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Compartmental Surgery for Oral Tongue Cancer: Objective and Subjective Functional Evaluation

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Objective: To assess functional outcomes in patients treated by compartmental tongue surgery (CTS) and reconstruction for advanced oral tongue/floor-of-mouth cancer.

Study Design: Retrospective case series.

Methods: A retrospective cohort of patients (n = 48) treated by CTS and free flap reconstruction was prospectively evaluated concerning postoperative functional outcomes at different time points (6 months and 1 year). Swallowing was studied by videonasal endoscopic evaluation (VEES) and videofluoroscopy (VFS), testing various food consistencies and grading the results with the Donzelli scale. Speech articulation, lingual strength, and endurance were studied by phone call and Iowa Oral Performance Instrument (IOPI). Subjective tests (EORTC H&N35 and UWQOL) were administered.

Results: After 1 year, VEES showed a Donzelli scale of 67% level 1, 23% level 2, and 10% level 3. Vallecular pouch was present in 81% of patients. VFS showed levels 1, 2, and 3 in 42%, 25%, and 33%, respectively, with liquids (L); 48%, 19%, and 33%, with semi-liquids (SL); and 54%, 33%, and 13%, with semi-solids (SS). Vallecular pouch residue was present in 69% with L, 73% with SL, and 87% with SS. The mean number of words recognized at phone call was 56 of 75 (range, 27–74). IOPI showed a mean tongue strength of 19.2 kPa (range, 0–40), and a mean endurance of 16.2 seconds (range, 0–60).

Conclusion: CTS does not significantly affect speech. Sub-clinical food aspiration and vallecular pouch are present in a significant proportion of patients, especially when adjuvant treatments are administered. Residual tongue strength is not affected when proper reconstruction is performed.

Key Words: Oral cavity, microvascular reconstruction and transplant surgery, swallowing/dysphagia, speech language pathology.

Level of Evidence: 4

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INTRODUCTION

Treatment strategies for oral tongue/floor-of-mouth squamous cell carcinoma (OTFOMSCC) have not substantially changed in the last decades and consist, for advanced lesions, in surgery followed by adjuvant radiotherapy (RT) or chemoradiotherapy (CRT). Conventional oral surgery with macroscopic healthy margins of 1–2 cm has not been universally accepted as a proper technique to optimize local control and may present issues in terms of consistency and reproducibility. Moreover, based on anatomical studies and previous reports focusing on the diffusion pattern of OTFOMSCC, the importance of extrinsic muscles and paramedian/lateral lingual septa involvement as potential avenues for loco-regional tumor spread has been recognized to play a pivotal role when planning surgical treatment.[1–3]

Last update of the TNM staging system introduced the parameter of depth of infiltration (DOI) as a relevant prognosticator that is able per se to accordingly stratify different tumors.[4,5] In particular, OTFOMSCC with a DOI > 10 mm have been demonstrated to be associated with a high risk of residual disease when treated by conventional transoral approaches.[6–8] Therefore, since the seminal papers of Calabrese et al.,[9–12] compartmental tongue surgery (CTS) has been proposed in advanced lesions with the intent to remove the tumor en bloc, within the entire hemitongue and floor-of-mouth compartment, along with the T-N tract and draining lymph nodes, thus standardizing the surgical technique and improving loco-regional control. The authors compared long-term oncological outcomes of CTS with those of a historical cohort of patients treated by standard transoral surgery and found an improvement in 5-year local, loco-regional controls, and overall survival of 16.8%, 24.4%, and 27.3%, respectively.[10] Similar favorable results were

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independently confirmed by our group, at least when considering naive tumors, but not in the salvage setting.[13]

One of the main concerns regarding CTS is represented by a presumed excessive impairment of speech and swallowing, possibly derived from the removal of the entire hemitongue and floor-of-mouth compartment, with ensuing flap reconstruction. The aim of this study was therefore to investigate the long-term functional outcomes in patients treated by CTS and reconstructed by free flaps for advanced stage OTFOMSCC by objective and subjective evaluations of swallowing and speech.

MATERIALS AND METHODS

This study was conducted in a tertiary academic referral hospital (Department of Otorhinolaryngology–Head and Neck Surgery, University of Brescia, Italy) from March 2008 to October 2017 on 48 patients consecutively treated with CTS followed by fasciocutaneous free flap reconstruction for naive OTFOMSCC with a DOI > 10 mm (Table I). Inclusion and exclusion criteria are summarized in Table II. Four patients were excluded from the study for death occurring during the study period: two for loco-regional relapse, one for distant metastases, and one for other non-oncological disease.

Preoperative work-up encompassed tumor biopsy, contrast-enhanced magnetic resonance (MR) for DOI evaluation, neck ultrasonography (US), and positron emission tomography (PET). All patients received tracheotomy and nasogastric feeding tube (NGFT). Antibiotic prophylaxis (ampicillin sulbactam +/– metronidazole) was routinely administered.

The CTS technique has been described in detail in previous studies.[3,9–11,13] Reconstruction was accomplished in all patients by either radial forearm (RF) or anterolateral thigh (ALT) free flaps.

Postoperative swallowing and speech rehabilitation under the guidance of a dedicated speech therapist started at bedside in the immediate postoperative course (seventh postoperative day or later if intervening complications).

A few patients (n = 10%, 20.8%) were evaluated at 6 months from the end of treatment (including adjuvant therapy, when indicated). On the other hand, all patients received functional assessment after 12 months. Patients were submitted to objective tests as

TABLE I.
Demographic and Oncologic Data.

No. of Patients	48
Mean age, yr (range)	59 (26–86)
No. of patients over-70	13 (27%)
M:F ratio	2:1
ASA score 2	31 (64.6%)
ASA score 3	17 (35.4%)
Pull-through approach	44 (92%)
Transmandibular approach	4 (8%)
Marginal mandibulectomy	2 (4%)
Unilateral neck dissection	33 (69%)
Bilateral neck dissection	15 (31%)
Type of free flap	RF 32 (67%)ALT 16 (33%)
Oropharyngeal involvement	14 (30%)ALT (9/14; 64.3%)RF (5/14; 35.7%)
Adjuvant (C)RT	33 (69%)CRT 13 (27%)RT 20 (42%)

ASA = American Society of Anesthesiologists; ALT = antero-lateral thigh; (C)RT = (chemo)radiotherapy; RF = radial forearm.

TABLE II.
Inclusion and Exclusion Criteria for CTS.

Inclusion Criteria	Exclusion Criteria
SCC of oral tongue/floor of mouth	MR finding of massive transgression of the median lingual raphe with bilateral tongue compartments involvement
DOI > 10 mm at MR	Major involvement of other oral subsites, oropharynx, and/or medullary infiltration of the mandible
Both conservative transmandibular and pull-through approaches	Reconstruction performed by flaps other than RF/ALT
Reconstruction by RF or ALT free flaps	Previous head and neck (C)RT
Postoperative survival >1 year	

ALT = antero-lateral thigh; (C)RT = (chemo)radiotherapy; DOI = depth of infiltration; MR = magnetic resonance; RF = radial forearm; SCC = squamous cell carcinoma.

videonasal endoscopic evaluation (VEES) and videofluoroscopy (VFS) for swallowing assessment, phone call for evaluation of speech articulation, and tongue strength and endurance testing (Fig. 1A,B).

VEES was performed with colored semiliquid bolus and coupled with transoral evaluation of oral/oropharyngeal post-swallowing pooling. VFS was carried out by oral administration of liquid (L), semiliquid (SL), and semisolid (SS) contrast medium (barium) in the right lateral and antero-posterior projections with digital registration of swallowing (30 frames/sec) using a Siregraph CF (Siemens, Forchheim, Germany).

All VEES and VFS examinations were recorded and graded according to a 3-point scale proposed by Donzelli et al.[14]: level 1, no laryngeal vestibule food entering; level 2, laryngeal vestibule food entering without penetration or aspiration; level 3, tracheal aspiration. Other parameters evaluated were delayed swallowing and oral/pharyngeal post-swallowing pooling. VEES were blindly and separately estimated by three independent otolaryngologists. The same otolaryngologists and one dedicated radiologist graded each VFS examination in the same way.

We selected particular combinations of tongue shapes, places, and manners of speech articulation to test the most resection-influenced phonemes (Fig. 2). During a phone call, patients were asked to read a list of 75 words containing these phonemes to an inexpert listener. Subsequently, a score ranging from 0 to 5 points (according to the number of words recognized for each single phoneme) was assigned (Table III).

The Iowa Oral Performance Instrument (IOPI) produced by the IOPI Medical (Woodinville, WA, USA) is a validated diagnostic and therapeutic device that objectively assesses tongue elevation strength by measuring the maximum pressure (expressed in kPa) on a standard sized air-filled bulb by pressing it between the hard palate and tongue (Fig. 1A,B).[15] It allows for comparing patient data to that in normal subjects (50th percentile of tongue strength, 60.7 kPa).[16] IOPI can be used to assess tongue fatiguability by measuring its endurance (inversely proportional to the former). Endurance is measured by quantifying the time (in seconds) that a patient can maintain 50% of the maximum pressure. In this setting, we used the IOPI as a measure of postoperative function: for each patient, we performed three tests, with 60-second pauses. The final results for strength and endurance were the mean values of the three tests.

Subjective tests for function evaluation were also administered in all patients after 1 year from the end of treatment. Specifically, the EORTC H&N35 (questions 35, 36, 37, and 38) and

Fig. 1. (A) Iowa Oral Performance Instrument (IOPI) device. (B) intraoral position of IOPI during patient evaluation. [Color figure can be viewed in the online issue, which is available at www.laryngoscope.com.]

UWQOL v.4 (question 5) questionnaires were adopted for swallowing. EORTC H&N35 (questions 53, and 54) and UWQOL v.4 (question 7) were used for evaluation of speech function.

Statistical Analysis

Statistical analysis was performed with JMP Pro14 software (SAS Institute Inc., Cary, North Carolina, USA). Parameters that significantly influenced the objective functional outcomes were evaluated with logistic regression analysis to simultaneously adjust for different confounders. The technique requires a dichotomous dependent (Y) and a set of independent variables (X) that are classified as prognostic factors. Independent variables were: evaluation time (6 vs. 12 months), age (more or less than 70 years), death occurred before or after 1 year from treatment (yes vs. no), type of flap used (RF vs. ALT), resection of oropharyngeal structures (yes vs. no), and adjuvant treatments (yes vs. no). Dichotomous dependent variables of the analyzed logistics model were: VEES, VFS, telephone call, resistance, and pressure tests. For the apex, body and posterior tongue speech articulation scores, as well as for pressure and resistance tests, the corresponding averages were taken as cut-off values.

With the logistic regression and the related odds ratio, we evaluated the risk (or probability) of the response of each Y according to the above-mentioned X variables that were supposed to be correlated with the course of the disease. The significance of the logistic model was evaluated with the chi-square (Whole Model) and the Wald tests for validity of the effects.

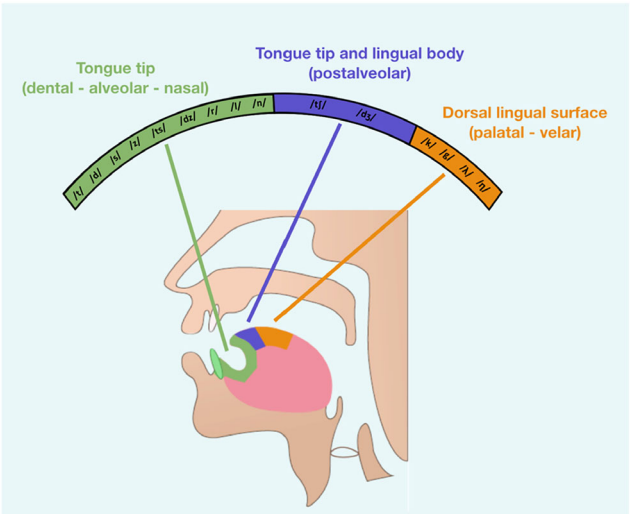

Fig. 2. Schematic drawing of phonemes tested for places and manners of tongue articulation after surgery. [Color figure can be viewed in the online issue, which is available at www.laryngoscope.com.]

RESULTS

All patients were postoperatively decannulated (mean tracheotomy dependence time, 10 days), and 2 (4%) remained gastrostomy-tube dependent at 1 year from the end of treatment.

Concerning microsurgical reconstructive outcomes, no total free flap failure nor donor site surgical complication occurred. Recipient site minor complications were observed in two patients: one cervical seroma and one pharyngocutaneous fistula, both healed with conservative treatments. Major complications (requiring return to the operatory room) were observed in four cases: one need for redo-venous anastomosis, one revision for hemorrhage, one RF free flap partial necrosis salvaged by a pectorals

TABLE III.
Phonemes Tested for Speech Articulation.

		Combinations of Tongue Shapes and Places of Articulation			
		Tongue Tip	Tongue Tip and Lingual Body	Dorsal Lingual Surface	Total Score
Manners	Stop	/t/ /d/ (dental)		/k/ /g/ (velar)	
	Fricative	/s/ /z/ (dental)			
	Affricative	/ts/ /dz/ (dental)	/t∫/ /d3/ (postalveolar)		
	Approximant	/r/ (alveolar)			
	Lateral	/l/ (alveolar)		/λ/ (palatal)	
	Nasal	/n/ (nasal)		/η/ (palatal)	
Scores		0–45	0–10	0–20	0–75

major pedicled flap, and one drainage of oro-cervical fistula with neck abscess due to flap dehiscence.

Early Evaluation (6 Months)

VEES. The rate of aspiration classified according to the Donzelli scale was level 1 in 60% (n = 6), level 2 in 30% (n = 3), and level 3 in 10% (n = 1). Post-deglutition residue was present at the level of the vallecular pouch in eight (80%) patients, glosso-tonsillar sulcus in seven (70%), piriform sinus in five (50%), and floor of mouth in three (30%). Prolonged swallowing time was observed in six (60%) patients.

VFS. The percentage of patients showing Donzelli level 1, 2, or 3 were 10% (n = 1), 20% (n = 2), and 70% (n = 7) with L; 40% (n = 4), 30% (n = 3), and 30% (n = 3) with SL; and 50% (n = 5), 30% (n = 3), and 20% (n = 2) with SS, respectively. Vallecular pouch residue rate was 80% (n = 8) with L, 50% (n = 5) with SL, and 100% (n = 10) with SS. We observed piriform sinus residue in 30% (n = 3), 30% (n = 3), and 50% (n = 5) of cases with L, SL, and SS, respectively. Finally, we observed a prolonged swallowing time with L, SL, and SS in 30% (n = 3), 40% (n = 4), and 70% (n = 7) of patients, respectively.

Speech evaluation. The mean number of words correctly recognized by an inexpert listener during a phone call with the patient were 52 (range, 32–68). The number and distribution of recognized words according to the overall phonemic type are detailed in Figure 2.

Objective evaluation of tongue strength and endurance. Mean strength was 15.4 kPa (range, 3–32), while mean endurance was 15 seconds (range, 0–60).

Late Evaluation (12 Months)

VEES. The percentages of aspiration classified according to the Donzelli scale was: level 1 in 67% (n = 32), level 2 in 23% (n = 11), and level 3 in 10% (n = 5). Post-deglutition residue was present at the level of the vallecular pouch in 39 patients (81%), glosso-tonsillar sulcus in 32 (67%), piriform sinus in 19 (40%), and floor-of-mouth in 16 (33%). Prolonged swallowing time was observed in 16 patients (33%).

VFS. The percentages of patients with Donzelli level 1, 2, or 3 were 42% (n = 20), 25% (n = 12), and 33% (n = 16) with L; 48% (n = 23), 19% (n = 9), and 33% (n = 16) with SL; and 54% (n = 25), 33% (n = 15), and 13% (n = 6) with SS, respectively. Two patients did not undergo VFS with SS due to aspiration and discomfort in the L and SL steps of VFS. Vallecular pouch residue was present in 69% (n = 33) with L, 73% (n = 35) with SL, and 87% (n = 40) with SS. We detected piriform sinus residue in 50% (n = 24), 40% (n = 19), and 37% (n = 17) of cases with L, SL, and SS, respectively. Finally, we observed a prolonged swallowing time with L, SL, and SS in 8% (n = 4), 17% (n = 8), and 37% (n = 15) of patients, respectively.

Speech evaluation. The mean number of words correctly recognized was 56 (range, 22–74).

Objective evaluation of tongue strength and endurance. IOPI device evaluation was performed in 44 patients (92%). Mean strength was 19.2 kPa (range, 0–40), mean endurance was 16.2 seconds (range, 0–60).

Subjective test evaluation at 12 months. For swallowing function, the mean score of EORTC H&N35 was: <60% in 16.7% (n = 8), 60% to 80% in 18.7% (n = 9), and >80% in 64.6% (n = 31). The UWQOL v.4 was: <60% in 22.9% (n = 11), 60% to 80% in 58.3% (n = 28), and >80% in 18.8% (n = 9).

For speech articulation, the mean score of EORTC H&N35 was: <60% in 16.7% (n = 8), 60% to 80% in 47.9% (n = 23), and >80% in 35.4% (n = 17). The UWQOL v.4 was: <60% in 6.3% (n = 3), 60%–80% in 75% (n = 36), and >80% in 18.7% (n = 9).

Factors Influencing Functional Outcomes

Considering VEES, vallecular pouch residue varied according to the type of postoperative treatment performed (P = .017): non-irradiated patients, those treated by RT, and those receiving CRT had a 60%, 95%, and 84.6% rate of vallecular pouch, respectively. Floor-of-mouth pooling was significantly associated with RF reconstruction (40.6% vs. 18.8%, P = .049) and had a correlation with associated oropharyngeal resection (42.9% vs. 29.4%, P = .073). Similarly, patients over 70 years of age (50% vs. 34.3%, P = .064) had a higher rate of post-deglutition residue at the level of the piriform sinus, but the difference did not reach statistical significance.

Concerning VFS evaluations, correlations between all analyzed variables are summarized in Table IV: gender,

TABLE IV.
Types of Food Tested at VFS and Affected Variables ($P < .05$ are evidenced in bold character, while $P < .1$ are underlined).

Liquids After 1 yr					
	N	Donzelli's Score	Prolonged Swallowing	Vallecular Pouch Residue	Hypopharyngeal Residue
	48	1.92	8.3%	68.8%	50%
Gender					
M	32	1.83	11.4%	62.9%	42.9%
F	16	2.25	0%	83.3%	66.7%
Time of evaluation					
6 mo	10	**2.60**	30%	80%	30%
12 mo	48	**1.92**	8.3%	68.8%	50%
Age					
<70	35	1.81	6.3%	75%	62.5%
>70	12	1.97	9.4%	65.6%	43.8%
Type of reconstruction					
ALTFF	16	1.94	5.9%	64.7%	47.1%
RFFF	32	1.86	14.3%	78.6%	57.1%
Oropharyngeal involvement					
No	34	1.80	6.7%	73.3%	53.3%
Yes	14	1.69	7.7%	46.2%	30.8%
Postoperative treatment					
No	15	1.80	6.7%	73.3%	53.3%
CRT	13	1.69	7.7%	46.2%	30.8%
RT	20	2.15	10%	80%	60%
Semi-Liquids After 1 yr					
	N	Donzelli's Score	Prolonged Swallowing	Vallecular Pouch Residue	Hypopharyngeal Residue
	48	**1.85**	**16.7%**	**72.9%**	**39.6%**
Gender					
M	32	1.81	18.8%	78.1%	50%
F	16	1.94	12.5%	62.5%	18.8%
Time of evaluation					
6 mo	10	1.9	40%	50%	30%
12 mo	48	1.85	16.7%	72.9%	39.6%
Age					
<70	35	1.71	20%	68.6%	40%
>70	12	2.17	8.3%	83.3%	33.3%
Type of reconstruction					
ALTFF	16	1.75	25%	81.3%	50%
RFFF	32	1.91	12.5%	68.8%	34.4%
Oropharyngeal involvement					
No	34	1.91	14.7%	**64.7%**	35.3%
Yes	14	1.71	21.4%	**92.9%**	50%
Postoperative treatment					
No	15	1.53	13.3%	73.3%	53.3%
CRT	13	1.85	23.1%	61.5%	30.8%
RT	20	2.10	15%	80%	35%
Semi-Solids After 1 yr					
	N	Donzelli's Score	Prolonged Swallowing	Vallecular Pouch Residue	Hypopharyngeal Residue
	48	**1.59**	**32.6%**	**87%**	**37%**
Gender					
M	32	1.56	34.4%	87.5%	**53.1%**
F	16	1.64	28.6%	85.7%	**0%**

(Continues)

TABLE IV.
Continued

Semi-Solids After 1 yr	N	Donzelli's Score	Prolonged Swallowing	Vallecular Pouch Residue	Hypopharyngeal Residue
Time of evaluation					
6 mo	10	1.70	70%	100%	50%
12 mo	48	1.59	32.6%	87%	37%
Age					
<70	35	1.52	30.3%	81.8%	33.3%
>70	12	1.75	41.7%	100%	41.7%
Type of reconstruction					
ALTFF	16	1.56	37.5%	93.8%	62.5%
RFFF	32	1.60	30%	83.3%	23.3%
Oropharyngeal involvement					
No	34	1.64	33.3%	84.8%	33.3%
Yes	14	1.46	30.8%	92.3%	46.2%
Postoperative treatment					
No	15	1.36	**7.1%**	85.7%	50%
CRT	13	1.46	**38.5%**	76.9%	30.8%
RT	20	1.84	**47.4%**	94.7%	31.6%

postoperative adjuvant treatment, oropharyngeal extension, and time of evaluation (6 vs. 12 months) were the most important variables influencing functional outcomes.

Patients receiving postoperative treatment had a tendency toward delayed swallowing times with SS (non-irradiated 7.1%, CRT 38.5%, RT 47.4%, P = .006). Oropharyngeal extension had a higher rate of vallecular pouch residue with SL (92.9% vs. 64.7%, P = .045) and higher Donzelli scores with SS (1.64 vs. 1.46, P = .087). Furthermore, patients evaluated 6 months after surgery achieved higher Donzelli scores with L (P = .023), and more prolonged swallowing time with SS (P = .038).

There was also a significant correlation between speech outcomes in terms of words recognized at phone and flap choice, with better results observed using RF (59.25 vs. 49.63, P = .020).

Males (19.87 kPa vs. 17.62 kPa, P = .048) and patients submitted to RF reconstruction (20.07 kPa vs. 17.69 kPa, P = .005) had better results at objective strength evaluation. Considering endurance, better results were associated with age over 70 years (19.68 vs. 6.82 seconds, P = .028).

Patients excluded from the study (n = 4) for death occurrence after less than 1 year from the end of treatment, underwent evaluation at 6 months in three cases only. The outcomes in this subset did not show statistically significant differences when compared to the remnant of the study cohort. Multivariate analysis did not evidence death in the first year after surgical treatment as a negative factor impacting functional outcomes of CTS.

DISCUSSION

Since the first description of CTS for OTFOMSCC, different authors have confirmed its good oncologic outcomes, whereas precise data regarding functional results are still lacking. For the first time in a comprehensive and quantitative way, our study precisely evaluated objective and subjective functional outcomes of patients undergoing CTS and reconstructed by fasciocutaneous free flaps.

Our data showed that patients in the present series experienced a non-negligible incidence of sub-clinical aspiration although at VEES evaluation none was classified as level 3 according to the Donzelli scale, and VFS aspiration rates ranged from 33% to 13% (according to the type of food). Residues at the level of the vallecular pouch and hypopharynx were frequent with L, SL, and SS food consistencies. Finally, a minority of patients showed a prolonged swallowing time with L (8%) and SL (17%). However, 37% of subjects showed a prolonged swallowing time with SS. Speech intelligibility was optimal, with a mean of 56 of 75 words recognized during a phone call. Furthermore, most patients had satisfying to near-normal results, with only a minority of subjects showing poor rates of intelligibility, thus favorably comparing with the results in the literature.[17,18] In particular, Chang et al.[17] defined word intelligibility of >80% as score 4 (out of 4), finding similar speech quality results after hemiglossectomies, with optimal results in most of patients (mean score, 3.74).

Of note, tongue strength and endurance were objectively evaluated using the IOPI device: at our assessment after 1 year, RF reconstruction seems to guarantee better results in terms of residual muscular strength and can be explained in terms of better residual tongue movements when not tethered by a bulky flap.

Overall, the most important variables influencing deglutition were adjuvant treatment, age, gender, oropharyngeal resection, and type of free flap employed, as previously reported in literature.[19–23] Performing functional evaluation at 6 and 12 months showed that it is reasonable to expect some improvements up to 1 year after

surgery, as also confirmed by other studies.[24–27] It is interesting to note how at 1 year after treatment patients' subjective perception of swallowing is generally reported as good/satisfactory in more than 50% of cases using both the EORTC and UWQOL questionnaires. On the other hand, speech function is less favorable and considered moderate in more than 50% of subjects, especially when evaluated by the UWQOL questionnaire.

Our series is characterized by a standardized and homogeneous surgical approach requiring flap reconstruction to prevent salivary fistula or tethering of the residual tongue. Thus, from a functional standpoint, resection and reconstruction can be considered as a rather uniform baseline for these patients, and the other variables (age, CRT, oropharyngeal resection, and type of flap) can be evaluated in each individual patient. Calabrese et al.[10,11] and Piazza et al.[13] previously identified the oncological indications of CTS for OTFOMSCC in detail. This study may further help in correctly defining the patient population best suited for this surgical approach, contributing to preoperative counseling and reduction of undesired side effects. Speech intelligibility is often optimal regardless of patient characteristics, while swallowing may be partially impaired in elderly patients and those receiving postoperative (C)RT. Furthermore, the relevant degree of subclinical aspiration observed should advise some caution in patients with compromised pulmonary function and guide their dietary modifications to reduce the amount of adverse events.[28,29]

The role of reconstruction after tongue surgery is still debated. As a general rule, the functional impact of complex reconstructive techniques should always be weighed against the increased risk of complications.[30] More extensive defects generally lead to poorer speech and swallowing results as demonstrated by Hartl et al.,[31] with the volume of resection considered as a major predictor of swallowing and aspiration-related issues when evaluated by the EORTC H&N35 questionnaire. This underlines the significant impact of the resection size, suggesting that reconstruction is primarily adopted to guarantee adequate oncological margins. Moreover, Ji et al.[32] recently demonstrated a significant difference between partial glossectomies and hemiglossectomies, showing that reconstruction led to functional impairments in the former. When not strictly needed, flaps may add excessive bulk to the residual tongue by reducing its range of movements; on the other hand, while potentially impairing speech, such adjunctive bulk may help in deglutition.[33,34]

Therefore, it is essential to find the adequate balance between the type of defect and the type of flap selected for each kind of reconstruction. In fact, adequate donor site selection according to each individual defect has the potential to result in consistent functional outcomes regardless of the type of flap employed.[35,36] On this basis, a CTS approach represents the ideal setting due to the relatively standardized size, shape of defect, and amount of neural (lingual and hypoglossal nerves) and muscular (intrinsic and extrinsic muscles) structures routinely sacrificed according to the present surgical technique. Furthermore, most authors report significant deterioration of speech and swallowing only in patients requiring resections wider than an hemiglossectomy, thus involving the contralateral tongue compartment or the mandible.[17,21,23] In this view, when appropriately indicated, CTS for OTFOMSCC has the potential to offer superior oncologic results without significantly reducing functional outcomes compared to conventional partial glossectomy.

CONCLUSIONS

CTS for oral cancer demonstrated good survival outcomes especially as a primary treatment modality, whereas no data on functional results have been gathered up to now. Our study demonstrated that this type of surgery does not substantially affect speech function. The main issue remains the swallowing process, causing some L and SS food aspiration and vallecular food pouch residue, especially when postoperative treatments are administered. Residual tongue strength does not seem to be affected when proper reconstruction with RF is accomplished. Some functional improvements were both subjectively as well as objectively observed up to 1 year after the end of treatment in most of patients.

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