



Post-laryngectomy voice rehabilitation with a voice prosthesis in a young girl with advanced thyroid cancer



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ABSTRACT

The aim of this report is to evaluate the effects of voice rehabilitation with a voice prosthesis in a young patient with thyroid cancer. A 17-year-old girl underwent voice restoration with a voice prosthesis after laryngectomy to treat thyroid cancer. She completed voice-related questionnaires (the Voice Handicap Index-10 and Voice-Related Quality Of Life Survey) at ages 17 and 21 and underwent phonetic functional evaluation. The sound spectrograms of her phonation using the voice prosthesis showed low frequency sounds without an obvious basic frequency. She was ashamed of her hoarse voice and did not use her voice prosthesis during high school. However, after beginning to work at age 20, she used her voice to communicate in the workplace. At age 21, her questionnaire scores, especially those related to the physical and functional domains, improved compared with those at age 17. Voice restoration with a voice prosthesis is recommended for young patients who undergo laryngectomy for advanced thyroid cancer. The advantages of voice restoration with a voice prosthesis may increase when the patient reaches working age, and it may improve post-laryngectomy quality of life considerably.

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1. Introduction

Compared to cancers of other sites, thyroid cancer occurs more often in young patients [1]. Although advanced thyroid cancer invades nearby organs, it is often possible to perform curative resection [2,3]. Invasion of the laryngeal lumen by thyroid cancer is uncommon [4]. Indications for total laryngectomy include laryngeal destruction or permanent

glottic dysfunction due to bilateral vocal cord palsy [4]. Unfortunately, a few young patients undergo laryngectomy for advanced thyroid cancer treatment [5]. Post-laryngectomy patients lose phonatory function and their quality of life (QOL) worsens dramatically [6]. Especially for the young, the decline in QOL with loss of phonation affects every aspect of life: mental, social, etc.

Three main options are currently possible for voice restoration after total laryngectomy: esophageal speech, electrolarynx speech, and tracheoesophageal speech with a voice prosthesis (T-E speech) [7]. T-E speech with a voice prosthesis is the newest option, with markedly improved

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phonatory restoration. Approximately 90% of patients using T-E speech regain speech. The surgery is simple and there are few complications after placement. The number of words that can be spoken immediately is greater than with esophageal speech [8]. Some authors who have assessed voice quality after laryngectomy based on Voice-Related Quality Of Life (V-RQOL) and the Voice Handicap Index (VHI) have reported that T-E speech with a voice prosthesis is associated with relatively high QOL [9].

However, some problems, such as changes in physical and voice quality, can persist. Adolescents can be especially affected. There have been no reports on voice rehabilitation for young patients with thyroid cancer after laryngectomy. The aim of this report is to evaluate the effects of voice rehabilitation with a voice prosthesis in a young patient with thyroid cancer.

2. Patients and methods

We evaluated the usefulness of voice restoration with a voice prosthesis in a young girl who underwent laryngectomy for advanced thyroid cancer based on voice-specific questionnaires and phonetic function. Her phonetic spectrogram was compared to that of an elderly woman after laryngectomy for advanced thyroid cancer. This study was approved by the ethics committee and the Institutional Review Board of Tottori University (Approval Number 2125) and was performed in accordance with the Declaration of Helsinki.

2.1. Patient

A 15-year-old woman presented with acute upper respiratory inflammation. Physical examination revealed swelling of her thyroid gland. Her past medical, surgical, family, and social histories were noncontributory. She underwent fine-needle aspiration biopsy and cytologic examination of her thyroid tumor revealed papillary adenocarcinoma. The primary lesion invaded the trachea, thyroid cartilage and both recurrent nerves, and the lymph node metastases occurred bilateral neck and bilateral parapharyngeal spaces. Laboratory studies showed mildly decreased free thyroxine at 0.96 ng/dl and mildly elevated thyroid-stimulating hormone levels at 7.59 μ U/ml. Serum thyroglobulin was elevated at 340 ng/ml. She was diagnosed with advanced T4aN1b papillary thyroid cancer. She underwent total thyroidectomy, bilateral neck dissection, and partial tracheal resection. Subsequently, she developed aspiration and was unable to tolerate any oral intake due to bilateral recurrent nerve paralysis, bilateral glossopharyngeal nerve paralysis and bilateral vagus nerve paralysis caused by the surgical operation for the parapharyngeal spaces. Her serious swallowing dysfunction was shown by videofluorography. She was placed a gastrostomy tube and received rehabilitation for the oral intake for 8 months. However, her swallowing function did not recover and she was admitted into our hospital with serious aspiration pneumonia three times during that period. Consequently, total laryngectomy was performed as a salvage procedure.

At age 17, she underwent surgery for phonation, so she underwent secondary voice prosthesis insertion with the Fukuhara method (Fig. 1) [10].



Fig. 1. A voice prosthesis was placed (Provox, Atos Medical Co., Hörby, Sweden).

2.2. Methods

After voice prosthesis insertion, the patient participated in two voice-specific questionnaires in Japanese, VHI-10 and the V-RQOL Survey, as an adolescent at age 17 and as an adult at age 21. We evaluated changes in her responses. Next, we analyzed her phonetic function. We also administered the phonetic function test to two other subjects; a young healthy woman (age 28) and an elderly woman (age 78) after laryngectomy for papillary thyroid carcinoma and voice restoration with a voice prosthesis in the same manner. The spectrograms obtained during the phonetic function test of the three subjects were compared.

2.2.1. VHI-10

The VHI, developed by Jacobson et al. in 1997, is a 30-question instrument [11]. In 2004, Rosen et al. distilled the VHI down to the 10 most clinically valuable items in the functional, physical, and emotional domains. This abridged version, the VHI-10, is highly correlated with the parent questionnaire [12]. Response options range from 0 to 4, with higher numbers indicating greater impairment [11]. The VHI and VHI-10 have been translated and validated in Japanese [13].

2.2.2. V-RQOL

V-RQOL was assessed using the Japanese version of the V-RQOL Survey [14]. The V-RQOL Survey, which has been translated and validated in Japanese [13], is a 10-item outcome instrument with two domains, social-emotional and physical-functioning. Each item is rated from 1 to 5, where 1 represents “not a problem” and 5 “a very big problem”. The calculation of the final score is based on the rules employed in several other QOL questionnaires. A standard score is calculated from the raw score, with higher values indicating that QOL is less impaired by voice functionality. For both the individual domains and the overall instrument, the maximum score is 100 (best QOL), and the minimum score is 0 (worst QOL).

2.2.3. Phonetic function test

The Model PS-77E device (Nagashima Medical Instruments, Tokyo, Japan) was used to perform the phonatory

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