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Eugene Nicholas Myers' Lecture on Head and Neck Cancer, 2020: The Surgeon as a Prognostic Factor in Head and Neck Cancer Patients Undergoing Surgery*

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Abstract

This paper is a transcript of the 29th Eugene N. Myers, MD International Lecture on Head and Neck Cancer presented at the American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS) in 2020. By the end of the 19th century, the survival rate in treated patients was 10%. With the improvements in surgical techniques, currently, about two thirds of patients survive for > 5 years. Teamwork and progress in surgical reconstruction have led to advancements in ablative surgery; the associated adjuvant treatments have further improved the prognosis in the last 30 years. However, prospective trials are lacking; most of the accumulated knowledge is based on retrospective series and some real-world data analyses. Current knowledge on prognostic factors plays a central role in an efficient treatment decision-making process. Although the influence of most tumor- and patient-related prognostic factors in head and neck cancer cannot be changed by medical interventions, some environmental factors—including treatment, decision-making, and quality—can be modified. Ideally, treatment strategy decisions should be taken in dedicated multidisciplinary team meetings. However, evidence suggests that surgeons and hospital volume and specialization play major roles in patient survival after initial or salvage head and neck cancer treatment. The metrics of surgical quality assurance (surgical margins and nodal yield) in neck dissection have a significant impact on survival in head and neck cancer patients and can be influenced by the surgeon's expertise. Strategies proposed to improve surgical quality include continuous performance measurement, feedback, and dissemination of best practice measures.

Keywords
- head and neck cancer
- prognosis
- survival
- surgeon
- treatment

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Introduction

It is a great honor and a privilege to deliver the Eugene Nicholas Myers Lecture on Head and Neck Cancer. The list of previous distinguished lecturers shows a constellation of 28 of the greatest leaders in our field, starting with John J. Conley, in 1972, to Hisham M. Mehanna, last year. It gave me the opportunity to reflect on the lessons learned during my 40-year journey in head and neck oncology. My first concern was to choose a topic that I have worked on and contributed to and one that will also be of interest to you all.

We are a part of the head and neck oncologic community that must deal with approximately 1.5 million men and women diagnosed with head and neck cancer in 2020 worldwide. In spite of the laudable progress in the diagnosis, staging, and treatment of head and neck cancer over the last 40 years, at least 494,378 people are expected to die from this disease by the end of this year.[1] Most of these patients are expected to die due to aggressive tumor biological behavior or unalterable patient characteristics. However, some of the deaths could be avoided with access to high-quality medical care.

How can surgeons positively affect the outcomes of head and neck cancer patients? The answer is by practicing multidisciplinary, evidence-based medicine and following in the steps of the great surgical leaders, the "masters" in our field.

Prognosis

The Sumerians, 4,000 years ago, and Greeks, by 400 B.C., had recognized that signs and symptoms could predict good or bad outcomes. Predicting the prognosis has always been a challenge for physicians because "…sick people have always been worried about their prospects for recovery…and physicians acquired genuine skill in prognosis long before therapeutics had anything to offer." Currently, prognosis is defined as an expert prediction of outcome based on an accurate diagnosis, knowledge of natural history of the disease, response to the treatment, and progression of the disease in the patient in question.[2]

In treated patients "… It is possible to predict survival probabilities in a new patient with head and neck squamous cell carcinoma based on historical results from a data-set analyzed with the Cox regression model. The results… may be used in patient counseling, clinical decision-making, and quality maintenance."[3]

Across history, many changes have been incorporated in this concept, and, currently, the concept of prognosis is dynamic, multidimensional, and not limited to life and death. However, in several empirical studies, cure and survival were prioritized in head and neck cancer patients.[4–8] Even after the completion of planned treatment (during follow-up), the main concern in these patients is the risk of recurrence and death.[9–12] A study on patients' preferences showed that most of them considered it important to receive qualitative prognostic information ("curable" or "good prospect"), but some preferred to receive more precise quantitative estimates on their life expectancies.[13]

Prognostic Factors and Treatment Decisions

The management of head and neck cancer patients in everyday clinical practice is based on diagnosis, disease stage, and other prognostic factors that can affect disease outcomes. Prognostic factors have three domains: 1) tumor (site, stage, and histology); 2) patient (age, sex, comorbidities, performance status, and immunity); and 3) environment (socioeconomic status, accessible treatment options, and quality of treatment). Knowledge regarding prognostic factors has a central role in an efficient treatment decision-making process.[2] The influence of most tumor- and patient-related prognostic factors in head and neck cancer cannot be changed by medical intervention.[3,8,13–26] However, environmental factors, such as treatment decision-making and quality, can be modified, leaving room for improvements.

The tumor-node-metastasis (TNM) staging system uses anatomical prognostic factors to classify tumors, not patients, with some common characteristics. It is the most widely used prognostic system in clinical practice worldwide. Aiming to improve its prognostic ability, Patel and Lydiatt[27] proposed the addition of several other factors to the current anatomic-based classification. These included comorbidities, tobacco use, molecular markers, and treatment variables. The 8th edition of the TNM classification included some significant pathological factors (e.g., depth of infiltration for oral cancer and extracapsular spread of lymph node metastases), molecular factors (human papilloma virus [HPV] infection for oropharynx carcinoma), and a patient-related factor (age for thyroid cancer).[28–30] Although one of the aims of the TNM classification is to allow the comparison of treatments' efficacy and outcomes in patients treated in different institutions or different geographic regions, the 8th edition of the TNM classification failed to include patient-related factors (comorbidities) and compliance with the current standards and quality of delivered treatment. The American Joint Committee on Cancer (AJCC) acceptance criteria for inclusion of risk models for individualized prognosis in the practice of precision medicine criterium number 12 states the following: "it should be clear which initial treatments were applied…"[31] Treatment type was included in only 11% of 40 prognostic nomograms based on the AJCC Precision Medicine Core criteria.[26]

Until the 1980s, in most institutions, the surgeon decided the treatment approach for head and neck cancer patients. Usually, the decision was based on prognostic factors and results of previous experiences with different treatment modalities. Selection of the optimal treatment strategy has increased in complexity owing to the numerous improvements in surgery, radiotherapy, chemotherapy, and immunotherapy. In the present-day scenario, the surgeon is included as a member of a multidisciplinary team.[32,33] The burden of decision-making is shared among surgeons, medical oncologists, and radiation oncologists and usually is based on tumor- and patient-related factors as well as the expected rates of complications and tumor control.[34–42] When the level of evidence is weak, local medical culture dictates treatment selection.[43,44] Furthermore, modern medical ethics emphasize the patients' right to self-determination: "…under identical external circumstances, different patients reach different decisions based on their personal values."[4]

According to a recent French review[33] on quality insurance in head and neck cancer multidisciplinary team meetings, most patients had undergone surgery before the meeting; the population was different from those included in clinical trials in terms of advanced age and poorer medical conditions. This emphasizes that the "… evidence-based recommendations should be adapted to patients' frailties." It has the obvious advantage of combining the knowledge and expertise of specialists from different fields and has resulted in changes in the management of one third of patients and in improvements in outcomes.[42–48] Dedicated multidisciplinary team meetings are conducted to not only decide the optimal treatment strategy but also to coordinate the care of these patients.[33,36,37,42,48,49]

The Surgeon's Influence on Prognosis

Progress in the art of surgery is mainly dependent on the talent of courageous and creative surgeons motivated by providing optimal care to patients. Surgeons committed to the welfare of their patients usually form an individualized relationship with the patients and propose treatments that they think are the best for the patient.[50] There has been extensive criticism regarding the lack of interest in surgeons in performing randomized clinical trials.[51–56]

In recent years, there has been increasing evidence that the surgeon and hospital volumes and specializations play a major role in postoperative complications, mortality, and survival after cancer surgery.[57–74] Theodore Kocher, who won a Nobel prize for his work in thyroid surgery, reported a 13% mortality rate in 101 operations performed during the first 10 years of practice; later on, this rate decreased to less than 1%.[75,76] More than a century later, Adkisson et al.[76] reviewed 1,249 thyroidectomies performed at the University of Pittsburgh and showed that surgeon volume is an essential consideration. Surgeons who perform more than 30 thyroidectomies a year are more likely to undertake complete initial resection of differentiated thyroid cancer. However, for more advanced disease the threshold is at least 50 operations per year.

Regarding head and neck surgery, a meta-analysis[61] on volume-outcome associations showed conflicting results between the six analyzed series.[77–82] Eskander et al.[66] assessed the influence of surgeon and institution resection volume on long-term overall survival in a cohort of 7,720 head and neck cancer patients treated in Ontario, Canada, from 1993 to 2010. Both hospital and surgeon volumes were significant predictors of improved overall survival rates. There was a 2.4% decrease in the hazard ratio for every additional 25 cases treated in an institution.

Kim et al.[83] reported 200 cases (18%) of structural recurrences in a study of 1,103 patients with advanced papillary thyroid carcinoma with lateral nodal metastases who were followed-up for 62 to 108 months (median, 81 months). Surgeon volume and experience were associated with structural recurrences but not with distant metastases or mortality. The significant impact of surgical volume in thyroid and parathyroid surgery was confirmed by Noureldine et al.[84] using a large American sample of inpatients (314 cases). However, the data suggest some disparities, and African American patients had less access to intermediate- and high-volume surgeons than Caucasian patients. This was associated with a higher risk of complications, longer length of hospital stay, and higher treatment costs.

The type of treatment facility can also be associated with overall survival in head and neck cancer patients. A population-based retrospective cohort study included 525,740 patients with malignant head and neck tumors registered in the National Cancer Database. The median survival in patients with aerodigestive cancers was 69.2 months. Improved overall survival was associated with treatment in an Academic Comprehensive Cancer Program (hazard ratio [HR], 0.89; 95% confidence interval [CI], 0.88–0.91); Integrated Network Cancer Program (HR, 0.94; 95% CI, 0.92–0.96); and Comprehensive Community Cancer Program (HR, 0.94; 95% CI, 0.92–0.95) compared with treatment at Community Cancer Programs. Survival rates were also lower in patients with government insurance or no insurance, African-Americans or Asians, and patients living in low-income areas.[85] The practice of head and neck oncology in low-resource settings has restrictions in terms of treatment availability due to the lack of specialized centers. As physicians, we "must do the best we can with what we have."[86]

David et al.[87] analyzed 46,567 patients with advanced-stage head and neck cancer from the National Cancer Database who underwent curative radiotherapy. Facility volume and academic designation had a significant impact on survival results. Cramer et al.[74] analyzed 68,856 surgically-treated cases from the same database and reported similar results and conclusions.

Our colleague Oliver Wendell Holmes, who is also a teacher of anatomy, an essayist, and a poet, is one of the founders of the Boston Society for Medical Improvement and has published a collection of Medical Essays: *The Young Knows the Rules but The Old Man Knows the Exceptions*.[88,89] One should also consider the words of the classical pianist Vladimir Horowitz: "the difference between the ordinary and extraordinary is practice."[90] This is similar to what surgeons have often repeated for a long time: "practice makes perfect."[91]

Surgeons used to be regarded as being very competitive and likely to adopt an authoritative style of leadership.[92] In more recent years, collaborative teamwork has become the gold standard of medical practice, and in this new environment, flexibility and a high level of emotional intelligence are essential to establish highly functioning teams.[93–95] From 2006 to 2017, a total of 43,939 patients underwent surgeries performed by practicing surgeons from the Michigan Bariatric Surgery Collaborative. Each of the 35 surgeons who completed a lifestyle inventory tool during a meeting had performed 43 to 4,302 procedures (mean: 1,247 procedures). There were lower levels of adverse events when the surgeon had styles that are highly constructive (i.e., achievement, self-actualizing, humanistic-encouraging, and affiliative) or passive/defensive (i.e., approval, conventional, dependent, and avoidance) compared to patients who underwent surgery performed by surgeons with lower levels of these styles. Surgeons with highly aggressive styles (i.e., perfectionism, competitiveness, power, defiance) had similar rates of postoperative adverse events.[96] As stated by Drodeck et al. on their 2015 study: "Given the complex nature of personality, however, it is currently impractical to use personality to predict clinical performance."[92]

Age is not a contraindication to surgical therapy[97,98]; however, the surgeon's attitudes in planning treatment for elderly and young patients may differ, and a large number of them do not receive standard therapy and are treated less aggressively. In some cases, this approach can be explained by the presence of severe uncontrolled comorbidities.[17,99–102] In other cases, patients and their families can be reluctant to allow surgical procedures.[99] Clayman et al.[97] reviewed 43 patients aged $\geq$ 80 years and found that only 23% of patients received adjuvant treatment. In a control group of younger patients, 44% of patients received adjuvant therapy.

Physician Performance and Prognostic Improvement

The current standard of care for head and neck cancer patients is evidence-based multidisciplinary treatment; however, there is great disparity in the quality of treatment delivery according to the economic status of the geographic region. In parallel, structured surgical training pathways are not used in several low-income countries. Board certifications and quality assurance programs have improved the outcomes of surgical oncology patients in high-income countries; however, such programs have not been fully implemented in low-to-middle-income countries, where surgeons frequently deal with advanced-stage disease and work with limited resources.[103] To implement international collaboration between the World Health Organization, International Agency for Research on Cancer, International Federation of Oto-Rhino-Laryngological Societies, International Federation of Head and Neck Oncologic Societies, International Academy of Oral Oncology, AAO-HNS, American Head & Neck Society, European Head & Neck Society, and national and regional societies and associations, they aim to improve the educational exchange of curriculum content to enhance residency and fellowship programs, facilitate virtual cancer conferences, and other eHealth activities.[103–105]

The cutting-edge application of novel technologies in head and neck surgery, such as the robotic or endoscopic surgery, has been introduced in clinical practice worldwide.[106–109] However, the complexity of using new devices and understanding anatomy from a different perspective is a challenge for young surgeons as well as for experts. Even the most experienced head and neck oncologic surgeons show a long learning curve before gaining expertise in such procedures.[106,109] For skull-base surgeries, virtual surgical simulation based on models created from the same patient has been considered a useful educational tool.[110,111]

Quality of Care and Quality Assurance

At the end of the last century, the Institute of Medicine[112] defined quality as "the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge." The Agency for Healthcare Research and Quality defines quality healthcare as "doing the right thing, at the right time, in the right way, for the right person and having the best possible results." The increasing cost of medical care is a global problem, and this has directed focus to the need to assess the value of the treatment (i.e., quality of care and long-term outcomes achieved at given prices).[113] Porter[114] stated that the achievement of high value for patients must become the overarching goal of health care delivery: "… the goal is what matters to patients and unites the interests of all actors in the system." The use of a non-standard of care increases the utilization of unnecessary resources, and healthcare expenditure in head and neck cancer patients is about 30% higher.[115]

The main objective of quality assurance is to improve the outcomes of patients through structural and process-related changes in the health system and by ensuring adherence to established procedures.[116] Numerous initiatives in quality assurance for head and neck cancer surgery have been proposed by different organizations.[117–123] The experience of surgeons and patient volume are critical indicators, as reported in several studies.[61,83,84,116–118,123–131] The higher the patient volume per surgeon, the lower is the long-term mortality.[61,118,125] Compliance with quality-related metrics was associated with improved survival rates in oral cancer patients who underwent surgical treatment.[74,132–134] Furthermore, adherence to referral for radiotherapy was significantly associated with overall and disease-free survival.[74,132,134] The effect of fragmented care was analyzed in 32,813 head and neck cancer patients treated with surgery and postoperative radiotherapy. Patients who underwent adjuvant treatment in a different institution had an increased risk of mortality.[135]

Among the metrics of quality assurance, surgical margins and nodal yield are two of the most significant metrics in head and neck surgery. Both have a significant impact on survival in head and neck cancer patients.[35,116,132,136,137]

The fundamental principle of radical resection is to obtain adequate exposure that allows good visualization of the entire tumor to ensure the possibility of resection with wide three-dimensional margins, while allowing maximum preservation of normal non-involved tissues. The dimensions vary according to the type and location of the tumor; it must be at least 1 to 2 cm for most squamous cell carcinomas of the upper aerodigestive tract. They can range from 2 mm for glottic squamous cell carcinomas and 5 mm for supraglottic human papillomavirus (HPV)-related oropharynx and basal cell carcinomas of the skin to 2 cm for facial melanomas or 3 cm for sarcomas and carcinomas of the hypopharynx and cervical esophagus.[138–140] These margins must include macroscopically healthy tissue; however, frequently, tumors originating in the mucosa involve dysplasia, carcinoma in situ, or even multifocal tumors.[141] The surgeon must take into account that visualization as well as palpation are important to achieve adequate resection.

Recent studies have redefined the concept of close surgical margins. Zanoni et al.[142] showed that recurrence-free survival in oral tongue cancer patients was significantly affected only if the surgical margins were 2.2 mm or less. In a study with 10 mongrel dogs, changes in the mucosal and muscle dimensions showed a mean shrinkage from the initial resection to the final microscopic assessment of 30.7% in the deep tongue margin to 47.3% in labiobuccal mucosal margin. Consequently, "…to obtain a 5 mm of pathologically clear margin, an in-situ margin of resection of at least 8 to 10 mm needs to be taken."[143] Surgical margins of excised specimens of lip and oral squamous cell carcinoma can shrink from 11.3% before excision to 47.5% at histopathologic evaluation.[144–146]

Nocon et al.[147] analyzed the rates of positive surgical margins in 28,840 head and neck cancer patients registered in the National Cancer Database; the overall positive margin rate was 17.6%. High-volume facilities had lower rates of positive margins (10.8%) than the lowest volume quartile (26.3%) or the two intermediate quartiles (16.5%). The rates of positive margins were lower in academic facilities than in nonacademic facilities (14.0% vs. 22.7%).

A prospective randomized trial compared negative margin rates between two intraoperative methods of margin assessment in oral cancer patients. Frozen section analysis revealed extension of surgical resection in 22 of 51 patients (43%) in the specimen-driven margin arm and in only 2 of 20 patients (10%) in the patient-driven margin arm. The final pathological report showed negative margins in 84% and 55% of patients in the 2 corresponding groups, respectively. The extension of surgical resection prevented the escalation of adjuvant treatment in 38% and 10% of the corresponding patients, respectively.[148] In a multi-institutional study comprising 280 patients with clinical stages I and II oral tongue squamous cell carcinoma, the frequency of positive margins was also lower (7.7%) in the specimen-driven margin group. The patient-driven margin group had worse local control rates.[149]

Several strategies have been developed to assess margins in situ, but they all remain to be validated. These include microendoscopy,[150] narrow-band imaging,[151,152] optical coherence tomography,[153] fluorescence spectroscopy,[154,155] Raman spectroscopy,[156] and mass spectrometry.[157]

The identification of metastatic lymph nodes in a neck dissection specimen depends on the quality of the neck dissection (surgeon-dependent) as well as on the sampling procedure (pathologist-dependent).[158–160] The reported lymph node yield in a radical neck specimen varies from 1 to 97 lymph nodes.[158–162] Lymph node ratio (or lymph node density) is the ratio of the number of involved lymph nodes to the total number of lymph nodes removed during regional lymph node dissection. Thus, it combines the number of metastatic lymph nodes and the thoroughness of the lymph node dissection.[163] Higher survival rates in cases involving a lower lymph node ratio have been shown in several human tumors, such as breast cancer,[163] gastrointestinal cancer,[164,165] and melanoma.[166,167] Lymph node ratio has also emerged as an independent prognostic factor for oral squamous cell carcinoma.[168–170] The prognostic significance of lymph node ratio was validated in a multi-institutional study with 4,254 patients. The overall survival rate was 49% in patients with a lymph node density of < 0.07, compared with 35% in patients with a lymph node density of > 0.07 ($p < 0.001$).[171]

A patient with 10 dissected lymph nodes and 1 metastatic lymph node has a lymph node ratio of 0.1. A patient with 50 dissected lymph nodes and 1 metastatic lymph node has a lymph node ratio of 0.02. This means that for the same number of metastatic lymph nodes (something that the surgeon cannot interfere with), the prognosis can be improved if a more comprehensive lymph node dissection is performed (something the surgeon can control).

Improvement in Surgical Quality

Arterial encasement, prevertebral involvement, mediastinal involvement, and massive skull-base invasion are considered contraindications to curative surgery. Nowadays, head and neck surgeons can rely on imaging to evaluate if a tumor is resectable or not, thus avoiding futile surgeries.[172] Furthermore, it is important to consider that modern imaging also provides additional information resulting in stage migration, and some current improvements in oncological outcomes may be due to the Will Rogers phenomenon: "Many patients who previously would have been classified in a 'good' stage were assigned to a 'bad' stage. Because the prognosis of those who migrated, although worse than that for other members of the good-stage group, was better than that for other members of the bad-stage group, survival rates rose in each group without any change in individual outcomes."[173] Stage migration has been documented in head and neck oncology, especially with the introduction of positron emission tomography-computed tomography in the pretreatment workup.[174–179]

Performance measurement, feedback, and dissemination of best practice measures are among the numerous strategies proposed to improve surgical and medical oncology quality.[113,127,180–183] In thoracic and general surgery, surgeon-specific outcome reports allow individualized performance evaluation and feedback provision.[127,180,184,185]

Randall Weber,[115] in his American Head and Neck Society Presidential Address "Improving the quality of head and neck cancer care" stated "… we have a unique opportunity and a societal obligation to reengineer head and neck cancer care for the betterment of our patients…" His recommendations for improving the quality of care in head and neck oncology were as follows: a) training using residency and fellowship programs, b) creation of multidisciplinary head and neck cancer teams, c) participation in national initiatives to improve the quality of cancer care, d) directing patients with head and neck cancer to tertiary care facilities, e) dissemination and implementation of NCCN treatment guidelines for head and neck cancer, and f) supporting the enrollment of patients in prospective clinical trials to promote the provision of evidence-based treatment and the development of new therapeutic paradigms in head and neck oncology.

In a program for evaluating head and neck surgical performance indicators at an individual and departmental level at the MD Anderson Cancer Center, University of Texas, performance monitoring and feedback interventions were shown to improve surgical performance. The length of hospital stay decreased from 2.1 to 1.5 days for low acuity procedures and from 10.5 to 7 days for high acuity procedures; the incidence rate of negative performance indicators decreased from 39.1 to 28.6%.[186–188] Lira et al.[189] analyzed 360 head and neck cancer patients treated in a Brazilian cancer center and achieved the MD Anderson benchmarks for all outcome indicators in low acuity procedures, but the rate of surgical site infection was higher and the length of hospital stay was longer in high-acuity procedures.

Cramer et al.[74] investigated 5 quality metrics of adherence to the NCCN guidelines in 76,853 surgically treated patients with head and neck cancer identified from the National Cancer Database. The patients were treated in 1,217 hospitals from 2004 to 2014. Negative surgical margins were noted in 80% of cases. Among the 41,572 patients who underwent neck dissection, 78.1% had 18 or more excised lymph nodes. From among 31,442 patients who had T3 to T4 or N2 to N3 disease, 69% received adjuvant radiotherapy, and among 17,789 patients with positive margins or extracapsular extension, only 42.6% received adjuvant chemoradiotherapy; adjuvant treatment was started within 6 weeks of surgery in only 44.5% of 35,716 cases. All five parameters had a significant impact on prognosis. The mean overall quality score for the studied patients was 70.7%, and high-quality care was associated with a reduced risk of mortality (HR 0.81; 95% CI 0.79–0.83). These results strongly suggest that adherence to these metrics could improve survival in head and neck cancer patients. Schoppy et al.[134] also analyzed data from the National Cancer Database and showed that 90% of rates of negative margins and 80% the number of 18 or more lymph nodes in neck dissection specimens identified the subset of high-quality hospitals associated with significant survival advantages when compared with other hospitals.

There is some evidence confirming the hypothesis that observation improves the results of surgeons.[127,190] This phenomenon is known as the Hawthorne effect. During the 1920s and 1930s, at Western Electric's Hawthorne Works electric company, Hawthorne, Illinois, the effect of different aspects of the work environment (lighting, breaks, etc.) on worker's productivity was studied. None of the conditions explained why the productivity had increased during the experiment and decreased after it ended. It was later shown that during the experiment, workers were responding to increased attention from the supervisors and not to any of the experimental variables. The changes were actually psychological; the workers' responses were influenced by the special attention and by knowledge of the ongoing experiment.[190,191]

Conclusion

Multidisciplinary tumor board meetings are the current gold standard for treatment planning in head and neck oncology, and compliance with recommended treatments has a significant impact on prognosis.

With regard to surgeons, training, specialization, experience, volume, attitudes, and performance are significant prognostic factors in several human cancers. Structured educational and quality assurance programs must be undertaken with the aim of improving surgical quality and the patient's outcomes.

There is limited literature on the surgeon's role in the prognosis of head and neck cancer patients. Thus, quality audits of the surgeon's performance, such as in terms of surgical margins, lymph node yield or lymph node ratio, complications, postoperative mortality, adherence to established guidelines, participation in multidisciplinary boards, and compliance with the board's decision, must be implemented.

Hospital and surgeon volume are the benchmarks of quality care because of their significant impact on postoperative complications and overall survival. It is critical to identify other variables associated with survival rates and the quality of life; then, modifications related to these variables should be promoted in surgical practice. However, these factors are not easily transferable, suggesting that the centralization of care in high-volume universities, research centers, and cancer centers can improve outcomes after head and neck oncologic treatment.

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Author Contribution
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