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Clinical Paper
Head and Neck Oncology

Study of surgical treatment for elderly patients with head and neck cancer

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Abstract. The aim of this study was to evaluate the clinical results of surgery for head and neck cancer (HNC) in elderly patients and to determine whether surgery for elderly HNC patients is safe and what types of surgery result in the most favourable outcomes for this age group. The cases of 637 elderly patients who were diagnosed with HNC and underwent surgical treatment were studied retrospectively. Patient demographic characteristics and treatment data were extracted from the appropriate patient records and analysed. Age did not significantly predict postoperative complications or death rates. Flap reconstruction surgery had no significant association with necrosis, haemorrhage, infection, need for rescue treatment, or length of intensive care unit stay. Age was not a risk factor for surgical treatment of HNC in the elderly patients. Flap reconstruction should not be considered riskier for elderly patients. The treatment choice for elderly patients with HNC should be based on medical assessments but not on age.

Key words: head; neck; cancer; elderly; surgery.

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According to cancer statistics for China, head and neck cancer (HNC; including cancer of the lip, oral cavity, pharynx, and nasopharynx) ranked eighth among cancers in 2015 with regard to incidence[1]. In 2011, the incidence rate of oral cancer in China among people older than 65 years of age was 10.28/100,000, while the incidence rate of oral cancer for all age groups was 2.93/100,000[2].

The World Health Organization (WHO) 2016 health statistics report stated that the average life expectancy of humans increased by 5 years between the years 2000 and 2015, reaching 71.4 years in 2015[3]. Based on the Global Age Watch Index 2015, the percentage of people older than 60 years was 12.3% in 2015, and it was predicted to reach 21.5% by 2050[4]. The number of HNC cases diagnosed will increase due to the increase in elderly patients.

Surgery, chemotherapy, and radiotherapy are the three main methods of treatment for malignant tumours. However, no target drug has been clinically proven to be effective for HNC. Furthermore, although radiotherapy has been used successfully as an adjunctive therapy for oropharyngeal cancer, this treatment is not considered optimal for most types of HNC. Surgery is a well-established treatment for HNC, but may lead to serious postoperative complications and a poor general condition.

Many previous research studies have shown that cancer patients with comorbidities are at higher risk of postoperative complications[5,6]. For example, diabetes has been reported as a risk factor for surgical site and pulmonary infections, flap necrosis, and postoperative haemorrhage, among others. Patients with cardio-

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vascular comorbidities are considered to have a higher risk of postoperative cardiovascular complications. Furthermore, it has been reported that a lower percentage of elderly patients with HNC receive standard treatments compared to younger patients, due to the more frequent presence of comorbidities in elderly patients[7]. Similarly, conservative treatment used to be considered more suitable than surgery for elderly patients with HNC, and even if surgery was selected to treat an elderly patient's HNC, it would likely be performed in a more conservative manner.

This clinical research study analysed the treatment outcomes of a total of 637 elderly HNC patients who underwent surgical treatment. The aim was to evaluate the effects of different surgeries on elderly HNC patients, and in particular to determine whether and how age is associated with different surgical issues, such as the type of flap, length of the intervention, and outcomes. It was sought to determine whether surgery for elderly HNC patients is safe and to establish the types of surgery providing the most favourable outcomes for this age group.

Patients and methods

The records of patients older than 65 years of age diagnosed with HNC, who received surgical treatment in the Department of Oral and Maxillofacial Surgery, Sun Yat-sen Memorial Hospital between 2005 and 2015, were identified and analyzed retrospectively. Only those with complete records were included; records were incomplete in 51 cases and these were excluded. Furthermore, only cases with cancer confirmed after surgery were included. For those patients who underwent more than one surgical treatment within a 1-year period, only the first surgery was included in the analysis, as it was considered that the second surgery would have been influenced by the previous intervention; 23 patients were excluded because they had more than one surgery in a year. For patients who underwent more than one surgery for recurrent or second primary tumours with a time interval between surgeries of more than 1 year, each surgery was included separately in the analysis.

All patients with comorbidities were evaluated by internists and anaesthetists to determine whether they would tolerate general anaesthesia and the surgery. Thirteen patients were deemed unsuitable for surgical treatment or were scheduled for delayed surgical treatment by the internists and anaesthetists on the basis of their general health condition. Finally, a total of 637 patients who underwent a total of 714 operations were included in this study.

The National Institute on Aging and National Institutes of Health definitions were applied in this study: subjects aged 65–74 years were considered as 'young-old', those aged 75–85 years were considered 'older-old', and those aged >85 years were considered 'oldest-old'[8]. The 637 patients and the 714 surgeries were grouped by age and reconstruction type (i.e., primary closure, tissue patch, free flap, or pedicle flap).

Patient data were gathered from the electronic medical charts and included age, sex, length of hospital stay in days (LOS), and factors related to the tumour and surgical treatment. These latter factors included the tumour site, TNM classification (according to the American Joint Committee on Cancer/Union for International Cancer Control (AJCC/UICC) TNM classification, sixth edition, 2002), type of reconstruction (i.e., primary closure, tissue patch, submental flap, pectoralis major myocutaneous flap, trapezius muscle flap, supraclavicular flap, facial artery flap, adjacent tissue flap, forearm flap, fibula flap, and anterolateral thigh flap), length of the intervention (the time period from skin incision to the completion of all wound closures), tumour site, requirement for blood transfusion, volume of haemorrhage, and details of the postoperative course, such as operation site and donor site infection and flap necrosis. With regard to complications, three groups were considered: pneumonia, other diseases, and no complications. Blood transfusion was divided into three levels: <2 units (small amount), 2–4 units (medium amount), and >4 units (large amount).

Measurement data were analysed with the χ^2 test and numerical data with the *t*-test. All independent variables that were associated with age and the type of reconstruction in the univariate analysis were selected and analysed among the three age groups in the multivariate analysis. In the analysis of the different types of flap, cases with tissue defects were categorized into four groups: no reconstruction, repaired by tissue patch, repaired by pedicle flap, and repaired by free flap. The data analysis was performed using IBM SPSS Statistics version 22.0 software (IBM Corp., Armonk, NY, USA). *P*-values of <0.05 were considered statistically significant.

Results

Patient characteristics

Of the 637 patients included in this study, 385 were male and 252 were female. They ranged in age from 65 to 96 years (mean age 73.4 years) at the time of surgery. By age group, 460 surgeries were performed in young-old subjects, 236 were performed in older-old subjects, and 18 were performed in oldest-old subjects. The principle tumour sites were the tongue and palate (Table 1). The TNM stages are given in Table 2; stage II tumours were most frequent, followed by stage III.

Among the total 714 surgeries performed, 550 resulted in a tissue defect; 116 of these defects (21.1%) were not restored with a flap or tissue patch. The tissue defects were restored with pedicle flaps in 335 cases (60.9%). Only 55 cases (10%) were repaired with free flaps. In comparison, 17.2% of all patients aged <65 years with HNC underwent free flap reconstructions during the same time period. The percentage of free flap reconstruction differed significantly between patients aged <65 years and those aged ≥65 years ($P = 2.13 \times 10^{-14}$). The recon-

Table 1. Tumour sites in the different age groups.

Site	Young-old (*n* = 460) (65–74 years)		Older-old (*n* = 236) (75–85 years)		Oldest-old (*n* = 18) (>85 years)	
Lip	15	3.3%	7	3.0%	1	5.6%
Palate	81	17.6%	66	28.0%	6	33.3%
Tongue	102	22.2%	30	12.7%	2	11.1%
Oropharynx	35	7.6%	10	4.2%	0	0.0%
Buccal mucosa	50	10.9%	37	15.7%	1	5.6%
Floor of mouth	26	5.6%	7	3.0%	0	0.0%
Gingiva	49	10.6%	34	14.4%	1	5.6%
Salivary glands	30	6.5%	7	3.0%	3	16.7%
Skin	22	4.8%	16	6.8%	4	22.2%
Neck	34	7.4%	13	5.5%	0	0.0%
Maxillary sinus	5	1.1%	4	1.7%	0	0.0%
Bone	11	2.4%	5	2.1%	0	0.0%