Should Hyoid Bone Invasion be Included in the Prognostic Markers of Laryngeal Cancer?

Larenks Kanserlerinde Hyoid Kemik İnvazyonu Prognostik Belirteçler İçerisinde Yer Almalı mı?

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ABSTRACT

Objective: To determine the rate of hyoid bone invasion in patients undergoing laryngectomy and to develop a conservative surgical approach based on the results.

Material and Methods: The data used in the study were gathered by the retrospective analysis of the medical records of 53 patients who underwent laryngectomy during the 2014–2019 period at the Otorhinolaryngology and Head and Neck Surgery Department of Akdeniz University.

Results: Fifty-three patients (50 male, 3 female) were included in the study. Of these, 52 had squamous cell carcinoma and 1 was diagnosed with a malignant mesenchymal tumor. The examination of the T stages of the patients revealed T4 in 41.5% the patients and T3 in 18.8%. Forty-four patients (83.01%) were treated with total laryngectomy and 9 patients (16.98%) with partial laryngectomy. The hyoid bones of all patients were examined histopathologically, and none of the 53 patients had hyoid bone invasion.

Conclusion: Hyoid bone invasion is very rare in laryngeal cancers. One of the main factors preventing hyoid bone invasion is the natural preservation of anatomical barriers between the larynx and the hyoid bone. No hyoid bone invasion was observed in any patient in the present study. Hence, it is believed that hyoid bone can be preserve, especially in selected cases.

Key Words: Head and neck cancer, Hyoid bone, Laryngeal cancer, Metastasis

ÖZ

Amaç: Larenjektomi yapılan hastalarda hyoid kemik invazyon oranının ortaya konulması ve sonuçlara göre konservatif cerrahi yaklaşımın geliştirilmesidir.

Gereç ve Yöntemler: Akdeniz Üniversitesi Kulak Burun Boğaz ve Baş-Boyun Cerrahisi anabilim dalında 2014-2019 yılları arasında larenjektomi yapılan 53 hastanın tıbbi kayıtlarının retrospektif incelenmesi ile veriler elde edilmiştir.

Bulgular: Çalışmaya 50 erkek, 3 kadın olmak üzere 53 hasta dahil edildi. Bu hastaların 52'i yassı hücreli karsinom'a sahipken, 1 hasta malign mezenkimal tümör tanısı almıştı. Hastaların T evreleri incelendiğinde; %41,5'nin T4, %18,8'inin T3 olduğu görülmüştür. Hastaların 44'ü (%83,01) total larenjektomi, 9'u ise (%16,98) parsiyel larenjektomi ile tedavi edilmiştir. Tüm hastaların hyoid kemiği histopatolojik olarak incelenmiştir. Dahil edilen 53 hastanın hiçbirinde hyoid kemik invazyon bulunmamıştır.

Sonuç: Larenks kanserlerinde hyoid kemik invazyonuna oldukça ender rastlanır. Hyoid kemik invazyonunun oluşmasını engelleyen faktörlerin başında larenks ve hyoid kemik arasındaki anatomik bariyerlerin doğal koruyucu olarak görev alması gelmektedir. Çalışmamızda hiçbir hastada hyoid kemik invazyonu izlenmedi. Bu bulgular ışığında, özellikle seçilmiş vakalarda hyoid kemiğin korunabileceğini düşünmekteyiz.

Anahtar Sözcükler: Baş-boyun kanseri, Hyoid kemik, Larenks kanseri, Metastaz

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INTRODUCTION

Laryngeal cancer is a disease that responds well to treatment, especially when diagnosed at an early stage. Treatment options include surgery, radiotherapy, and chemotherapy. The stage of the disease, whether the patient has a comorbid disease, his/her profession, and personal decision affect the treatment strategy. As in all head and neck tumors, surgical treatment is very effective in laryngeal cancers. Today, many techniques and instruments (laser surgery and robotic surgery) are used for surgery. Total laryngectomy is widely preferred in advanced-stage laryngeal cancers. During surgery, the entire larynx, a part of the trachea based on the invasion of the tumor, and the hyoid bone are included in the specimen even if the tumor is located far from the supraglottic area and the hyoid bone (1, 2).

Partial laryngectomies are planned according to the localization of the tumor. In supraglottic tumors, the hyoid bone can be resected together with the supraglottic region based on the invasion of the tumor (3). The aim of this study was to evaluate tumor invasion into the hyoid bone in laryngectomies performed at the clinic and shed light on avoiding unnecessary resections in future laryngectomies.

MATERIALS and METHODS

This study was conducted at the Department of Otorhinolaryngology and Head and Neck Surgery of Akdeniz University. The ethics committee of Akdeniz University approved this retrospective analysis of the data of patients diagnosed with laryngeal cancer and treated with total or partial laryngectomy during the 2014–2019 period (08.01.2020/KAEK-22). Fifty-three patients whose data were obtained were included in the study.

Table I: T stage of lesions.

Stage of primary tumor	Number of patients
T1	9
T2	12
T3	10
T4	22
Total	53

RESULTS

Of the 53 patients included in the study, 50 were male (94.3%) with a mean age of 60.2 (38–80) years. Of these, 52 had squamous cell carcinoma and 1 had a malignant mesenchymal tumor. The examination of the T stages of the patients revealed T4 in 41.5% of the patients and T3 in 18.8% (Table I). Fifteen (28.3%) patients received postoperative radiotherapy, while 14 (26.4%) did not require any additional treatment during the postoperative period (Table II).

Twelve patients (22.6%) were treated with salvage total laryngectomy due to recurrence after organ-sparing treatment. All except 3.77% of the patients were still alive and without cancer. Two patients who underwent salvage total laryngectomy died due to postoperative complications. Forty-four patients (83.01%) were treated with total laryngectomy and 9 (16.98%) with partial laryngectomy. The hyoid bone of all the patients was examined histopathologically. None of the patients had hyoid invasion.

DISCUSSION

The hyoid bone is located in the anterior part of the neck. It is a U-shaped bone structure originating from the second and third pharyngeal arches. This structure, which hosts the attachment of many muscles, is connected with the tongue, mandible, skull base, sternum, scapula, and thyroid cartilage. It accompanies these anatomical structures during their functions. For example, it helps maintain the positional balance of the airways at the time of respiration. It acts as a framework and provides support for the tongue. Although it is not seen as a potential metastatic site in laryngeal cancers, it is routinely excised during total laryngectomy (4). Depending on the technique used during partial laryngectomies and the extent of the tumor, the hyoid bone can be either preserved or removed (5). Squamous cell carcinoma can lead to bone metastases by local invasion or hematogenic spread. Bone metastases in head and neck cancers often occur by local invasion. Mandibular invasion in oral cavity tumors and hyoid invasion in base of tongue tumors occur in this way (6). Cartilage invasion is a

Table II: Patient information about adjuvant therapy after surgery.

	Number of patients	%
Patients who received RT*	19	35.8
Patients who received RT* + CT**	15	28.3
Patients who received CT**	5	9.4
Patients who did not receive any treatment	14	26.4
Total	44	

*Radiation therapy; **chemotherapy.

common finding in advanced-stage laryngeal cancers and one of the factors adversely affecting prognosis. Because of the different patterns of vascularity of these regions, it is thought that invasion areas are generally limited to ossified regions. The presence of cartilage invasion may provide a way for the tumor to spread to adjacent tissues of the larynx (7). Very few studies have been conducted on bone invasion in laryngeal cancers. Bone metastases are osteolytic in nature and account for approximately 10-35% of distant metastases. The most common metastatic sites are the lumbar and the lower thoracic regions, whereas the femoral, tibial, and temporal regions are among the rare sites where distant bone metastases occur (8,9). Kirchner examined hyoid bone invasion in 55 patients with laryngeal cancer; invasion was not reported in any of these cases (10). In a similar study, Ogura did not report any hyoid bone invasion in a series of 59 patients (11).

Timon et al. examined 755 patients and found hyoid bone invasion in 11 patients. Of these 11 patients, 6 had laryngeal carcinoma, 3 had vallecular tumors, and 1 had base of tongue and 1 had pyriform sinus tumors. All patients with hyoid invasion had T4 tumors. In this study, hyoid invasion was seen in three of eight patients with vallecular tumors (37.5%). This rate was reported to be 1.1% (6/552) in patients with laryngeal cancer. All laryngeal cases with hyoid invasion are supraglottic tumors (4). In the present study, supraglottic laryngeal carcinoma was observed in 19 patients (35.8%) and none had hyoid invasion.

The fibroelastic membrane is thought to be the underlying cause of the hyoid bone being relatively resistant to metastases. The thyroepiglottic ligament and the fibroelastic membrane forming the thyroid membrane prevent the contact of the tumor with the hyoid bone and hence metastasis. Hyoid invasion is more common in vallecular, base of tongue, or aryepiglottic area tumors. However, it is thought that the rarity of laryngeal cancers is associated with the fibroelastic membrane (12, 13).

CONCLUSION

Hyoid bone invasion in laryngeal cancers is very rare. It is related to not only the tumor type and stage of tumor invasion but also the anatomical structure directly. The sample size in the present study was small. However, the data supported the preservation of the hyoid bone during total laryngectomy. Large-sample studies should be performed to explore the creation of new modalities in surgical treatment. Preventive surgical approaches increase the quality of life of patients and reduce surgical complications.

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