Journal of Neonatal Surgery
ISSN(Online): 2226-0439
Vol.13, (2024)
https://www.jneonatalsurg.com

OPEN ACCESS

Quality of life and functional outcomes after organ-preserving for oral and oropharyngeal squamous cell carcinoma

Wael Mohamed Ahmed [1],[2*], Mohammad Abrar Bhat [3], Mohamed Abdelkader Elmenshawi[4], Osama Ahmed Hamdi [5], Alaa Abdelrhman Ali El Sead Ghiat[6], Barrag Alhazmi [7]

[1] Armed Forces Hospital, Jazan, Saudi Arabia.

[2] Surgical Oncology Department, Faculty of Medicine, Suez Canal University, Ismailia, Egypt.

[3] Specialist Oral and Maxillofacial Surgery, Armed forces Hospital, Jazan, kingdom of Saudi Arabia

[4] General surgery Registrar, Armed Forces Hospital, Jazan, Saudi Arabia.

[5] Dentist, Armed forces hospital, Jazan, Kingdom of Saudi Arabia

[6] General Surgery Department, Al-Ahrar Teaching Hospital, General Organization for Teaching Hospitals and Institutes (GOTHI), Egypt

[7] General and vascular surgery consultant, Armed Forces Hospital, Jazan, Saudi Arabia.

***Corresponding author:**

Wael Mohamed Ahmed

Email ID : drwaelsalem9999@gmail.com

Cite this paper as: Wael Mohamed Ahmed , Mohammad Abrar Bhat , Mohamed Abdelkader Elmenshawi, Osama Ahmed Hamdi , Alaa Abdelrhman Ali El Sead Ghiat, Barrag Alhazmi (2024) Quality of life and functional outcomes after organ-preserving for oral and oropharyngeal squamous cell carcinoma. .Journal of Neonatal Surgery, 13, 2142-2150

ABSTRACT

Background: Combining organ preservation strategies with free-flap reconstructions is a leading approach in treating oral and oropharyngeal squamous cell carcinomas (SCCs).

Objectives: The purpose of this study was to analyze the clinical characteristics, functional outcomes, and quality of life of patients undergoing organ-preserving surgery for oral and oropharyngeal squamous cell carcinoma.

Methods: The study consisted of a single-institution retrospective cohort study with cross-sectional assessment for patients treated from January 2020 to December 2024. Functional outcomes were measured using the Voice Handicap Index-10 (VHI-10); speech intelligibility grading; dysphagia and other clinical severity measures, such as the Dewar's Scale (DOSS); and endoscopic functional swallowing tests. The participants' overall quality of life (QoL)was measured using the EORTC QLQ-C30 and QLQ-H&N35 functional outcomes questionnaires (QoL).

Results: A total of 72 participants were included. Most were male and younger than 70 years with minimal comorbidities. Good voice, speech, and swallowing function were exhibited by more than half. Speech with 61% of the participants and swallowing functioning normally in 57% was present. Overall quality of life was good, with a mean global QoL score of 72.4 ± 18.9. Functional domain scores were high, particularly in the high range for the physical and emotional-social domains. Dry mouth and sticky saliva, associated with and occurring after radiotherapy, were the most severe symptoms.

Conclusion: Patients with stage I and II oral and oropharyngeal cancer who undergo organ conservation with free flap techniques SCC have a good quality of life and functional outcomes with minimal treatment sequelae.

Keywords: *Organ preservation; Quality of life; Functional outcomes; Cancer; Surgery*.

1. INTRODUCTION

In addition to surviving head and neck cancer, it is critical to have outcomes where individuals maintain intact speech and swallow functions. Patients living with head and neck cancer can require a composite of different therapies. These can be selected based on several variables, including cancer type and location, extent of disease, regional lymph node involvement, the patient's overall medical condition and preferences, and the treatment strategies of the medical institution providing treatment (1). While the surviving outcomes of head and neck cancer patients have been studied over the past 15 years about the various therapies that can be used individually or in combination surgery, radiation therapy, and chemotherapy, the medical community continues to have insufficient consensus on these treatment regimens that prolong survival and also

allow the patient to continue to have intact speech and swallow functions (2).

With continued advances improving health outcomes in cancer surgery, patient-reported outcomes are becoming critical endpoints. Quality of life (QoL) and functional outcomes must now become standard measures, as patients are living longer after diagnosis and treatment. The trade-offs between durable oncologic control and maintenance of organ function and psychosocial well-being (body image, speech, psychosocial aspects, and sexual function) are now major factors in surgical decision-making (1,2). The focus on these outcomes has driven the development of organ-preserving surgery as the standard in cancer surgery. Local excision, reconstruction, and even selective non-interventional approaches have become commonplace as durable oncologic control is now required, along with the ability to maintain active levels of functionality (3).

Patients achieve long-term functional outcomes when conservative resection techniques, such as partial glossectomy, are used and when important mobility and structures of the tongue and oral cavity are preserved (4). After surgery, patients report difficulty with articulation and swallowing. Over time, patients improve their articulation and swallowing, in part due to functional adaptation and rehabilitation. Patients also participate in quality of life which indicates that patients who receive organ-preserving procedures have better quality of life compared to those who receive radical resection procedures, despite the functional limitations that are present in advanced cases (5).

Oropharyngeal squamous cell carcinoma is when conservative surgical strategies have shown similar positive functional and quality of life outcomes, especially compared to total glossectomy or multimodal treatment regimens. Studies with long-term follow-up indicate that the preservation of laryngeal and tongue functions is correlated with improved swallowing and speech clarity, and an increase in the quality of life as reported by the patients themselves. Functional outcomes, even in patients with extensive resections, may be acceptable when the principles of organ preservation and the use of adequate rehabilitation are applied, although the deficits may be more pronounced after extensive resections compared to partial resections (6). The emphasis on these findings is that there is a need to prioritize individualized treatment plans. This approach especially aims to achieve a functional loss balance with the preservation of the tumor, therefore optimizing long-term survivorship outcomes (5).

Function preservation is critical during the course of treatment for colorectal, specifically, rectal cancer, as treatment can cause irreversible changes to a patient's bowel control, urine functions, sexual function, and overall psychosocial wellbeing. With regards to bowel-sparing procedures compared to radical resections, it has been noted that, "preserving the sphincter" does not guarantee a better outcome as persistent bowel dysfunction, activity restrictions, and psychosocial problems continue to be reported (7,8). Thus, for early-stage disease, organ-preserving methods, such as combination of radiotherapy and local excision, are becoming more widely accepted as a means of keeping the patient oncologically safe while minimizing the risk of functional impairment (3, 9).

Critically, the idea of organ preservation entails not just "less surgery", but also implants and the recovery of functionality after oncologic resection. Take head and neck oncology as an example. The reconstruction after tongue resection is assessed for flap survival and margins, as well as for speech, swallowing, and social functioning; these outcomes can and have been shown to dictate long-term QoL, just as disease status can (10). The reverse end of the spectrum is also well described in the literature concerning highly radical pelvic procedures, particularly in pelvic exenteration with or without sacrectomy. Here, extensive surgery is unavoidable for control, but it has significant and lasting functional consequences. This makes QoL highly relevant for decision-making, expectation management, and planning postoperative survivorship care (11). This is also what the cited studies are trying to convey. A common principle across these studies is that organ-preserving oncologic surgery should be assessed through a double prism: oncologic effectiveness and functional recovery, that is, patient-centered. This demands the validated use of QoL measurements and long-term outcomes assessment to inform the outcomes that matter (12-14).

The advancement of sophisticated radiotherapy with new fractionation schedules and protocols utilizing combined chemoradiation has raised hopes that damage to oral and pharyngeal structures will lessen the functional complications that follow aggressive surgical interventions. Over the past 40 years, the literature on head and neck oncology, encompassing strategies for organ preservation, has grown substantially. This study aims to evaluate the quality of life and functional outcomes associated with organ preservation in patients with cancer.

2. METHODOLOGY

Study design

This was a single-institution retrospective cohort study with cross-sectional assessment of functional outcomes and quality of life at least one year postoperatively. Identifying all eligible patients who underwent oncologic resection with free flap reconstruction for oral or oropharyngeal squamous cell carcinoma between January 2020 and December 2024, and then conducting a cross-sectional function and quality-of-life assessment.

Patients

This study included patients who underwent oncologic resection followed by free flap reconstruction for oral or oropharyngeal squamous cell carcinoma at our institution from January 2020 to December 2024. Patients were included only if they were alive and free of disease at the time of evaluation. This condition guaranteed that all cases had at least one year of postoperative follow-up.

Inclusion criteria

Patients who received procedures first oncologic surgery, then, two days later, free-flap reconstruction for squamous cell carcinoma of the oral cavity or oropharynx during the time frame of the study were considered eligible.

In addition, all patients had to be alive and free of disease at the time of evaluation, corresponding to at least 1 year post-surgery.

Exclusion criteria

Study participants were excluded if they experienced complications from microvascular reconstruction that resulted in complete necrosis of the free flap. Those diagnosed with additional comorbidities anticipated to significantly impair the procedure's functional outcome or compromise the patient's quality of life were also excluded from the study.

Tumor staging and comorbidity assessment

Tumor staging was based on the 2009 American Joint Committee on Cancer staging system. Patient comorbidity was evaluated using the Kaplan–Feinstein Index, which standardizes the assessment of preexisting medical conditions that may affect postoperative outcomes.

Surgical classification

Ablative surgical procedures were classified into two distinct types based on mandible involvement and reconstruction strategies. Type 1 procedures were oral and oropharyngeal resections without a segmental mandibulectomy and reconstruction with fasciocutaneous free flaps. Type 2 procedures were oral and oropharyngeal resections with a segmental mandibulectomy and reconstruction with osteocutaneous free flaps. In all cases, the free flaps were unreinnervated.

Evaluation of functional outcomes and quality of life

Over a year postoperatively, the same experienced head and neck surgeon performed evaluations of functional outcomes and patient quality of life to reduce interobserver discrepancies. An array of complementary clinical and patient-reported outcome measures was used to assess speech and swallowing function.

Speech assessment

The outcomes of the participants' speech were assessed using both subjective and clinical evaluations. The participants were administered the Voice Handicap Index-10, a validated 10-item questionnaire designed to measure the severity of speech-related disability; scores range from 0 to 40, with higher scores indicating greater disability. During the evaluation, hypernasality was diagnosed. Speech clarity was assessed using a four-tier clinical scale, ranging from standard or almost normal to severely altered or unintelligible, based on the need for speech repetition and overall clarity.

Swallowing assessment

The severity of the swallowing dysfunction was determined using the Dysphagia Outcome and Severity Scale, a standardized, 7-level instrument in which 7 indicates normal swallowing. Folding fiber-optic laryngoscopy was also used to examine swallowing dysfunction, employing a blue liquid dye and soft food. This evaluation examined the closure of the nasopharynx, as well as the penetration/aspiration, and any oral and pharyngeal residue, as well as the involuntary loss of the labial of the soft food.

Additional functional measure

Mouth opening has been examined as an objective parameter for evaluating jaw function and measured as the interincisor distance using a caliper.

Quality of life assessment

We used validated versions of the European Organization for Research and Treatment of Cancer (EORTC) Core Quality of Life Questionnaire (QLQ-C30) and the EORTC Head and Neck Cancer Quality of Life Questionnaire (QLQ-H&N35), which are specific modules used to assess participants' quality of life. Following EORTC's scoring guidelines, all scale and single-item scores were converted to a 0-100 scale via a linear transformation. For the functioning and overall quality of life scores on the functional scales, a higher score was consistent with better functioning. In contrast, for the symptom scales and single-item assessments, a higher score was consistent with increased burden, or problems of greater severity.

Ethical consideration

Approval from the Institutional Review Board was obtained for the current study. The study adhered to the ethical principles

outlined in the Declaration of Helsinki. During the follow-up visit (≥1 year postoperatively), informed consent was obtained face to face and study objectives, the nature of the assessments, and confidentiality protections were explained; patients were informed of the voluntary nature of study participation and that it would not impact their care, and that the withdrawing from the study was an option available to them at any time without any repercussions.

Statistical analysis

The version of IBM SPSS Statistics (Version 26.0; IBM Corp., Armonk, NY, USA) was used for all of the statistical analysis. Categorical variables (e.g., sex, age group, comorbidity category, radiotherapy timing, salvage surgery, and surgery type) were summarized as frequencies and percentages, while continuous outcomes from the EORTC QLQ-C30 and EORTC QLQ-H&N35 were presented as mean ± standard deviation (SD) with 95% confidence intervals (CI). Comparisons between subsites for categorical variables were conducted using the χ^2 test; Fisher's exact test was applied when expected cell counts were <5. Differences in continuous quality-of-life and symptom scores between groups were evaluated using the independent-samples t test for approximately normally distributed data, and the Mann–Whitney U test when normality assumptions were not met. All tests were two-tailed, and statistical significance was set at $p < 0.05$.

Results

Among the study participants (n = 72), the majority were male, aged 70 years or younger, and had low comorbidity (KFI < 2; 80.6%). Patients received radiotherapy more often after surgery than before surgery. Among the subsites, the oropharyngeal participants (n = 38) exercised higher percentage of postoperative radiotherapy. The percentage of patients who underwent salvage surgery was relatively low (8.3%), with a higher proportion in the oropharynx (10.5%) than in the oral cavity (5.9%) (Table 1).

Table 1. Clinical characteristics of the patients

Clinical characteristics	All (n = 72)	Oral cavity (n = 34)	Oropharynx (n = 38)	P value
Gender				0.02
Men	50 (69.4%)	22 (64.7%)	28 (73.7%)	
Women	22 (30.6%)	12 (35.3%)	10 (26.3%)	
Age (years)				0.04
< 70	60 (83.3%)	27 (79.4%)	33 (86.8%)	
≥ 70	12 (16.7%)	7 (20.6%)	5 (13.2%)	
Comorbidity				≤0.001
KFI < 2	58 (80.6%)	26 (76.5%)	32 (84.2%)	
KFI ≥ 2	14 (19.4%)	8 (23.5%)	6 (15.8%)	
Preoperative radiotherapy	9 (12.5%)	4 (11.8%)	5 (13.2%)	0.03
Postoperative radiotherapy	52 (72.2%)	21 (61.8%)	31 (81.6%)	
Salvage surgery	6 (8.3%)	2 (5.9%)	4 (10.5%)	≤0.001

KFI, Kaplan-Feinstein Index.

Among the subsites, the oropharyngeal participants exercised higher Type 1 (81.6%) than other Types (44.1%); Type 2 (n = 34) was exercised by those in the oral cavity, which implies that more of those in the oral cavity group were likely to require segmental mandibulectomy/osteocutaneous reconstruction.

Table 2. Comparison between types of surgery in patients

Clinical characteristics	All (n = 72)	Oral cavity (n = 34)	Oropharynx (n = 38)	P value
Type 1 surgery	46 (63.9%)	15 (44.1%)	31 (81.6%)	≤0.001
Type 2 surgery	26 (36.1%)	19 (55.9%)	7 (18.4%)	

Overall functional outcomes were positive, with 'good' voice, speech, and swallowing function noted in more than half of patients. In most cases, VHI-10 scores were low, and only a small proportion of patients met the criteria for severe voice handicap. Speech intelligibility was normal in 61% of patients; however, a large group of patients (39%) were noted to have speech with significantly decreased intelligibility. 57% of patients demonstrated normal swallowing function with a score of 5 or more on the Dysphagia Outcome and Severity Scale (DOSS), and 35% were noted to have mild to moderate dysphagia, and 8% of patients suffered from severe dysphagia (Table 3).

Table 3. Functional outcomes of the patients

Functional outcome	No. of cases (n=72)	%
VHI-10 (0–10)	40	56
VHI-10 (11–20)	18	25
VHI-10 (21–30)	10	14
VHI-10 (31–40)	4	5
Normal speech intelligibility	44	61
Reduced intelligibility	28	39
Normal swallowing (DOSS ≥5)	41	57
Mild–moderate dysphagia	25	35
Severe dysphagia	6	8

VHI, Voice Handicap Index; DOSS, Dysphagia Outcome and Severity Scale

On average, the individuals in the sample demonstrated strong function and excellent quality of life post treatment, particularly in the general domain of their QoL, which was measured at 72.4 ± 18.9 (95% CI: 68.1-76.7). This was also indicated in the subscores about the global performance (physically (82.1), role (79.6), emotional (77.9), and social (75.2)), which showed maintenance of the ability to perform daily activities alongside the psychosocial aspects of life (active daily living and social wellbeing). Even so, the sample showed a low-to-moderate symptom burden of fatigue (30.8) and pain (22.4) (Table 4).

Table 4. EORTC QLQ-C30 scores

Variable	Mean ± SD	95% CI
Global quality of life	72.4 ± 18.9	68.1 – 76.7
Physical functioning	82.1 ± 20.3	77.2 – 86.4
Role functioning	79.6 ± 25.1	73.8 – 85.4
Emotional functioning	77.9 ± 23.6	72.5 – 83.3
Social functioning	75.2 ± 28.4	68.9 – 81.5
Fatigue	30.8 ± 27.6	24.5 – 37.1
Pain	22.4 ± 26.9	16.2 – 28.6

The scores can vary from 0 to 100. For the functional and global scales of the quality of life (QoL) survey, higher scores indicate better functional capacity. Symptom scales, however, as well as problem scales, are such that the higher the score, the higher the degree of his/her problem or symptom. CI 95% refers to the 95% confidence interval.

The most common problems after treatment and their head and neck-specific symptoms are dry mouth, with a mean of 60.2. This aligns with dry mouth associated with radiation therapy. Dry mouth is also associated with a mean of 46.1, with sticky saliva. There are social eating problems that can affect one's ability to participate in a meal fully. Pain and problems with swallowing and speech occur in approximately 26 to 32 (moderate level of symptoms) of patients (table 5).

Table 5. EORTC QLQ-H&N35 scores

Variable	Mean ± SD	95% CI
Pain	26.3 ± 22.8	21.1 – 31.5
Swallowing	31.7 ± 24.6	26.0 – 37.4
Speech problems	27.5 ± 26.2	21.6 – 33.4
Social eating	41.9 ± 33.7	34.1 – 49.7
Dry mouth	60.2 ± 35.4	52.0 – 68.4
Sticky saliva	46.1 ± 39.2	37.1 – 55.1

Scores range from 0 to 100. A high score on a symptom or single-item scale indicates a high level of symptoms or problems. CI 95%, 95% confidence interval.

3. DISCUSSION

The philosophy of oncologic surgery, particularly with respect to organ preservation, has shown a trend toward prioritization across various cancer types. Formerly focused on disease control, the focus now centers on preserving organ function and quality of life. The Preservation of specific anatomical structures and the associated functions of speech, swallowing, continence, and social function in the context of the morbidities of these disorders is due to advanced surgical, reconstructive, and adjunctive techniques (15).

There is a lesser degree of symptom burden with the radical approach and the resulting morbidity of the disorders. The same holds for studies in colorectal, urologic, and head-and-neck oncology, with the radical surgical approach and resulting morbidity. Preservation approaches in oncology are associated with better patient-reported outcomes, with higher levels of physical, emotional, and social strength and well-being than with radical approaches and even higher than with symptom burden (16,17).

The purpose of this study was to analyze the clinical features, outcomes, and health-related QoL outcomes in residents who underwent and survived oncological resection and free-flap reconstruction of the head and neck (oral and oropharyngeal) squamous cell carcinoma. The study emphasizes survival outcomes (rather than traditional oncologic outcomes) as reflecting the contemporary paradigm shift toward patient-centered outcomes, in which functional outcomes and QoL post-treatment become the dominant markers of success in therapeutic interventions. The use of validated instruments (VHI-10, DOSS, EORTC QLQ-C30, QLQ-H&N35) facilitated a multi-dimensional post-treatment recovery assessment, in accordance with the contemporary principles of outcome reporting in organ-preserving strategies (16,18), covering the expected domains of recovery (physical, functional, and psychosocial) for the specialty.

From a methodological perspective, the cross-sectional design enabled thorough post-treatment assessment among patients who were clinically stable and had at least a one-year follow-up, suggesting that the effects of the actual treatment had largely dissipated. This is similar to QoL studies in other oncologic disciplines, such as colorectal and urologic cancers, where greater emphasis is placed on chronic functional outcomes. However, in contrast to extensive multi-institutional studies, the current report provides in-depth head and neck functional data that are clinically relevant and contribute to understanding the actual post-treatment survivorship of this patient cohort (18, 19).

This population was mostly people who are male, younger than 70, and who have a low burden of comorbidity, i.e., these are factors that are helpful for postoperative recovery and functional impairment. The increased occurrence of postoperative radiation therapy, especially evidenced in patients diagnosed with tumors of the oropharynx, is in line with the accepted course of action for therapy that aims to achieve locoregional therapeutic control best while sparing the involved organ of any unnecessary modifications. Equally, the greater prevalence of Type 1 surgeries in the oropharynx group is consistent with the plan for reconstruction using fasciocutaneous flaps, aimed at preserving speech and swallowing (20,21).

On the contrary, the patients diagnosed with tumors of the oral cavity underwent Type 2 surgery much more frequently than the others, and this Type 2 surgery involved segmental mandibulectomy and surgery that combines bone and skin grafting (osteocutaneous reconstruction). This illustrates more pronounced functional and anatomical challenges associated with this subsite. This is in line with the findings of others that have shown that cancers that are located in the oral cavity often require greater resections than what is typical, which may put patients at increased functional handicap. The low rates of salvage surgery observed in this cohort further support the predominant effectiveness of the primary treatment approach, which is comparable to other organ-preservation and reconstructive oncology studies (4, 22).

Most patients retained good voice function and achieved normal speech clarity and appropriate swallowing. Most patients achieved low Voice Handicap Index scores and therefore had a voice handicap that was unnoticeable. Scores on the Dysphagia Outcomes and Severity Scale indicated that the number of patients who had severe dysphagia was small. These findings are consistent with head and neck and other cancer literature, affirming the conclusions of the use of new reconstructive surgery to restore the ability to perform essential activities of daily living in the head and neck region while achieving a reasonable quality of life (10, 15).

Access to health services, Global QoL, and all four functioning domains of the EORTC QLQ-C30 were likely high, indicating that physical, emotional, role, and social functioning were preserved. These findings are consistent with outcomes documented in survivorship studies conducted after more extended periods of life, in which patients demonstrate the ability to adapt to constraints and remain functionally resilient, despite persistent disabling symptoms. The presence of moderate symptoms of fatigue and pain indicates that the disability was preserved and that there was no complete resolution of symptoms; patterns that have also been documented to occur in populations dealing with cancer in the pelvic region and colon (23,24).

Despite improvements in global quality of life, the head-and-neck-specific symptom assessments indicated that the most prominent complaints remained xerostomia and sticky saliva. These findings are attributable to salivary gland dysfunction resulting from radiotherapy and have been cited as the primary reasons for reduced social engagement and oral comfort. Issues such as social eating, moderate to severe impediments to speech and swallowing, and the residual impact of generalized treatment on patients' daily lives are typically not considered when functional deficits in individuals are scored

as favorable (21, 24).

Achieving overall QoL and favorable functional outcomes is possible after free-flap reconstruction for oral and oropharyngeal cancers. It is particularly likely among patients with low comorbidity, planned reconstruction, and favorable functional scores. However, cross-sectional data show that head-and-neck-specific stem symptoms remain common and indicate the potential impact of collaborative rehabilitation and symptom-targeted survivorship care (9,16).

4. LIMITATIONS

There are several significant limitations to this study. The study was conducted at a single institution over a single period, which may have limited the generalizability of the results to other centers with different surgical expertise, patient populations, or rehabilitation protocols. Second, the sample size of this study was small. Moreover, the study was conducted only among disease-free survivors at least 1 year postoperative, which may have introduced selection and survivorship bias, leading to overestimation of quality-of-life scores and functional outcomes. Functional status and quality of life were assessed only once; therefore, the study cannot assess potential changes or recovery trajectories.

5. CONCLUSION

This study suggests that patients undergoing organ-preserving oncologic surgery with free-flap reconstruction exhibit favorable functional outcomes and overall sound quality of life, as evidenced by high EORTC QLQ-C30 functional scores for voicing, speech, and swallowing. Although persistent xerostomia and other treatment-related sequelae were common, they did not appear to significantly compromise overall quality of life in long-term survivors. These observations are consistent with other survivorship studies and indicate that patients often report satisfaction despite surviving with QoL at risk for unresolved localized symptoms. This also underscores the importance of organ preservation and the provision of carefully designed rehabilitative and supportive services that continue over time.

REFERENCES

[1] Park EJ, Baik SH. Functional outcomes after sphincter-preserving surgeries for low-lying rectal cancer: a review. Precision and Future Medicine. 2021;5(4):164-174.
[2] Nocera F, Angehrn F, von Flüe M, Steinemann DC. Optimising functional outcomes in rectal cancer surgery. Langenbecks Arch Surg. 2021;406(2):233-250.
[3] Bach SP, Gilbert A, Brock K, Korsgen S, Geh I, Hill J, et al. Radical surgery versus organ preservation via short-course radiotherapy followed by transanal endoscopic microsurgery for early-stage rectal cancer (TREC): a randomised, open-label feasibility study. Lancet Gastroenterol Hepatol. 2021;6(2):92-105.
[4] Quinsan IDCM, Costa GC, Priante AVM, Cardoso CA, Nunes CLS. Functional outcomes and survival of patients with oral and oropharyngeal cancer after total glossectomy. Braz J Otorhinolaryngol. 2020;86(5):545-551.
[5] Riva G, Sapino S, Ravera M, Elia G, Pecorari G. Long-term functional outcomes and quality of life after partial glossectomy for T2 squamous cell carcinomas. Braz J Otorhinolaryngol. 2022;88:S33-S43.
[6] Nemade H, Thaduri A, Gondi JT, Chava S, Kumar A, Raj P, et al. Five-year long-term functional and quality of life outcomes in total glossectomy survivors. Eur Arch Otorhinolaryngol. 2025;282(4):2063-2070.
[7] Kang SB, Cho JR, Jeong SY, Oh JH, Ahn S, Choi S, et al. Quality of life after sphincter preservation surgery or abdominoperineal resection for low rectal cancer (ASPIRE): a long-term prospective, multicentre, cohort study. Lancet Reg Health West Pac. 2021;6:100087.
[8] Pappou EP, Temple LK, Patil S, Smith JJ, Wei IH, Nash GM, et al. Quality of life and function after rectal cancer surgery with and without sphincter preservation. Front Oncol. 2022;12:944843.
[9] Rullier E, Vendrely V, Asselineau J, Rouanet P, Tuech JJ, Valverde A, et al. Organ preservation with chemoradiotherapy plus local excision for rectal cancer: 5-year results of the GRECCAR 2 randomised trial. Lancet Gastroenterol Hepatol. 2020;5(5):465-474.
[10] Yi CR, Jeong WS, Oh TS, Koh KS, Choi JW. Analysis of speech and functional outcomes in tongue reconstruction after hemiglossectomy. J Reconstr Microsurg. 2020;36(7):507-513.
[11] McCarthy ASE, Solomon MJ, Koh CE, Firouzbakht A, Jackson SA, Steffens D. Quality of life and functional outcomes following pelvic exenteration and sacrectomy. Colorectal Dis. 2020;22(5):521-528.
[12] Cai Z, Yuan X, Li H, Feng X, Du C, Han K, et al. Bowel function, quality of life, and mental health of patients with high-grade intraepithelial neoplasia or T1 colorectal cancer after organ-preserving versus organ-resection surgeries: a cross-sectional study at a Chinese tertiary care center. Surg Endosc. 2024;38(10):5756-5768.
[13] Collard M, Lefevre JH. Ultimate functional preservation with intersphincteric resection for rectal cancer. Front Oncol. 2020;10:297.
[14] Sun G, Lou Z, Zhang H, Yu GY, Zheng K, Gao XH, et al. Retrospective study of the functional and oncological outcomes of conformal sphincter preservation operation in the treatment of very low rectal cancer. Tech Coloproctol. 2020;24(10):1025-1034.

[15] Nicoletti R, Alberti A, Castellani D, Yee CH, Zhang K, Poon DM, et al. Functional outcomes and safety of focal therapy for prostate cancer: a systematic review on results and patient-reported outcome measures (PROMs). Prostate Cancer Prostatic Dis. 2024;27(4):614-622.
[16] Fokas E, Appelt A, Glynne-Jones R, Beets G, Perez R, Garcia-Aguilar J, et al. International consensus recommendations on key outcome measures for organ preservation after (chemo)radiotherapy in patients with rectal cancer. Nat Rev Clin Oncol. 2021;18(12):805-816.
[17] Baird P, Steinke JD, Minnaar HS, Stewart AJ. Assessment of quality of life in rectal cancer with organ-preservation treatment: are we there yet? Clin Oncol (R Coll Radiol). 2023;35(2):e110-e120.
[18] van der Valk MJ, van der Sande ME, Toebes RE, Breukink SO, Bröker ME, Doornebosch PG, et al. Importance of patient reported and clinical outcomes for patients with locally advanced rectal cancer and their treating physicians: do clinicians know what patients want? Eur J Surg Oncol. 2020;46(9):1634-1641.
[19] Fernández-Martínez D, Rodríguez-Infante A, Otero-Díez JL, Baldonedo-Cernuda RF, Mosteiro-Díaz MP, García-Flórez LJ. Is my life going to change? A review of quality of life after rectal resection. J Gastrointest Oncol. 2020;11(1):91-102.
[20] Visini M, Giger R, Shelan M, Elicin O, Anschuetz L. Predicting factors for oncological and functional outcome in hypopharyngeal cancer. Laryngoscope. 2021;131(5):E1543-E1549.
[21] Kouka M, Beckmann L, Bitter T, Kaftan H, Böger D, Büntzel J, et al. Oncological and functional outcome after laryngectomy for laryngeal and hypopharyngeal cancer: a population-based analysis in Germany from 2001 to 2020. Sci Rep. 2024;14(1):7761.
[22] Pfuetzenreiter EG Jr, Ferreron GF, Sadka JZ, de Souza ABP, Matos LL, Kowalski LP, et al. Total laryngectomy vs non-surgical organ preservation in advanced laryngeal cancer: a meta-analysis. Braz J Otorhinolaryngol. 2024;90(3):101404.
[23] Ghignone F, Hernandez P, Mahmoud NN, Ugolini G. Functional recovery in senior adults undergoing surgery for colorectal cancer: assessment tools and strategies to preserve functional status. Eur J Surg Oncol. 2020;46(3):387-393.
[24] Hammermüller C, Hinz A, Dietz A, Wichmann G, Pirlich M, Berger T, et al. Depression, anxiety, fatigue, and quality of life in a large sample of patients suffering from head and neck cancer in comparison with the general population. BMC Cancer. 2021;21(1):94...