Metastatic involvement of draining paratracheal lymph nodes in hypopharyngeal carcinoma: a clinicopathological study

Ahmed Tantawy,[1] Mostafa Shehata [2] and Nabila Metwalli [3]

إصابة العقد اللمفية النازحة المجاورة للرغامى بنقائل السرطان تحت البلعومي

أحمد طنطاوي ومصطفى شحاته ونبيلة متولي

خلاصة : تمت دراسة الشواهد النسيجية على إصابة العقد اللمفية المجاورة للرغامى بالنقائل في حالات السرطان تحت البلعومي ، ومضاعفاتها المرضية السريرية . فقد أجريت لخمسة وعشرين مصابا بالسرطان تحت البلعومي عملية استئصال كلي للحنجرة والبلعوم والمريء مع التصفية التامة للأنسجة المحيطة بالرغامى . ووجد أن نسبة العقد اللمفية الإيجابية المجاورة للرغامى كانت 40% في حالات السرطان تحت البلعومي . أما في الآفات خلف الحلقية فكانت نسبة العقد الإيجابية أكبر (50%) بالمقارنة بآفات الجدار الخلفي (16.67%) . ولوحظ وجود زيادة يعتد بها إحصائيا في معدل حدوث العقد اللمفية الإيجابية المجاورة للرغامى في حالات انتشار السرطان إلى الغدة الدرقية والحبال الصوتية ، والامتداد النقيلي إلى السلسلة الوداجية الغائرة من العقد الرقبية العميقة ، وإلى خارج المحفظة وحول الأعصاب .

ABSTRACT Histological evidence of metastatic involvement of paratracheal lymph nodes in hypopharyngeal carcinoma and its clinicopathological implications were studied. Twenty-five patients with hypopharyngeal carcinoma underwent total laryngopharyngo-oesophagectomy with complete paratracheal clearance. The incidence of positive paratracheal lymph nodes was 40% in hypopharyngeal tumours. Postcricoid lesions showed a higher percentage of positive nodes (50%) compared to those in posterior wall lesions (16.67%). There was a statistically significant increase in the incidence of positive paratracheal lymph nodes with thyroid gland invasion, vocal cord invasion, metastasis to the internal jugular chain of the deep cervical nodes and extracapsular and perineural spread.

Atteintes métastatiques des ganglions lymphatiques paratrachéaux dans le cancer de l'hypopharynx

RESUME Les données histologiques de l'atteinte des ganglions lymphatiques paratrachéaux dans le cancer de l'hypopharynx et ses implications sur le plan clinico-pathologique ont été examinées. Vingt-cinq patients atteints du cancer de l'hypopharynx ont subi une pharyngo-laryngectomie et une oesophagectomie totales avec clairance paratrachéale complète. L'incidence des ganglions lymphatiques paratrachéaux positifs s'élevait à 40% pour les tumeurs de l'hypopharynx. Le pourcentage des ganglions positifs au niveau des lésions rétro-cricoïdiennes s'est avéré supérieur (50%) à ceux des lésions de la paroi postérieure (16,67%). Il y avait une augmentation statistiquement significative de l'incidence des ganglions lymphatiques paratrachéaux positifs avec envahissement de la thyroïde, des cordes vocales, et métastase au niveau de la chaîne jugulaire interne des ganglions latéraux profonds du cou et dissémination extracapsulaire et périneurale.

[1]Lecturer in otolaryngology; [2]Professor of Otolaryngology, Head and Neck Surgery; [3]Assistant Professor of Pathology. Faculty of Medicine, Alexandria University, Alexandria, Egypt.
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Introduction

The hypopharyngeal lymph usually flows directly into the superior nodes of the deep cervical chain. However, if these superior lymph nodes are clogged by a metastatic carcinoma, flow of lymph into the paratracheal lymph nodes may take place in the form of the so-called paradoxical metastasis [*1*,*2*].

The postcricoid area and the cervical oesophagus drain primarily into the lower deep cervical and paratracheal lymph nodes (PTNs). It is the latter group which is responsible for most local recurrences [*3*]. Som [*4*] emphasized the importance of removing these nodes when attempting radical resection of pharyngo-oesophageal neoplasms and advocated dissection of the lymph nodes lying above the innominate vein in the superior mediastinum. He approached this region by splitting the manubrium.

Harrison stated that only by removing the whole manubrium sterni could the paratracheal adipose tissue, lymphatics and lymph nodes be removed as far as the left innominate vein [*5*,*6*,*7*]. On the other hand, Hiroto believes that without sternum amputation, PTN clearance is possible as far as immediately above the aorta, i.e. the level of the 3rd and 4th thoracic vertebrae [*8*].

The incidence of metastatic involvement of the PTNs in patients with hypopharyngeal carcinoma, as well as the clinicopathological factors associated with their metastases are not adequately documented. The present study aimed to evaluate the clinicopathological characteristics of primary hypopharyngeal carcinoma and neck secondaries, which are associated with PTN metastases.

Patients and methods

Twenty-five patients suffering from primary hypopharyngeal cancer were treated between 1990 and 1992. All patients underwent total laryngopharyngectomy, total oesophagectomy and reconstruction by stomach pull-up with either radical or functional neck dissection. Complete clearance of the paratracheal (recurrent laryngeal chain) lymph nodes was done successfully without manubrial resection. The nodes were cleared as a block with the primary specimen in most cases or were dissected separately. The exact site of enlarged nodes was determined by measuring the distance from the lower border of the cricoid cartilage to the enlarged nodes. The opposite tracheal ring (TR) was recorded.

Evaluation of metastatic PTNs was determined by clinical examination and TNM staging [*9*] and by histopathological evaluation of the specimens. The neck specimen was separated from the primary carcinoma and both were fixed in 10% buffered formol saline for at least 48 hours. The hyoid bone was carefully dissected and separated. The specimen was then cut using a sharp scalpel in horizontal and parallel sections from the pharyngo-epiglottic fold to 2 cm below the free margins of the tumour in the hypopharynx or cervical oesophagus. Sections were made at 5 mm distances. Representative blocks were grossly studied, photographed and labelled. They were then processed and embedded in paraffin wax for histological evaluation. Sections were cut at 4 µm and stained by the conventional H&E method. After gross examination of the radical neck specimen and fixation in 10% formol saline for 48 hours, the specimen was sectioned into six groups (Figure 1):

Group A: anterior superior cervical lymph nodes

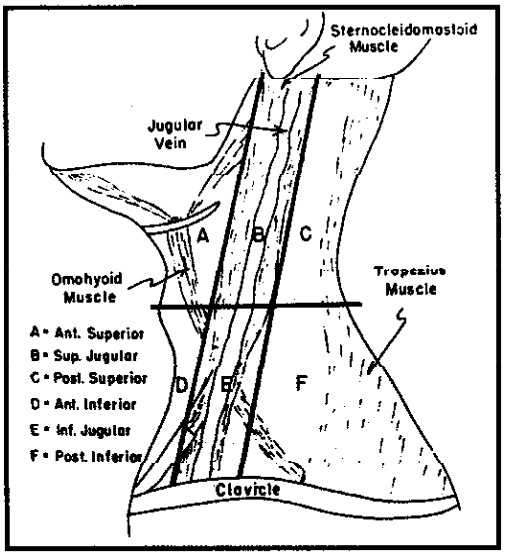

Figure 1 **A schematic presentation showing the division of the radical neck specimen into six regions**

Group B: superior jugular cervical lymph nodes

Group C: posterior superior cervical lymph nodes

Group D: anterior inferior cervical lymph nodes

Group E: inferior jugular lymph nodes

Group F: posterior inferior cervical lymph nodes.

Each group was separated and the specific lymph nodes in each group were dissected, measured in relation to size and number, embedded in paraffin and cut into 6 µm sections and stained with H&E. The dissected paratracheal lymph nodes were handled in the same way and examined for their site, size and metastatic deposits.

Histopathological sections of the primary tumour and neck dissection specimens were examined for the following specific information: (i) site, size and submucosal extension of the primary tumour; (ii) degree of tumour differentiation; (iii) extraluminal tumour spread; and (iv) site, size and perineural, vascular and extracapsular spread of the metastatic cervical nodes. The clinical and pathological findings were correlated to the presence of PTN.

Results

Eighteen patients (72%) had their primary tumour arising in the postcricoid area, six (24%) in the posterior pharyngeal wall and one (4%) in the piriform sinus, with male predominance in 80% of cases (Figure 2). The study revealed a high incidence of pT4 tumours in 84% of cases (21/25), while 8% were classified as pT3 (2/25 cases), 4% as pT2 (1/25 cases) and 4% as pT1 (1/25 case). On the other hand, 44% (11/25 cases) were classified as pN0, 8% (2/25 cases) as pN1, 24% (6/25 cases) as pN2, 8% (2/25 cases) as pN2b, and 16% (4/25 cases) as pN2c.

The incidence of pathologically positive cervical lymph nodes for all primary sites was 32% (8/25). Area B (superior jugular nodes) was the most common place for positive lymph nodes, being the site of 28% (7/25). Evidence of metastasis was recorded in 18.3% of nonenlarged nodes. It varied in enlarged nodes depending on their size, being 26.5% (1 cm or less), 31.3% (2 cm or less) and 50% (3 cm or more) (Table 1). There was no statistically significant difference in the incidence of positive nodes on the right and left sides (Figures 3–6).

The commonest site for positive PTNs was found to be at the 3 cm (5–6 TR) level (Table 2). It was found that 52.9% of lymph nodes on both sides were recorded at this level. There were no positive PTNs at a level exceeding 4 cm (8 TR) on either side, i.e. all positive nodes were located above the level of the horizontal line where the bra-

Table 1 **Distribution of histologically positive paratracheal lymph nodes (PTN) in relation to their size**

Size of PTN	Positive PTN					
	Right		Left		Total	
	No.	%	No.	%	No.	%
Not enlarged						
< 1 cm	9/42	21.4	6/40	15.0	15/82	18.3
Enlarged						
1 cm–	6/23	26.1	7/26	26.9	13/49	26.5
2 cm–	3/ 9	33.3	2/ 7	28.6	5/16	31.3
3 cm+	1/ 1	100.0	0/ 1	0.0	1/ 2	50.0

Table 2 **Distribution of histologically positive paratracheal lymph nodes (PTN) at different levels**

Level		Positive PTN					
		Right (*n* = 19)		Left (*n* = 15)		Total (*n* = 34)	
		No.	%	No.	%	No.	%
1 cm–	(1–2 TR)	–	–	3	20.0	3	8.8
2 cm–	(3–4 TR)	5	26.3	3	20.0	8	23.5
3 cm–	(5–6 TR)	11	57.9	7	46.7	18	52.9
4 cm–	(7–8 TR)	3	15.8	2	13.3	5	14.7
4 cm+	(>8 TR)	–	–	–	–	–	–

TR = tracheal ring

Table 3 **Site of primary hypopharyngeal tumours versus histologically positive paratracheal lymph nodes (PTN)**

Site of tumour		Positive PTN					
		Unilateral		Bilateral		Total	
		No.	%	No.	%	No.	%
PC	(*n* = 18)	7/18	38.9	2/18	11.1	9/18	50.0
PW	(*n* = 6)	0/6	0.0	1/6	16.7	1/6	16.7
PS	(*n* = 1)	0/1	0.0	0/1	0.0	0/1	0.0
Total	(*n* = 25)	7/25	28.0	3/25	12.0	10/25	40.0

PC = postcricoid; PW = posterior pharyngeal wall; PS = piriform sinus

chiocephalic trunk crosses in front of the trachea. A comparison between positive PTNs in different sites of origin of the primary tumour showed no statistically significant differences (Table 3). However, postcricoid lesions showed a high percentage of positive PTNs (50%) as compared to those in posterior pharyngeal wall lesions

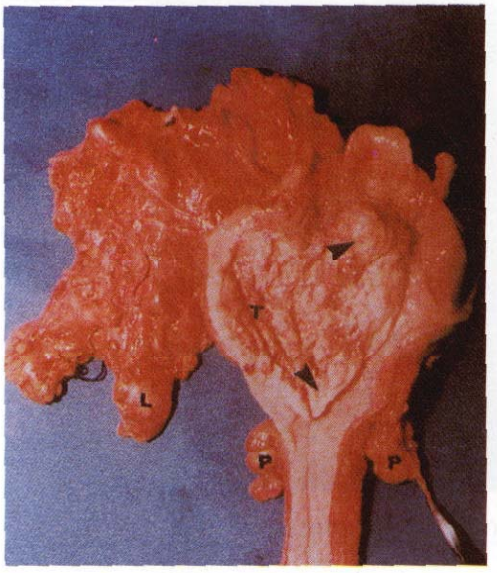

Figure 2 **Posterior pharyngeal wall tumour (T) extending into postcricoid region and cervical oesophagus. Also shown are the bilaterally enlarged paratracheal lymph nodes (P) and the left metastatic lower jugular lymph node (L)**

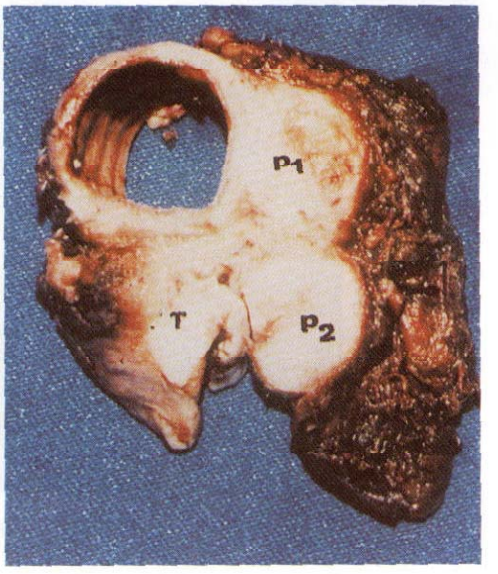

Figure 3 **Horizontal section showing tumour (T) in the cervical oesophagus and two metastatic paratracheal nodes (P)**

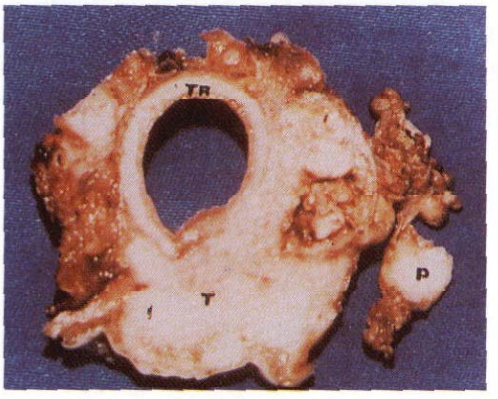

Figure 4 **Horizontal section showing tumour (T), right metastatic paratracheal lymph node (P) and the tracheal ring (TR)**

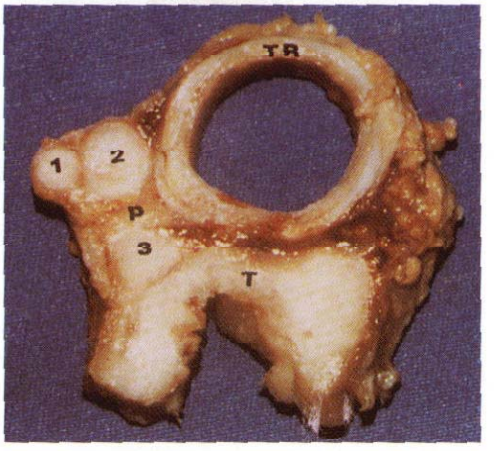

Figure 5 **Horizontal section showing tumour (T), three left metastatic paratracheal lymph nodes (P) and the tracheal ring (TR)**

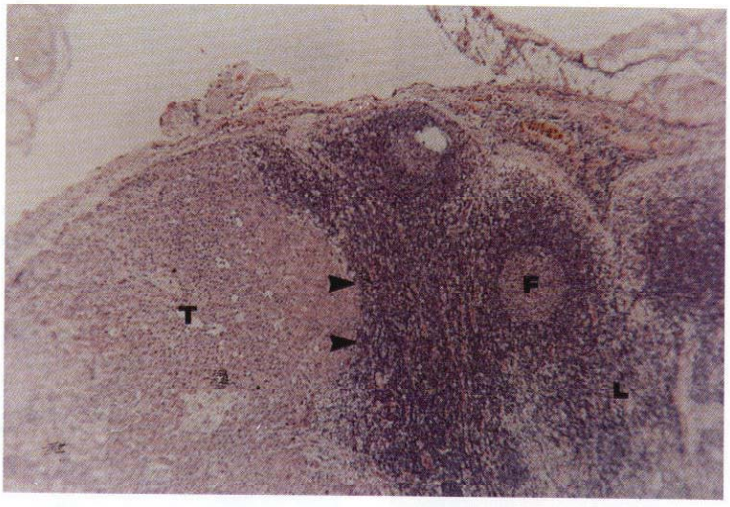

Figure 6 **Paratracheal lymph nodes (L) showing follicular hyperplasia (F) and massive tumourous infiltration (T) (H&E x 250)**

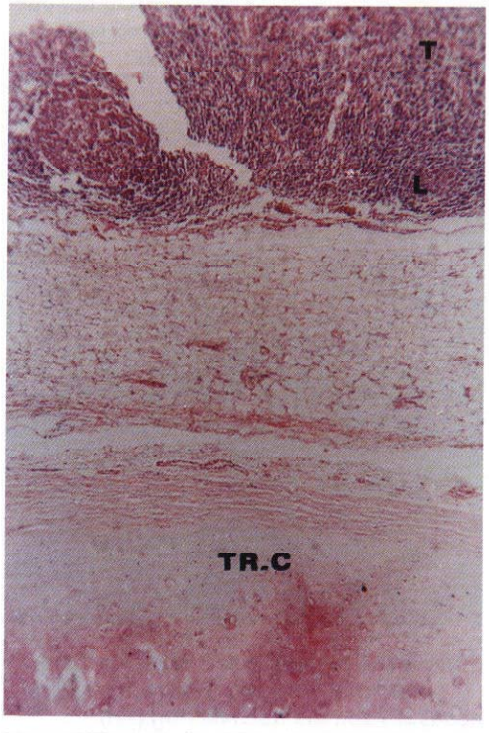

Figure 7 **Paratracheal lymph node (L) showing tumourous infiltration (T). Tracheal cartilage (TR.C) is seen not far from the neoplasm (H&E x 250)**

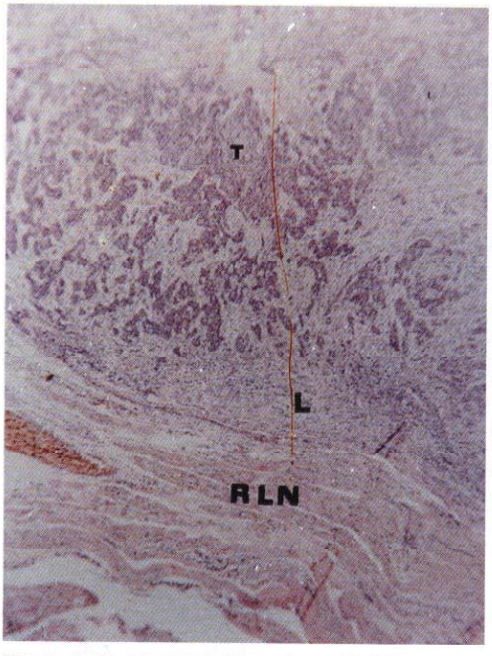

Figure 8 **Paratracheal lymph node (L) showing grade II squamous cell carcinoma infiltration (T). Fibrosis and desmoplasia around tumour cells leave no residual lymphoid tissue. Adjacent recurrent laryngeal nerve bundles (RLN) identified (H&E x 250)**

Table 4 **Tumour differentiation (grades) versus histologically positive paratracheal lymph nodes (PTN) in the three tumour sites**

Site	Well differentiated Grade 1				Moderately differentiated Grade 2				Poorly differentiated Grade 3			
			Positive PTN				Positive PTN				Positive PTN	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
PC*	9/18	50.0	4/ 9	44.4	8/18	44.4	4/8	50.0	1/18	5.6	1/1	100.0
PW	5/ 6	83.3	0/ 5	0.0	0/ 6	0.0	0/0	0.0	1/ 6	16.7	1/1	100.0
PS	0/ 1	0.0	0/ 0	0.0	1/ 1	100.0	0/1	0.0	0/ 1	0.0	0/0	0.0
Total	14/25	56.0	4/14	28.6	9/25	36.0	4/9	44.4	2/25	8.0	2/2	100.0

**In the case of PC carcinoma, the number of cases was 18: 9/18 were well differentiated (4/9 had positive PTN); 8/18 were moderately differentiated (4/8 had positive PTN) and only 1/18 was poorly differentiated with positive PTN*
PC = postcricoid; PW = posterior pharyngeal wall; PS = piriform sinus

Table 5 **Size of the primary lesion versus histologically positive paratracheal lymph nodes (PTN) in the three tumour sites**

Site	Size of primary lesion															
	< 2 cm				2 cm–				4 cm–				6 cm+			
			+ve PTN				+ve PTN				+ve PTN				+ve PTN	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
PC	0/18	0.0	–	–	3/18	16.7	1/3	33.3	4/18	22.2	2/4	50.0	11/18	61.1	6/11	54.6
PW	0/ 6	0.0	–	–	0/ 6	0.0	–	–	2/ 6	33.3	0/2	0.0	4/ 6	66.6	1/ 4	25.0
PS	0/ 1	0.0	–	–	1/ 1	100.0	0/1	0.0	0/ 1	0.0	–	–	0/ 1	0.0	–	–
Total	0/25	0.0	–	–	4/25	16.0	1/4	25.0	6/25	24.0	2/6	33.3	15/25	60.0	7/15	46.7

PC = postcricoid; PW = posterior pharyngeal wall; PS = piriform sinus

(16.7%). The incidence of positive nodes was 40% in the hypopharyngeal tumours.

Positive PTNs were recorded in 28.6% of well differentiated tumours, 44.4% of moderately differentiated tumours and in 100% of poorly differentiated tumours (Table 4). There was no statistically significant increase in positive PTNs with increase in tumour differentiation. However, the more undifferentiated tumours had an increased incidence of positive nodes. The majority of tumours (60%) measured more than 6 cm in vertical diameter. Although the incidence of positive PTNs increased as the size of the primary tumour increased, this was not statistically significant. Positive PTNs were recorded in 46.67% of tumours with vertical lengths equal to, or exceeding 6 cm (Table 5).There was a significant increase of positive PTNs with thyroid gland and vocal cord invasion (Figures 7 and 8). Invasion of the laryngeal cartilage, paraglottic space and cervical oesophagus showed no significant increase in positive PTNs (Tables 6 and 7). It was noticed that the incidence of positive PTNs increased in

Table 6 **Histological characteristics of the primary tumour versus histologically positive paratracheal lymph nodes (PTN) in the three tumour sites**

Extra-hypopharyngeal spread	PC (n = 18)				PW (n = 6)				PS (n = 1)				Total (n = 25)			
			Positive PTN				Positive PTN				Positive PTN				Positive PTN	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Thyroid gland																
Right lobe	3/18	16.7	3/3	100.0	–	–	–	–	–	–	–	–	3/25	12.0	3/3	100.0
Left lobe	2/18	11.1	1/2	50.0	–	–	–	–	–	–	–	–	2/25	8.0	1/2	50.0
Bilateral	1/18	5.6	1/1	100.0	–	–	–	–	–	–	–	–	1/25	4.0	1/1	100.0
Subtotal	6/18	33.3	5/6	83.3	–	–	–	–	–	–	–	–	6/25	24.0	5/6	83.3
Soft tissue	–	–	–	–	–	–	–	–	–	–	–	–	0/25	0.0	–	–
Thyroid cartilage	–	–	–	–	–	–	–	–								
Right side	3/18	16.7	2/3	66.7	3/25	12.0	2/3	66.7								
Cricoid cartilage	–	–	–	–	–	–	–	–	–	–	–	–	0/25	0.0	–	–
Arytenoid cartilage	–	–	–	–	–	–	–	–								
Bilateral	1/18	5.6	1/1	100.0	1/25	4.0	1/1	100.0								
Vocal cords																
Right	2/18	11.1	2/2	100.0	0/6	0.0	–	–	–	–	–	–	2/25	8.0	2/2	100.0
Left	2/18	11.1	1/2	50.0	1/6	16.7	0/1	0.0	–	–	–	–	3/25	12.0	1/3	33.3
Bilateral	9/18	50.0	5/9	55.6	0/6	0.0	–	–	–	–	–	–	9/25	36.0	5/9	55.6
Subtotal	13/18	72.7	8/13	61.5	1/6	16.7	0/1	0.0	–	–	–	–	14/25	56.0	8/14	57.1
Paraglottic space																
Right	3/18	16.7	2/3	66.7	0/6	0.0	–	–	0/1	0.0	–	–	3/25	12.0	2/3	66.7
Left	1/18	5.6	0/1	0.0	1/6	16.7	0/1	0.0	1/1	100.0	0/1	0.0	3/25	12.0	0/3	0.0
Bilateral	3/18	16.7	3/3	100.0	0/6	0.0	–	–	–	–	–	–	3/25	12.0	3/3	100.0
Subtotal	7/18	38.9	5/7	71.4	1/6	16.7	0/1	0.0	–	–	0/1	0.0	9/25	36.0	5/9	55.6
Submucosal spread																
Proximal > 1 cm	4/18	22.2	3/4	75.0	3/6	50.0	1/3	33.3	–	–	–	–	7/25	28.0	4/7	57.1
Proximal > 2 cm	0/18	0.0	–	–	0/5	0.0	–	–	–	–	–	–	0/25	0.0	–	–
Distal > 1 cm	2/18	11.1	0/2	0.0	1/5	16.7	0/1	0.0	–	–	–	–	3/25	12.0	0/3	0.0
Distal > 2 cm	0/18	0.0	–	–	0/6	0.0	–	–	–	–	–	–	0/25	0.0	–	–
Subtotal	6/18	33.3	3/5	50.0	4/5	66.7	1/4	25.0	–	–	–	–	10/25	40.0	4/10	40.0
Oesophagus	15/18	83.3	8/15	53.3	6/6	100.0	1/6	16.7	–	–	–	–	21/25	84.0	9/21	42.9

PC = postcricoid; PW = posterior pharyngeal wall; PS = piriform sinus

Table 7 **Comparison between positive paratracheal lymph nodes (PTN) according to histological involvement of extrahypopharyngeal structures**

Extra-hypopharyngeal structure	Positive PTN No.	%	z
Thyroid gland			
Involved ($n = 6$)	5/6	83.3	2.4850*
Not involved ($n = 19$)	5/19	26.3	
Thyroid cartilage			
Involved ($n = 3$)	2/3	66.7	1.0053
Not involved ($n = 3$)	8/22	36.4	
Arytenoid cartilage			
Involved ($n = 1$)	1/1	100.0	1.25
Not involved ($n = 24$)	9/24	37.5	
Vocal cords			
Involved ($n = 14$)	8/14	57.1	1.9738*
Not involved ($n = 11$)	2/11	18.2	
Paraglottic space			
Involved ($n = 9$)	5/9	55.6	1.1909
Not involved ($n = 16$)	5/16	31.3	
Submucosal spread			
Involved ($n = 10$)	4/10	40.0	0
Not Involved ($n = 15$)	6/15	40.0	
Oesophagus			
Involved ($n = 21$)	9/21	42.9	0.6683
Not Involved ($n = 4$)	1/4	25.0	

Statistically significant

pT3 and pT4 tumours as compared to pT1 and pT2 tumours (Table 8). As regards cervical lymph node metastases, 29.4% of patients with pN0 neck carcinoma had positive PTNs, while patients with multiple (pN2b) and bilateral (pN2c) positive cervical lymph nodes had a higher incidence of positive PTNs (100% and 75% respectively). There was a statistically significant increase in positive PTNs in patients having positive cervical lymph nodes in areas A, B, C and E (Table 9).

Discussion

Although PTNs were considered of normal size if their diameters were less than 1 cm [*10*], metastatic deposits were recorded in 0.5 cm lymph nodes. This confirms the statement of Hiroto that paratracheal nodes of 0.5 cm or more in diameter should be excised for the possibility of metastases [*8*]. There is general agreement that resection of the PTN is necessary to reduce the incidence of tracheal or stromal recurrence in hypopharyngeal cancer surgery.

Harrison stressed the importance of manubrial resection when dealing with hypopharyngeal tumours and malignant tumours involving the subglottic region of the larynx [*3,5*]. Our findings concerning the position of histologically positive PTNs differed from those of Harrison [7] and Hiroto [*8*]. The commonest site for these nodes was at a distance 3 cm from the lower border of the cricoid cartilage (5–6 TR), where 52.44% of positive nodes were found. There were no positive nodes at a level more than 4 cm from the lower border of the cricoid cartilage, i.e. all positive nodes were above the sternum (suprasternal notch) and brachiocephalic trunk. On the other hand, our findings suggest that the final judgement should be made at the time of surgical exploration. If at least a 2 cm margin of normal trachea can be obtained, PTNs can be adequately removed and the trachea recreated without tension, without manubrial resection being necessary. Thus, based on our pathological findings, manubrial resection is not advised for complete paratracheal clearance, as these nodes can be adequately resected digitally down to the level of the brachiocephalic trunk on both sides.

The incidence of metastasis to the PTN in hypopharyngeal carcinoma is unknown. Only one previous study showed that out of 17 cases of hypopharyngeal tumour, me-

Table 8 **Distribution of histologically positive paratracheal lymph nodes (PTN) versus T and N classification of the primary tumour in the three tumour sites**

Site	T and N staging for positive PTN																	
	T1		T2		T3		T4		N0		N1		N2a		N2b		N2c		N3	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
PC																				
Unilateral	0/1	0.0	0/1	0.0	1/1	100.0	6/15	40.0	5/13	38.5	–	–	–	–	1/2	50.0	1/3	33.3	–	–
Bilateral	0/1	0.0	0/1	0.0	0/1	0.0	2/15	13.3	0/13	0.0	–	–	–	–	1/2	50.0	1/3	33.3	–	–
Total	0/1	0.0	0/1	0.0	1/1	100.0	8/15	53.3	5/13	38.5	–	–	–	–	2/2	100.0	2/3	66.7	–	–
PW																				
Unilateral	–	–	–	–	–	–	0/6	0.0	0/4	0.0	0/1	0.0	–	–	–	–	0/1	0.0	–	–
Bilateral	–	–	–	–	–	–	1/6	16.7	0/4	0.0	0/1	0.0	–	–	–	–	1/1	100.0	–	–
Total	–	–	–	–	–	–	1/6	16.7	0/4	0.0	0/1	0.0	–	–	–	–	1/1	100.0	–	–
PS																				
Unilateral	–	–	–	–	0/1	0.0	–	–	–	–	0/1	0.0	–	–	–	–	–	–	–	–
Bilateral	–	–	–	–	0/1	0.0	–	–	–	–	0/1	0.0	–	–	–	–	–	–	–	–
Total	–	–	–	–	0/1	0.0	–	–	–	–	0/1	0.0	–	–	–	–	–	–	–	–
Total	0/1	0.0	0/1	0.0	1/2	50.0	9/21	42.9	5/17	29.4	0/2	0.0	–	-	2/2	100.0	3/4	75.0	–	–

PC = postcricoid; PW = posterior pharyngeal wall; PS = piriform sinus

tastases in the PTN was found in only one case (5.9%). The picture in the majority of the remaining cases was only that of histiocytosis [*8*]. Our findings revealed a 40% incidence of positive PTNs in hypopharyngeal carcinoma, far exceeding Hiroto's findings [*8*]. Postcricoid cancer was the commonest hypopharyngeal tumour which showed positive PTNs (50%) (Table 3).

Some studies have revealed that increased undifferentiation or tumour grading in hypopharyngeal carcinoma has been associated with increased positive cervical nodes and an increased incidence of bilateral neck metastases [*11,12*]. Our findings showed positive PTNs in 28.6% of well differentiated tumours, 44.4% of moderately differentiated tumours and 100% of poorly differentiated tumours. Although these figures were not statistically significant, a remarkable increase in positive PTNs with undifferentiation of the primary tumour was clearly noted. Moreover, these changes have been reported in another study to be statistically significant [*13*]. These findings support the hypothesis that the incidence of positive regional lymph nodes is higher in high grade tumours in any head and neck cancer.

Harrison emphasized the importance of combining total thyroidectomy with pharyngolaryngo-oesophagectomy for postcricoid lesions [*14*]. Thyroid gland invasion (Table 6) was recorded in 24% of our patients (6/25). Hiroto reported a 30% incidence of thyroid invasion with hypopharyngeal tumours [*8*]. Five out of the six patients (83.3%) with thyroid gland invasion had histologically positive PTNs. The increase in positive PTNs with thyroid gland invasion versus noninvasion was statistically significant (Table 7). Other investigators found that thyroid gland invasion was often associated with cervical lymph node metastases [*15,16*].

Only four of our patients had cartilage invasion; the thyroid gland was invaded in three of them and the arytenoid cartilage in one. The cricoid cartilage, trachea and epiglottis showed no evidence of tumour invasion. Positive PTNs were found in 75% of patients with cartilage invasion (thyroid and arytenoid cartilage). However, this high percentage was statistically insignificant. Other reports have also shown that the incidence of cervical lymph node metastases correlated with thyroid cartilage invasion [*15,17*].

Invasion of the cervical oesophagus was noted in 83% of cases, with PTN metastases in 53% of these cases. As the main lymphatic drainage of the cervical oesophagus are the paratracheal lymph nodes, an incidence of PTN metastases higher than that recorded in this study would be anticipated. The increase in positive nodes with cervical oesophagus involvement was not statistically significant. In our study the incidence of cervical node metastases was much lower than in other reports [*12*]. Pathologically positive cervical nodes were evident in 8/25 (32%) of all tumours (Table 9). This low percentage is possibly explained by the rarity of piriform fossa tumours among our patients. The predominance of neck node metastases in areas B, C and E in this study has also been reported by other authors [*18*].

Our findings of positive PTNs in 50.0% of patients with pathologically no neck nodes (Table 9) raises the possibility that the paratracheal nodes are primary sites of metastases besides other classical sites. Absence of clinical evidence of neck nodes does not necessarily indicate negative paratracheal nodes, and their clearance is important, even in the absence of neck dissection. Positive neck nodes were associated with 50.0% PTNs. There was a statistically significant increase in PTNs in

Table 9 **Metastases in cervical lymph nodes with and without histologically positive paratracheal lymph nodes (PTN)**

Tumour site	Neck metastasis: Negative No.	%	Unilateral No.	%	Bilateral No.	%	Total No.	%	Area A No.	%	Area B No.	%
PC (*n* = 18)												
Positive PTN n = *9*	5/9	55.6	2/9	22.2	2/9	22.2	4/9	44.44	3/9	33.3	4/9	44.4
Negative PTN n = *9*	8/9	88.9	0/9	0.0	1/9	11.1	1/9	11.1	0/9	0.0	2/9	22.2
PW (*n* = 6)												
Positive PTN n = *1*	0/1	0.0	0/1	0.0	1/1	100.0	1/1	100.0	0/1	0.0	1/1	100.0
Negative PTN n = *5*	4/5	80.0	1/5	20.0	0/5	0.0	1/5	20.0	0/5	0.0	0/5	0.0
PS (*n* = 1)												
Positive PTN n = *0*	–	–	–	–	–	–	–	–	–	–	–	–
Negative PTN n = *1*	–	–	1/1	100.0	0/1	0.0	1/1	100.0	1/1	100.0	0/1	0.0
Total (n = 25)												
Positive PTN n = *10*	5/10	50.0	2/10	20.0	3/10	30.0	5/10	50.0	4/10	40.0	5/10	50.0
Negative PTN n = *15*	12/15	80.0	2/15	13.3	1/15	6.7	3/15	20.0	0/15	0.0	2/15	13.3
Total	17/25	68.0	4/25	16.0	4/25	16.0	8/25	32.0	4/25	16.0	7/25	28.0

PC = postcricoid; PW = posterior pharyngeal wall; PS = piriform sinus

patients with positive cervical lymph nodes in areas A, B, C and E. Involvement of any of these areas should raise suspicion of PTN metastases.

Extracapsular and perineural spread have been increasingly identified as poor prognostic factors. Their incidence in positive necks was 16% and 12% respectively. Only advanced pN2 necks (pN2b, pN2c) showed evidence of extracapsular and perineural spread and this was associated with a significant increase in positive PTNs.

We evaluated the laterality of positive PTN to determine if the side of positive nodes correlates with the side of metastases. We found that 40% of cases with positive PTNs and thyroid gland involvement showed similarity of the positive sides, i.e. the side of the positive nodes was similar to that of the invaded thyroid gland. Similarity was also noted in the paraglottic space (12.5%), vocal cords (12.5%) and thyroid cartilage (50%). On the other hand, 60% of positive PTN cases showed similarity to the side of positive cervical lymph nodes. It is

Table 9 **Metastases in cervical lymph nodes with and without histologically positive paratracheal lymph nodes (PTN)** *(concluded)*

Neck metastasis								Extracapsular spread		Perineural spread		Positive pretracheal lymph node	
Area C		Area D		Area E		Area F							
No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
4/9	44.4	1/9	11.1	4/9	44.4	2/9	22.2	4/9	44.4	3/9	33.3	1/9	11.1
1/9	11.1	0/9	0.0	0/9	0.0	0/9	0.0	0/9	0.0	0/9	0.0	0/9	0.0
0/1	0.0	1/1	100.0	1/1	100.0	1/1	100.0	0/1	0.0	0/1	0.0	0/1	0.0
0/5	0.0	0/5	0.0	0/5	0.0	1/5	20.0	0/5	0.0	0/5	0.0	0/5	0.0
–	–	–	–	–	–	–	–	–	–	–	–	–	–
0/1	0.0	0/1	0.0	0/1	0.0	0/1	0.0	0/1	0.0	0/1	0.0	0/1	0.0
4/10	40.0	2/10	20.0	5/10	50.0	3/10	30.0	4/10	40.0	3/10	30.0	1/10	10.0
1/15	6.7	0/15	0.0	0/15	0.0	1/15	6.7	0/15	0.0	0/15	0.0	0/15	0.0
5/25	20.0	2/25	8.0	5/25	20.0	4/25	16.0	4/25	16.0	3/25	12.0	2/25	4.0

PC = postcricoid; PW = posterior pharyngeal wall; PS = piriform sinus

thus advisable to do bilateral paratracheal clearance whenever unilateral metastatic nodes are present.

Conclusions

- Evidence of metastases was recorded in 18.29% of the nonenlarged PTNs.The smallest nonenlarged PTN showing metastasis was 0.5 cm in diameter.
- The level where the majority of metastatic PTNs (52.94%) were found was 3 cm (5–6 TR) from the lower border of the cricoid cartilage. No metastatic PTNs were found at a level more than 4 cm from the lower border of the cricoid cartilage, i.e. above the upper border of the sternum and the level of the brachiocephalic trunk.
- The incidence of positive PTNs was 40% in hypopharyngeal tumours. Postcricoid lesions showed a high percentage of positive nodes (50%) as compared to posterior pharyngeal wall lesions (16.67%).

- There was a statistically significant increase in positive PTNs with: (i) thyroid gland invasion; (ii) vocal cord invasion; (iii) metastasis to areas A, B, C and E of the neck (area E showed the highest value); and (iv) extracapsular and perineural spread.
- There was no statistically significant increase in positive PTN with:
  - different sites of the primary tumour
  - primary tumour differentiation
  - size of the primary tumour (vertical length)
  - increase in T staging of the primary tumour
  - laryngeal cartilage invasion
  - paraglottic space invasion
  - cervical oesophagus invasion.
- Patients with histologically negative neck showed positive PTNs in 29% of cases, while patients with positive neck showed positive nodes in 62.5% of cases.

Recommendations

Paratracheal lymph node clearance is recommended for all patients with hypopharyngeal carcinoma. Complete clearance can safely be done down to the level of 6 cm from the lower border of the cricoid cartilage without manubrial resection. PTN metastases should be considered in the TNM classification system for hypopharyngeal carcinoma.

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There is sufficient evidence to indicate that cancer is now becoming a problem of major public health concern in the Eastern Mediterranean Region. The main contributors to the increasing prevalence of cancer in the Region are high rates of smoking in the population, significant transition to economic affluence associated with changes in eating practices and nutritional status, and the epidemiological transition with control of communicable diseases resulting in increased life expectancy.

Source: The Work of WHO in the Eastern Mediterranean Region. Annual Report of the Regional Director. 1 January - 31 December 1996. *Pages 127-128.*