Speech Outcomes in Patients with Neck Dissections

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ABSTRACT

Neck dissections have been proposed as surgical interventions for regional lymph node metastases removal in the 19th century. The first detailed description of “en block” tumor removal together with metastatic lymph nodes of the neck, was performed in 1888 by Franciszek Jawdynski. Damage to various structures in these operations causes significant function loss.

The purpose of the present study is to determine the degree of impairment of speech function, depending on the surgical volume and extension.

Methods. A bio-psycho-social method, the Speech Handicap Index mapping tool, was used to evaluate the speech function of all operated patients. The results obtained were analyzed by SPSS Vers23.0.

Results. A prospective longitudinal study of 68 patients (25 women - 36.76% and 43 men - 63.24%, and mean age - 61.18 years (Me - 61.00; Mo - 70; SD - 13.66)), was conducted. In the postoperative period, no significant difference was found in the three domains of SHI in terms of the surgical volume.

Conclusion. The volume and the extend of the neck dissection bar does not cause any significant speech disorders postoperatively.

Key words: Speech Outcomes–Neck Dissection–Speech Handicap Index (SHI)–Postoperative Consequences

1 INTRODUCTION:

The regional lymph nodes status is one of the chief and most significant prognostic factors for the survival of patients with malignancies in the maxillofacial and cervical areas. Therefore, the treatment of the affected cervical nodes is one of the most debated topics in maxillofacial oncology [1–3].


Classification of neck dissections. In 1987 Suen and Goepfert [10] are among the first to offer universal cervical dissection classification, which was later simplified by Medina [11]. In 1991 The Committee for Head and Neck Surgery and Oncology of the American Academy of Otolaryngology Head and Neck Surgery, in collaboration with the Education Committee of the American Society for Head and Neck Surgery (ASHNS) [12], suggested a new classification system. This classification pattern has been also revised in 2002 [13] . In 2008 the Committee for Neck Dissection Classification of the American Head Neck Society (AHNS) have published an ameliorated version [14]. The classification is based on the following procedures:

- Radical neck dissection – standard basic procedure for cervical lymphadenectomy, which involves removal of all lymph nodes from level I to level V, with the removal of sternocleidomastoid muscle, accessory nerve and internal jugular vein (submandibular glands are included in the dissection) [14] .

- Modified radical neck dissection – removal of nodes from level I to level V (as well as in radical neck dissection), with the exception of some non-lymphatic structures (m. sternocleidomastoideus, n. accessorises and/or v. jugularis

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complex is necessary for speech and articulation [25, 26]. The lips, tongue, buccal mucosa and maxillary-mandibular usually affect particular structures - nerves [20, 21] and/or blood vessels, and analysis of the negative outcomes are well defined and specific complications [17–19]. The evaluation of one or more lymphatic levels. There are variants of selective neck dissection entitled as lateral, supraomohyoid, posterior, central neck dissections [14, 15].

The extend of the surgical procedure and the surgical approach commonly leads to undesirable clinical outcomes and specific complications [17–19]. The evaluation, and analysis of the negative outcomes are well defined and usually affect particular structures - nerves [20, 21] and/or blood vessels [22–24].

Affecting of the speech. The coordinated functioning of the lips, tongue, buccal mucosa and maxillary-mandibular complex is necessary for speech and articulation [25, 26]. Therefore, tumor resection followed by oral structure damage, are associated with a significant affection of the speech. As a general rule, resection of the anterior part of the tongue is associated with speech disturbance, whereas ablative surgery of the back and root of the tongue dominantly affect swallowing [27, 28].

Speech investigation methods. Three groups of methods are well known:

- Questionnaire survey - Raghav C. Dwivedi et al. [29] have reported that questionnaires were used in 57% of all the surveys conducted, as well as in 2/3 of all retrospective studies known. In all studies, speech assessment was performed using common questionnaires to assess the quality of life of patients with maxillofacial pathology. Only one survey was conducted through a speech-specific questionnaire - the Speech Handicap Index (SHI) [30].

- Perceptual Research - this modality has been used in less than half of the studies. The most commonly evaluated parameter is speech intelligibility. Speech articulation and nasal resonance have been examined in ¼ of the publications [27].

- Acoustic research – it has been done in a small number of publications [31]. The estimated parameters are formant frequency (F1, F2, F3), secondary formant frequency level, fundamental frequency (F0), noise/harmony ratio. All studies were conducted retrospectively.

2 MATERIALS AND METHODS:

A prospective, longitudinal study was performed in a total number of 68 patients that have undergone neck dissection due to metastatic disease, in the Maxillofacial Surgery Clinic, Alexandrovskaya Hospital, Sofia, for the period of March 2016 to March 2019. The distribution of patients by gender includes 25 women - 36.76% and 43 men - 63.24%. The age characteristics of the cohort are as follows: Mean (Mean) - 61.18 years, with the youngest patient being 30 years old and the oldest being 88 years old (Me - 61.00; Mo - 70; SD - 13.66). Their distribution of the patients, according to the volume of intervention performed is presented in Figure 1.

Figure 1. Distribution of patients with neck dissection, according to the volume of surgery (RND – Radical Neck Dissection, SOHND –SupraOmoHyoid Neck Dissection, SND – Selective Neck Dissection)

Evaluation of speech disturbance. A thorough observation and evaluation of the speech function in patients with neck dissections due to malignancies in the maxillofacial area have been conducted. The speech disturbance assessment was performed using the Speech Handicap Index (SHI) tool. SHI was created and developed to evaluate speech disorders in patients with malignancies in the maxillofacial and cervical areas. It is structured by 30 questions, divided into two groups of questions (two domains, two subscales): the first group of questions assesses the physiological characteristics of the patient’s speech and the second evaluates the psychosocial functioning related to speech difficulties. Speech problems are graded by a 5-point scale: 0 - never, 1 - almost never, 2 - sometimes, 3 - almost always and 4 - always. The total scale value is obtained by summarizing the points of all questions; the possible results are from 0 - no speech disturbances, up to a maximum of 120 - severe speech disturbances. At the end of the scale, an independent test unit was added, where the patient may pass Te his or her speech problem as excellent, good, medium, and poor.

Statistical analysis. The statistical program SPSS Vers23.0 and R3.4.0. were used for the statistical processing of the data obtained. A level of significance that rejects the null hypothesis is assumed to be α = 0.05. Descriptive
3 RESULTS:

Evaluation of the speech. Speech function assessment was performed preoperatively and postoperatively on day 30.

Pre-operatively, low levels of speech impairment were recorded for the three domains of the SHI scale for the three groups of cervical dissections: SD - X=2.85, SD=3.07, CI95%=[2.11, 3.60]; PSD - X=2.81, SD=3.22, CI95%=[2.03, 3.59]; T - X=6.28, SD=6.26, CI95%=[4.76, 7.80] Table 1 Figures 2, 3 and 4

On the 30th day, changes in the levels of arithmetic mean values of the three domains of the SHI scale in the groups of cervical dissections were registered: SD domain - X=25.04, SD=13.78, CI95%=[21.71, 28.38]; PSD domain - X=24.07, SD=14.09, CI95%=[20.66, 27.48]; T total score - X=52.44, SD=29.76, CI95%=[45.24, 59.64]. No statistically significant difference was found for the two domains (SD, PSD) and total scale score (T) for the three groups of cervical dissections - for SD F (2,65) = 1.131, p = 0.329; for PSD - F (2,65) = 1.338, p = 0.269; for T (total score) F (2,65) = 1.286, p = 0.283. On the 30th day, no statistically significant difference was found in the two domains of the SHI instrument - SD - χ² (2) = 1.779, p = 0.411; PSD - χ² (2) = 1.768 p = 0.413, as in the overall scale score T - χ² (2) = 1.912, p = 0.384.

4 DISCUSSION:

Preoperatively, all patients were examined using the SHI tool for speech assessment function. The application of bio-psychosocial speech assessment methods allows for a comprehensive study of the function, including the functional assessment of the outcomes from a patient’s “point of view” [32] In the present study, no significant difference in speech function was found between the three groups of patients that have undergone neck dissections. Our research is in agreement with other literature reports [33]. The lack of significant speech function impairment in neck dissections of...
different extension, is explained by the quite similar damage of particular structures associated with speech function observed in various surgical procedures performed due to the presence of different pathologies. The isovolumetricity of the articulatory structures and the preservation of the resonator cavities play a dominant role in speech function [34].

The sacrifice of cervical structures within the volume of cervical dissections does not cause a significant difference in speech disturbances between operations because of the uniformity of speech-involved structures. [35–37]

5 CONCLUSION:
The volume of cervical dissection surgery (RND - Radical Neck Dissection, SOHND - SupraOmoHyoid Neck Dissection, SND - Selective Neck Dissection) due to malignancies in the maxillofacial region has no effect on speech function in the postoperative period.

REFERENCES