h

Cervical node metastases in squamous carcinoma of the larynx

Abdülcemal ümit IŞIK[1], A.Sami BERÇİN[1], Ömer AYDIN[1], Birol CİVELEK[1], Zişan ÖZGÜLER[2], Tevfik AKTÜRK[1]

Depts. of [1]ENT, [2]Pathology, Medical School of Ankara University ANKARA - TURKEY

In this prospective study, 44 patients of squamous cell carcinoma of larynx with primary location in glottic or supraglottic region are studied, in between 1988-1991. As a total of 51 neck dissections were carried out. Neck was divided into 5 anatomical regions in this study. In detailed histopathological investigation of neck specimens, it was also seen that region V was not affected in clinically - No neck, hence this region was rarely affected in clinically N+ neck. In elective neck dissections carried out for clinically - No necks, metastases to regions II, III and IV were 28%, 20%, 4% respectively. However, in theraupeutic neck dissections carried out for clinically N+ necks, metastases to region II, III and IV were 56%, 50%, 26% respectively. These results emphasize the high risk of metastases to the jugular chain in laryngeal carcinoma. [Turk J Med Res 1993; 11(2): 101-105]

Key **Words** Cervical metastases, Larynx

Laryngeal carcinoma comprises of 30% of head and neck and upper respiratory system malignancies. The most important factor for prognosis is the presence of cervical lymph node metastases. Primary tumor localization, oncotype of tumor, grade of celular differentiation, presence of some anatomical barriers, all play an effective role in tumor spread. There is a tendency for squamous cell carcinoma of larynx to metastasize to cervical lymph nodes via embolization.

Larynx is anatomically divided into 3 regions as supraglottic, glottic, subglottic regions. This division is based on its embryological development (6). Presmani (3) et al, in their studies with injection of dyes, showed that submucosal lymphatics of larynx function as compartments which limit the spread of laryngeal neoplasms to an important extent.

Radical neck dissection which was first explained **by** Crile in 1906 for neck metastases in squamous cell carcinoma of larynx, has been applied for so many year, since then. However, later on due to removal of spinal accessory nerve, internal jugular vein and sternocleidomastoid muscle, it was thought that RND was a very destructive operation. So, new modifications were developed. Contrary to the classical radical neck dissection, a new approach in which two of these three structures are saved, namely modified radical neck dissection and functional neck dissection where all the three structures are left intact were described. 2.3.ii. This modified technique (FND) is based on the fact that lymphatic system courses in the aponeurotic sheaths. According to Bocca, FND helps removal of lympatic nodes and lymphatic channels without harming any vital structures beneath this aponeurosis as wr!> as providing a sufficient oncological radical approach. Additionally in 1980 Lindberg (8) and Skolnik (14) suggested the idea of selective neck dissection, as an oponent to comprehensive neck dissection. Many neck dissections under the name of selective neck dissection which is directly related to removal of lymph nodes which are mostly metastasized or carry a high risk of metastases depending on the location of primary tumor have been explained such as suprahyoid, supraomhyoid, anterior and posterior dissection (11,16). In suprahyoid neck dissection: submental and submandibular lymph nodes are removed. In supraomohyoid neck dissection, submental, submandibular, upper and middle juigular together with upper and middle posterior cervical lymph nodes are removed. While in anterior neck dissection, upper, middle and lower jugular lymph nodes are removed, and finally only upper, middle and lower posterior lymph nodes are removed in posterior neck dissection (2).

Received: Oct. 19,1992 **Accepted:** Dec. 29,1992

Correspondence: Abdülcemal Ümit IŞIK
Dept. of E.N.T. Medical School of
Ankara University 06100 ANKARA

In this prospective study a correlation between neck dissections applied for laryngeal carcinoma patients and neck metastases was sought. Furthermore, similarities between comprehensive neck dissections and selective neck dissections were studied. Thus, alternative modalities for treatment of neck metastases of primary laryngeal carcinomas were suggested.

MATERIALS AND METHODS

44 patients in whom neck dissections were applied in between 1988 and 1991 at the ENT clinic of Medical School of Ankara University were studied. Neck dissections were carried out at the same time with resection of primary tumor. Localization of Primary tumor was determined by the help of indirect, direct laryngoscopy and laryngeal CT. These findings were matched with postoperative examinations of laryngectomy material. By the help of preoperative phpsical examination and neck ultrasonography, the number, size and localization of cervical lymphadenopathies were determined. Those patients with preoperative chemotheraphy, radiotherapy or with multiple primaries and with no neck dissections applied were excluded from the study.

A total of 51 radical or modified neck dissections were conducted in 44 patients. Lymph nodes in the region I, II, III, IV and V were totaly removed (Region I: Submertal, submandibular, Region II: Upper jugular, Region III: middle jugular, Region IV: Lower jugular, Region V: Posterior servical).

During neck dissections, relying on oncological principles spinal accessory nerve was almost always saved. However sternocleidomastoid muscle was removed in each case. In bilateral dissections, internal jjugular vein was left intact in the less involved ^ide. For clinically - N_0 cases - with elective modified radical neck dissection (EMRND) was applied. For clinically N+ cases, (for therapeutic aim) either radical neck dissection (RND) or MRND was applied. Each group was divided into glotic and supraglottic types among themselves. Operation specimens were put into containers with 10% formaldehyde. All of the specimens were examined for histopathologic diagnosis at the Pathology Department of Ankara University, Faculty of Medicine. After treating each specimen in formaldehyde for 48 hours, from each lymph node 1-3 sections were taken and following hematoxylen-eoisn staining, they were all examined under microscope, together with their histologic examination results, histopathology of primary tumor, type of neck dissections conducted, and regions of removed lymph nodes were recorded. Anatomic localizations of lymph nodes was made by markings during operations and by adjustments of pathologist. Total number of lymph node and metastatic lymph nodes were determined. For statistical analysis of regional metastases, one sample Chi squared test was used.

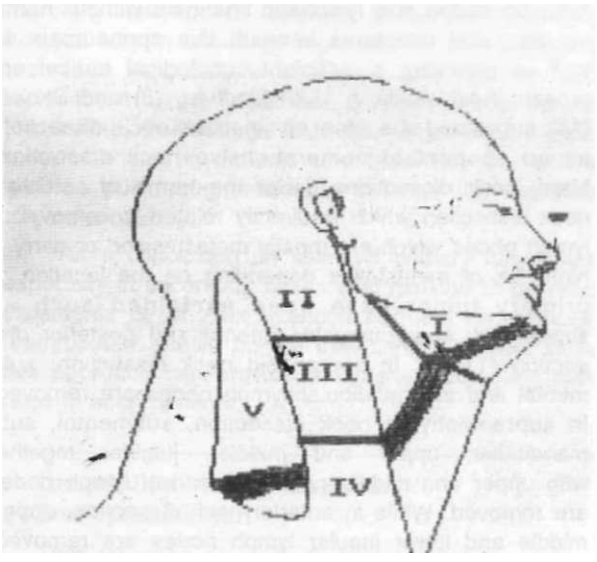

Figure **1.** Lymph node regions of the neck.

RESULTS

In this study, 2 female (4%), 42 male (96%), a total of 44 patients were included. The mean age was 53 (28-70). Primary tumor size of patients in elective and theurapeutic neck dissection groups is shown in Table 1. For all 44 patients, a total of 51 neck dissections were performed, including 22 RND (43%) and 29 MRND (57%). Fifty one percent of these were therapeituc and 49% were elective neck dissections (END). In 51 neck dissections 1297 lymph nodes were removed, 57 of which had metastasis. 43 of these 57 lymph nodes (74%) were localized in the regions II and III. The rate of metastasis in these regions were found to be statistically significant ($p<0.05$) when compared with other regions Table 2. The average number of lymph nodes removed in RND and in MRND were 26, 83 and 24.40 respectively. This difference was not statistically significant ($p>0.05$).

Among clinically No neck patients, 23 supraglottic (92(%), 2 glottic (8%) laryngeal carcinoma patients underwent END. Of supraglottic laryngeal carcinoma patients, 3 had bilateral simultaneous neck dissections. The type of neck dissections was chosen according to

Table **1**. Primary tumor size by clinical groups

Primary tumor	Elective Neck Dissection		Therapeutic Neck Dissection	
size	n:25	%	n:26	%
1	1	4	2	7
2	10	40	11	42
3	12	48	10	38
4	2	8	3	11

Table 2. Cumulative lymph nodes total from 51 neck dissections and relative percentage of nodal metastases by neck region

Region	Total Lymph Node	Total Metastatic Lymph Node	Incidence of Metastases	
			Elective Neck Dissection	Therapeutic Neck Dissection
I	163	2	%4	%4
||	359	25	%28	%65
Hi	263	18	%20	%50
IV	299	10	%4	%26
V	213	2	0	%3
Total	1297	57		

peroperative determination of metastasis rate and localization of metastasis. Spinal accessory nerve was kept untouched as much as possible regarding oncological principles. In histopathologic^! examination of neck dissection specimens of 22 patients with END, 7 (31%) patients had metastases in lymph node, one of 7 patients had bilaterally metastatic lymph nodes. In a patient with contralateral metastasis, metastases were localized in the upper and middle jugular lymph nodes. The remaining 15 patients (69%) had no cervical metastases diagnosed. The incidence and localization of neck metastases in those patients with elective neck dissections are shown in Figure 2 and and Figure 3. It was seen that, region I was rarely metastasized in elective neck dissections. Of 25 modified radical neck dissections, only a patient with with supraglottic laryngeal carcinoma (4%) had metastases in the region I. However no patients had metastasis in region V. The number of metastasis in region II, III and IV was 6 (26%), 5 (19%), I (4%) respectively. In statisticial analysis of these results, it was seen that the rate of metastasisin regionII and III was significant when compared with other regions ($p<0.05$). Among 2 patient of glottic, clinically No neck laryngeal carcinoma who had elective neck dissection, only one had metastasis. This was localized in the upper \u2212 region.

For clincally N+ 22 patients, a total of 26 therapeutic dissections 4 of which were bilateral were performed, 23 of these (89%) were carried out for supraglottic laryngeal carcinoma patients and 3 others were carried out for glottic laryngeal carcinoma patients. 17 patients (77%), one of whom had bilateral metastasis had cervical metastasis. Among those 4 patients who had bilateral simultaneous neck dissections, only one had contralateral metastasis in upper jugular lymph nodes. Of those supraglottic laryngeal carcinoma patients, one (4%) had metastasis in region I and there was no metastasis in region II, II andIV were 15 (65%) 12 (52%), 7 (30%) respectively. In statistical analysis of these results, the rate of metastasis in regions II and III was found to be significant when compared with metastasis at other regions ($p<0.001$). Of 3 glottic patients with therapeutic neck dissections, 2 had metastasis in region II and one had metastasis (33%) in region III. There was no metastasis in other region.

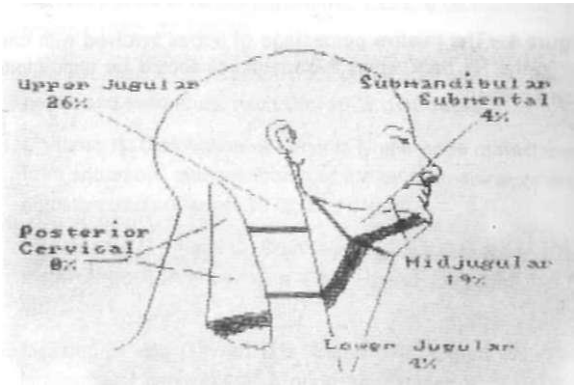

Figure 2. The relative percentage of nodes involved with cancer in the No neck when electively dissected for supraglottic larynx primary.

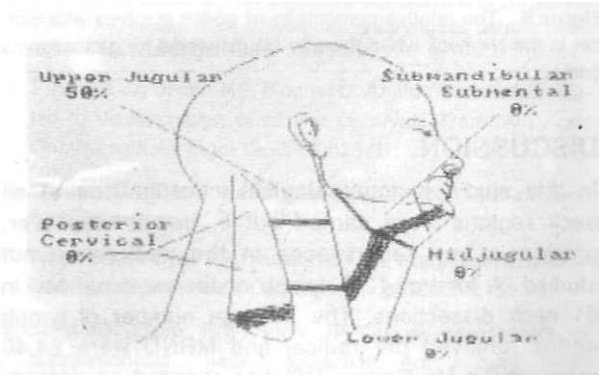

Figure **3.** The relative percentage of nodes involved with cancer in the No neck when electively dissected for glottic larynx primary.

The nodal metastases in patients who had elective and therapeutic neck dissections are shown in Table 2. In both groups, rate of metastasis in regions II and ill was found to be significantly different from other regions.

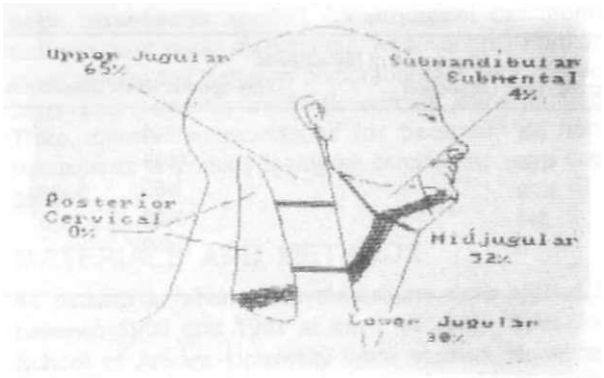

Figure 4. The relative percentage of nodes involved with can cer in the N+ neck when therapeutic dissected for supraglotti larynx primary.

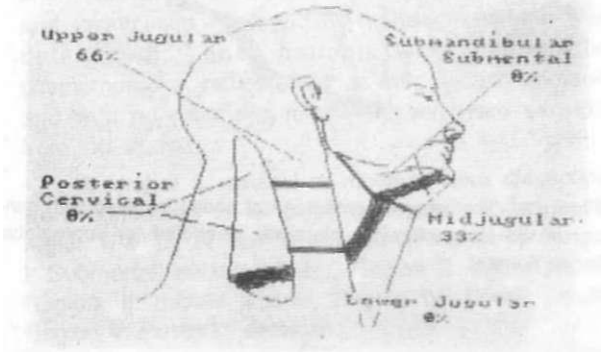

Figure 5. The relative percentage of nodes involved with cancer in the N+ neck when therapeutic dissected for glottic larynx primary.

DISCUSSION

In this study, histopathological investigations of all neck regions were carried out in details. However, prognosis and recurrences in the neck were not studied. A total of 1297 lymph nodes were remoed in 51 neck dissections. The average number of lymph nodes removed per radical and MRND were 24.40 respectively. Mc Gavran (10) has reported an average of 43 lymph node for each neck dissection in his series of 96 neck dissections. Zeitels (18), has reported an average of 37 lymph nodes for each neck dissection in his 87 neck dissections. Fisch (5), has carried out with lymphangiographic techniques determined a total of 43 lymph node in the each neck. When our results are compared with the other studies, the low number of lymph nodes in our study is easely noticed. The low number of metastatic lymph nodes is also well correlated with these results.

For clinically No patient, modified radical neck dissections were carried out. As seen in Figures 2 and 3 there was only one patient with metastasis in regions other than jugular chain. It was seen that this metastasis which was localized in Region I was due to soft tissue infiltration of extralaryngeal exteriorized T4 tumor. Ogura (10), reported metastases in all regions other than submental and submandibular regions in his study of 59 laryngeal carcinoma patients. Byers (2,3) et al, empasizing the rare metastasis in submandibular region suggest the neck dissections to be carried out without involving this region. Mc Gavran (10) with 96 laryngeal carcinoma patient reported no lymph node metastasis in posterior triangle. In our study, we determined no metastasis in posterior triangles during the elective neck dissections of clinically No patients in parallel with some other reports showing similarities with our results (4,8,10). It can be suggested that posterior triangle dissection is not necessary for clinically No primary laryngeal carcinoma patients.

During the neck dissections of clinically N+ patients the rates of metastasis in region I and V were 1 (4%) and 0 (0%) respectively. The patient with submandibular region metastasis had a T4 supraglottic primary laryngeal tumor. Which also show soft tissue infiltration to the tongue base. Twelwe percent of patients in this group showed metastases in regions out of jugular chain. There was no isolated metastasis of posterior triangle in this group. In Zeitel's study of 87 neck dissections reported no isolated metastases in region IV and V if there were no metastases in regions II and III (17). In our group of patients the incidence of 12% metastasesin clinically N+ necks, 4% metastases in No necks excluding the region II, III and IV suggest that in laryngeal cancers jugular lympatic chain carries the highest risk of involvement. Lindberg's (8), study of supraglottic laryngeal cancer showed that the main lymph nodes for drainage of this region was jugular chain and the mostly involved groups was upper jugular chain and the mostly involved group was upper jugular chain nodes. He also reported the rarity of metastasis in posterior triangle and almost always no metastasis in submandibular region. Of the two laryngeal carcinoma patients with clinically No necks for whom elective modified radical neck dissections were carried out, one had metastasis in upper jugular nodes. However, of the 3 glottic carcinoma patients with clinically N+ nodes, one had upper jugular and the other had middle jugular node metastasis.

Byer (2,3) et al, in their enlarged groups of patients, determined no significant difference of neck recurrences in clinically No an Ni patients in whom anterior neck dissections had been performed. The incidence rate of 12% of metastasis out of jugular chain in clinically N+ supraglottic and incidence rate of 4% in clinically No supraglottic laryngeal carcinoma patients suggest that comprehensive neck dissections are more suitable for clinically N+ supraglottic laryngeal carcinoma cases.Although the number of our cases is

limited for a statistical analysis, it can be suggested that anterior neck dissections are sufficient for primary glottic tumors with clinically No necks. However, for those cases with possible or present extralaryngeal extension grostly determined during the operation, dissection of submandibular region should have a special attention. In those cases, of primary supraglottic or glottic tumors with clinically No neck and no extralaryngeal spread considered, anterior neck dissections should be preferred instead of comprehensive neck dissections.

Molinari comparative retrospective studies of MRND and RNO determined the overall relapse rates of **2.5%** after RND and 1.6% after MRND. Likewise, Lingeman (9), determined no significant differences in the rates of relapses following RND and MRND. In our study, we behaved as much conservative as possible and preferred MRND relying on oncological principles.We did not evaluate the relapse rates in the nodes. However, we belive that preferece of MRND over RND decreases the functional loss and causes a bettercosmeticalapperance.

Yassı hücreli larenks karsinomlardaki servikal metastazlar

Bu prospektif çalışmamızda primer lokalizasyonu glottik ya da supraglottik toplam 51 boyun diseksiyonu yapılan 44 skuamöz larenks karsinoma vakası 1988.-1991 yılları arasında incelendi. Çalışmada boyun 5 anatomik bölgeye ayrıldı. Boyun spesimelerinin detaylı histopatolojik incelemelerinde bölge V'in klinik N_0 boyunlarda tutulmadığı ancak klinik+ boyunlarda nadien tutulduğu görüldü. Elektif boyun disseksiyonu yapılan klinik N_0 boyunlarda bölge II %28, bölge III %20, bölge IV'ün ise %4 oranında tutulduğu terapötik boyun disseksiyonu yapılan klinik N+ boyunlarda ise bölge II'nin %56, bölge III'ün %50, bölge IV'ün ise %26 oranında tutulduğu gözlendi. Bu sonuçlarla, larenks karsinomlarında juguler zincirin yüksek metastaz riski taşıdığı vurgulandı.

[TurkJMedRes 1993; 11(2): 101-105]

REFERENCES

1. **Bocca E, Pignataro O, Oldine C, Cappa C. Functional neck dissection an evaluatin of rewiew of 843 cases. Laryngoscope 1984; 94:942-5.**
2. **Byers RM. Modified neck dissection. A study of 967 cases from 1970-198. Am J Surg 1985; 150:414-21.**
3. **Byers RM, Wolf PF, Ballantyne AJ. Rationale for elective modified neck dissection. Head Neck Surg 1988; 10:160-7.**
4. **Candela FC, Shah J.Jaques DP. Patterns of cervical node metastases from squamous carcinoma of larynx. Arch Otolaryngol Head Neck Surg 1990; 116:432-5.**
5. **Fisch UP, Sigel M. Cervical lymphatic system as visualized by lymphoraphy. Ann Otol Rhinol 1964; 73:156-60.**
6. **Keser R, Bacaci K, Gürsel O. Macroscopical and histological researches in larynx carcinoma. Estratto da otorinolaringologia1982; 32:385-90.**
7. **Lee JG, Krause LG. Radical neck dissection, elective, therapeutic and secondary. Arch Otol 1975; 101:341-5.**
8. **Lindberg R. Distribution of cervical lymph node metastases from squamous cell carcinoma of the upper respiratory and digestive tracts. Cancer 1972; 29:1446-49.**
9. **Lingeman RE, Helms C, Stephans R. Neck dissection: Radical or conservative. Ann Otol Rhinol Laryngol 1977; 86:737-44.**
10. **Malcolm H, Mc Gavran MH, Bauer WC, Ogura JH. The incidence of cervical lymph node metastases from epidermoid carcinoma of the larynx and their relationship to certain characteristics of primary tumor. Cancer 1961; 14:456-61.**
11. **Medina JE. A. Rational classification of neck dissections. Otolaryngol Head Neck Surg 1989; 100:169-76.**
12. **Molinari R, Cantu G. Retrospective comparison of conservation and radical neck dissection in laryngeal cancer. Ann Otol Rhinol Laryngol 1983; 92:215-21.**
13. **Presman JJ, Simon MB, Monnel C. Anatomical studies related to dissemination of cancer of larynx. Trans Am Acad Ophthalm Otolaryngol 1960; 64:628-31.**
14. **Skolnik EM. The posterior triangle in radical neck surgery. Arch Otolaryngol 1976; 102:1-4.**
15. **Snow GB, Annyas AA, Vanslooten EA. Prognostic factors of neck node metastases. Clin Otolaryngol 1982; 7:185-92.**
16. **Spiro JD, Spiro RH, Shah JP. Critical assessment of supraomohyoid neck dissection. Am J Surg 1988; 156:286-9.**
17. **Zeiteis SM, Domanwski GF, Vincent ME. A model for multidisciplinary data collection for cervical metastases. Laryngoscope 1991; 101:1313-17.**