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Dysphagia

Complication of Esophageal Self-Dilation for Radiation-Induced Hypopharyngeal Stenosis

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Abstract. We present an unusual case of hypopharyngeal stenosis, secondary to radiation therapy for laryngeal squamous cell carcinoma, complicated by repeated inadvertent passage of a Maloney dilator through the larynx into the right mainstem bronchus during self-dilation. A brief review of esophageal/hypopharyngeal stenosis and management alternatives is presented. Self-dilation is presented as a therapeutic method for recurrent stenosis of the hypopharynx and esophagus. Recognition and avoidance of this complication is discussed.

Key words: Hypopharyngeal/esophageal stenosis — Self-dilation — Complication — Head and neck cancer — Deglutition — Deglutition disorders.

Pharyngeal or esophageal stenosis is an uncommon complication of radiation therapy for the treatment of hypopharyngeal, laryngeal, and esophageal cancers. It is traditionally managed by esophageal dilation. Severe cases may require repeated dilation. We report a patient who developed severe hypopharyngeal stenosis following therapy for squamous cell carcinoma of the supraglottic larynx. Management of the stenosis was complicated by repeated passage of a dilator by the patient into his airway. The case history, radiological evaluation, and principles of management of stenosis by self-dilation are presented.

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Case Report

A 45-year-old male was diagnosed in November 1994 with $T_3N_0M_0$ squamous cell carcinoma of the epiglottis, extending laterally to the left pharyngeal wall and involving the base of tongue. He was treated with an organ preservation protocol including two courses of cisplatin and 5FU and 7000 cGy external beam radiation with complete oncologic response. During the course of his therapy, he developed progressive dysphagia with weight loss that prompted placement of a gastrostomy tube. Despite persistent dysphagia, a swallow study was obtained in the spring of 1995 that demonstrated an adequate swallow and his diet was advanced. He had one episode of pneumonia complicated by pleural effusion requiring hospitalization and placement of a chest tube. A referral to Johns Hopkins Department of Otolaryngology–Head and Neck Surgery was made in October 1995 for evaluation of aspiration. The patient had no airway symptoms and an adequate voice. Examination revealed no evidence of disease, however, supraglottic edema and thickened secretions were noted. Laryngeal sensation was intact and there was normal true vocal fold motion. Fluoroscopic assessment was completed with a speech-language pathologist revealing a normal oral phase with prompt pharyngeal swallow onset. Penetration of contrast to the true vocal folds was seen with thin liquids prior to the initiation of the swallow. Only trace amounts of the bolus passed through a stenotic cricopharyngeal segment followed by regurgitation of the bolus. The stricture measured 1.5 cm in length with a maximal lumen of 3 mm (Fig. 1).

The patient was taken to the operating room in December 1995; stenosis of the hypopharynx was confirmed. There was no evidence of persistent carcinoma. The inlet into the esophagus was narrowed and initially canulated with a pediatric esophagoscope. The stenotic segment was dilated with Maloney dilators to 30 Fr. The patient was seen in the clinic and was taught to perform self-dilation with a 30 Fr Maloney dilator. He performed dilations twice daily and reported improved ability to swallow liquids. Repeat operative dilation to 46 Fr was performed in January 1996. The patient did well initially postop followed by recrudescence of his symptoms despite the patient's reports of daily self-dilations. The stricture was confirmed by operative endoscopy in March 1996. A tight stenosis was present and was dilated to 54 Fr.

The patient reported progressive dysphagia after each operative dilation despite regular, frequent self-dilation. Further investigation into the history of self-dilation techniques revealed coughing and shortness of breath during dilation. Chest radiograph

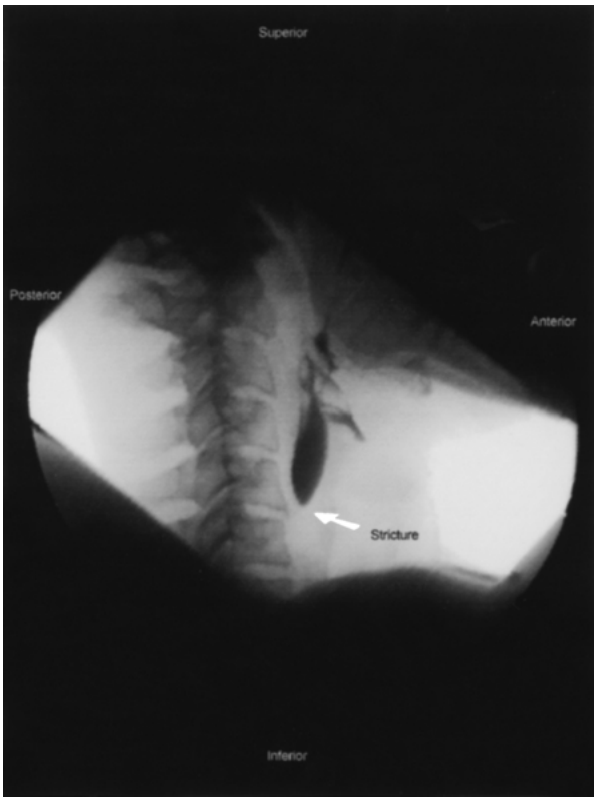

Fig. 1. Fluoroscopic evaluation of patient demonstrating significant hypopharyngeal stenosis marked with arrow.

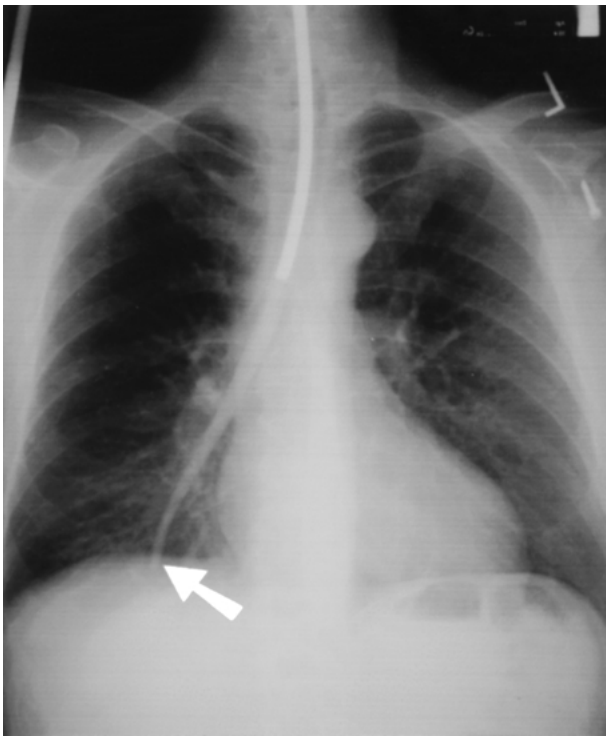

Fig. 2. Chest radiograph taken of patient during self-dilation demonstrating intubation of the right mainstem bronchus with Maloney dilator. Arrow marks tip of dilator.

of the patient performing self-dilations showed passage of the dilator through the larynx into the trachea and right mainstem bronchus (Fig. 2). Fluoroscopic-guided instruction by a speech-language pathologist was used to teach the patient positioning to facilitate passage of the dilator properly into the pharynx and esophagus. Neck flexion was determined to be the optimal position for passage through the hypopharyngeal stenotic segment and into the cervical esophagus (Fig. 3). He now swallows without complaints, takes a regular diet, and continues to perform self-dilation with a 38 Fr Maloney dilator daily without sequella.

Discussion

Strictures can be congenital or acquired, but their management is similar [1]. The most common treatment for hypopharyngeal and esophageal strictures is dilation [2]. Radiation therapy is commonly used as adjuvant or primary therapy for the treatment of head and neck squamous cell carcinoma. Despite advances made in radiation therapy, there are still side effects [3]. These include mucositis, skin changes, dysphagia due to pharyngeal and esophageal motor dysfunction, and odynophagia. These problems most commonly occur during the acute clinical period, the first six months [4]. Hypopharyngeal and esophageal strictures are usually associated with the subacute clinical period, the second six months [5]. Ulceration and fistulae do not develop in a uniform time frame [6].

Cervical esophageal strictures are complications of radiation therapy to the hypopharyngeal and laryngeal regions because the cervical esophagus is included in the lower margin of the radiotherapy portal. Chemotherapy may increase the risk of stenosis in the head and neck cancer patient since adjuvant chemotherapy has been shown to increase the incidence of strictures in patients treated for esophageal cancers [7–11]. Benign esophageal and hypopharyngeal strictures are most often secondary to fibrosis of the lamina propria and submucosa although edema, inflammation, and spasm may also play a role in their etiology. The resultant fibrosis causes temporary or permanent dysmotility. Ulceration may also lead to stricture formation, especially if ulceration occurs in the presence of infection, trauma, or neoplasm [12]. It has been reported that esophageal strictures can occur up to five years after the completion of radiation therapy [11–13].

Nonoperative management of strictures is possible in the majority of cases regardless of the etiology [14]. The frequency with which dilation

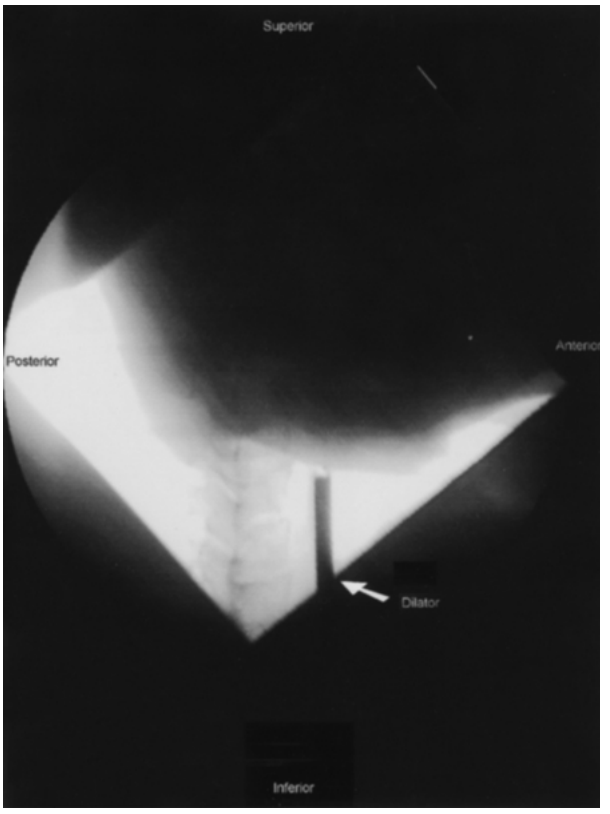

Fig. 3. Following surgical dilation, the patient is instructed under videofluoroscopy to self-dilate with a Maloney dilator. He is taught to flex his neck to avoid penetration of the airway. Note dilator passing into cervical esophagus (arrow).

needs to be performed is dependent upon the degree and recurrence rate of the stenosis. Nelson et al. [14] reported better results with concurrent use of injectable steroids during dilation [15]. Percutaneous endoscopic gastrostomy or open gastrostomy is recommended for alimentation if stricture severity prevents an adequate oral diet or aspiration occurs.

The first step in the management of stenosis after treatment for pharyngeal or esophageal malignancy is endoscopy and biopsy to rule out persistent or recurrent malignancy [16]. At the time of endoscopy, the stricture can be dilated if there is no evidence of tumor. A stenosed hypopharynx or esophagus can usually be dilated to accommodate a 48 Fr dilator [17]. Strictures most commonly develop over a period of months and do not represent an urgent problem. Safe dilation to a maximal lumen can take place over several endoscopies [18].

Adults can tolerate a fairly normal diet when the esophageal lumen is maintained to 36 Fr [17]. Some esophageal stenoses are refractory to periodic dilation. In patients who require multiple, frequent dilations to maintain esophageal patency, self-dilation should be considered. The most common complications of self-dilation are esophageal perforation, bleeding, bacteremia, and aspiration pneumonia. The incidence of complications is reported to be 0.3% [16]. Successful dilation, whether performed by a healthcare practitioner or the patient, is facilitated by fluoroscopic guidance [14,16].

Not all patients are candidates for self-dilation. Patients must be motivated and compliant and have close to normal pharyngeal function for this procedure to be beneficial [19]. In our experience, patients with poor pharyngeal function have failed to achieve adequate swallowing despite self-dilation. In order to determine how often a patient must self-dilate, close clinical followup is necessary [19].

In order to facilitate the passage of the dilator into the cervical esophagus, the geometry of the oropharynx and hypopharynx must be optimized. In the case reported, this was best achieved with neck flexion. The best method of determining optimal positioning is with the use of fluoroscopy [18,20]. Fluoroscopy also allows for assessment of an individual's ability to perform self-dilation. The dilator must be well lubricated to decrease resistance. Lidocaine jelly can be used to diminish the gag reflex and improve patient comfort. Once patients are comfortable and competent with self-dilation performed under supervision in the clinic, they can begin self-dilation at home following a regimen determined by the severity of their stenosis. Antireflux measures should be considered since reflux has been associated with esophageal stenosis and dilation may increase reflux [21].

Patients should be informed about potential complications; perforation and bleeding are most commonly mentioned. Bleeding is usually self-limited and of little consequence, but there have been reports of significant hemorrhage, especially in patients with varices. Perforation, the most feared complication, is an uncommon event. Palmer [16] reported an incidence of 0.14% in his experience. Perforation can present with chest pain, abdominal rigidity, fever, tachycardia, and shortness of breath with or without pneumothorax, effusion, crepitance in the chest or neck, or sepsis [20]. Inadvertent passage of the dilator into the airway, which occurred in the case reported, is rare. This could potentially result in bronchitis, pneumonia, or pneumothorax. If improper passage occurs regularly, as was the case with our patient, the stenosis will recur due to failure of passage of the dilator through the stenotic segment.

In summary, hypopharyngeal and esophageal stenoses are documented complications of radiation

therapy for head and neck squamous cell carcinoma. The stenosis can usually be treated with dilation. Some patients will require multiple dilations and certain patients are candidates for daily self-dilation. For the latter, instruction in self-dilation techniques with a radiologist and speech-language pathologist utilizing fluoroscopy to determine the optimal position and safety of the procedure is advised.

We present the case of repeated inadvertent passage of a Maloney dilator into the airway during self-dilation for a hypopharyngeal stricture. In this case, there were no long-term sequellae and the patient was able to learn the proper technique for self-dilation under fluoroscopic guidance.

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