Clinical Efficacy of Mandibular Osteotomy Approach in the Surgical Treatment of Advanced Oral Cancer and Its Impact on Patient Prognosis

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Abstract: Objective: To investigate the clinical efficacy of mandibular osteotomy approaches in treating advanced oral cancer and their impact on patient prognosis, providing reference for optimizing clinical surgical protocols. Methods: A total of 96 patients with advanced oral cancer treated at the Department of Stomatology, Yichang Central People's Hospital between September 2022 and September 2025 were randomly divided into two groups (n=48 each). The observation group underwent mandibular osteotomy surgery, while the control group received conventional lower lip incision surgery. Treatment outcomes were compared between groups. Results: The observation group demonstrated a higher overall clinical response rate (93.75%) compared to the control group (79.17%). At 6 months postoperatively, the observation group showed superior scores in speech clarity, eating function, and masticatory efficiency compared to the control group. Additionally, the observation group achieved higher scores across all dimensions of the SF-36 questionnaire, with all $P<0.05$. Conclusion: Mandibular osteotomy demonstrates superior clinical efficacy in treating advanced oral cancer, effectively improving patients' oral function and quality of life, with significant clinical application value.

***Keywords*:** advanced oral cancer; mandibular osteotomy; lower lip incision approach; clinical efficacy

1. Introduction

Oral cancer is a common head and neck malignancy with an increasing incidence rate. Due to its extensive invasion, rapid disease progression, treatment challenges, and poor prognosis[1,2], surgery remains the core therapeutic approach for advanced oral cancer. The scientific selection of surgical approaches directly impacts tumor resection completeness and the preservation of surrounding normal tissues, critically influencing postoperative functional recovery and long-term prognosis[3]. The traditional lower lip incision approach has been clinically applied for a long time. However, this technique offers limited exposure of the surgical field, making it difficult to precisely control tumor margins and increasing the risk of residual disease and recurrence. Additionally, it causes significant damage to normal oral physiological structures, resulting in poor postoperative recovery of functions such as speech and eating. This approach struggles to meet the dual clinical demands of precise treatment and functional preservation, and its limitations in clinical application have become increasingly apparent[4].

With the continuous advancement of oral surgical techniques, the mandibular osteotomy approach has gained clinical adoption due to its advantages of expanded exposure and enhanced precision. This technique enables more thorough tumor resection while minimizing damage to healthy tissues, thereby facilitating postoperative functional recovery[5]. Therefore, this study compares the clinical outcomes of the two surgical approaches through multidimensional analysis, including clinical efficacy, oral function recovery, quality of life improvement, and prognosis. It explores the clinical value of the mandibular osteotomy approach to provide scientific reference for optimizing surgical plans for advanced oral cancer, aiming to further enhance clinical diagnosis and treatment levels and improve patient prognosis.

2. Materials and Methods

2.1 General Data

This study included 96 patients with advanced oral cancer who underwent treatment at the Department of Stomatology, Yichang Central People's Hospital between September 2022 and September 2025. They were randomly divided into two groups, each comprising 48 patients. Comparison of general data between the two groups showed no significant differences ($P>0.05$), as shown in Table 1.

Table 1. Comparison of General Data Between the Two Groups

Indicator		Observation Group (n=48)	Control Group (n=48)	t/X^2 Value	P Value
Gender	Male	27 (56.25)	29 (60.42)	0.171	0.679
	Female	21 (43.75)	19 (39.58)		
Average Age (years)	51.35±4.24	52.11±4.56	0.846	0.400	
Average Duration of Illness (months)	3.07±0.64	3.09±0.69	0.147	0.883	
BMI (kg/m2)	23.57±2.58	23.69±2.46	0.233	0.816	
Tumor Location	Body of Tongue	18 (37.50)	17 (35.42)	0.045	0.832
	Base of Tongue	15 (31.25)	16 (33.33)	0.048	0.827
	Floor of Mouth	10 (20.83)	9 (18.75)	0.066	0.798
	Other	5 (10.42)	6 (12.50)	0.103	0.749

2.2 Inclusion and Exclusion Criteria

Inclusion Criteria: (1) Meets diagnostic criteria for oral cancer; (2) Indicated for surgical treatment; (3) Complete clinical records; (4) Alert and able to cooperate with the experimenter; (5) Signed informed consent form.

Exclusion Criteria: (1) Concurrent malignant tumors; (2) Damage to major organs such as heart, liver, or kidneys; (3) Recent receipt of other antitumor therapies including radiotherapy, chemotherapy, or targeted therapy; (4) Concurrent severe oral diseases; (5) Withdrawal from the study.

2.3 Surgical Approach

The control group underwent traditional lower lip cleft repair: Under general anesthesia, a longitudinal incision was made from the midline of the lower lip to the chin. The skin, subcutaneous tissue, and muscles were dissected layer by layer to expose the anterior mandible. The incision was extended as needed based on tumor location and size to achieve complete exposure of the surgical field. The tumor was completely excised with adequate safety margins. The incision was then closed layer by layer. A drainage tube was routinely placed, and symptomatic management including infection prevention and hemostasis was administered.

Observation Group: Mandibular Osteotomy Approach: Under general anesthesia, a mandibular osteotomy site is selected based on tumor location, typically at the body or chin region. A corresponding incision is made, tissues are dissected layer by layer to expose the mandible, and specialized instruments are used to cut the mandible. The mandible is retracted laterally or inferiorly to to fully expose the tumor and surrounding tissues. The tumor was precisely excised to ensure complete removal while preserving normal oral tissues and neurovascular structures as much as possible. The mandible was repositioned and stabilized, the incision was closed in layers, and a drainage tube was placed. Postoperative care included routine infection prevention and nutritional support.

2.4 Observation Indicators

(1) Clinical Efficacy:

Marked response: Complete tumor disappearance, full resolution of clinical symptoms, and near-normal restoration of oral function.

Effective response: ≥50% reduction in tumor volume, marked improvement in clinical symptoms, and partial restoration of oral function.

No response: <50% reduction or enlargement of tumor volume, no improvement or worsening of clinical symptoms, and no restoration of oral function.

(2) Oral Function: Assessed preoperatively and at 6 months postoperatively for both groups. Speech clarity was evaluated using a Chinese character reading test, where patients accurately read Chinese characters aloud. Speech readability rate =Correct readings/Total characters×100%. Eating function was assessed by dietary status, scored as 3 points (normal diet), 2 points (semi-liquid diet), or 1 point (nasogastric feeding), with higher scores indicating better eating function. Masticatory function was evaluated using chewing efficiency, measured after patients consumed 2 grams of peanuts.

(3) Quality of Life: Assessed using the SF-36 questionnaire at 6 months post-surgery. Higher scores indicate better quality of life[6].

2.5 Statistical Methods

Data were analyzed using SPSS 26.0 software. Count data were recorded as case numbers and percentages and analyzed

via chi-square (χ^2) tests. Continuous data were recorded as means±standard deviations and analyzed via t-tests. Differences were considered statistically significant at P<0.05.

3. Results

3.1 Clinical Efficacy

The clinical total effective rate was higher in the observation group than in the control group (P<0.05), as shown in Table 2.

Table 2. Comparison of Clinical Efficacy Between Groups [n (%)]

Group	n	Evident	Effective	Ineffective	Overall effectiveness rate
Observation Group	48	29 (60.42)	16 (33.33)	3 (6.25)	45 (93.75)
Control Group	48	21 (43.75)	17 (35.42)	10 (20.83)	38 (79.17)
X2Value					4.360
PValue					0.037

3.2 Oral Function

At 6 months postoperatively, the observation group demonstrated superior oral function compared to the control group, P<0.05, as shown in Table 3.

Table 3. Comparison of Postoperative Oral Function Between Groups ($\bar{x}$±s)

Group	n	Speech Clarity (%)		Feeding Function (Points)		Chewing Efficiency (%)	
		Preoperative	Postoperative	Preoperative	Postoperative	Preoperative	Postoperative
Observation Group	48	60.29±5.41	92.87±5.49	1.54±0.29	2.47±0.38	55.70±4.96	90.23±4.58
Control Group	48	60.38±5.46	86.40±6.27	1.55±0.30	2.13±0.31	55.81±5.04	85.30±6.15
tValue		0.081	5.379	0.166	4.803	0.108	4.454
PValue		0.936	0.000	0.868	0.000	0.914	0.000

3.3 Quality of Life

At 6 months postoperatively, the observation group scored higher than the control group, P<0.05, as shown in Table 4.

Table 4. Comparison of Postoperative Quality of Life Between Groups ($\bar{x}$±s, points)

Group	n	General Health Status		Mental Health		Physical Pain		Social Functioning	
		Preoperative	Postoperative	Preoperative	Postoperative	Preoperative	Postoperative	Preoperative	Postoperative
Observation Group	48	48.27±5.20	65.25±6.83	49.25±7.01	67.28±6.19	51.21±7.13	66.24±7.13	52.79±6.41	69.40±4.31
Control Group	48	48.49±6.03	61.73±5.94	49.03±6.25	60.79±5.86	51.30±6.87	61.76±7.32	52.17±5.69	60.83±5.27
tValue		0.191	2.694	0.162	5.275	0.063	3.037	0.501	8.721
PValue		0.849	0.008	0.871	0.000	0.950	0.003	0.617	0.000

4. Discussion

The clinical treatment of advanced oral cancer consistently prioritizes tumor radical resection and functional preservation as core objectives. The rationality of the surgical approach directly determines the precision of tumor excision, the extent of tissue damage, and postoperative recovery outcomes, which are crucial for patient treatment experience and long-term prognosis. Optimizing surgical approach strategies represents a key direction for enhancing the diagnostic and therapeutic standards of advanced oral cancer[7]. The traditional lower lip incision approach, a long-established technique in clinical practice, offers mature operational procedures. However, limitations in incision pathways and surgical exposure hinder adequate visualization of deep or extensively infiltrated tumor lesions, increasing the risk of residual disease. This approach also causes significant damage to normal oral physiological structures and neurovascular networks. Postoperative recovery of fundamental functions like speech and eating is slow, with limited improvement in quality of life. This approach struggles to meet current clinical demands that emphasize both precision medicine and patient-centered care, making its limitations

increasingly apparent[8]. As a vital functional organ, the oral cavity performs multiple physiological functions including mastication, speech, and swallowing. Advanced oral cancer patients already suffer functional impairment due to tumor invasion. If surgery further exacerbates tissue damage, it severely impedes patients' return to normal life postoperatively. This underscores the urgent clinical need for superior surgical approaches.

With innovations in oral surgery techniques, the mandibular osteotomy approach has gained clinical adoption due to its core advantage of providing an expansive surgical field. This technique enables the scientific selection of mandibular osteotomy sites to adequately retract bone tissue, thereby expanding the surgical field of view. It clearly delineates tumor margins and their relationship with surrounding tissues, ensuring thorough tumor resection while minimizing unnecessary damage to healthy structures. This approach preserves ample space for postoperative functional recovery, meeting the dual demands of radical tumor removal and functional preservation in advanced oral cancer[9]. Its core advantage lies in achieving a balance between surgical visibility and tissue preservation through optimized anatomical pathways. This enables surgeons to more accurately distinguish tumor tissue from healthy structures within complex surgical environments, avoiding additional damage caused by indiscriminate expansion of resection margins. This precision-oriented surgical philosophy aligns closely with modern surgical trends emphasizing“minimally invasive techniques and functional preservation,”offering advanced oral cancer patients a superior treatment option. The findings of this study further validate the clinical advantages of the mandibular osteotomy approach. Compared to the traditional lower lip incision approach, this technique more effectively enhances clinical outcomes, accelerates the recovery of oral function, and comprehensively improves postoperative quality of life. This functional restoration extends beyond the physiological level to psychological and social dimensions, helping patients reduce negative emotions such as inferiority and anxiety caused by functional impairment, and boosting their confidence in reintegrating into family and society.

Consistent with existing literature, most studies confirm that precision surgical approaches better preserve postoperative function and optimize treatment experience for oral cancer patients compared to traditional techniques. Our findings align with this consensus, further solidifying the value of the mandibular osteotomy approach in advanced oral cancer treatment[10]. Compared to previous studies, this research focuses on advanced-stage patients, refines multidimensional assessments of oral function and quality of life, and systematically observes the impact of surgery on long-term recovery. It supplements targeted clinical data for advanced oral cancer surgery. All subjects were from the same medical institution, ensuring uniform surgical techniques and postoperative care standards, thereby reducing the interference of diagnostic and therapeutic variations on the results and enhancing the reliability and clinical relevance of the conclusions.

However, this study has certain limitations. Its single-center retrospective design, limited sample size, and concentrated case sources may result in insufficient generalizability due to geographical and treatment condition homogeneity, making it difficult to fully adapt to the clinical realities of different medical institutions. Additionally, the study did not further explore the potential impact of individual differences such as patient age and underlying diseases on surgical outcomes. The depth of the research requires expansion and warrants further investigation in subsequent studies.

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