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ORIGINAL PAPER

Bartłomiej Kamiński

Surgical voice rehabilitation performed by means of voice prosthesis post laryngectomy

Otolaryngology Ward of Maria Skłodowska-Curie District Hospital in Skarżysko-Kamienna, Poland

ABSTRACT

Introduction. In 1972, in Poland, Professor Erwin Mozolewski presented a pioneering thesis concerning the creation of intubated voice fistula in a group of 24 patients. It was undoubtedly the prototype of today's voice prosthesis.

Materials and method. The study involved 33 men after total laryngectomy due to advanced squamous cell carcinoma, treated in the Otolaryngology Ward of the District Hospital in Skarżysko-Kamienna between the years 2012–2017, who were implanted with a voice prosthesis Provox II and Provox Vega.

Results. During the analyzed period, 127 voice prosthesis were replaced in 33 patients. This paper focuses on complications connected with the implantation of voice prosthesis. The most common reason for replacement of a voice prosthesis was fluid leakage through the voice prosthesis channel – 95 cases. Spontaneous prolapse of the voice prosthesis occurred in 11 patients, and after re-insertion of the prosthesis, the correct fistula voice was obtained. The voice prosthesis was replaced due to difficulty in creating the prosthetic speech in 8 patients. A much more serious complication is the occurrence of leakage around the voice prosthesis. In the examined group, leakage around the prosthesis occurred in 5 patients. An inflammatory plaque was formed around the prosthesis, which was removed in case of significant prosthetic cover or at the request of an alarmed patient – in 4 patients. The prosthesis protruded and rotated in the trachea and hung on a fragment of mucous membrane of the trachea in 1 patient.

Keywords. laryngeal cancer, voice prosthesis, tracheoesophageal fistula

Introduction

Only humans use articulated speech, and, thanks to this ability, we are capable of expressing our thoughts, emotions and needs. We acquire speech in early childhood and use accompanies us throughout our lives. Loss of voice is not only a physical but also a mental and social injury. The history of voice and speech rehabilitation is connected with the first operation of the removal of the larynx due to cancer, which was performed in 1873 in Vienna by Teodora Bilroth. In the 20th century, the rehabilitation of voice and esophageal speech was the only natural method of obtaining a substitute form of using voiced speech. In 1972, in Poland, Professor Erwin Mozolewski presented a pioneering thesis concerning the rule of creating intubated voice fistula in a group of 24 patients. It was undoubtedly the prototype of to-

Corresponding author: Bartłomiej Kamiński, e-mail: bartl.kaminski@gmail.com

Participation of co-authors: A – Author of the concept and objectives of paper; B – collection of data; C – implementation of research; D – elaborate, analysis and interpretation of data; E – statistical analysis; F – preparation of a manuscript; G – working out the literature; H – obtaining funds

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day's voice prosthesis. Despite the very good results, this method was not widespread due to the economic situation in our country resulting in a lack of industry interest in cooperation and commercial production.[1] Only a few years later, in 1980, Singer and Bloom described their experiences, and their prostheses were commercially successful and became a breakthrough in speech rehabilitation in patients after complete laryngectomy.[2] In the Department of Otolaryngology of the District Hospital in Skarżysko-Kamienna, the primary implantation of the voice prosthesis is routine in the case of complete laryngectomy due to large malignant tumors and has been used since 2012. In this study, the type of complications associated with surgical voice rehabilitation using Provox voice prostheses was assessed.

Materials and methods

The study involved 33 men after total laryngectomy due to advanced squamous cell carcinoma, treated in the Otolaryngology Ward of the District Hospital in Skarżysko-Kamienna, between the years 2012-2017, who were implanted with a voice prosthesis Provox II and Provox Vega. In 32 patients, the vocal prosthesis was implanted initially during total laryngectomy, and one patient was implanted with the secondary prosthesis. All the subjects were men aged 47 to 83 (average age 66.3). During the above-mentioned period of time, 127 voice prostheses were replaced in 33 patients. This study presents an analysis of the complications after the establishment of a voice prosthesis.

Results

No early complications were observed in the form of prolonged healing, the occurrence of inflammatory reaction around the voice prosthesis or other serious complications described in the literature in the studied group of patients.

Among the late complications, the most common were leakage of saliva and fluid through the canal of the voice prosthesis, the widening of the fistula's channel with leakage around the voice prosthesis, formation of granulation tissue around the prosthesis, spontaneous prolapse of the voice prosthesis and protrusion and rotation of the prosthesis.[3-5]

An undoubted advantage of voice prostheses is the possibility of replacing them under local anesthesia. All replacements were carried out under such anesthesia.[6]

The most common reason for the replacement of voice prostheses was the leak of fluids through the voice prosthesis canal - 95 patients. The above complication can hardly be called a complication; it should rather be treated as natural wear of the prosthetic valve by the Candida fungi growing on its surface. In one of the patients the replacement of the prosthesis for this reason occurred after one month of using it, and at the same time, with another patient, the replacement of the voice prosthesis took place after 36 months of using it.

Spontaneous prolapse of the voice prosthesis occurred in 11 patients and, after re-insertion of the prosthesis, a correct fistula voice was obtained. In the examined group of patients, the prolapse of the prosthesis always occurred outwards; there was no loss of the voice prosthesis and its aspiration to the respiratory tract.

A much more serious complication is the occurrence of leakage around the voice prosthesis - as observed in 5 patients. Each time the prosthesis was removed, a nutrient tube was established for a period of 1 to 3 days and, after the shrinkage of the fistula, the prosthesis was inserted again. From the moment of the introduction of the prostheses with an additional XtraSeal collar, with a small leakage around the voice prosthesis, such a prosthesis was applied without the need to shrink the fistula canal. In one case, I had to remove the XtraSeal vocal prosthesis because of the discomfort of the patient in the form of difficulty in swallowing solid foods.

In 8 patients, the replacement of the voice prosthesis was due to the difficulty in creating prosthetic speech. I recognized that despite the lack of leakage of fluids, it was worth replacing the prosthesis and each time a satisfactory return of the prosthetic speech was obtained.

In 4 patients, inflammatory plaque was observed around the prosthesis, which was removed in the case of significant prosthetic cover or at the request of an alarmed patient.

One patient had spontaneous movement of the voice prosthesis to the light of the tracheoesophageal fistula with obstruction of the esophageal end. It was necessary to remove the voice prosthesis and, in the absence of fluid leakage through the fistula canal and lack of speech creation, the fistula was left for spontaneous healing. After 3 months the patient underwent secondary implantation of the voice prosthesis, obtaining a correct fistula voice.

In one patient there occurred a prosthetic protrusion, its rotation in the trachea and hanging on a fragment of mucous membrane. The prosthesis was hanging from a fragment of the mucous membrane of the trachea. The prosthesis was removed by cutting out the mucous membrane on which it was hanging and, after the shrinkage of the tracheoesophageal fistula, the prosthesis was put on again, with a good effect in the form of fistula speech. I have not encountered a description of such a case in the literature.

None of the patients had severe complications described in the literature in the form of aspiration pneumonia, esophageal perforation, deep neck abscesses, mediastinitis or necrosis of esophageal or tracheal tissue.

The average time of retention of the voice prosthesis was 7–8 months.

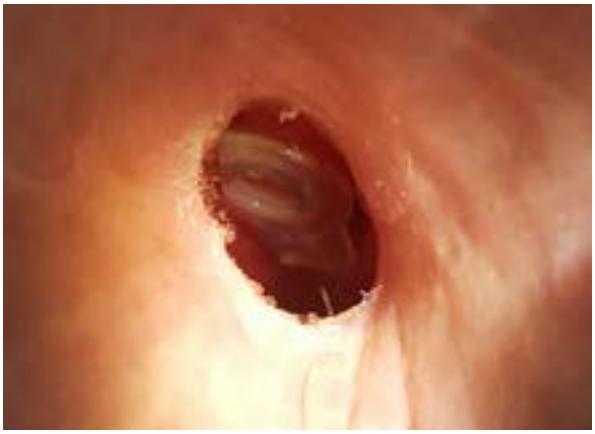

Photo 1. A correctly placed voice prosthesis on the back wall of the trachea

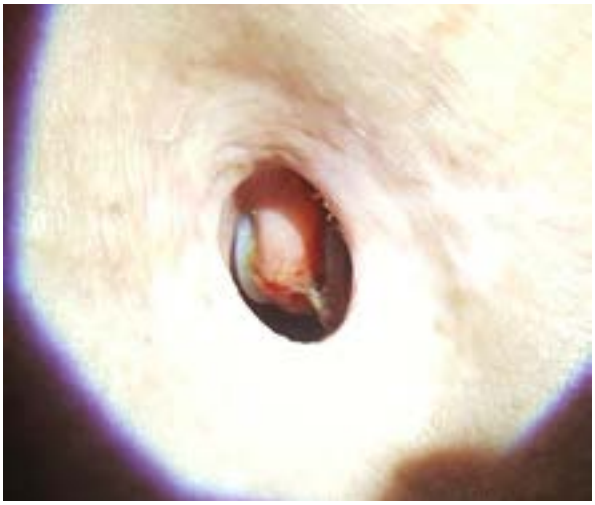

Photo 2. An extended vocal prosthesis onto the tracheal lumen; both collars of the prosthesis are visible, hanging from the fragment of the mucous membrane

Discussion

Surgical speech rehabilitation in patients after complete removal of the larynx requires very close cooperation between the doctor and the patient - not only in the rehabilitation of speech but also with proper care of the prescribed voice prosthesis - and requires constant patient control until the end of life. It is known that the patient, after implantation of the prosthesis, will sooner or later need to have it replaced. Also, a patient with a voice prosthesis should be aware that if the prosthesis falls out, the patient will have to contact a doctor who will be able to treat the patient, preventing covering of the fistula and aspiration of food to the respiratory tract. The patient must be aware that any difficulties in creating prosthetic speech require urgent medical consultation in order to prevent the prosthesis from protruding into the lumen of the tracheoesophageal fistula with the closure of the esophageal end. Therefore, the decision about implanting the voice prosthesis must be thoroughly analyzed by the patient and the doctor. In the otolaryngology ward in Skarżysko-Kamienna, before the operation of complete laryngectomy and implantation of the voice prosthesis, the patient always talks to three thyristectinians who use a voice prosthesis. I believe that such meetings and conversations are a great psychological stimulus for the patient to fight cancer and show that, despite mutilation, you can rehabilitate the fistula and continue to enjoy life. Laryngectomates also admit that such conversations are a great support for them and they would like to take part in such meetings and talks in the future. The exchange of mutual experiences of people using the voice prosthesis also affects the patient's awareness as to when they can wait and when they should be immediately see a doctor.

One of the commonest complications of surgical speech rehabilitation using the Provox system is the leakage of the prosthetic valve and the leakage of the digestive tract towards the trachea. Many authors confirm the occurrence of this complication and the majority of them agree that there is no rule as to the timing of the proper operation of the voice prosthesis.[7-9] In the analyzed material, the prolapse of the voice prosthesis from the fistula channel was observed. Loss of the prosthesis occurred when the prosthesis fell outside the body; no aspiration of the prosthesis to the respiratory tract was noted. One of the most serious complications is the widening of the fistula canal around the voice prosthesis and leakage around the prosthesis[10-12]. Most often, the prosthesis was removed and a nutritional drain was placed in order to shrink the fistula canal. After introducing prostheses with an additional XtraSeal flange, my own experience in applying them around for the leakage around the prosthesis are very good, and less often I applied a drainage tube with small fistula enlargements. Only one patient experienced discomfort when swallowing using a prosthesis with an additional collar. The formation of granulation tissue around the prosthesis is a rare complication and the granulation tissue is most often removed surgically.[13-15] I have not found any case in the literature of the protrusion of the voice prosthesis to the light of the trachea and its hanging on the mucous membrane. To remove the prosthesis, a fragment of the mucous membrane on which the prosthesis was hung was removed, and after the insertion of the nutrient tube and the shrinkage of the fistula canal, the voice prosthesis was re-established.

Conclusions

1. Surgical voice and speech rehabilitation using a voice prosthesis is an effective method that allows for creating an understandable voice and efficient communication of the patient with the environment.
2. Complications after implantation of the voice prosthesis are usually of a local and temporary nature;

however, it is always necessary to consider the possibility of severe complications.

3. Success in surgical speech rehabilitation with the use of voice prostheses requires close cooperation between the doctor and the patient.

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