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EVALUATION OF TREATMENT MODALITIES IN LARYNGEAL CANCER

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ABSTRACT

This retrospective study was carried out to evaluate the results of treatment modalities and to identify the prognostic factors affecting survival (OAS) and disease free survival (DFS) of 116 laryngeal cancer patients treated and followed up in Clinical Oncology and Nuclear Medicine and ENT departments, Mansoura University Hospital during the period 1990-1999 inclusive. Laryngeal carcinoma represented 0.8% of all malignancies and 8.5% of all head and neck cancers during the period of the study. The median age of the patients was 60 years with a male to female ratio 22:1. History of smoking was found in 62.9% of cases. The main presenting symptom was hoarseness of voice (62.1%). Glottic carcinoma formed the majority of cases (44.8%). Squamous cell carcinoma was the

commonest pathology (95%). Grade I was the commonest tumor grade (46.6%). Different treatment modalities were used in the management of the patients. Radiotherapy was used alone in treatment of 28 patients (24.1%); surgery alone in 12 patients (10.3%); and combined surgery and radiotherapy in 70 patients (60.3%). Chemotherapy was added to either surgery or radiotherapy or both in 6 cases (5.2%). Combined modality treatment of surgery followed by radiotherapy resulted in longer OAS and better DFS. Early lesions T1-T2, N0-N1 showed better response to treatment and better OAS. DFS at 18 months was 95% for T1 lesion. Treatment of laryngeal carcinoma needs a multi-disciplinary approach to standardize treatment policies, to avoid excessive surgery for early lesions and to use organ preservation proto-

cols using neo-adjuvant chemotherapy as first step for locally advanced lesions before radical surgery is done. Regular follow up and endoscopic examinations are mandatory for early detection of recurrences and for proper management of disease failures.

INTRODUCTION

Cancer of the larynx represents 2% of the total cancer risk and is the most common head and neck cancer (skin excluded) (Wingo et al., 1995). The ratio of glottic to supraglottic carcinoma is approximately 3:1 (Mendenhall et al., 1998). The peak incidence of laryngeal cancer is in the sixth decade with male to female ratio 4.5:1 (Harrison et al., 1997). Risk factors for laryngeal cancer include history of smoking and excessive use of voice. The role of alcohol is less clear for glottic cancer but has been implicated in supraglottic cancer (Phillips et al., 1998).

The treatment objective for carcinoma of the larynx is to obtain the best cure rate with the optimal preservation of organ function. Radiotherapy and/or surgery have been the primary treatment modality for carcinoma of the larynx. Surgical procedures include endoscopic stripping, LAZER

excision, cordectomy, partial laryngectomy for early glottic carcinoma, and supraglottic partial laryngectomy for early supraglottic carcinoma. Total laryngectomy is necessary in the surgical treatment of advanced carcinoma of the larynx (Phillips et al., 1998). Neoadjuvant chemotherapy combined with radiotherapy has been used in the treatment of advanced operable laryngeal cancers with organ preservation and with no compromise of survival (Harrison et al., 1997).

The aim of this study is to delineate the clinico-epidemiological features, evaluate treatment results and identify prognostic factors affecting disease-free survival (DFS) and overall survival (OAS) of laryngeal cancer patients treated in Clinical Oncology & Nuclear Medicine and E.N.T. Departments, Mansoura University Hospital (MUH) during the period 1990-1999.

PATIENTS AND METHODS

The present study is a retrospective analysis of 116 laryngeal cancer patients presented to Clinical Oncology & Nuclear Medicine and E.N.T. Departments, MUH during the period 1990-1999, inclusive. An abstract sheet was done for each patient which include patients characteristics,

diagnostic and staging procedures, initial treatment received, response to treatment, treatment side effects and complications, date of relapse and date of last follow up or date of death. Patients characteristics included age, sex, history of cigarette smoking and presenting signs and symptoms. Diagnostic and staging procedures according to AJCC staging system 1997 included complete ENT examination, direct and indirect laryngoscopic examination, date of diagnosis (date of biopsy), histological diagnosis, laboratory and radiological (chest X-ray and CT neck) investigations. Initial treatment modalities included radiotherapy in 103 patients, surgery in 86 patients and chemotherapy in 6 patients.

Radiotherapy was used in the treatment of 103 patients (88.88%), alone in 28 patients (27.18%), combined with surgery in 70 patients (67.96%), with chemotherapy in 2 patients (1.94%), and with both surgery and chemotherapy in 3 patients (2.91%). Radiotherapy was given using ^{60}Co machine and 6 MV linear accelerator in a dose of 50 Gy /5w/25 treatments to the tumor bed and regional L.N draining sites as a post-operative adjuvant treatment. In radical treatment radiotherapy was given

in a dose of 60-65 Gy/6-6.5 w/30-33 treatments in 2 phases: phase I: 45-50 Gy/5w/25 treatments to the tumor bed and regional LN draining sites and phase II: 15-20 Gy/1.5-2w/7-10 treatments was given to the primary tumor site as well as residual LN if present. The spinal cord was shielded after a dose of 45 Gy.

Surgery was used in the treatment of 86 patients (74.14%), alone in 12 patients (13.95%), combined with radiotherapy in 70 patients (81.39%), with chemotherapy in one case (1.16%), and with both radiotherapy and chemotherapy in 3 cases (3.49%). Surgical techniques included total laryngectomy in 57 patients (66.28%), supraglottic laryngectomy in 14 patients (16.28%), cordectomy and vertical partial laryngectomy in 2 cases (2.33%), excision of the mass and cord stripping in 13 cases (15.12%). Block neck dissection was used in 24 cases either with total in 11 cases or horizontal laryngectomies in 13 cases.

Chemotherapy was given in 6 cases (with surgery in one case, with radiotherapy in 2 cases and with both surgery and radiotherapy in 3 cases) giving platinol 100 mg/ m² / 3 weeks.

Cases were assessed one month after the end treatment by complete ENT and endoscopic examinations and CT neck. Regular follow up is carried out by E.N.T. and endoscopic examinations every 1-2 month. CT neck and/or biopsies from suspicious lesions is carried out whenever indicated.

Response to treatment was defined as follow :

- a-Complete response: Complete disappearance of all signs and symptoms of the disease.
- b- Partial response: Reduction of more than 50% of the size of the lesion.
- c- No response: Less than 50% decrease in size of the lesion.

STATISTICAL ANALYSIS

All statistical tests were done through a computerized statistical program (SPSS/PC). One hundred and sixteen patients were analyzed. There were 3 cases, which were planned to receive radical radiotherapy but did not complete their treatment. Two cases, where surgery was done, were planned for postoperative radiotherapy; one of them did not finish radiotherapy and the other lost follow up shortly after ending radiothera-

py. This gave missing system of 4 cases in the assessment for the response, 5 cases in that for recurrence and follow up at 18 months.

Frequency tables, arithmetic mean, standard deviation (SD) and standard Error (SE) were done to describe the data. Chi-square test was used to test for association between different variables. Life tables and Kaplan-Meier tests were used to test the effect of different variables on survival. Kendall's non-parametric correlation was used to test for linear relationship between the site of the lesions, stage, grade, DFS and OAS.

DFS was calculated from the date of the initial response till the date of recurrence, patient's death or last follow up. OAS was calculated from the date of pathological diagnosis till patient's death or last follow up.

RESULTS

This study included 116 patients with laryngeal carcinoma, which constitute 8.5% of total head and neck cancer patients, and 0.8% of total malignant cases in the period of the study (1990-1999, inclusive). They included glottic carcinoma in 52 patients (44.8%), supraglottic carcinoma

in 43 patients (37.1%), subglottic carcinomas in 3 patients (2.6%) and transglottic carcinomas in 18 patients (15.5%). The peak age incidence was found in the sixth decade of life. Age ranged from 35 to 80 years with median age of 60 years. Males were 111 patients (95.7%) while females were 5 patients (4.3%) with male to female ratio of 22:1.

History of cigarette smoking was observed in 73 patients (62.9%) versus 43 patients (37.1%) non-smoker. History of smoking for more than 20 years was found in 70 patients (60.3%).

Clinical presentation and its association with site of the lesion are shown in Table 1. Hoarseness of voice was the commonest presenting symptom in 72 patients (62.1%) regardless the site of the lesion, followed by dysphagia in 32 patients (27.6%), neck nodes, stridor and dyspnea in 4.3%, 2.6% and 3.4% of the cases respectively .

All case were squamous cell carcinoma with grade I in 54 patients (46.5%), grade II in 48 patients (41.4%), and grade III in 14 patients (12.1%).

Clinical staging, tumor grading and their relations to-site of the lesion are shown in Table 2. The vocal cord was mobile in 37 cases (31.9%), partially mobile in 8 cases (6.9%) and fixed in the majority of cases. 71 cases (61.2%). Fifty patients (43.1%) were T3, 20 patients (17.2%) were T1, 21 patients (18.1%) were T2, and 25 patients (21.6%) were T4. Clinically negative neck node (N0) was found in 81 patients (69.8%), N1 in 20 patients (17.2%), N2 in 13 patients (11.2%) and N3 in 2 patients (1.7%). One supraglottic carcinoma patient showed distant metastases in the lung and bones (M1). There was significant association between site of the lesion and T-stage ($X^2 = 40.286, P < 0.001$), N-stage ($X^2 = 29.021, P < 0.004$) and tumor grade ($X^2 = 16.701, P < 0.033$). Kendall's non-parametric correlation tests have shown positive correlation between T-stage and N-stage (tb correlation coefficient =0.344, $P < 0.001$), T-stage and tumor grade (tb=0.188, $P < 0.023$) and N-stage and tumor grade (tb=0.197, $P < 0.021$) (Table 3).

There were 112 patients who underwent evaluation for the response one month after treatment (Table 4). There was significant association between response to treatment and

treatment modalities ($X^2 = 43.35$, $P < 0.001$). Also there was significant association between the response and both T-stage of the tumor ($P < 0.001$) and N-stage ($P < 0.043$). There was non-significant association between the response and both tumor grade and the site of the lesion ($P < 0.081$ and < 0.194) respectively. Kendall's non-parametric correlation tests showed significant correlation between the response and T-stage ($t_b = -0.405$, $P = 0.001$), survival ($t_b = +0.372$, $P = 0.001$) and cord mobility ($t_b = -0.275$, $P = 0.002$). It was negative in T-stage and cord mobility, and positive with the survival. There were non-significant correlation between the response and N-stage ($t_b = 0.170$, $P = 0.055$), tumor grade ($t_b = 0.067$, $P = 0.453$) and DFS ($t_b = 0.158$, $P = 0.073$) (Table 5).

Pattern of recurrence with different treatment modalities is shown in Table 6. Mean duration of DFS was 12.69 ± 7.89 months (range 2-36 months). Recurrence occurred in 6 cases (25%) of the group managed by radiotherapy alone, in 5 cases (41.7%) of the group managed by surgery alone, and in 39 cases (57.4%) of the group managed by surgery plus radiotherapy. The association between treat-

ment modalities and recurrence were non-significant ($X^2 = 12.849$, $P < 0.38$). Also, there was non significant association between the recurrence and T-stage ($X^2 = 20.297$, $P < 0.062$), site ($X^2 = 16.316$, $P < 0.431$) and grade ($X^2 = 12.772$, $P < 0.120$). The only significant association with the recurrence was found with N-stage ($X^2 = 21.233$, $P < 0.047$). (Table 7).

The impact of different treatment modalities on the patients' status at 18 months follow up is shown in Table 8. The difference between them was statistically significant ($X^2 = 48.072$, $P < 0.001$). There was significant association between T-stage and follow up status at 18 months ($X^2 = 59.388$, $P < 0.001$). There was non significant association with N-stage and tumor grade ($X^2 = 16.096$, $P < 0.065$ and $X^2 = 8.233$, $P < 0.222$ respectively). Again, there was significant association between the site of the lesion and patients' status on follow up at 18 months ($X^2 = 28.258$, $P < 0.005$).

DFS ranged from 4 months to 52 months with mean of 17.73 months ± 9.45 . DFS at 1-, 2- and 3- years was 91.86%, 58.38%, and 10.47% respectively. There was significant negative correlation between DFS and the fol-

lowing factors: T-stage (tb= -.509, $P<0.001$), N-stage (tb=-.378, $P<0.001$) and cord mobility ((tb= -.450, $P<0.001$). There was non-significant correlation with tumor grade (tb= -.157, $P<0.66$) (Table 9).

OAS ranged from 4 to 57 months with mean duration of 21.05 months ± 10.33 . The 2- and 3-year OAS was 55% and 19% respectively. Median OAS for glottic, supraglottic, subglottic and transglottic lesions were 41.78 months, 15.83 months, 36 months, and 24.53 months respectively. There were significant differences in OAS between glottic and supraglottic lesions ($P<0.001$), glottic and transglottic lesions ($P<0.011$), and supraglottic and transglottic group ($P<0.041$) (Figure 1). Median OAS for T1, T2, T3, and T4 was 42 months, 37.44 months, 20.85 months and 13.75 months respectively. The differences are statistically significant (Table 10 & Figure 2). For N-stages, median OAS was 32.77 months, 19.28 months, 13.69 months, and 9 months for No, N1, N2, and N3, respectively. The differences are statistically significant (Table 11 & Figure 3). For pathological grades, median OAS was 35.76 months, 22.25 months and 17.4 months for grade I, II

and III respectively with significant difference between grade I and III ($P<0.033$) (Figure 4). Median OAS was 19.24 months for the radiotherapy group, 31.33 months for the surgery group, 33.81 months for the combined surgery and radiotherapy group, and 10.00 months for the group received chemotherapy (with other lines of treatment) (Table 12 & Figure 5). The Median OAS for patients with complete response was 36.51 months, 15.30 months for those patients with partial response and 7.00 months for those with minimal or no response. The differences are statistically significant (Table 13). At 18 months follow up, median OAS was 54 months for patients in complete response, 18 months for patients with recurrent or residual disease and 13.9 months for patients who lost follow up or died, the differences are statistically significant (Table 14).

Kendall's non-parametric correlation tests between OAS and different categories have shown, significant positive correlation with DFS and initial response, significant negative correlations with T-stage, N-stage, cord mobility and follow up at 18 months, and non significant correlation with tumor grade (Table 15).

Table (1): Clinical presentation of 116 laryngeal cancer patients.

	<i>H.O.V.</i>	<i>Dysphagia</i>	<i>Neck node</i>	<i>Stridor</i>	<i>Dyspnea</i>	<i>Total</i>
Glottic	46 88.5%	4 7.7%		1 1.9%	1 1.9%	52 100%
Supraglottic	11 25.6%	25 58.1%	4 9.3%	1 2.3%	2 4.7%	43 100%
Subglottic	3 100%					3 100%
Transglottic	12 66.6%	3 16.6%	1 5.6%	1 5.6%	1 5.6%	18 100%
Total	72 62.1%	32 27.6%	5 4.3%	3 2.6%	4 3.4%	116 100%

$\chi^2 = 46.604$ $P < 0.001$

Table (2): Clinical staging and tumor grading according to the site of the lesion.

Site	T stage				N-stage				Tumor grade			Total
	T1	T2	T3	T4	N0	N1	N2	N3	G1	GII	GIII	
Glottic	19 36.5%	10 19.2%	19 36.5%	4 7.7%	45 86.5%	4 7.7%	2 3.8%	1 1.9%	30 57.7%	21 40.4%	1 1.9%	52 100%
Supraglottic	1 2.3%	9 20.9%	16 37.2%	17 39.5%	19 44.2%	14 32.6%	9 20.9%	1 2.3%	13 30.2%	19 44.2%	11 25.6%	43 100%
Subglottic		1 33.3%	1 33.3%	1 33.3%	3 100%			2 66.7%	1 33.3%			3 100%
Transglottic		1 5.5%	14 77.8%	1 5.5%	14 77.8%	2 11.1%	2 11.1%		9 50.0%	7 38.9%	2 11.1%	18 100%
Total	20 17.2%	21 18.1%	50 43.1%	25 21.6%	81 69.8%	20 17.2%	13 11.2%	2 1.7%	54 46.5%	48 41.4%	14 12.1%	116 100%

$\chi^2 = 40.286$
 $P < 0.001$

$\chi^2 = 29.021$
 $P < 0.004$

$\chi^2 = 16.701$
 $P < 0.033$

Table (3): Correlations between T-stage, N-stage and tumor grade.

Categories		T-stage	N-stage
T-stage	τ_b	.344	
	P	<0.001	
Tumor grade	τ_b	.188	.197
	P	<.023	<0.021

Table (4) Association between response to treatment and different treatment modalities.

<i>Treatment</i>	<i>Complete</i>	<i>Partial</i>	<i>No response</i>	<i>Total</i>
Radiotherapy	9 36%	10 40%	6 24%	25 100%
Surgery	12 100%			12 100%
Surgery + Radiotherapy	63 91.3	5 7.3%	1 1.4%	69 100%
Chemotherapy with others	3 50%	3 50%		6 100%
Total	87 77.7%	18 16.1%	7 6.3%	112 100%

 $X^2=43.35$ $P<0.001$ **Table (5):** Correlation between the response and different factors.

		<i>T-stage</i>	<i>N-stage</i>	<i>Grade</i>	<i>DFS</i>	<i>Survival</i>	<i>Cord mobility</i>
Response	τb	.405	.170	.067	+.158	+.372	-.275
	p	.001	.055	.453	.073	0.001	0.002

Table (6): Association between the recurrence and different treatment modalities.

<i>Treatment</i>	<i>No recurrence</i>	<i>Local</i>	<i>Stomal</i>	<i>Nodal</i>	<i>Systemic</i>	<i>Total</i>
Radiotherapy alone	19 76%	3 12%	1 4%	2 8%		25 100%
Surgery along	7 58.3%	1 8.3%	2 16.7	2 16.7%		12 100%
Surgery + radiotherapy	29 42.6%	19 27.9%	12 17.6%	7 10.3%	1 1.5%	68 100%
Chemotherapy + others	2 33.3%	1 16.7%	2 33.3%	1 16.7%		6 100%
Total	57 51.4%	24 21.6%	17 15.3	12 10.8%	1 9%	111 100%

 $X^2= 12.849$ $P<0.380.$

Table (7): Association between the recurrence and N-stage.

<i>N-stage</i>	<i>No recurrence</i>	<i>Local</i>	<i>Stomal</i>	<i>Nodal</i>	<i>Systemic</i>	<i>Total</i>
N ₀	45 57.7%	17 21.8%	12 15.4%	3 3.8%	1 1.3%	78 100%
N ₁	7 36.8%	5 26.3%	2 10.5%	5 26.3%		19 100%
N ₂	5 38.5%	2 15.4%	3 23.1%	3 23.1%		13 100%
N ₃				1 100%		1 100%
Total	57 51.4%	24 21.6%	17 15.3%	12 10.8%	1 .9%	111 100%

$$X^2 = 21.233$$

$$P < 0.047$$

Table (8): Association between patient's response at 18 months follow up and treatment modality, T-stage and site of the lesions.

<i>Follow up at 18 months</i>	<i>Treatment modality</i>				<i>T-stage</i>				<i>Site</i>			
	<i>R th</i>	<i>S</i>	<i>S + R th</i>	<i>C th and others</i>	<i>T₁</i>	<i>T₂</i>	<i>T₃</i>	<i>T₄</i>	<i>Glottic</i>	<i>Supra-glottic</i>	<i>Sub-glottic</i>	<i>Trans-glottic</i>
<i>Free</i>	8 32.0%	8 66.7%	31 45.6%		19 95.0%	13 68.4%	13 27.7%	2 8.0%	32 64.0%	8 20.0%	1 33.3%	6 33.3%
<i>Residual or Recurrent</i>	12 48.0%	3 25.0%	16 23.5%	4 66.7%	1 5.0%	6 31.6%	16 34.0%	12 48.0%	11 22.0%	18 45.0%		6 33.3%
<i>Last follow Up</i>	5 20.0%	1 8.3%	21 30.9%	2 33.3%			18 38.3%	11 44.0%	7 14.0%	14 35.0%	2 66.7%	6 33.3%
<i>Total</i>	25	12	68	6	20	19	47	25	50	40	3	18

$$X^2 = 48.072$$

$$P < 0.001$$

$$X^2 = 59.388$$

$$P < 0.001$$

$$X^2 = 28.258$$

$$P < 0.005$$

Table (9): Correlation between DFS and different factors

		<i>T-stage</i>	<i>N-stage</i>	<i>Grade</i>	<i>Cord mobility</i>
D.F.S.	τb	-0.509	-0.378	-0.157	-0.450
	<i>p</i>	0.001	0.001	0.66	0.001

Table (10) : Significance of differences in OAS regarding T-stage.

<i>Factor</i>		T_1	T_2	T_3
T ₂	X ²	4.94		
	P	.0236		
T ₃	X ²	17.25	5.76	
	P	.0001	.0164	
T ₄	X ²	30.53	18.10	12.41
	P	.0001	.0001	.0004

Table (11): Significance of differences in OAS regarding N-stage.

<i>Factor</i>		N_0	N_1	N_2
N ₁	X ²	3.25		
	P	0.0713		
N ₂	X ²	23.63	4.70	
	P	0.001	0.030	
N ₃	X ²	17.65	5.67	.92
	P	0.001	0.0173	.3366

Table (12): Significance of differences in OAS regarding treatment modalities.

<i>Treatment modalities</i>		<i>Radio-therapy</i>	<i>Surgery</i>	<i>Surgery + Radio-therapy</i>
Surgery	X ²	2.511		
	P	0.113		
Surgery + radiotherapy	X ²	4.42	.02	
	P	0.035	.887	
Chemotherapy + others	X ²	3.46	13.65	20.18
	P	.0627	.0002	.0001

Table (13): Significance of differences in OAS according to the response 1 month after ending treatment.

<i>Response</i>		<i>Complete response</i>	<i>Partial response</i>
Partial response	X ²	28.57	
	P	0.0001	
No response	X ²	51.37	6.25
	P	.0001	.0124

Table (14): Significance in differences in OAS according to follow up at 18 months.

<i>Response</i>		<i>Free</i>	<i>Residual or recurrent</i>
Residual or recurrent	X ²	32.71	
	P	0.0001	
Lost follow up or died	X ²	68.40	10.6
	P	0.0001	0.001

Table (15): Kendall's non-parametric correlation between OAS and different categories.

		<i>T-stage</i>	<i>N-stage</i>	<i>Grade</i>	<i>Cord mobility</i>	<i>Follow up at 18 months</i>	<i>DFS</i>	<i>Response</i>
OAS	tb	-.511	-.347	-.123	-.433	-.583	.764	.275
	p	.001	.001	.106	.001	.001	.001	0.001

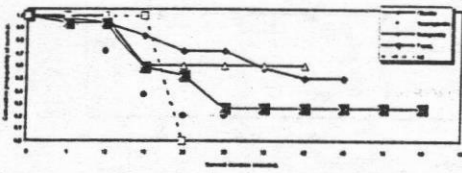


Figure 1. Survival probability in relation to site.

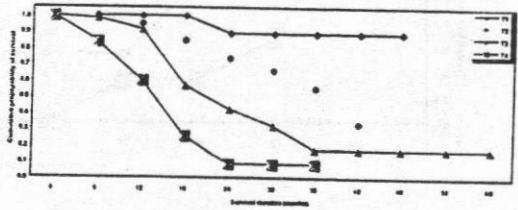


Figure 2. Survival probability in relation to T-stage.

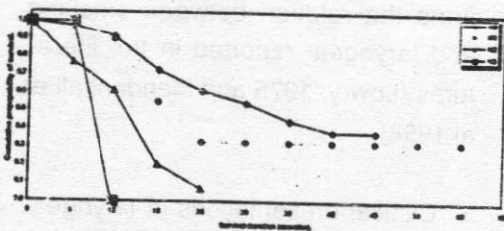


Figure 3. Survival probability in relation to N-Stage.

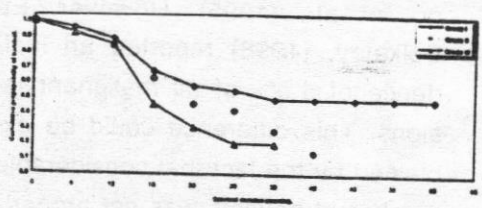


Figure 4. Survival probability in relation to grade.

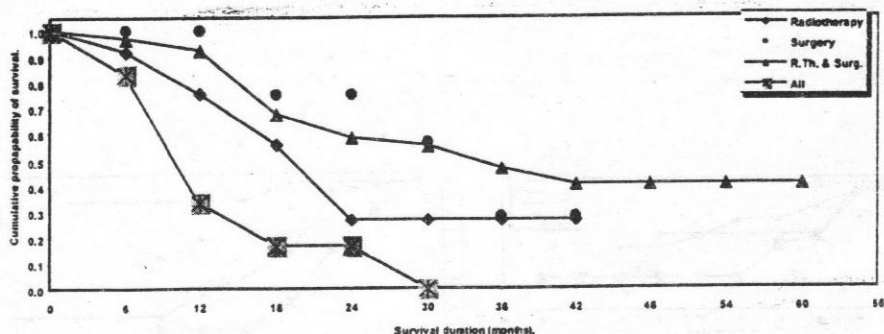


Figure 5. Survival probability in relation to treatment modalities.

DISCUSSION

One hundred- sixteen patients with laryngeal carcinoma were managed during the period 1990-1999, inclusive and constituted 0.8% of all malignant lesions and 8.5% of all head and neck malignancies during the same period. This percentage is about half of the incidence 2% reported by Wingo, et al., (1995). However, El-Bolkainy, (1998) reported an incidence of 1.5% of all malignant lesions. This difference could be explained by the fact that considerable number of patients was not properly collected from E.N.T. department especially the early cases.

The peak age incidence was found in the sixth decade of life, in agreement with Austin, (1982). Male to fe-

male ratio of 22:1 in our study is much higher than the current ratio of 4.5:1 reported by Wingo et al., (1995). Male predominance in our study may be attributed to decreased incidence of smoking among Egyptian females.

Cigarette smoking was observed in 62.9% of the patients. This confirms the relation between smoking and laryngeal reported in the literatures (Lowry, 1975 and Mendenhall et al 1998).

Clinical presentations of laryngeal cancer in this study are similar to those reported by Phillips et al., (1998) who mentioned that hoarseness of voice is the most common presenting symptom of early vocal cord cancer and pain on swallowing is

the most common presenting symptoms of carcinoma of the supraglottis.

The relative incidence of laryngeal carcinoma according to the anatomical site, histopathological type and grade in this study is similar to that reported by Batsakis et al., (1982), Lawson et al., (1989), El-Bolkainy, (1998) and Phillips et al., (1998). Carcinomas of the vocal cords are usually well or moderately differentiated while those of the supraglottis and subglottis are usually less differentiated (Batsakis et al., 1982).

T3 lesion was the commonest among T-stages of our patients (about 43.1%). Similar incidences of T-stages of the lesions were reported by Abdelkader, (1985), Wang, (1990) and Mendenhall et al (1998). The predominance of T1 lesions in glottic cases may be due to their early presentation by hoarseness of voice (Mendenhall et al 1998).

Again positive lymph node metastases were found in 30.17% of patients. This ratio approximates that reported by Shah, (1990). The incidence of lymph node metastases increases with the T-stage. Glottic carcinomas has low incidence of ly-

mph node metastases compared to the high incidence in supraglottic carcinomas owing to sparse lymphatic drainage of the vocal cords (Shah, 1990 and Cox, 1992).

Initial complete response was found in 36% of the patients who received radiotherapy alone. Failure of radiotherapy in the study may be due to that most of the cases in radiotherapy group were advanced from the start. Failure of radical radiotherapy to induce initial local control in advanced laryngeal carcinoma was confirmed by Rene and Wang, (1985). Kawashima et al., (1999) reported that conventional radiotherapy may allow organ preservation and ultimate local control in patients with T < 4 cm, but larger volume tumors should be considered candidates for the most intensive chemo-radiotherapy.

T-stage has a significant inverse effect on the response. Lee et al., (1997) reported that there is inverse relationship between primary tumor volume and local control rate. Also, mobility of vocal cords had a significant inverse effect on the response. This was confirmed by Wang, (1990) who reported that impaired vocal cord mobility is associated with low local

control rate and survival. In our study N-stage has insignificant effect on response. However, Mendenhall et al. (1998) reported that treatment failure in supraglottic carcinoma is usually the result of cervical lymph node metastases rather than the primary tumor

Evaluation of the patients' response at 18 month follow up shown that complete response was 32%, 66.7%, and 45.6% in radiotherapy, surgery and the combined surgery and radiotherapy groups respectively. Detailed analysis of the response with different variables in each treatment modality was not possible owing to the limited number of cases in each subset.

Recurrence rate during the follow up period was 49%. Recurrence was mostly local in 22% followed by nodal recurrence in 10% of cases. Ogura et al., (1975) reported a recurrence rate of 21% with local and nodal recurrence rate of 9% for each of them. The high recurrence rate in our study is probably related to the small number of cases, lack of standardized treatment policies and the high percentage of advanced cases at presentation (T3-4 lesions form 64% of cases).

The median OAS in our cases was 21.05 months with 2- and 3-year OAS of 55% and 19% respectively. Median OAS was 33.81 months, 19.24 months, and 31.33 months for the combined radiotherapy and surgery, radiotherapy, and surgery groups respectively. The difference in survival duration between the first 2 groups was statistically significant. This may be explained by the fact that majority of our cases (64 %) were T3-4 at presentation. The high OAS of surgery group may be due to patient selection.

Also, it was found that median OAS decreases with the increase in T-stage where it was found to be 42 months for T1, 37.44 months for T2, 20.85 months for T3 and 13.75 months for T4. Lower median OAS for T3 and T4 lesions in our study may be attributed to the fact that the policy of radical radiotherapy and surgery for salvage (RRSS) was not planned for the patients. RRSS was found by Mackenzie et al.,(2000) to offer a good chance of laryngeal preservation without compromising ultimate loco-regional control or survival when compared to primary laryngectomy and neck dissection in patients with locally advanced carcinoma of the larynx.

Also, survival duration was significantly affected by the site of the lesion. Median survival for glottic lesions was 41.78 month, where it was 15.83 month for supraglottic lesion and the difference was highly significant. This confirms with Golen et al., (1999) where, they found a significant differences in DFS and OAS for glottic and supraglottic cancers, generally, 5-years overall and disease-free survival rates were (67% and 63% versus 40% and 36%, respectively).

Survival of our patients was significantly affected by T-stage, N-stage, mobility of the cord and response at 18 months, in all of them there was inverse effect on survival duration. Shah, (1990) reported the inverse effect of advanced tumor stage on local control rates and survival duration. It was found that D.F.I. had a positive significant effect on the survival duration. Again median survival was significantly higher in patients who were in complete remission (54 months). For patients with local recurrence it was only 22.25 months; a fact that was proven by Hermans et al., (1999).

Summary and Conclusions :

Laryngeal carcinoma represented

0.8% of all malignancies, and 8.5% of head and neck malignancies during the period of study. Glottic carcinomas formed the majority of cases (44.8%). Squamous cell carcinoma was the commonest pathology. G1 was the commonest tumor grade (46.6%). The majority of cases were T3 (43.1%). Best survival durations were recorded in early lesions T1-T2, N0-N1 and in the group, which was managed by combined surgery and radiotherapy. Treatment of laryngeal carcinoma needs a multi-disciplinary approach to standardize treatment policies, to avoid excessive surgery for early lesions and to use organ preservation protocols using neo-adjuvant chemotherapy for locally advanced lesions before radical surgery. Regular follow up and endoscopic examinations are mandatory for early detection and management of recurrences.

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الملخص العربي

تمثل هذه الدراسة تقييم لطرق العلاج المختلفة المستخدمة في علاج سرطان الحنجرة وتأثيرها على حياة المرضى وفترة خلوهم من المرض. وبلغ عدد الحالات محل البحث ١١٦ حالة تم علاجها بقسم علاج الأورام والطب النووي وقسم الأنف والأذن والحنجرة بجامعة المنصورة في الفترة من ١٩٩٠ - ١٩٩٩، ولقد مثلت هذه الحالات ٨٠٪ من كل حالات الأورام السرطانية في الفترة المذكورة. وكانت نسبة الذكور إلى الإناث ٢٢:١.

وقد قسمت الحالات حسب نوع العلاج المستخدم إلى أربع مجموعات: مجموعة العلاج الإشعاعي، مجموعة العلاج الجراحي، مجموعة العلاج الإشعاعي الجراحي المشترك ومجموعة العلاج الكيماوي.

وقد كانت نسبة الاستجابة الكاملة للمرضى بعد إنتهاء العلاج ٧٥٪ في حين كانت نسبة الخلو من المرض بعد ١٨ شهر من المتابعة ٤٢٫٣٤٪ كانت معظمها من الحالات التي تم علاجها بالعلاج الإشعاعي الجراحي المشترك.

ومن نتائج هذا البحث يمكن التوصل إلى :

العلاج المشترك من الجراحة والعلاج الإشعاعي معا هي أفضل الطرق لعلاج سرطان الحنجرة

أهمية وضع منظومة متكاملة للاعتناء بمرضى سرطان الحنجرة من وضع خطة العلاج والمتابعة واستخدام الطرق الحديثة للمحافظة على الحنجرة ما أمكن ذلك.

أهمية متابعة المرضى بصورة منتظمة مع اجراء الفحوصات اللازمة لاكتشاف إرتجاع الورم بصورة مبكرة.

استخدام الطرق الحديثة لعلاج سرطان الحنجرة باستخدام العلاج الكيماوي في علاج الحالات المتقدمة كمحاولة للمحافظة على الحنجرة متبوعا بالعلاج الإشعاعي عند حدوث استجابة كاملة.