

The function of the tongue of morphology and function after surgery and tongue reconstruction evaluation analysis

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Abstract: *The tongue body is with special physiological functions of organs, function recovery after the defect is the major problem of the oral and maxillofacial surgery. At present, the tongue. Over the years, scholars have been committed to studying a variety of tongue reconstruction methods based on anatomical and functional repair. With the continuous introduction of the concept of functional surgery, the goal of tongue defect reconstruction after tongue cancer surgery has been raised from physical recovery to equal attention to function and appearance, and various tissue flap repair technologies have been widely used in clinical practice and mature, so it has become possible to reshape the original shape of patients' tongue.*

Keywords: *Tongue cancer; Tongue reconstruction; Surgical flap; Voice function; functional surgery*

1. Introduction

The most common site of primary intraoral cancer is the tongue. Patients with advanced tongue cancer need an aggressive surgical approach combined with postoperative radiotherapy for successful treatment. At present, the treatment of tongue cancer is mainly based on the patient's condition and personal situation to develop personalized treatment plan. Resection of tongue cancer focus not only causes the destruction of the shape of the tongue, but also causes oral dysfunction such as speaking voice and swallowing. It will strike patients psychologically and affect their normal life after surgery [1]. When the tongue defect is more than 1/2 of the tongue body, it will affect a variety of physiological functions of patients to varying degrees. Therefore, surgery for tongue cancer patients requires not only resection of the primary lesion but also simultaneous flap repair.

2. Review

2.1 Principles of treatment:

According to the classification of the Union for international cancer control (UICC), the anterior 2/3 of the tongue should be classified as oral cancer, and the posterior 1/3(base of the tongue) should be classified as oropharyngeal cancer. More than 85% of tongue cancers occur in the tongue. Most squamous cell cancers. At present, the treatment of tongue cancer still emphasizes comprehensive treatment, mainly surgical operation [2]. During the operation, it was required to make an incision 2 cm outside the lesion to remove the mass completely, and the intraoperative frozen pathology showed a negative incisal margin, so as to control the postoperative recurrence rate.

2.2 Simultaneous tongue reconstruction was performed with appropriate tissue flap

Tongue is a kind of organ with delicate structure and complicated function. It is involved in a variety of physiological functions, so the purpose of repairing or reconstructing the tongue defect is to restore the function and shape of the tongue [3]. Brown believed that the selection range of tissue flap for tongue reconstruction was very wide, and the flap type was generally determined according to the size of tissue defect. On the other hand, whether the lesion involved hard tissue should be taken into consideration [4]. Usually, for the small area of the tongue root defect, the anterior flap of the tongue can be backward formed, and the function can be restored. For tongue resection of less than 1/3, the local defect area was

directly closed suture without repair. Tongue defects of $1/3 \sim 1/2$ and tongue resection of more than $1/2$, or tongue and bottom tissue complex defects, such as regional repair reconstruction or free tissue flap distal defect, postoperative oral physiological functions of patients will be affected, directly resulting in postoperative quality of life decline. Of course, a variety of factors should be considered in the selection of reconstruction.

2.2.1 Forearm flap

The forearm flap was first developed by Yang Guofan et al. Because of its constant anatomy, it has a longer vascular pedicle and a thicker diameter. The skin flap is thin and soft, and the advantages of "double operation" are widely used, so it is known as "Chinese skin flap". The application of forearm free flap is common in the first choice of defect repair after tongue cancer surgery. However, the defects in the traditional design of the flap are obvious. If the donor area needs skin grafting, on the one hand, the second surgical area needs to be opened up to increase the surgical trauma; on the other hand, the scar after skin grafting in the donor area greatly affects the forearm appearance. It is found that the overall function of the tongue can be recovered well after the free forearm flap repair in the patients with tongue defects of $1/4 \sim 1/2$, while in the patients with tongue defects of $3/4$ or above, Forearm flap is not as effective as other flaps [5].

2.2.2 Pectoralis major muscle flap

In more than 30 years of application of pectoralis major muscle, there have been numerous studies on PMMF incision, advantages and disadvantages, and application scope. In 1979, Ariyan first reported the use of pectoralis major musculocutaneous flap to repair defects after resection of head and neck tumors. The tissue flap has the function of donor vascular homeostasis and is easy to operate and prepare. No need for vascular anastomosis, no need for postural changes, high survival rate. And most of the donor area can be directly pulled up suture and other advantages. However, the resection of large oral and maxillofacial and oropharyngeal malignant tumors is often accompanied by large tissue defects (such as tongue, tongue root, lateral wall of pharynx, soft and hard palate, upper and lower jaw and other joint defects). The use of pectoralis major musculocutaneous flap often results in short vascular pedicle, insufficient tissue volume, postoperative chest and shoulder joint activity disorders and other complications. Meanwhile, the tongue shape after repair is poor. In particular, the morphology of the tip of the tongue is difficult to recover [6]. To guide the pectoralis major musculocutaneous flap to the defect of the head and neck. It is often unnecessary to sacrifice the sternocleidomastoid muscle, otherwise the neck will appear very bloated and unsightly. In order to further reduce these postoperative complications, domestic and foreign scholars continue to improve the preparation of pectoralis major musculocutaneous flap. With the development of functional surgery, the application of pedicle pectoralis major musculocutaneous flap has decreased. However, for those with large defect range, it is still an optional repair flap [7].

2.2.3 Anterolateral femoral flap

Anterolateral femoral flap is the anterolateral thigh flap, which is formed from the lateral femoral artery as the descending branch of the blood vessel. Xu Shuofang et al. (1984) reported that the donor area of the flap was concealed, a large area of the flap could be cut, and the repair area could be up to 400 square centimeters. The vascular pedicle was constant, and the vascular tube diameter was thick. Clinically, fascial flap, musculocutaneous flap or island flap can be made according to the needs. If the anterolateral femoral cutaneous nerve is included, a handfeel flap can be made. The flap has been widely used in the repair of deformity defects of limbs, head and face, neck and perineum. It is known as "universal flap" [8]. However, it is difficult to quantify the impact of skin flap removal on donor area function, and the evaluation of donor area function involves many aspects, such as appearance satisfaction, sensation and movement. In the preparation of anterolateral thigh flap, for some obese patients, the flap is often too thick and bloated, and intraoperative thinning of the flap is complicated and risky, which is easy to cause flap edge necrosis. In addition, although the blood supply of anterolateral femoral flap was stable, there were still variations in the perforator branch [9]

2.2.4 Kiss flap of forearm

Kiss flap of forearm was first proposed and applied by Chinese scholars. The main idea of the flap is to make the donor area can be directly closed without the need to close the wound with another adjacent flap or skin graft through reasonable design of the flap, which is to minimize the damage to the function and shape of the donor area caused by the flap incision. It is a typical economic flap. The design of Kiss flap and the method of directly co-suturing to close the donor area defect is superior to other previous closing methods, which not only enhances the aesthetic effect after the closure of the donor area defect

of the forearm, but also avoids the surgical trauma of opening up the second operative area for skin extraction and skin grafting, simplifies the surgical process, and the method is simple and easy, worthy of promotion [10].

2.3 Evaluation of tongue function after reconstruction

Successful tongue reconstruction after tongue cancer requires not only good wound healing and flap survival, but also good chewing and speech function. This is closely related to the control of spinal nerve, cranial nerve and proprioception in the reconstruction of the tongue. Damage to any of the links will result in dysphagia, decreased speech articulation, and even aspiration [11]. The goal of tongue reconstruction is to make the function of the reconstructed tongue as close as possible to that of the original tongue. There is no unified standard for function evaluation of tongue defect after reconstruction. It mainly includes tongue shape and volume as well as speech and swallowing functions.

2.3.1 Reconstruction of the speech function of the tongue

As a muscular structure, the tongue is fine and complex. With its unique extensibility and range of motion, it is the most important vocal organ in the oral jaw system. In the process of pronunciation, the tongue can not only arbitrarily change its own form and position, to adjust the shape of the resonance cavity, but also work with the adjacent teeth, alveolar bone, soft palate, hard palate and other organizations to complete the necessary formation and break of the resistance in the process of pronunciation; However, in view of the complex mechanism of speech generation and the large differences between individuals and regions, there is still a great dispute on which repair means after tongue resection is more conducive to the recovery of postoperative speech function of patients [12]. A number of studies have also found that the speech articulation of patients with tongue cancer after surgery gradually recovers and stabilizes from 6 months after surgery, suggesting that the recovery of speech function is a long-term process. Patients should actively cooperate with professionals to carry out speech function recovery training, and should not be discouraged or give up when the effect is not obvious in the training process, and should persist [13].

2.3.2 Reconstruction of tongue mastication

Mastication is an important function of the mouth. The recovery of masticatory function in patients with tongue cancer after surgery is closely related to the scope of mandibular defect, the number of teeth lost and the degree of lingual muscle defect, as well as the gender, age and degree of masticatory muscle injury of patients during surgery. Therefore, the recovery of masticatory function in tongue cancer patients and Loewen et al. tested and analyzed the masticatory function of tongue reconstruction with forearm flap, mainly focusing on the efficiency of masticatory food and mandibular movement of patients. The experiment showed that the chewing efficiency of the normal control group was significantly higher than that of the tongue reconstruction group, but there was no significant difference in the exercise of the mandible between the two groups.

2.3.3 Reconstruction of tongue swallowing function

Normal human swallowing process can be broken down into three periods. The mouth, pharynx and esophagus. Borggreven found that the defect of the base of the tongue could affect the swallowing function more than the defect of the body of the tongue. The defects of the tongue and the root of the tongue were more, and the single defects of the tongue or the root of the tongue would affect the swallowing function. Ideally, patients with tongue reconstruction want to be able to swallow normally. And minimize the chance of aspiration. No matter what kind of repair method is adopted, the ultimate goal is to restore the shape and volume of the tongue well, so that the swallowing function can proceed smoothly [14].

2.4 Prospect of reconstruction of defect function after tongue cancer surgery

Due to its unique structure, complexity and functional diversity, tongue repair and reconstruction have been difficult to achieve ideal results. First of all, the focus of restoration and reconstruction is still focused on two aspects, namely shape restoration and volume restoration. However, it is still difficult to repair the shape of the tip of the tongue and the volume of the root of the tongue. Secondly, there is still no conclusion on how to select the scope of excision and how to reconstruct after excision to maximize the recovery of speech, chewing and swallowing functions. In addition, in recent years, some scholars have devoted themselves to studying the restoration of free flap and tongue reconstruction after nerve anastomosis. Only in the nerve anastomosis group at the tongue tip, the temperature sensation was

significantly restored, and the two points of recognition, light touch and taste were significantly lower than the normal level. The results are not satisfactory. However, there are few relevant researches at home and abroad, and this method still needs to be further studied [15]

3. Conclusion

In recent years, scholars at home and abroad have shifted their attention to the allograft of tongue, and animal experiments show that in the future, tongue defect patients are likely to adopt this research method. Therefore, the author believes that there is still a lot of work to be done for tongue function reconstruction after tongue cancer surgery.

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