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Window resection of the trachea and secondary reconstruction for invasion by differentiated thyroid carcinoma

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Abstract

Objective: In cases of differentiated thyroid carcinoma, the presence or absence of invasion into the circumferential organs is an important prognostic factor. Surgical procedures include circular resection of the trachea with end-to-end anastomosis and window resection with secondary closure. We have used window resection with secondary closure since 1993, and herein retrospectively analyze the treatment outcomes for this surgical procedure in order to determine the indications for procedure selection.
Methods: Subjects comprised 41 cases of invasion by differentiated thyroid carcinoma into the trachea, for which surgery was performed at the Department of Head and Neck Surgery of the National Cancer Center Hospital East from 1993 to 2007. The mean age was 65.7 ± 7.9 years, and the median length of the observation period was 43 months. There were 17 cases (41.4%) cases of secondary relapse.
Results: The 5-year and 10-year overall survival rates for this surgical procedure were 78.9% and 74.5%, respectively, while the 5-year and 10-year local control rates were 92.4% and 73.4%, respectively. The pathological resection stump was positive in 27 cases (65.8%), but no significant differences in treatment outcome were observed between the stump-positive group and the stump-negative group. There were 26 cases in which closure of the tracheal fistula was performed by the time of observation. When the tracheal defect had a diameter equivalent to 7 rings of the trachea or less and a circumference half that of the tracheal cartilage or smaller, including partial cricoid cartilage, it was possible to perform closure with only a local flap. For larger defects, reconstruction was performed using hard tissues or materials, such as hydroxyapatite, titanium mesh, and costal cartilage. There were 2 cases that required re-window because of dyspnea after closure.
Conclusion: The treatment outcomes for this surgical procedure for invasive cases of differentiated thyroid carcinoma into the trachea resulted in a low rate of local recurrence and similar survival rates as described in other reports. Even for cases of resection exceeding half the circumference of the trachea, closure of the tracheal fistula can be performed using hard tissues or materials; however, in such cases, we believe that closure should be attempted progressively in a two-stage reconstruction.

Keywords: Differentiated thyroid carcinoma; Tracheal invasion; Secondary reconstruction

1. Introduction

The prognostic factors for differentiated thyroid carcinoma include age, histopathological type, size of primary lesion, presence or absence of invasion into organs around the thyroid, and presence or absence of distant metastasis [1]. Treatment outcomes for differentiated thyroid carcinoma are generally good, but when invasion into the circumferential organs (trachea, larynx and cervical esophagus) occurs, it is necessary to resect those organs, thereby making treatment more difficult in many cases. The trachea and larynx are particularly susceptible to invasion,

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and this often causes problems for treatment. For cases of invasion into the trachea, circular resection, end-to-end anastomosis or window resection are mainly performed. We use a surgical procedure comprising resection of part of the trachea at the site of tumor invasion, temporary formation of a tracheal fistula, and secondary closure of the fistula. The advantage of this surgical procedure is that postoperative rest and fixation of the neck region are not necessary, and the airway can be secured with certainty. However, the resection margins are often close together or adjacent. Here, we examined the long-term treatment outcome of this surgical procedure and studied its validity and usefulness.

2. Patients and methods

Subjects comprised 41 cases diagnosed with invasion into the trachea before surgery and in which window resection of the trachea was performed, and these cases were selected from 338 cases of differentiated thyroid cancer for which surgery was performed at the Department of Head and Neck Surgery at the National Cancer Center Hospital East from 1993 to 2007, and we examined these cases retrospectively. On preoperative evaluation, subject cases included those in which invasion into the trachea was suspected based on CT and echo images and in which endoscopy detected redness or irregularity in the membrane of the tracheal lumen. The cases included 18 males and 23 females with a mean age of 65.7 ± 7.9 years, and the median observation period was 43 months (4–167 months). There were 24 cases undergoing initial treatment, including Stage IVA (22 cases) and Stage IV C (2 cases) cases, and there were 17 cases of secondary relapse, which comprised 41.4% of the total. And there were 22 cases with recurrent nerve paralysis before surgery.

3. Statistical analysis

Treatment outcomes were evaluated using the Kaplan–Meier method, and significant differences between the two groups were examined with the log-rank test.

4. Results

For all of the cases showing invasion into the trachea, window resection of the trachea (including cases of partial resection of the thyroid and cricoid cartilage) was performed, and there were no cases in which circular resection or end-to-end anastomosis were performed. In addition, there were 2 cases that required a free jejunal graft due to invasion into the esophagus. Although all cases were histopathologically diagnosed as papillary carcinoma, 4 of the cases presented with papillary carcinoma involving poorly differentiated components, and 1 case was papillary carcinoma involving anaplastic components. Histopathological evaluation of the resection stumps revealed that 27 of the 41 cases were stump positive (65.8%). In addition, no pathological findings of invasion into the trachea were observed in 2 cases. There were no cases in which radiation therapy was performed as an additional postoperative treatment.

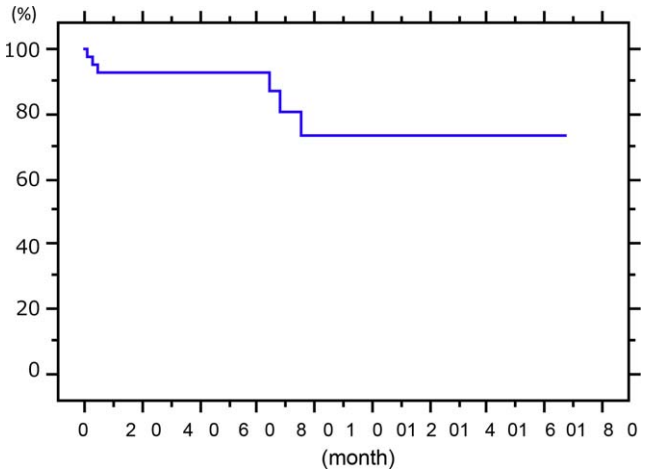

Fig. 1. Postoperative local control.

The 5-year and 10-year local control rates were 92.4% and 73.4%, respectively (Fig. 1), and the 5-year and 10-year overall survival rates were 78.9% and 74.5%, respectively (Fig. 2). For the pathological resection stumps, no significant differences were observed in the 5-year survival rates between the stump-positive and stump-negative groups (Fig. 3). Examination of the histopathological type in the 36 cases of papillary carcinoma and the 5 cases of papillary carcinoma involving poorly differentiated components and anaplastic components revealed that survival rates was significantly lower in the latter group ($p < 0.0001$). We included a case with poorly differentiated components on pathological findings, and death at 4 months after surgery was due to original disease by rapid regrowth in the neck and mediastinal lymph nodes. In addition, with regard to sex, age (older or younger than 65 years), the presence or absence of preoperative recurrent nerve paralysis, history of initial treatment or recurrence, and the presence or absence of

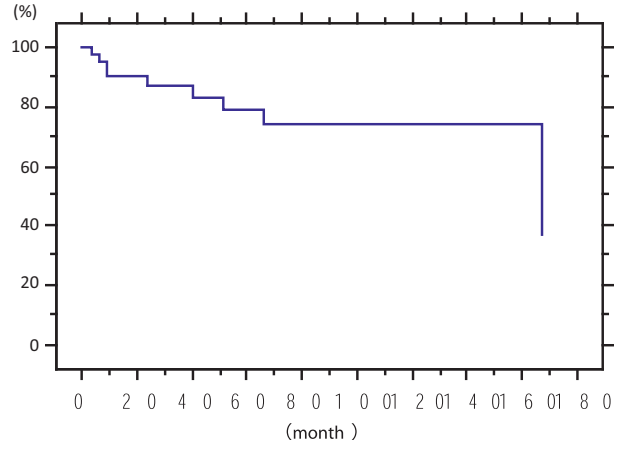

Fig. 2. Postoperative overall survival.