introduction

Patients facing imminent suffocation due to central airway stenosis are a serious problem because it can directly result in death. Advanced esophageal cancer causes two major problems to the airway because of the close anatomical relationship between the problems of airway stenosis and esophago-respiratory fistulation (ERF). Especially in the upper two-thirds of the esophagus in the thorax, a major airway obstruction is a common complication. Airway stenting is one of the primary solutions for the management of stenosis caused by both extrinsic compression and direct tumor invasion (1, 2). In the same manner, such stenting has also been shown to be useful in the treatment of ERF (2). Although considerable evidence has demonstrated the effectiveness of airway stenting in patients with unresectable esophageal cancer over the past decade (1), the maintenance of tumor overgrowth after such stenting has so far been scarcely reported.

Argon plasma coagulation (APC) is a form of noncontact electrocoagulation which has been used for open surgery for more than 15 years (3), as well as for both laparoscopy (4) and gastro-intestinal endoscopy (5). It has recently been widely accepted as the preferred palliative therapy for airway narrowing in unresectable lung cancer and metastatic renal cell carcinoma (6). We herein describe the successful

palliative therapy of APC in the management of airway suffocation in a case with advanced esophageal cancer.

Case Report

A 58-year-old man consulted our department to receive treatment for ERF. The patient had been diagnosed to have esophageal cancer about two years previously. He was treated by chemotherapy (cisplatin and 5-fluorouracil) and 63 Gray of concurrent radiotherapy. The esophageal cancer recurred after 1 year and it gradually became difficult to consume food via the oral route. A percutaneous endoscopic gastrostomy was performed about six months after recurrence. In the subsequent three months, he had dyspnea, hemoptum and cough. ERF and vocal cord palsy was revealed by both esophagoscopy and bronchoscopy. An esophagogram showed leakage of the contrast media (Gastrografin® Oral ▪ Enema, Nihon Schering K.K. Osaka) from the esophagus to the trachea. These findings suggested that his suffocation was mainly due to vocal cord palsy and his hemoptum and cough symptoms were caused by the fistulation. We presumed that airway maintenance against thick secretion would be difficult after stent implantation. We decided against airway stent implantation in order to seal the fistulation after the tracheostomy. A covered metallic stent (length 60mm, diameter

18mm, Ultraflex™, Boston Scientific, Boston, MA, USA) was inserted into the trachea to seal the fistulation (Fig. 1a) after a tracheostomy. The length from the oral end (i.e. uncovered end) of the stent to the site of the tracheal retainer was about 10 mm. His respiratory symptoms were relieved after performing these maneuvers. Six months later, he consulted again because of the difficulty of suction cannula insertion from a silicon-formed tracheal retainer (Tracheal Opening Retainer®, KOKEN, Tokyo, Japan) at his tracheostomy. Computed tomography of the chest revealed esophageal cancer invasion to the airway lumen (Fig. 2). Subsequent fiberoptic bronchoscopy revealed that the cancer had grown dramatically at the oral end of the stent and the cancer therefore had almost blocked his trachea at the point of the tracheostomy (Fig. 1b, Fig. 3). The cancer also invaded the site of the uncovered part of the stent, however, the degree of invasion was much weaker than the circumference of the tracheostomy. Because the patient maintained a good general condition, further palliative therapy was thus needed. We decided to dilate the tracheal stenosis with APC using a flexible bronchoscope. The equipment for APC consists of the APC probe, an argon-gas source, and a high-frequency surgical unit (APC 300, ERBOTOM ICC; Erbe Elektromedizin; Tuebingen, Germany). To deliver the gas, we used a flexible-monopolar Teflon tube with a 1.5-mm diameter, 150-cm length; this was put

into the working channel of the flexible bronchoscope. As shown in Figure 3, the most narrow site was circumference of the tracheostomy, we performed several short 1-2 s bursts of APC (energy at 25 W and argon flow at 0.5 L/min) at the sites of stenosis from the entrance of the tracheal retainer, and the devitalized tissue was then mechanically removed with grasping forceps. We were extremely careful when we performed APC on any lesion next to the tracheal retainer, thereafter we removed the retainer at the border and circumference of the retainer for more coagulation. We attached a polypropylene-formed “speech” cannula (Tracheal cannula PP Speech type®, KOKEN, Tokyo, Japan) at the site of the tracheostomy after performing dilatation by APC. Three days after performing dilatation, his airway from the “speech” cannula to stent became sufficiently dilated (Fig 1c). The “speech” cannula provided easy access for the suction cannula thus allowing us to clean the stent lumen, while also making it possible for the patient to breathe and speak. The APC procedure was performed 9 more times in order to maintain the airway against tumor growth without any complications, but the cancer continued to grow at the circumference of the tracheostomy. At this time, the patient’s general condition was still good and he wished to receive further therapy to fight the cancer. He was then treated by second line systemic chemotherapy (docetaxel and nedaplatin). Chemotherapy was effective

and the tumor growth around the circumference of the tracheostomy thereafter gradually decreased. Although the clinical course went relatively well, he died due to massive hemoptysis 15 days after the 2 series of the chemotherapy. No oxygen desaturation including during bronchoscopy, was observed during the clinical course. In addition, we did not use any oxygen supply except on the day that the patient died.

Discussion

Our experience in performing APC as a palliative therapy against tracheal stenosis due to advanced esophageal cancer is herein presented. APC enabled us to safely create sufficient airway dilatation in a patient with severe tracheal stenosis at the site of a tracheostomy which had been caused by esophageal cancer overgrowth.

The esophageal cancer tended to easily invade the surrounding tissue. In cases where the patient's performance status is good, a surgical bypass may be one of the ways to successfully perform palliative therapy and thus avoid ERF. However, many patients cannot receive such therapy due to their advanced stage of cancer. As a result, in these patients, palliative therapy is thus needed. Many of the palliative therapies such as radiotherapy, stenting, mechanical core-out, balloon dilatation, and laser ablation have previously been reported (1, 2, 7-9). ERF is one of the most difficult

problems for the management of advanced esophageal cancer. It occurs in 0.9% to 18% of patients with esophageal cancer (10). Such fistulation typically results from direct tumor invasion or necrosis. It can also deteriorate iatrogenetically; for example, due to the presence of either esophageal or airway stents, and it also occurs as a complication of either chemo- or radiotherapy (2).

Stenting, especially double stent therapy is currently a more acceptable palliative therapy than other therapies. Stenting is effective for the treatment of airway stenosis due to both extrinsic compression and direct tumor invasion, and has also been shown to be useful in the treatment of ERF. Because stenting is only a palliative therapy, cancer overgrowth at the end of the stent can occur after placement. However, further palliation after stenting has up to now been scarcely reported. The present patient was able to maintain a good performance status in the phase of tumor overgrowth at the end of the stent, and therefore further palliation therapy was needed. Tracheal stenosis due to massive granulation at the end of the stent, especially at the uncovered part of the metallic stent, can also occur. In our case, however, the circumference of the tracheostomy including the neck was gradually uplifted, stiffened and flared, and the cancer directly invaded as shown in Fig. 2. Thus, we judged the stenosis from the end of the stent to circumference of tracheostomy to be mainly due to the cancer invasion.

Recently, APC has been introduced into the field of flexible bronchoscopy, and it has been used for the treatment of benign or malignant lesions in the airway (6, 11). It has an excellent safety profile, is convenient and simple to use, and it also has a relatively low cost, which therefore makes it most suitable for therapeutic applications through the use of a flexible bronchoscope (6). We previously reported the safety and promising effect of APC for the management of airway stenosis (12). In the present case, the site of the stenotic lesion was also safely devitalized and removed through sequential APC and the use of grasping forceps. We did not experience any serious trouble during the ten treatment courses. There are some important points that need to be taken into consideration regarding the use of the APC procedure; namely, the APC probe should be extended beyond the tip of the bronchoscope to avoid any thermal damage caused by the bronchoscope, while the inspired oxygen concentration must also be carefully maintained at $\leq 40\%$ (6). More recently the safety limits of the APC around an indwelling airway stent have been reported (13); it is important to pay special attention during APC when performing it near the stenting site. If these points are carefully observed, then safe and effective endobronchial dilatation can be successfully carried out.

In summary, we successfully performed airway dilatation at the site of a

tracheostomy using APC in a case with advanced esophageal cancer. Although tracheal stenting is the first choice for the management of this disease, APC provides further palliative therapeutic choice for airway dilatation in patients with advanced esophageal cancer after airway stent implantation.

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Figure Legends

Figure 1 a; Ultraflex™ was inserted to seal the esophago-respiratory fistulation.

b; The esophageal cancer had almost blocked his trachea at the point of the tracheostomy. A bronchoscope could not be inserted through the point of the tracheostomy.

c; Three days after the dilatation by APC, a bronchoscope could be inserted into the trachea and the stent (*) could be seen again.

Figure 2; Esophageal cancer invasion was seen in the tracheal lumen (arrow) and the circumference of the trachea (*). The tracheal retainer is indicated by a bracket.

Figure 3; The illustration shows tracheal invasion of esophageal cancer. It shows the same condition at Figure 1b. ① tracheostoma, ② oral side of the trachea, ③ caudal side of the trachea ④ covered type metallic stent ⑤ the site of the esophago-respiratory fistulation, and oblique line shows the region of cancer invasion.