Primary Tumors of the Trachea. Results of Various Forms of Treatment and Review of Tracheal Reconstruction for Primary Tracheal Tumors in Japan

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Abstract

The present study describes the clinical features and results of various forms of treatment in 6 patients with primary tumor of the trachea, 5 of them with primary tracheal carcinoma. Four of the 5 patients with primary tracheal carcinoma are still living 16 months to 8.5 years after treatment. Two patients who had tracheal reconstruction are alive, 19 and 16 months after surgery. Seventy-nine cases of tracheal reconstruction for primary tracheal tumors are reviewed which have been reported in Japanese literature until the end of 1982. Circumferential resection of the trachea with end-to-end anastomosis was performed in 11 of 30 patients before 1978, and in 39 of 49 patients since 1979.

Primary tumors of the trachea are relatively rare, and there have been few reports of surgical treatment in Japan. The present study describes the clinical features and results of various forms of treatment in 6 patients with primary tracheal tumor and reviews the present status of tracheal reconstruction for primary tracheal tumor in Japan.

Materials and methods

Six patients with primary tumor of the trachea, 5 of them with primary tracheal carcinoma, were treated at our institute from 1968 to 1982.

Primary tracheal carcinoma (5 cases)

The ages of the 5 patients with primary tracheal carcinoma were 29 to 78 years. The histological diagnosis and sex are listed in **Table 1**. Two of these patients had epidermoid carcinoma, 2 had adenocarcinoma and one had adenoid cystic carcinoma. The most common presenting symptoms were bloody sputum, dyspnea and wheezing. The duration from onset to diagnosis was 1 month to 1 year. One patient (Case 5) complained of dysphagia and hoarseness and had superior vena caval syndrome. The location and extent of the tumors were determined by tomography, computed tomography and bronchoscopy. In 4 cases the tumor was in the lower third of the trachea and in one in the mid-portion. One case with superior vena caval syndrome (Case 5) had widespread local extension and mediastinal metastasis of the carcinoma. Distant organ metastasis was not observed in any of the 5 cases. Final tissue diagnosis was established by direct bronchoscopic biopsy in all 5 cases and was confirmed by surgery or autopsy in 3 cases.

Tracheal reconstruction after circumferential resection of the involved trachea with primary end-to-end anastomosis was performed in 2 patients—a 33-year-old woman with epidermoid carcinoma (Case 3) and a 29-year-old man with adenocarcinoma (Case 4). The cervical approach with upper sternotomy was used in Case 3 with the tumor located in the mid-portion of the trachea, and right posterolateral thoracotomy in Case 4. In Case 4, the tumor involved the trachea just above the carina, but the carina was preserved. The tracheal resections were 5 and 6 rings (35 and 40 mm), respectively, and the trachea was anastomosed by interrupted sutures of 3-0 Dexon. Repeated bronchoscopic resections of the tumor were performed for the 78-year-old woman with adenoid cystic carcinoma in the lower portion of the trachea just above the carina, which occluded about 80 per cent of the lumen, because she refused surgery (Case 2). She received systemic and intra-bronchial artery injections of chemotherapeutic drugs. Two patients received irradiation without surgery. A 54-year-old man with epidermoid carcinoma of the lower portion of the trachea just above the carina (Case 1) had Linneac radiation (6000 rads). A 75-year-old man with superior vena caval syndrome (Case 5) received Cobalt radiation (6000 rads) because of extensive disease and advanced age. Cases 3 and 4 received postoperative irradiation.

Benign tracheal tumor (1 case) :

A 35-year-old man with severe dyspnea was admitted emergently because of increased symptoms, and a tumor was noted on the right anterior wall of the upper trachea occluding two thirds or more of the lumen. The tumor, measuring 10×15 mm, was resected immediately with part of the tracheal wall.

Results

Four of the 5 patients with primary tracheal carcinoma are still living (16 months to 8.5 years after treatment). Two patients who had tracheal reconstruction are alive, 19 months and 16 months after surgery. Repeated postoperative bronchoscopies have shown no signs of recurrence, although metastases to lymph nodes in the left side of the neck were removed one year after surgery in Case 3. One patient treated with radiotherapy (Case 1) is living 8.5 years later without apparent evidence of disease, and one patient with adenoid cystic carcinoma treated by repeated bronchoscopic removal (Case 2) is alive 5 years later without recurrence. One patient with adenocarcinoma (Case 5) died 2 months after Cobalt radiation; postmortem examination showed carcinomatous invasion of the mediastinum and adjacent lymph nodes, but no grossly visible residual tumor in the mucosa of the trachea.

The 35-year-old man with benign tumor of the upper trachea who underwent emergency surgery is alive about 14 years later without any complications. Postoperative bronchoscopy showed neither tracheal stenosis nor recurrence. The tumor looked malignant macroscopically, but histological examination showed inflammatory pseudotumor.

Discussion

Primary tumor of the trachea is relatively rare. It has been estimated that one of every 1,000 patients with cancer has a tumor originating in the trachea^{1) 2)}, and also that one of every 180 patients with bronchogenic carcinoma or one of every 75 patients with laryngeal cancer has a malignant tracheal tumor³⁾. Malignant tracheal tumors are more frequent than benign ones. In 1958, Gilbert⁴⁾ collected 503 tumors of the trachea in adults, 217 of which were malignant. However, in 1978, Weber³⁾ reported that of 59 primary tracheal tumors 51 were malignant. Recent reports in the Japanese^{5) 6)} and English^{2) 3) 7)} literature indicate that 80 % or more of primary tracheal tumors are malignant.

In cases of benign tumor of the trachea, surgery may not always be necessary, but for patients with severe symptoms such as Case 6, surgical treatment is required. Endoscopic resection is often effective for benign tracheal tumor with symptoms. In Japan, surgery for benign primary tumors of the trachea has been performed in 10 patients, 6 of whom had circumferen-

tial resection with end-to-end anastomosis : papilloma in 2 cases and leiomyoma, hemangioma, schwannoma, and lipochondroma in one case each.

Successful tracheal reconstructions have often been reported in the English literature⁸⁻¹³⁾, but not in the Japanese. In 1977, Ishihara⁶⁾ collected 197 cases of surgery of the trachea ; in 37 (19%) primary tracheal carcinoma was present. Sixty-nine cases of tracheal reconstruction for primary malignant tracheal tumors have been reported in the Japanese literature up to December, 1982 (**Table 2**). In addition, 10 patients with primary benign tumors had tracheal reconstructions. Circumferential resection of the trachea with end-to-end anastomosis was performed in 11 of 30 patients (36.6%) before 1978, and in 39 of 49 patients (79.6%) since 1979 ; in 21 of these (53.8%) resections of 5 or more tracheal rings were performed.

It is well known that resection of almost one half of the trachea can be accomplished without difficult, and end-to-end anastomosis can be performed without serious risks. We are in general agreement with reports that more extensive resection with primary anastomosis, as much as 5 cm of trachea, can be done without the use of a prosthesis and that end-to-end anastomosis is superior to the techniques employing partial patches or prostheses. In cases in which the extent of the resection exceeds the possibility of primary anastomosis, the use of prostheses may be considered. However, the prostheses now available are not perfect because of their low mobility and elasticity or poor tissue-affinity. Therefore, we are hoping for the development of better prostheses.

Endoscopic tumor resection is an important form of palliation. For a patient with adenoid cystic carcinoma, circumferential tracheal resection with end-to-end anastomosis is the treatment of choice. However, for special cases, such as Case 2 with advanced age and poor condition, endoscopic resection of the tumor should be performed as a second choice. Houston⁸⁾ reported recurrence after as long as 25 years in one case. Therefore, the follow-up period of Case 2 is not long enough to predict the ultimate behavior of the tumor.

The use of irradiation for primary malignant tumors of the trachea is controversial, although reports of successfully treated cases of epidermoid carcinoma or adenoid cystic carcinoma^{2) 14) 15)} have occasionally been seen. Many surgeons believe that irradiation alone is not useful in the treatment of primary tracheal carcinoma. However, in Case 1 with epidermoid carcinoma, irradiation was effective and there has been no recurrence for over 8 years, and in Case 4, preoperative radiation relieved symptoms, especially bleeding, and consequently tracheal reconstruction was easier. Therefore, the effect of irradiation, more particularly as an adjunct to radical or palliative surgery or endoscopic removal should be investigated more carefully.

Summary

The clinical features and results of various forms of treatment in 6 patients with primary tumor of the trachea, 5 of them with primary tracheal carcinoma, are described. Four of the 5 patients with primary tracheal carcinoma are still living (16 months to 8.5 years after treatment), and one patient with benign tumor underwent emergency surgery is alive about 14 years later without any complications. Seventy-nine cases of tracheal reconstruction for primary tracheal tumors have been reported in Japanese literature and circumferential resection of the trachea with end-to-end anastomosis has been performed in about 80 % of surgical cases since 1979.

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Table 1 Six patients with primary tracheal tumors

Patient Age	Sex	Histologic Type	Location	Symptom	Duration from Onset to Diagnosis	Treatment	Prognosis
1. 54 yr	M	epidermoid carcinoma	lower trachea (just above the carina)	bloody sputum dyspnea	6 mo	Linneac radiation (6000 rads)	alive, 8.5 yr
2. 78 yr	F	adenoid cystic carcinoma	lower trachea (just above the carina)	dyspnea cough fever	4 mo	Scopical resection (3 times)	alive, 5 yr
3. 33 yr	F	epidermoid carcinoma	mid-portion	bloody sputum wheezing	5 mo	Circumferential resection & End-to-end anastomosis	alive, 19 mo
4. 29 yr	M	adeno- carcinoma	lower trachea (just above the carina)	bloody sputum dyspnea	1 yr	Circumferential resection & End-to-end anastomosis	alive, 16 mo
5. 75 yr	M	adeno- carcinoma	lower trachea	hoarseness dyspnea hemoptysis SVC syndrome	1 mo	Cobalt radiation (6000 rads)	dead
6. 35 yr	M	inflammatory pseudotumor	upper portion	wheezing dyspnea cough	1 mo	Partial resection of tracheal wall	alive, 14 yr

Table 2 Tracheal reconstruction of primary tumors reported in Japanese literature

Histologic Type	Surgical Cases	Surgical Techniques				Prostheses	Others
		Circumferential resection & end- to-end anastomosis		Partial resection (with or without patch)			
		4 rings or less	5 rings (or 4 cm) or more				
adenoid cystic carcinoma	43 (26)	10 (5)	16 (15)	10 (3)		5 (2)	2 (1)
mucoepi- dermoid carcinoma	7 (3)	5 (3)	0	2 (0)		0	0
carcinoid	3 (1)	1 (0)	0	2 (1)		0	0
epidermoid carcinoma	9 (6)	3 (2)	3 (3)	2 (1)		0	1 (0)
adeno- carcinoma	3 (2)	0	2 (2)	1 (0)		0	0
sarcoma	3 (2)	2 (2)	1 (0)	0		0	0
small cell carcinoma	1 (1)	0	1 (1)	0		0	0
benign tumor	10 (8)	6 (6)	0	3 (1)		0	1 (1)

Legend, the numbers in the brackets indicate patients numbers after 1979.