HEAD AND NECK CANCER: CONTRIBUTION FOR THE ANALYSIS OF THE REHABILITATION NEEDS

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ABSTRACT
With this study, we aim to understand the relevance of the Speech Therapist´s intervention on a Cancer Department, through the analysis of the correlated surgical cases effectuated in the Otorhinolaryngology Department of the Portuguese Cancer Institute of Porto Francisco Gentil – EPE, between January 2005 and December 2008. All surgeries relevant to the Speech Therapist's intervention were analyzed according to the number of sessions needed for an individualized rehabilitation and, afterwards, for the entire group.

KEYWORDS
Head and Neck Neoplasms, Rehabilitation, Speech Therapy.

RESUMO
Com este estudo pretende-se dar a compreender a pertinência da intervenção dos Terapeutas da Fala num serviço oncológico, tendo por base a análise dos casos cirúrgicos tratados no Serviço de Otorrinolaringologia do Instituto Português de Oncologia do Porto Francisco Gentil – EPE, entre Janeiro de 2005 e Dezembro de 2008. Foram seleccionados todos os procedimentos cirúrgicos com relevância para a intervenção dos Terapeutas da Fala e agrupados de acordo com o número de sessões necessárias para uma reabilitação individualizada e calculado posteriormente o impacto para todo o grupo.

PALAVRAS-CHAVE
Neoplasias de Cabeça e Pescoço, Reabilitação, Fonoterapia.

1. **INTRODUCTION**

Head and neck tumours are the 6th most common neoplasm, with approximately 640000 new cases per year with a mortality of 5% (IARC-WHO GLOBOCAN Database 2002). Surgical treatment of these tumours affects structures involved in breathing, voice, speech and swallowing, apart from aesthetic sequels. This study aims to analyze the surgeries performed in patients treated for cancer in the Otorhinolaryngology (ENT) Department of the Portuguese Institute of Oncology of Porto Francisco Gentil – EPE (IPOPFG-EPE), between January 2005 and December 2008 with relevance for Speech Therapists, analyzing the impact of intervention areas.

This analysis will only address aspects concerning surgical options, once the removed structures, the mobility of remaining ones, and the type of reconstruction, allows us to foresee the implications in voice, speech and swallowing. In this way, it is possible to establish a more precise rehabilitation protocol (Crevièr-Buchman, Brihaye and Tessier).

Another aim of this study is to explore the costs of the rehabilitation, starting with the average time spent in it, because, in the case of Speech Therapists intervention, these studies are almost non-existent, not knowing what the real costs of rehabilitation and its relevance.

2. **MATERIAL AND METHOD**

Concerning the importance of the inclusion of Speech Therapists in multidisciplinary teams involved in the rehabilitation of patients with head and neck cancer, was carried out a collection of surgical acts effectuated by the ENT Department, during four years (2005 to 2008), with impact on Speech therapist's intervention areas. We also compare endoscopic techniques, assisted by CO_2 laser with conventional surgical techniques, seeking to understand its growing application from 2005.

Based on topographic localizations of tumours were structured surgical techniques, for tumours of: 1) oral cavity; 2) maxilla/mandible; 3) other locations/undefined lesions of the oral cavity and maxilla/mandible; 4) pharynx; 5) larynx; 6) pharyngolaryngeal region; and 7) others.

3. **OUTCOMES**

3.1. **CHARACTERIZATION OF THE SAMPLE**

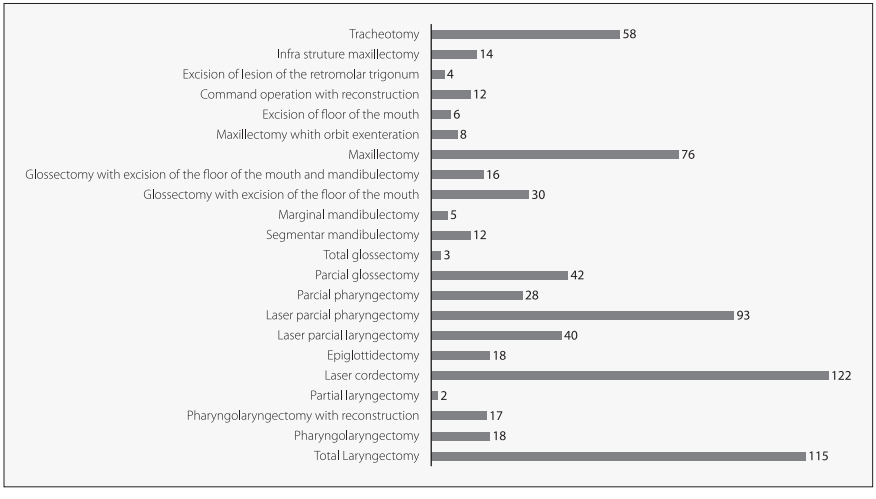
During the period of the study 1553 surgeries were made, 739 (47.59%) of which would be expected a Speech Therapist intervention, since the removed structures may bring consequences in voice, speech, and/or swallowing. The majority of patients were male (649 cases). The mean age for male was 58 and for female was 60. (Table 1)

Year/Gender	2005	2006	2007	2008	Total	%	Mean age
Male	138	151	168	192	**649**	87,82	58
Female	18	22	19	31	**90**	12,18	60
Total	**156**	**173**	**187**	**223**	**739**	**100**	

TABLE 1 - Characterization of the sample by gender.

3.2. **SURGICAL TECHNIQUES**

The tables and graphs below highlight the distribution of surgical techniques. The five most commonly performed procedures were laser cordectomy (122), total laryngectomy (115), laser partial pharyngectomy (93), maxilectomy (76) and tracheotomy (58). (Graphic 1) Between 2005 and 2008 the topographical region more frequently addressed was the larynx (297), followed by pharynx (121), maxilla/mandible (101) and oral cavity (99). (Tabela 2)



GRAPHIC 1 - Absolute frequency of surgical techniques.

Topographic regions	N
Oral cavity	99
Maxilla/mandible	101
Oral cavity & maxilla/mandible	28
Pharynx	121
Larynx	297
Pharyngolaryngeal region	35
Tracheotomy	58
Total	**739**

TABLE 2 - Number of surgeries performed by topographic region.

In the oral cavity and according to the data in table 3, the relative frequency of surgeries performed in this area was expressed as follows: partial glossectomy (43%), glossectomy

with excision of the floor of the mouth (30%), infra structure maxillectomy (14%), excision of the floor of the mouth (6%), resection of lesion of the retromolar trigonum (4%) and total glossectomy (3%).

Surgeries performed in the "oral cavity"	N					%
	2005	2006	2007	2008	Total	
Partial glossectomy	8	18	7	9	42	43
Total glossectomy	1	1	1	0	3	3
Excision of the floor of the mouth	1	1	2	2	6	6
Infrastructure maxillectomy	8	4	1	1	14	14
Resection of the retromolar trigonum	2	1	1	0	4	4
Glossectomy with excision of the floor of the mouth	7	5	10	8	30	30
Total	**27**	**30**	**22**	**20**	**99**	**100**

TABLE 3 - Absolute frequency of surgeries performed in the "oral cavity".

In the region of "maxilla/mandible", the most frequent surgical techniques were Maxillectomy (75%), followed by marginal mandibulectomy (12%), maxillectomy with orbit exenteration (8%) and segmentar mandibulectomy (5%), as shown in table 4.

Surgery performed on "Maxilla/Mandible	N					%
	2005	2006	2007	2008	Total	
Maxillectomy with orbit exenteration	2	0	3	3	8	8
Maxillectomy	7	17	17	35	76	75
Marginal mandibulectomy	0	0	3	2	5	12
Segmentar mandibulectomy	4	0	2	6	12	5
Total	**13**	**17**	**25**	**46**	**101**	**100**

TABLE 4 - Distribution of absolute and relative frequencies of surgeries performed in the "maxilla/mandible".

In some situations, it was necessary to remove rather than an anatomical region for a complete ablation of tumours mass, having these surgeries grouped in surgical acts like glossopelvectomy with mandibulectomy.

In other locations undefined of the oral cavity and maxilla/mandible, as can be seen in table 5, the surgeries most frequently performed were the glossopelvectomy with mandibulectomy (57%) and command operation with reconstruction (43%).

Surgeries performed in "undefined locations of the oral cavity and maxilla/mandible"	N					%
	2005	2006	2007	2008	Total	
Glossopelvectomy with mandibulectomy	10	2	2	2	16	57
Command operation with reconstruction	4	3	2	3	12	43
Total	**14**	**5**	**4**	**5**	**28**	**100**

TABLE 5 - Absolute and relative frequencies of surgeries performed in "undefined locations of the oral cavity and maxilla/mandible".

In the pharynx, according to the typescript in table 6, the surgical procedures more frequently performed were laser partial pharyngectomy (77%), partial pharyngectomy (23%). We should however consider that 99% of surgeries performed in this region were made through endoscopic/transoral procedure instead of external ones (23% - partial pharyngectomy).

Surgeries performed on "pharynx"	N					%
	2005	2006	2007	2008	Total	
Laser partial pharyngectomy	14	20	37	22	93	77
Partial pharyngectomy	3	1	11	13	28	23
Total	**17**	**21**	**48**	**35**	**121**	**100**

TABLE 6 - Absolute and relative frequencies of surgeries performed in "pharynx".

In what larynx is concerned, as shown in table 7 the most common surgery was laser cordectomy (41%), followed by total laryngectomy (39%), laser partial laryngectomy (14%) and laser epiglottidectomy (6%). The other surgeries do not have representation (fronto-lateral laryngectomy and near-total Laryngectomy). In this region most of the interventions were also made by endoscopic procedures (61% - laser parcial laryngectomy, laser epiglottidectomy and laser cordectomy) and only 39% by external approach (fronto-lateral laryngectomy, near-total laryngectomy and total laryngectomy).

Topographic Surgeries performed in the region of "larynx"	N					%
	2005	2006	2007	2008	Total	
Laser partial laryngectomy	5	11	11	13	40	14
Laser epiglottidectomy	1	10	5	2	18	6
Laser cordectomy	18	33	26	45	122	41
Fronto-lateral laryngectomy	1	0	0	0	1	0
Near-total laryngectomy	0	1	0	0	1	0
Total laryngectomy	35	34	20	26	115	39
Total	**60**	**89**	**62**	**86**	**297**	**100**

TABLE 7 - Absolute and relative frequencies of surgeries performed in "larynx".

In the pharyngolaryngeal region, the most frequently procedures performed were pharyngolaryngectomy (51%) and the pharyngolaryngectomy with reconstruction (49%). (Table 8)

Surgery performed on "pharyngolaryngeal region"	N					%
	2005	2006	2007	2008	Total	
Pharyngolaryngectomy	2	0	11	5	18	51
Pharyngolaryngectomy with reconstruction	5	0	5	7	17	49
Total	**7**	**0**	**16**	**12**	**35**	**100**

TABLE 8 - Distribution of absolute and relative frequencies of surgeries performed in the "pharyngolaryngeal region".

We should also highlight the fact that in 216 of the 739 surgeries it was also necessary to do a neck dissection. In these cases the after-effects post-surgical were stronger and the recovery was slower.

3.2.1. LASER SURGERY

As can be seen from table 9, the most frequently performed endoscopic surgeries occurred in two anatomical regions: pharynx and larynx. Regarding the evolution of this type of surgery, it was observed a gradual increase in the endoscopic laser procedures, from 2005 until 2008 (table 9). However, we can see that overall, the conventional techniques (63%) are superior in number to the endoscopic one (37%). (Table 10)

		Oral cavity	Maxilla/ Mandible	Oral Cavity & Maxilla/ Mandible	Pharynx	Larynx	Pharyngo-Laryngeal region	Tracheo-tomy	Total
2005	Conventional Surgery	27	13	14	3	35	7	18	117
	Laser Surgery	0	0	0	14	25	0	0	39
2006	Conventional Surgery	30	17	5	1	35	0	11	99
	Laser Surgery	0	0	0	20	54	0	0	74
2007	Conventional Surgery	22	25	4	11	20	16	10	108
	Laser Surgery	0	0	0	37	42	0	0	79
2008	Conventional Surgery	20	46	5	13	26	12	19	141
	Laser Surgery	0	0	0	22	60	0	0	82
Total		99	101	28	121	297	35	58	739

TABLE 9 - Absolute frequency of surgeries performed in accordance with topographical region and surgical option.

Type of surgery	%
Conventional	63
Laser	37
Total	100

TABLE 10 - Relative frequency of the type of surgery.

The table 11 show the variation within the endoscopic approaches between 2005 and 2008. We see an increase in laser partial pharyngectomy, laser partial laryngectomy and laser cordectomy procedures and the remaining (laser epiglottidectomy) also ranged during the same period. However, it has been increasingly used the endoscopic approach.

Surgery		2005	2006	2007	2008	Total
Pharynx	Laser partial pharyngectomy	14	20	37	22	92
Larynx	Laser partial laryngectomy	5	11	11	13	40
	Laser epiglottidectomy	1	10	5	2	18
	Laser cordectomy	18	33	26	45	122
TOTAL		38	74	79	82	273
%		14%	27%	29%	30%	100%

TABLE 11 - Distribution of laser surgery.

4. **AREAS OF INTERVENTION OF THE SPEECH THERAPIST IN HEAD AND NECK CANCER**

The various regions of the head and neck area are clearly involved in breathing, mastication, swallowing, voice and speech. Thus, partial or total removal of some of these structures will have side effects in some of these functions, alone or in association. (Boyle and Kraus; Tonini). Being Speech Therapists the professionals that assess and treat these disorders, their inclusion in multidisciplinary teams will be beneficial for a fast and effective rehabilitation, balancing the structures functioning as well as improving the psychosocial and emotional state of patients and caregivers (Gulfier). The knowledge of these possible surgical techniques in this functional complex enables us to predict the after-effects post-surgical in contexts of voice, speech and swallowing. (Crevièr-Buchamn, Brihaye and Tessier).

4.1. **ILLUSTRATION OF POSSIBLE AREAS OF INTERVENTION BASED ON SURGERIES PERFORMED FROM ENT DEPARTMENT AT IPOPFG – EPE**

The following charts and tables enable us to understand which are the main areas of intervention of Speech Therapists in patients undergoing surgery for head and neck cancer are, and how these areas are distributed. Table 12 matches the type of surgery and the areas of intervention. The surgery with more direct implications on voice is the laser cordectomy and some others like resection of lesion of the retromolar trigonum have implication on voice and speech. In the area of deglutition techniques like laser epiglottidectomy, laser partial pharyngectomy and partial pharyngectomy. Voice and swallowing areas are the most frequently effected in total laryngectomy, near-total laryngectomy, fronto-lateral laryngectomy, laser partial laryngectomy. The partial glossectomy and excision of lesion of the floor of the mouth can cause changes at the level of speech and swallowing. The remaining interventions (pharyngolaryngectomy, pharyngolaryngectomy with reconstruction, total glossectomy, segmentar mandible, marginal mandible, glossectomy with excision of lesion of the floor of the mouth, glossectomy with excision of lesion of the floor of the mouth with marginal mandibulectomy, maxillectomy, maxillectomy with orbit exenteration, command operation with reconstruction and infra structure maxillectomy) have functional implications on voice, speech and swallowing.

Surgery /Intervention areas	Voice	Speech	Swallowing	Voice & Speech	Voice & Swallowing	Speech & Swallowing	Voice, Speech & Swallowing
Laser cordectomy	X						
Laser epiglottidectomy			X				
Laser partial pharyngectomy			X		X		X
Partial pharyngectomy			X				
Resection of lesion of the retromolar trigonum				X			
Total Laryngectomy					X		
Near-total Laryngectomy					X		
Fronto-lateral Laryngectomy					X		
Laser partial Laryngectomy					X		
Partial glossectomy						X	
Excision of lesion of the floor of the mouth						X	
Pharyngolaryngectomy							X
Pharyngolaryngectomy with reconstruction							X
Total glossectomy							X
Segmentar mandible							X
Marginal mandible							X
Glossectomy with excision of lesion of the floor of the mouth							X
Glossectomy with excision of lesion of the floor of the mouth and with marginal mandibulectomy							X
Maxillectomy							X
Maxillectomy with orbit exenteration							X
Command operation with reconstruction							X
Infra structure maxillectomy							X

TABLE 12 - Areas of intervention of the Speech Therapist, according to the surgical technique. (Behlau et al.; Camargo cit. in Mello; Carvalho, "Influência"; Carvalho, *A atuação*; Cichero; Crary and Groher; Crevi**èr-Buchman, Brihaye and Tes**sier; Dwivedi et al.; Figueiredo et al.; Fouquet, Amaral and Vicente; Furia cit. in Carvalho, *A atuação*; Gielow; Gielow cit. in Carvalho, *A atuação*; Le Huche and Allali; Matos; Mello; Murray; Perkins, Hancock and Ward; Sanchez; Seif; Steffen and Feijó cit. in Mello; Vale et al.; Vicente; Zago and Sawada cit. in Carvalho, *A atuação*).

According to the table 13, the preferred areas for rehabilitation were voice and swallowing (32%), voice, speech and swallowing (28%), voice (17%) and swallowing (16%). The area voice and speech is the least frequent intervention area (1%) and speech area has field of direct intervention. This allows us to infer that the surgical procedures are very complex and involve multiple sequels, extending the time and compromising the effectiveness of the rehabilitation. It is also observed that the number of patients have been increasing progressively.

Intervention Area	Year of surgery				Total	%
	2005	2006	2007	2008		
Voice	18	33	26	45	122	17
Swallowing	17	28	40	35	118	16
Voice and Speech	3	2	1	0	6	1
Voice and Swallowing	60	59	54	62	235	32
Speech and Swallowing	9	19	9	11	48	6
Voice, Speech and Swallowing	49	32	57	72	210	28
Total	**156**	**173**	**187**	**223**	**739**	**100**

TABLE 13 - Absolute Frequency of areas of intervention of Speech therapists.

According to the analysis, we can conclude that 82% of surgeries have direct implications in swallowing, 78% in voice and 35% in speech. These sequels can be multiple and associated.

5. **TEMPORAL ANALYSIS OF REHABILITATION PROCESS**

Currently, the investigations that assess the costs of the intervention are more frequent, contributing to a more rational and meticulous rehabilitation. Head and neck cancer treatment involved different medical resources, high direct financial costs (services/institutions, medications, equipments) and indirect (working time spent by professionals, caregivers, other family resources and social support for patients). For these reasons, it is urgent to analyze carefully the different financial costs involved in this process (Terrell and Wilkins).

In this specific kind of rehabilitation, the frequency of Speech Therapy sessions should be whenever possible daily, while the patient is in the hospital and weekly after hospital discharge. Each session should last about 30 minutes, but this could vary according to the needs of the patient, the Speech Therapist's approach and time available. In the case of total laringectomies, the ideal intervention should be 3 to 4 weekly sessions (Lazarus, Ward and Yiu).

To accomplish this study, it was used as a measure the mean time of a Speech Therapy session, despite being a relative question, because it depends on physical and psychological factors as well as the commitment and motivation of the patients and professionals experience, enable us to extrapolate some results. For this effect it was considered a 8-working hour, with weekly 30-minute sessions in outpatients. So, during a day, with a fully completed schedule without breaks, a Therapist can perform 16 sessions. Consequently, during the time-span of this study (2005 to 2008), a Speech Therapist would make 14672 sessions, that multiplied by 30 minutes would give 7336 hours of work (table 14).

Year	No sessions
2005	3664
2006	3648
2007	3680
2008	3680
Total	**14672**

TABLE 14 - Number of sessions per year (This calculation were excluded weekends, public holidays and vacation).

Through the analysis of table 15 and based on the complexity of interventions in this area, we can ascertain that the pharyngolaryngeal topographical region is the one that requires more time of rehabilitation, followed by other locations/undefined lesions of the oral cavity and maxilla/mandible. This happens because the surgeries performed in these regions are more invasive and extensive.

Another aspect to consider is the total number of sessions needed (19800) for the entire sample (739 surgeries). From the comparison between the table 14 and 15 we can see that 26% of the surgeries (192) would not have an appropriate rehabilitation. Taking into consideration this results, we can consider that to meet the requirements of this population, it would be needed at least two Speech Therapists to be part of the team in this Department, so that all patients could have access to a well-timed rehabilitation.

Topographical Region	No total sessions	No middle sessions	No minimum sessions	No maximum sessions
Oral cavity	1678	19,95	4	144
Maxilla/Mandible	2868	28,40	5	144
Oral cavity & Maxilla/Mandible	4032	144	144	144
Pharynx	2484	20,53	4	24
Larynx	3698	12,45	3	24
Pharyngolaryngeal region	5040	144	144	144

TABLE 15 - Distribution of the total number, mean, minimum, and maximum sessions per topographical region. (Behlau et al.; Berlin cit. in Mathieson; Berlin et al. cit. in Martin; Carvalho, "Influência"; Crevièr-Buchman, Brihaye and Tessier; Figueiredo et al.; Furia, Carrara-de Angelis e Mourão; Goode cit. in Mathieson; Laccoureye et al. cit. in Yeager and Grillone; Le Huche and Allali; Logemann; Mekaru et al.; Murray; Perkins, Hancock and Ward; Pou; Santos; Singer; Thomas and Keith; van As-Brooks, Finizia, and Ward; Yeager and Grillone).

6. **CONCLUSION**

With this study, we aim to understand the reality of an Oncology Department, in what concern the necessity of Speech Therapists to include in the multidisciplinary teams. Cancer patients from an ENT Department need the intervention of these professionals and the amount of work is growing due to the high number of new cases.

Only on a theoretical point of view, it is possible to quantify the number of sessions that are appropriate to the several surgical procedures. Therefore, the number of Speech Therapists, required to meet the needs of these department, could have been underestimated once there are no reliable data about this issue. We conclude that more important than demonstrating the relevance of the Speech Therapists integration in multidisciplinary teams it is also important to understand the dynamics and the role of these professionals in the oncologic area.

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