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Analysis of decannulation time and oral intake recovery in oral cancer patients

Análise do tempo de decanulação e liberação de via oral em pacientes com câncer de boca

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Keywords

Oral Neoplasms
Neoplasms of Tongue
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Glossectomy
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Deglutition Disorders
Speech Therapy

ABSTRACT

Purpose: to analyze the time of decannulation and oral diet release of patients undergoing oral cancer surgery at the Hospital Alberto Cavalcante and to verify which factors are associated with the time of decannulation and oral diet release. **Methods:** an observational study of the database of 33 adult patients surgically treated with oral cancer and served between 2012 and 2017. The socio-demographic variables (age and gender) and clinical variables (type of surgery, surgical extension, type of reconstruction, clinical conditions and times of decannulation and reintroduction of the oral route) were collected through electronic medical records analysis. Descriptive statistical analysis was performed with measures of central tendency, dispersion and proportions. For the association analysis, the non-parametric Mann-Whitney U test was used for independent samples. **Results:** of the 33 participants, male and elderly predominated, 69.8% underwent resection of more than one structure. The median time of decannulation among patients with oral cancer was 8 days, and oral clearance of 9.5 days. Resections with more than one structure, the presence of fistula and dehiscence interfered in the oral release time. **Conclusion:** the median time of decannulation was eight days and oral release time of 9.5 days. Resections with more than one structure, the presence of fistula, and suture dehiscence are associated with increased oral release time.

Descritores

Neoplasias Bucais
Neoplasias da Língua
Traqueostomia
Glossectomia
Deglutição
Transtornos de Deglutição
Fonoaudiologia

RESUMO

Objetivo: caracterizar o tempo de decanulação e liberação de dieta por via oral dos pacientes submetidos à cirurgia do câncer de boca no Hospital Alberto Cavalcante, e verificar quais fatores estão associados ao atraso no tempo de decanulação e de liberação de dieta por via oral. **Método:** estudo observacional de análise do banco de dados de 33 pacientes adultos tratados cirurgicamente do câncer de boca e atendidos no período de 2012 a 2017. As variáveis sociodemográficas (idade e sexo) e clínicas (tipo de cirurgia, extensão operatória, tipo de reconstrução, condições clínicas e tempos de decanulação e reintrodução da via oral) foram coletadas por meio de análise de prontuários eletrônicos. Foi realizada análise estatística descritiva com medidas de tendência central, dispersão e proporções. Para análise de associação foi utilizado o teste não paramétrico Mann-Whitney para amostras independentes. **Resultados:** Dos 33 participantes, predominou o sexo masculino e idosos, 69,8% realizaram ressecção de mais de uma estrutura. A mediana do tempo de decanulação entre os pacientes com câncer de boca foi de 8 dias, e da liberação da via oral foi de 9,5 dias. As ressecções com mais de uma estrutura, a presença de fístula e de deiscência interferiram no tempo de liberação de via oral. **Conclusão**: a mediana de tempo de decanulação foi de oito dias e de liberação de via oral de 9,5 dias. As ressecções com mais de uma estrutura, a presença de fístula, e de deiscência de sutura, estão associadas com o aumento do tempo de liberação de via oral.

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INTRODUCTION

Despite the easy diagnosis, mouth cancer has been growing in recent years among Brazilian men, with tumors that affect the lips, tongue, floor of the mouth, jaw, and hard palate, according to the National Cancer Institute (in Portuguese *Instituto Nacional de Câncer* (INCA) [1]. It could be estimated 11,200 new cases of oral cancer in Brazil in men and 4,010 new cases in women for 2020 [1].

Surgical treatment of oral cancer can leave sequelae such as orofacial deformities and oropharyngeal dysphagia, compromising one or more structures, partially or totally, and causing nutritional disorders that lead to the worsening of the patient's general health status [2].

Dysphagia can cause reduced food intake and unfavorable changes in the diet, which can lead to malnutrition, dehydration, and decreased resistance to infection [3]. In these cases, the patient needs the use of an alternative feeding and hydration route, such as the nasoenteral catheter (NEC) [3].

Generally, patients with oral cancer in the postoperative period remain with an alternative route of feeding for a few days, so that the healing of the remaining area occurs. However, the ability to swallow is an important aspect in the evolution of the NEC removal process[4].

Tracheostomy may also be present in the postoperative period in some cases as it is a temporary alternative for breathing while the operated area is swollen, obstructing the upper airways [5].

Tracheostomy is associated with an increased risk of aspiration and may have a mechanical and functional impact on the physiology of swallowing [5]. The restriction of the hiolaryngeal excursion and the deviation of the airflow to the stoma in the neck reduces the pressure and the amount of airflow, consequently the vocal folds close with less force, which can facilitate the aspiration of the bolus and the risk of stasis, which worsens the individual's swallowing function [5,6]. The change in the temperature of the respiratory flow in the lower airways is another physiological impact resulting from the tracheostomy, which provides for desensitization of the mucosa and consecutive silent aspiration [7,8].

Coordination between breathing and swallowing is important for the feeding process to occur safely. In this process, swallowing apnea occurs so that the bolus passes through the pharynx to the esophagus, and the expiratory flow, at the end of the pharyngeal phase of swallowing, has the function of cleaning possible post-swallowing residues [9,10]. Thus, the presence of tracheostomy can trigger changes in the integration of respiratory and swallowing functions causing dysphagia [6], which justifies the need for decannulation, as soon as possible, in patients in whom the dynamics of swallowing is impaired.

Therefore, it is of utmost importance to analyze the times of decannulation and oral release and to identify the factors that may influence these processes in patients treated surgically for oral cancer to establish guidelines for speech-language therapy rehabilitation.

This study aimed to identify the times of decannulation and release of food through the oral route in patients surgically treated for oral cancer and to verify the factors associated with the delay in the time of decannulation and release of diet by oral route.

METHODS

This is an observational analytical cross-sectional study with a convenience sample and analysis of secondary data, through electronic medical records of patients diagnosed with oral cancer treated surgically at the *Hospital Alberto Cavalcante* in Belo Horizonte, in the state of Minas Gerais (MG).

This study was approved by the Research Ethics Committees of the *Fundação Hospitalar* of MG and the Federal University of Minas Gerais with the respective numbers: 57666016.9.0000.5119 and 57666016.9.3001.5149, with the waiver of the Informed Consent Form (ICF) as it is an observational study with analysis of secondary data.

The sample consisted of patients diagnosed with oral cancer, treated surgically, of both genders, over 18 years old, who attended the Head and Neck Cancer (HNC) and Speech-Language Therapy sectors at *Hospital Alberto Cavalcante*, a reference in Oncology at State Health Network. For this study, the individuals with associated resections from other regions of the head and neck, neurological diseases, previous communication disorders, or cognitive changes that prevented the participant from understanding the instructions provided in the speech-language therapy assessment and treatment process were excluded.

The research data collection took place between January 2012 and July 2017. During this period, 47 patients diagnosed with oral cancer were treated, and of this total, 33 of them were included in the research as they fit the inclusion and exclusion criteria of the study.

During hospitalization, the evaluation and speech and language intervention of swallowing and speech in glossectomy, pelvectomy, maxillectomy, and mandibulectomy began on the second day after surgery, while in the combined surgeries of two or more structures, the evaluation was on the fourth day of postoperative.

The evaluation of speech articulation involved the auditory-perceptual evaluation of voice quality (GRBASI scale) [11]; speech intelligibility, articulatory type and speech rate (4-point scale of degrees of deviation) [12]; measurement of Maximum Phonation Time (MPT); and evaluation of resonance (balanced or nasal) [13].

The clinical evaluation of the swallowing biomechanics was initiated with saliva and, according to the type of surgical and reconstruction approach, the most efficient and safe consistency for food evaluation was chosen. To assist in the swallowing analysis process, additional resources were used, such as cervical auscultation and monitoring of oxygen saturation [14].

During the hospitalization period, sessions were held once a day, except on weekends and holidays. After hospital discharge, outpatient follow-up was weekly, with 40-minute sessions and the prescription of a therapeutic program occurred according to the patient's functional impairment, to be followed daily at home.

For cases of oral cancer, orofacial motricity exercises were usually performed in therapeutic programs to promote coordination and mobility of the remaining structures of the stomatognathic

system [15], and when necessary, laryngeal sensitization by vocal and breathing exercises. Functional swallowing training was performed by offering food in specific consistencies and volumes, according to the patient's tolerance, and progressive increase, until the safe and efficient oral route, was released. When necessary, oral motor control, airway protection, and waste cleaning maneuvers were used to facilitate the biomechanics of swallowing [15].

The data from the medical records of the participants were collected to characterize the sample and define the times for decannulation and release of food through the oral route. These data were obtained in the description of the surgery, and the medical and speech-language therapy developments.

The sociodemographic variables considered were associated to gender and age. The studied clinical variables comprised the times of decannulation and Oral Release (OR), both in days; the presence of the previous radiotherapy (yes, no); maintaining alertness (yes or no); the presence of respiratory diseases (yes or no); the presence of effective cough (yes or no); and the consistencies released, classified using the International Dysphagia Diet Standardization Initiative (IDDSI) scale: 0 (thin liquid); 2 (slightly thickened liquid); 3 (moderately thickened liquid); 4 (pasty); 6 (soft and chopped solid); and 7 (normal) [16]. The clinical variables referring to the surgical procedure were: type of surgery (glossectomy, pelvectomy, mandibulectomy, palatectomy or associated resections between these structures); operative extension of the tongue (partial or total); operative extension of the floor of the mouth (partial or total); operative extension of the mandible (marginal, segmental, which may be anterior, lateral or lateral and anterior, partial, almost total or total resection); operative extension of the palate (partial or total); type of reconstruction of the tongue and floor of the mouth (primary suture with the structure itself, regional flap, free flap, not performed) [17]; type of mandible reconstruction (free bone flaps or titanium plate) [17]; type of reconstruction of the palate (obturator plate or not); the presence of neck dissection (yes or no); the presence of postoperative fistula (yes or no); the presence of suture dehiscence (yes or no); and performing a tracheostomy (TCT) (yes or no). Clinical staging due to the absence of this information in most medical records were not included.

For analysis of the association, it could be considered the response variables of the time of decannulation and release of diet by oral route, both in days. The explanatory variables considered were related to age range, operative extension, presence of fistula, and presence of dehiscence. The age group variable was categorized into two groups: up to 59 years old (N = 14); and over 60 years old (N = 19). For categorization of the surgical extension variable, two groups were formed: for Group 1, patients submitted to resection of a single structure (N = 10) were considered; and for Group 2, individuals submitted to resection of two or more structures of the oral cavity (N = 23).

The statistical analysis of the data was performed using the statistical program Statistical Package for the Social Sciences (SPSS) version 17.0. First, a descriptive analysis of the data with measures of central tendency, dispersion and proportions was performed. Subsequently, for the association analysis, the Mann-Whitney U non-parametric test was used for independent samples. The level of significance was set at 5%.

RESULTS

The sample consisted of 33 patients who surgically treated oral cancer, and the demographic and clinical characteristics of the individuals are shown in Table 1. There is a predominance of males and the elderly population. No individual underwent

Table 1. Demographic and clinical characterization of patients with oral cancer

Variables	Classification	N	%
Gender	Male	28	84.8
	Female	5	15.2
Age group	Up to 59 years old	14	42.5
	≥60 years old	19	57.5
Age (years old)	Minimum	42	
	Maximum	89	
	Median	62	
	Mean	61.5	
	Standard Deviation	12.32	
Presence of prior RT	No	33	100
	Yes	0	0
Maintaining alertness	Yes	33	100
	No	0	0
Presence of respiratory disease	No	30	90.9
	Yes	3	9.1
Presence of effective cough	Yes	31	93.9
	No	2	6.1
Consistency released according to IDDSI	Without OR indication	7	21.2
	0	4	12.1
	2	1	3.0
	3	8	24.2
	4	0	0
	6	0	0
	7	0	0
	0 and 3	12	36.4
	0 and 6	1	3.0

Caption: N = Number of participants; RT = Radiotherapy; IDDSI = International Dysphagia Diet Standardization Initiative; IDDSI 0 = runny liquid; IDDSI 2 = slightly thickened liquid; IDDSI 3 = moderately thickened liquid; IDDSI 4 = pasty; IDDSI 6 = soft and chopped solid; IDDSI 7 = normal diet.

radiotherapy before the surgery. Regarding clinical variables, all patients were alert, responding to commands, and had an effective cough, capable of mobilizing and expectorating pulmonary secretion. The majority did not have a diagnosis of pulmonary diseases and managed to release OR of some consistency (78.8%) during the period of speech-language therapy intervention.

Table 2 shows the variables referring to surgery. Regarding the type of surgery, 69.8% of individuals underwent surgery combined with resection of more than one structure. In cases of glossectomy and pelvectomy, partial resection occurred in all patients. Regarding the extension of the mandibulectomy, the excision of the lateral segment of the mandible was the most frequent. There was only one case of partial resection of the palate, without reconstruction. The tongue was the most used structure for the reconstruction of the floor of the mouth. In surgeries in which the mandible or palate was resected, there was no reconstruction. There was no presence of fistula or suture dehiscence in the postoperative period of most patients.

Regarding the process of decannulation and OR, 18 (75%) of the 24 patients who underwent tracheostomy were decannulated. As for the reintroduction of the oral route, 26 individuals (78.8%) of the 33 patients had their OR released. The median OR release time was 9.5 days and the decannulation time was eight days (Table 3).

There was no association between the studied variables and the time of decannulation (Table 4).

Thus, it could be observed an association between oral release time and greater operative extension, presence of fistula, and presence of dehiscence (Table 5).

Table 2. Characteristics of the operative treatment of participants with oral cancer*

Variables	Classification	N	%
Type of surgery	Pelveglossomandibulectomy	16	48.5
	Glossectomy	7	21.2
	Pelveglossectomy	5	15.2
	Mandibulectomy	2	6.1
	Pelvemandibulectomy	2	6.1
	Palate Resection	1	3
Operative tongue extension	Partial	28	100
	Total	0	0
Operative extension of the floor of the mouth	Partial	23	100
	Total	0	0
Operative extension of the mandible	Lateral segment	12	60
	Target previous	2	10
	Anterior and lateral segments	2	10
	Marginal	2	10
	Quasitotal	1	3
	Total	1	3
Operative extension of the palate	Partial	1	100
	Total	0	0
Type of reconstruction/tongue suture	Primary	27	96.4
	Regional flap	1	3.6
	Free flap	0	0
	Not done	0	0
Mouth floor reconstruction type	Regional flap	21	100
	Primary	0	0
	Free flap	0	0
	Not done	0	0
Type of jaw reconstruction	Not done	20	100
	Bone free flap	0	0
	Titanium plate	0	0
Type of palate reconstruction	Not done	1	100
	Free flap	0	0
	Blanking Plates	0	0
Presence of neck dissection	Yes	28	84.8
	No	15	15.2
Presence of postoperative fistula	No	27	81.8
	Yes	6	18.2
Presence of suture dehiscence	No	30	90.9
	Yes	3	9.1
Tracheostomy	Yes	24	72.7
	No	9	27.3

*Totals differ for each variable due to data that does not apply
Caption: N = Number of participants.

Table 3. Measures of central tendency and dispersion for time for decannulation and oral diet release.

Variables	N	Min	Max	Median	Mean	SD	P25	P50	P75
Decannulation time (days)	18	4	140	8.0	24.50	38.80	6.75	8.0	20.3
OR diet release time (days)	26	1	347	9.5	37.00	73.10	3.75	9.5	37.3

Caption: N = Number of participants; Min = Minimum; Max = Maximum; SD = Standard Deviation; P = Percentile; OR = Oral.

Table 4. Association between time to decannulate and age, operative extension, presence of fistula, and dehiscence

		N	Mean	DP	*p*
Age group	Up to 59 years old	10	24.60	42.03	0.788
	≥60 years old	8	24.37	37.20	
Operative extension	Group 1	5	33.00	59.83	0.427
	Group 2	13	21.23	29.96	
Presence of fistula	No	14	19.64	29.23	0.957
	Yes	4	41.50	65.83	
Presence of dehiscence	No	16	24.00	4.098	0.179
	Yes	2	28.50	19.09	

Mann-Whitney U test
Caption: SD = Standard Deviation.

Table 5. Association between time for oral diet release and age range, operative extension, presence of fistula, and dehiscence

		N	Mean	DP	*p*
Age group	Up to 59 years old	11	58.55	105.98	0.466
	≥60 years old	15	21.20	29.78	
Operative extension	Group 1	9	20.44	50.9	**0.013**
	Group 2	17	45.76	82.57	
Presence of fistula	No	21	17.05	26.4	**0.011**
	Yes	5	120.80	138.01	
Presence of dehiscence	No	23	35.39	77.75	**0.040**
	Yes	3	49.33	5.51	

Mann-Whitney U test
Caption: SD = Standard Deviation

DISCUSSION

In this study, most of the population with oral cancer was male. According to INCA estimates for 2020, cancer of the oral cavity is one of the most frequent among men and, in recent years, there has been an increase in the occurrence among women, which may be a result of the increase in smoking habits and/or consuming alcoholic beverages [1].

Surgical resection remains the main treatment for many types of oral cancer. However, surgery compromises the anatomy and functions of swallowing and speech and can cause definitive functional impairments, despite advances in minimally invasive surgical approaches, and microsurgical reconstructions [18].

The frequency of decannulation among patients with oral cancer was 75% and the median time was eight days. In studies with glossectomy cases, the frequency was higher, ranging between 84% and 90% [19,20]. The median time of decannulation is less than 13.7 days for patients who underwent hemiglossectomy [21] and greater than 3.5 months for patients who underwent glossectomy with resection of at least 75% of the tongue [22]. The results found in this study may be due to the operative extension. Although not statistically relevant, cases with resections of more than one structure of the oral cavity are generally larger tumors with worse staging. These clinical conditions make surgical treatment more extensive, which can cause edema, fistulas, and dehiscence, and delay the removal of the tracheostomy.

The frequency of OR release was 79% and the median time of oral release in the group of patients studied was 9.5 days. In a study with patients undergoing partial, subtotal, or total glossectomy, we found that OR was achieved by 49% of the participants, while 16% were partially dependent on the alternative route of feeding and 36% were dependent on the enteral route for nutrition. In patients who achieved OR, the average time was 31 days (ranging from 9 - 209 days) (23). In this study, the frequency of the higher OR release and in a shorter time is probably due to the absence of cases of total or subtotal glossectomy. The onset of reintroduction of the oral route may vary between head and neck cancer services. However, the time found in this study indicated that after confirming the absence of postoperative complications, the patient can intervene regarding swallowing, being possible OR release in the first weeks after surgical treatment.

Resections of the oral cavity can impair the oral phase of swallowing and cause posterior food leak due to the difficulty of oral motor control [24] and, consequently, risk of aspiration

of the bolus. The literature points to a prevalence of 12 to 25% of chronic aspiration in cases of oral cancer surgery [18]. The severity of dysphagia can be influenced by several clinical factors and the literature indicates that the size of the tongue resection, the type of reconstruction, and the stage of the primary tumor affect swallowing [10,23,25].

In this study, most of the patients had thin liquid (IDDSI 0) and moderately thickened liquid (IDDSI 3) consistencies released. Thin and moderately thick liquids are easier to perform ejection and oral motor control respectively, especially in cases of limited mobility of the remaining structures, especially in resections associated with more structures. In a study on dysphagia symptoms, patients treated surgically for oral cancer, perceive a greater degree of difficulty in swallowing with solid foods [10]. Another study found that swallowing of liquid was worse in the first postoperative month in cases with resection of 50 to 75% of the tongue, due to poor oral motor control, with an increased risk of laryngeal penetrations and the need for multiple swallows for cleaning of waste [24].

There was a significant association between the presence of greater operative extension, presence of fistula, and dehiscence with the time of oral release. The average time of oral diet release in the group of patients with more than one resected structure (Group 2) was twice as many as those with resections restricted to a single structure (Group 1). In the operative treatment, swallowing changes are multifactorial, vary according to the location and size of the tumor, the extent of resection, the type of reconstruction, and complementary treatments [3,17,23,26]. In general, the greater the resection is, the more impaired the swallowing function will be [17,23].

The resection of the tongue is an important structure for the formation and transport of the bolus and protection of the airways, even if partial resection can impact the biomechanics of swallowing [3]. A systematic review study with total glossectomy and preservation of the larynx identified the need for an alternative route of feeding from 0 to 87% of the cases after six months after the operation and from 0 to 75% after one year of surgical treatment [27].

Other resected oral cavity structures are also identified as causing chewing and swallowing impairments. An example is the resection of the palate, in which the oral cavity maintains communication with the nasal cavity, requiring the reconstruction of these structures to restore oral function [28]. Thus, when more than one structure is resected, swallowing rehabilitation requires more time to promote adaptations and compensations to obtain an efficient and safe function.

Fistulas and dehiscence are postoperative complications and in these cases, we must wait to repair the clinical condition for food reintroduction by OR, thus, the use of NEC must be the only form of feeding [18].

Other factors are pointed out as variables that influence success in achieving OR in glossectomies such as partial tongue resection and absence of excess weight (Body Mass Index (BMI)), radiotherapy before surgical treatment, and adjuvant chemotherapy [23].

The swallowing rehabilitation after cancer surgery is individualized to meet the unique needs of each patient. In general, patients with oral cancer who underwent surgery (and often postoperative radiotherapy) need rehabilitation for speech and swallowing and should be planned based on the identified physiological and functional changes [18]. Therefore, it is important that the speech-language therapist knows exactly which operative extension and type of reconstruction were used, so it is possible to make an adequate assessment and outline the therapeutic program, as surgeries classified with the same name can cause different speech disorders.

Few studies deal with the time of decannulation and oral diet release in patients treated surgically for oral cancer, and the factors that can influence these times.

Although the findings of this research came from secondary analysis in a database, the results found pointed out to relevant aspects that can support the speech-language therapy performance for the definition of prognosis and therapeutic planning.

This study had some limitations such as the absence of clinical tumor staging, hindering the analysis of the association with the response variables, and the lack of instrumental evaluation, which could contribute to the analysis of swallowing biomechanics before and after speech-language therapy in oral cancer cases. The service where the study was carried out does not have the resources of videofluoroscopy and videoendoscopy of swallowing.

Future studies with a longitudinal design are essential to establish guidelines for the therapeutic process of patients treated surgically for oral cancer.

CONCLUSION

Patients who underwent surgery for oral cancer had a median decannulation time of eight days and an oral release of 9.5 days. Resections with more than one structure and the presence of fistula or suture dehiscence are associated with increased time to release the oral diet.

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Authors' contributions

SAM collected and analyzed the data and organized the text; LCCV and ACCG have critically reviewed the content of the manuscript.