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The Efficacy and Safety of Radical Surgery Combined with Modified Cervical Lymph Node Dissection in the Treatment of Oral Cancer

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Abstract: *Objective*: To analyze the efficacy and safety of radical surgery combined with modified neck lymph node dissection in the treatment of oral cancer. *Methods*: A retrospective selection was made of 80 patients with oral cancer treated in the Department of Stomatology at Yichang Central People's Hospital from January 2020 to January 2022. According to differences in treatment plans, all patients were randomly divided into two groups, with 40 cases in each group: the control group underwent radical surgery for oral cancer, while the observation group received radical surgery combined with modified neck lymph node dissection. Surgical outcomes, VAS scores, oral function, and prognosis were compared between the two groups before and after treatment. *Results*: There was no significant difference in intraoperative blood loss and operation time between the two groups ($P > 0.05$). At 1 month and 3 months postoperatively, VAS scores in the observation group were lower than those in the control group ($P < 0.05$). Postoperatively, oral function scores in all three dimensions were higher in the observation group compared to the control group ($P < 0.05$); the 3-year metastasis rate was lower in the observation group, while the survival rate was higher than in the control group ($P < 0.05$). *Conclusion*: Radical surgery combined with modified neck lymph node dissection is significantly effective in treating oral cancer. It markedly relieves postoperative pain, improves oral function, reduces metastasis rates, and increases survival rates.

Keywords: Radical surgery for oral cancer; Modified neck lymph node dissection; Oral cancer; Oral function; Prognosis

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1. Introduction

Oral cancer, as one of the most common malignant tumors of the head and neck, has shown an increasing incidence worldwide year by year, with the age of onset gradually becoming younger. It has become a serious public health problem threatening human life and health [1]. According to clinical epidemiological data [2], most oral cancer patients are diagnosed at the middle or late stages, with tumor cells often invading surrounding

tissues and accompanied by cervical lymph node metastasis. This not only significantly increases the difficulty of treatment but also severely affects patients' prognosis, quality of life, and long-term survival rate. Currently, surgical resection remains the core method for treating oral cancer. Among these, radical surgery for oral cancer, by thoroughly removing the primary tumor lesions, provides a basis for controlling local disease progression. However, radical surgery alone inadequately addresses potentially metastatic cervical lymph nodes, which can lead to a persistently high postoperative recurrence rate, becoming a key bottleneck limiting treatment efficacy [3]. Cervical lymph node dissection, as an important auxiliary procedure for managing cervical lymph node metastasis in oral cancer, has evolved from traditional radical dissection to modified dissection. While traditional radical cervical lymph node dissection can maximally remove potentially metastatic lymph nodes and surrounding fatty connective tissues, it causes significant surgical trauma and has a high rate of postoperative complications, often resulting in postoperative sequelae such as neck sensory abnormalities and shoulder dysfunction, greatly reducing postoperative quality of life [4]. With the deepening integration of precision medicine concepts into tumor treatment, modified cervical lymph node dissection has emerged. It selectively removes regional lymph nodes while preserving important nerves, blood vessels, and muscles in the neck, aiming to ensure treatment efficacy while minimizing surgical damage to patients' physiological functions [5]. Based on this, this study selected 80 oral cancer patients admitted to the Department of Stomatology at Yichang Central People's Hospital as research subjects, aiming to analyze the effectiveness and safety of radical surgery combined with modified cervical lymph node dissection in treating oral cancer. The findings are reported as follows.

2. Clinical data

2.1. General information

A retrospective selection was made of 80 patients with oral cancer admitted to the Department of Stomatology at Yichang Central People's Hospital from January 2020 to January 2022 as study subjects. According to differences in treatment plans, all patients were randomly divided into a control group (n = 40) and an observation group (n = 40). There were no significant differences in the clinical data between the two groups ($P > 0.05$). Detailed data can be found in **Table 1**.

Table 1. Comparison of Clinical Data Between the Two Groups of Patients

Group	Number of cases	Male/Female (n)	Mean age (years)	Disease classification		
				Tongue cancer	Buccal cancer	Palatal cancer
Control group	40	22/18	44.79±5.51	24	8	8
Observation group	40	25/15	45.01±5.72	23	7	10
χ^2/t value		0.464	0.175		0.052	
P value		0.496	0.861		0.820	

2.2. Inclusion and exclusion criteria

Inclusion criteria: (1) Pathologically confirmed diagnosis of oral cancer; (2) intact head and neck skin without damage, infection, ulceration, or other abnormalities; (3) no preoperative oral sensory dysfunction, with normal basic functions such as speech and eating.

Exclusion criteria: (1) Presence of severe organic diseases affecting the heart, liver, kidneys, or other internal

systems; (2) cognitive dysfunction preventing cooperation with preoperative assessment and postoperative follow-up; (3) history of psychiatric disorders or currently receiving relevant medication; (4) severe immune deficiency.

2.3. Treatment methods

All enrolled patients underwent routine examinations before surgery, and their physical condition was comprehensively assessed through systematic evaluation. Contraindications to surgery were eliminated, and ensured that core vital signs such as heart rate, blood pressure, and respiration were stable within the safe allowable range of surgery. Combined with the specific location of the tumor lesions, both groups of patients underwent radical oral cancer resection. The specific surgical procedure is as follows: the surgical incision is designed along the natural horizontal stripe of the neck to ensure that the incision heals beautifully and reduces skin tension, the incision starts from the midpoint of the chin, extends outward to the anterior edge of the sternocleidomastoid muscle, cuts the skin and subcutaneous tissue in an arc according to the design trajectory, separates the loose connective tissue layer on the deep surface of the platyscapitar muscle, and moderately turns the flap to both sides and fixes it. Fully expose the superficial important tissues of the neck, such as the external jugular vein and the major auricular nerve, to avoid damage to the above structures during the separation process.

Subsequently, at the intersection of the anterior edge of the sternocleidomastoid muscle and the intermediate tendon of the scapulohyoid muscle and the corresponding area from the sternocleidomastoid muscle to the posterior edge of the scapulohyoid muscle, the layers of the neck fascia were gradually cut along the tissue level, and after exposing the deep tissue, the muscle was carefully released along the deep direction of the sternocleidomastoid muscle towards its posterior edge, and attention was paid to protecting the integrity of muscle fibers and peripheral vascular nerves during the release process. Lymph node dissection takes the middle tendon of the scapulohyoid muscle as a clear starting point, and strictly follows the bottom-up and back-to-front cleaning sequence to ensure that the cleaning area is not missed, and the lymph nodes and surrounding adipose connective tissue in the upper and middle groups of deep cervical lymph nodes and the lower triangle of the mandible are completely removed in turn. After surgery, telephone follow-up combined with regular review was used to observe all patients for 3 years.

2.4. Observation indicators

(1) Surgical condition: Record the intraoperative blood loss and surgical time of patients in both groups.

(2) Pain score: Use the Visual Analogue Scale (VAS) to record the pain scores of patients in both groups. This scoring system represents the degree of pain on a scale from 0 to 10, where a lower score indicates milder pain experienced by the patient.

(3) Oral function: Oral function tests were conducted on both groups of patients by physicians with the appropriate professional qualifications before surgery and six months after surgery. The tests covered three aspects: speech clarity, eating function, and chewing efficiency.

(4) Prognosis: Record the 3-year metastasis rate and survival rate of patients in both groups.

2.5. Statistical methods

Data were analyzed using SPSS 23.0 statistical software. For count data, results are presented as percentages (%). The Chi-square test (χ^2 test) was used to analyze associations in count data between different groups. Measurement data conforming to a normal distribution are presented as mean ± standard deviation (SD), and the t-test was used to compare differences in measurement data between groups. In the entire statistical analysis, $P < 0.05$ was

considered statistically significant, indicating a meaningful difference between groups.

3. Results

3.1. Comparison of surgical conditions and VAS scores between the two groups

The results showed that there was no statistically significant difference in intraoperative blood loss and operation time between the two groups ($P > 0.05$). At 1 month and 3 months postoperatively, the VAS scores of the observation group were lower than those of the control group ($P < 0.05$) (**Table 2**).

Table 2. Comparison of Surgical Conditions and VAS Scores Between the Two Groups of Patients (mean ± SD)

Group	Number of cases	Intraoperative blood loss (mL)	Operation time (min)	VAS score (points)	
				1 month postoperatively	3 months postoperatively
Control group	40	188.76±22.15	98.01±12.54	5.66±1.32	2.99±0.30
Observation group	40	195.10±23.87	99.42±14.37	4.11±1.36	2.01±0.65
t value		1.231	0.468	5.172	8.658
P value		0.222	0.641	0.000	0.000

3.2. Comparison of oral function between the two groups of patients

The results showed that after surgery, the oral function scores of the three dimensions in the observation group were higher than those in the control group ($P < 0.05$) (**Table 3**).

Table 3. Comparison of Oral Function Between the Two Groups of Patients (mean ± SD)

Group	Number of cases	Language clarity /%		Eating function /score		Masticatory efficiency /%	
		Preoperative	Postoperative	Preoperative	Postoperative	Preoperative	Postoperative
Control group	40	60.33±6.12	87.05±6.71*	1.54±0.31	2.16±0.43*	55.70±6.29	84.78±6.32*
Observation group	40	60.41±6.45	93.20±6.98*	1.53±0.28	2.49±0.40*	55.48±6.03	90.47±6.38*
t value		0.057	4.017	0.151	3.554	0.160	4.007
***P* value**		**0.955**	**0.000**	**0.880**	**0.001**	**0.874**	**0.000**

Note: Compared with preoperative, $^{*}P < 0.05$

3.3. Comparison of prognosis between the two patient groups

The results showed that postoperatively, the 3-year metastasis rate in the observation group was lower than that in the control group, while the survival rate was higher than that in the control group ($P < 0.05$) (**Table 4**).

Table 4. Comparison of Prognosis Between the Two Groups of Patients [n (%)]

Group	Number of cases	Metastasis rate at 3 years postoperatively	Survival rate at 3 years postoperatively
Control group	40	14(35.00)	15(37.50)
Observation group	40	5(12.50)	30(75.00)
χ^2 value		5.591	11.429
P value		0.018	0.000

4. Discussion

In this study, the VAS scores of the observation group at 1 month and 3 months after surgery were significantly lower than those in the control group, due to the targeted protection of important nerves in the neck by modified cervical lymph node dissection. In this study, the modified technique focused on identifying and protecting the deep branches, accessory nerves, and anastomotic branches of the cervical plexus after opening the fascial layer of the neck, avoiding mechanical damage to nerve fibers [6]. In addition, the curved incision of the modified surgical style is in line with the characteristics of neck skin tension, and the postoperative incision heals more smoothly, reducing the compression and stimulation of nerve endings by scar tissue and reducing the risk of chronic pain [7]. At the same time, the combined surgery completely removes the potentially metastatic lymph nodes, avoiding local inflammatory stimulation caused by lymph node residue after surgery, and further reducing the pain stress response.

The postoperative language, eating and chewing function scores of the observation group were significantly better than those of the control group, which was essentially the maximum preservation of neck anatomy by modified cervical lymph node dissection, which provided a structural basis for oral function recovery. In terms of language function, the modified procedure avoids damage to the lingual nerve and recurrent laryngeal nerve, while preserving the normal tone of the neck muscles, reducing the risk of postoperative tongue movement restriction and decreased coordination of the pronunciation organs, and significantly increasing the proportion of words read correctly in the Chinese speech intelligibility test [8]. The improvement of eating and chewing function is closely related to the preservation of neck muscle groups, and part of the sternocleidomastoid muscle and scapulohyoid muscle are removed during traditional radical dissection, resulting in weakening of neck muscle strength and affecting the coordination of swallowing and chewing movements. The modified procedure only freed the perimuscular lymphatic tissue, preserving the integrity of the muscle, so that the patient could recover the muscle force efficiency when chewing 2 g of peanuts faster after surgery, and the chewing efficiency was improved on average compared with the control group [9].

The metastasis rate in the observation group at 3 years after surgery was lower than that in the control group, and the survival rate was higher than that in the control group. Although the modified procedure narrows the scope of dissection, it ensures the complete removal of the superior, middle, and submandibular triangular metastases of deep cervical lymph nodes through precise preoperative evaluation and rapid intraoperative pathological detection, avoiding the destruction of normal lymphoid tissue caused by blindly expanding the scope of dissection caused by traditional surgery, and reducing the risk of tumor residue [10]. In addition, the modified surgical method retains the lymphoid tissue and immune cells in the non-metastatic area of the neck, avoiding the excessive inhibition of the body's immune function by the traditional surgical method, making the patient's postoperative immune cell activity significantly higher than that of the control group, and enhancing the body's ability to clear small residual lesions.

5. Conclusion

In summary, radical oral cancer resection combined with modified cervical lymph node dissection has significant effects in the treatment of oral cancer, with significant relief of postoperative pain, significant improvement of oral function, significant reduction of postoperative metastasis rate, and significant increase in survival rate.

Disclosure statement

The author declares no conflict of interest.

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