Clinical Evaluation of the Head and Neck Cancer Patient

**General Approach to the Head and Neck Cancer Patient**

Clinical evaluation of the patient with head and neck cancer entails multiple challenges for the physician. In the context of an initial clinical encounter, the caregiver needs to collect the findings that will guide diagnosis, while also establishing a constructive therapeutic relationship with the patient and family members, addressing acute intervention needs, and outlining and initiating a plan for further diagnostic workup and treatment. The imperatives that the physician must address in the evaluation of the head and neck cancer patient may be considered as 12 Key Tasks, as outlined in Table 2.1. An accurate and comprehensive examination must be performed. A complete medical history should be undertaken, with special attention paid to key risk factors, including prior cancer history, smoking history, alcohol intake, extent of sun exposure, reflux, industrial or occupational exposures, and immunosuppression. Cardinal signs and symptoms associated with head and neck cancer include lesions or masses, persistent hoarseness, mouth or throat pain, dysphagia, odynophagia, hoarseness or dysphonia, dyspnea, stridor, unilateral otalgia or hearing loss, aspiration, weight loss, or cranial nerve deficits. Assessment and documentation must be performed of the patient’s overall medical and functional status, which may influence the suitability of specific treatments such as surgical resection or radiotherapy. Critical information regarding previous treatments must be collected, including previous oncologic surgeries, chemotherapy treatments, or prior radiotherapy. If the patient has had prior radiotherapy, key elements of therapy must be documented, including treatment portals, dosages, fractionation, treatment duration and compliance, and specifics regarding prior surgical or chemotherapeutic interventions obtained.

A provisional diagnosis or differential should be established with rapid formulation of a plan of care and clear delineation of the next steps required. At the same time, the treating physician must be vigilant in assessing areas in which immediate intervention may be necessary, such as treating pain, airway management, or addressing severe nutritional deficiencies. Assessment and treatment of pain is an important aspect of the clinical evaluation of the head and neck cancer patient, although insufficient attention is often paid to this aspect of care. In a recent meta-analysis of studies on pain among patients with cancer, den Beukjen and colleagues found that >50% of patients had inadequately treated pain; when considered by cancer type, patients with head and neck cancer had the highest prevalence of insufficient pain management at 70%. A comprehensive evaluation of the head and neck cancer patient typically involves adjunctive measures such as radiographic imaging and cytopathologic tissue analysis. However, physical examination of the head and neck and history-taking by the evaluating clinician retain a central role in shaping further assessment and treatment. For example, patient age is a key factor to be considered in evaluating the patient with a solitary neck mass. Whereas the overwhelming majority of neck masses in young patients are either infectious or inflammatory in origin, most neck masses in adults involve neoplasia. Although benign pathologies are common in young patients with cystic neck masses, >80% of patients over the age of 40 who present with such findings are ultimately found to have carcinoma. The clinician should be highly suspicious of the diagnosis of branchial cleft cyst or thyroglossal duct cyst in patients older than 40 with no prior history of symptoms; >30% of patients over 40 initially diagnosed with branchial cleft cyst subsequently prove to have cystic metastases of squamous cell carcinoma.

As part of the initial visit, head and neck cancer patients should be engaged with a team of professionals dedicated to providing guidance and support through their course of care, including an oncology nurse, nurse practitioner or physician assistant, and patient navigator. Such multilayered staffing in the management of head and neck cancer patients improves treatment compliance and overall satisfaction with care.

If the patient is a smoker, provision of smoking counseling and offering treatment or referral to smoking cessation resources is necessary at the initial visit, as persistent smoking during treatment is an independent risk factor for poor treatment outcome. In many cases, patients will present having already been told that they have a head and neck cancer or they may have a strong suspicion of such a diagnosis. There is wide variation regarding patients’ desires regarding the detail in which they want cancer diagnoses described and the degree of specificity with which they want prognostic information delivered. Although legal and ethical standards in the United States regarding informed consent demand full disclosure, it is incumbent upon the clinician to attempt to furnish such information in an optimal manner for individual patients. The obligation to full disclosure does not obviate the responsibility of the provider to attempt to tailor the delivery in accordance with patient preferences and sensitivities.

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CHAPTER 2

Joshua D. Hornig, Barry T. Malin, and Brendan O’Connell
TABLE 2.1 12 Key Tasks in the Initial Evaluation of the Head and Neck Cancer Patient

- Perform comprehensive head and neck examination; additional physical examination as indicated.
- Elicit complete HPI and symptom description.
- Delineate risk-factor profile (e.g., smoking history, sun exposure, radiation exposure, etc.).
- Assess overall medical and functional status in the context of possible treatment options.
- Engage a care team (cancer nurse, cancer nurse practitioner, and cancer patient navigator) to provide patient support and guidance.
- Ascertain critical information regarding prior therapies and start process to obtain such data if not available at the time of initial consultation.
- Recognize and address needs for urgent intervention: airway compromise, aspiration risk, inadequately treated pain, severe malnutrition, and hemorrhage risk.
- Obtain biopsy specimens, as indicated and feasible in office setting.
- Express recognition of the patient’s concerns regarding diagnosis and acknowledgment of the impact regarding stress, anxiety, fear, and grief on patients and their loved ones.
- Initiate multidisciplinary board review and key referrals as indicated: medical oncology, radiation oncology, speech and swallowing therapy, maxillofacial surgery/prosthodontics, pain management, anesthesiology/medicine, social work, financial/benefits counseling, smoking cessation resources.
- Order directed imaging and laboratory studies.
- Clearly identify and explain next steps in diagnosis and treatment in terms appropriate for the individual patient.

Examination of the Skin

Examination should begin with assessment of facial structures; any gross asymmetry or facial swelling should be noted. Thorough external inspection of the patient’s skin for any suspicious lesions is performed. Particular attention should be given to sun-exposed areas, including the external auricles and the posterior neck. The scalp and other hair-bearing areas should be closely inspected, as lesions in these areas often escape notice. All pigmented lesions and nevi should be examined closely for color variation, border quality, asymmetry, and ulceration.

Examination of the Ear

Examination of the ear and temporal bone is a required portion of the assessment. The skin overlying the external ear and mastoid region is inspected and palpated when appropriate. Following inspection of the external ear, otoscopic examination should be performed to assess the external auditory canal, tympanic membrane, and middle ear space. The presence and quality of any otorrhea or evidence of effusion is noted. Subjective pain associated with aural discharge is particularly concerning for underlying malignancy. In an adult presenting with unexplained unilateral or bilateral serous otitis media, fiberoptic endoscopic assessment should be performed to rule out obstruction of the Eustachian tube by a nasopharyngeal mass.

Examination of the Nose

Anterior rhinoscopy is performed under direct visualization with a nasal speculum and a headlight or head mirror. With exposure enhanced by appropriate speculum technique, the anterior nasal cavity and its contents are visualized, including the vestibule, anterior septum, floor of the nasal cavity, inferior turbinate, middle turbinate, and middle meatus. The presence of secretions, masses, obstruction, scabbing, or active bleeding should raise suspicion for sinonasal pathology.

Examination of the Oral Cavity

The oral cavity begins anteriorly at the skin/mucosal junction of the vermilion border of the lips. The hard/soft palate junction, the anterior tonsillar pillar, and circumvallate papillae form a plane posteriorly, which separates the oral cavity from the oropharynx. The oral cavity is divided into the following subsites: the lips, buccal mucosa, floor of mouth, retromolar trigone, oral tongue, hard palate, and alveoli. Oral cavity examination is best performed with two tongue blades and a head light or head mirror. The use of a handheld light source is discouraged, as it prevents the examiner from using both hands to manipulate oral cavity contents.

Examination should begin with external inspection of the lips and then proceed to thorough intraoral examination. When asking the patient to open their mouth, the presence of trismus should be noted, as it suggests pterygoid muscle involvement. The buccal mucosa, gingiva, gingivobuccal sulci, the retromolar trigone, and overall state of dentition are then assessed. The tongue is then grasped with a gauze pad and gently manipulated to allow full visualization of the ventral, dorsal, and lateral surfaces. The lateral surfaces should be inspected for lesions and palpated to assess for induration. With the tongue pulled superiorly, the floor of the mouth should be inspected and manually palpated; submucosal masses in the floor of the mouth should raise suspicion for minor salivary gland tumors. Midline protrusion and lateral excursion of the tongue should be tested; atrophy of one side or asymmetric protrusion raises suspicion for tongue invasion or cranial nerve XII involvement. Inspection and palpation of the hard palate is performed.

PHYSICAL EXAMINATION

Thorough physical examination is critical in the evaluation of the patient with possible head and neck cancer. A complete physical examination of the entire head and neck is essential, regardless of suspected primary site. Appropriate steps should be taken prior to the initiation of the physical exam in order to develop and enhance patient comfort and rapport. Appropriate hand washing should precede examination, and adherence to universal precautions should be maintained. These actions promote trust between patient and physician. Physical examination should begin with attention to the general appearance of the patient. Information regarding a patient’s overall health, mood and affect, hygiene, and smoke exposure may be gained with simple observation.

In addition to visualization of anatomic structures of the head and neck, manual palpation is a critical tool for assessment of the head and neck. Palpation should routinely be performed of the neck and oral cavity. Bimanual palpation is necessary for comprehensive evaluation of the floor of mouth and submandibular areas. Palpation techniques can yield critical information regarding submucosal extension, fixation, and tumor thickness. Any abnormal or concerning findings should be described in relation to key landmarks and anatomic subsites, so as to facilitate accurate communication with other providers and appropriately document changes over time.
CHAPTER 2 | CLINICAL EVALUATION OF THE HEAD AND NECK CANCER PATIENT

Oral cavity examination requires assessment of all mucosal surface changes suggestive of potential or premalignancy: leukoplakia, erythroplakia, lichen planus, oral submucosal fibrosis, discoid lupus erythematosus, and dyskeratosis. The most common sites for premalignant lesions include the buccal mucosa, lower gingiva, tongue, and floor of mouth. Adjunctive screening methods including toluidine blue application, fluorescence, and brush biopsy have not proven to be of unequivocal benefit in enhancing detection of oral malignancy, but early findings regarding the potential application of optical coherence tomography in early detection are promising.

**Examination of the Oropharynx**

The oropharynx extends from the level of the soft palate to the hyoid bone and has four distinct subunits: soft palate, tonsillar region, base of tongue, and posterior and lateral oropharyngeal wall. The soft palate should be examined for mucosal lesions and submucosal fullness or swelling. Elevation of the soft palate should be symmetric and can be assessed by asking the patient to say “ah”; asymmetric elevation should raise suspicion for CN X involvement. The tonsillar region consists of anterior and posterior tonsillar pillars encompassing the palatine tonsils. The anterior tonsillar pillar and tonsil represent the most common sites for primary tumors of the oropharynx. Asymmetrically hypertrophied lymphoid tissue, particularly in the palatine tonsils, should raise suspicion. The lateral and posterior pharyngeal walls are inspected; medialization of the lateral oropharynx may represent mass effect from an entity in the parapharyngeal space, which lies posterolateral to the tonsil. Palpation of the base of tongue is paramount as direct examination of this area is limited. Submucosal lesions may be missed on indirect visualization, but can often be palpated with good manual examination techniques. The base of tongue, pharyngoepiglottic folds, and vallecula should be inspected during indirect laryngoscopy with either mirror examination or fiberoptic endoscopy, as discussed below.

**Examination of the Neck and the Parotid Region**

Examination of the neck is paramount in the evaluation of head and neck cancer. All levels of the neck, including the supraclavicular region, should be palpated to assess for the presence of lymphadenopathy. The anatomy of the neck is divided into six levels, as described in Table 2.2. Size, mobility, and location of suspected malignant lymph nodes should be carefully documented in relation to these levels. The thyroid should be palpated for the presence of distinct nodules or gross enlargement. Standing behind the patient and having them swallow facilitates identification of irregularities of the thyroid lobes. The parotid glands, the preauricular lymph nodes, and the postauricular lymph nodes should be palpated. A mass in the parotid may represent primary neoplasm, metastatic lymph node, a cyst, or an inflammatory process. If the patient presents with a neck mass without an obvious primary, the index lesion can be identified in most cases on the basis of a comprehensive examination. In cases where the primary lesion is not discovered on initial physical exam, further workup with adjunctive imaging (CT, MRI, or PET/CT), tissue sampling, operative endoscopy, and immunohistochemical or molecular studies as indicated will facilitate ultimate discovery of the primary lesion in 97% of patients.

**TABLE 2.2 Anatomic Boundaries of the Levels of the Neck**

<table>
<thead>
<tr>
<th>Level</th>
<th>Bound by</th>
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<tbody>
<tr>
<td>Level IA (submental)</td>
<td>Bound by lateral edge of the anterior bellies of the digastric muscles and the hyoid bone.</td>
</tr>
<tr>
<td>Level IB (submandibular)</td>
<td>Bound by mandible, anterior belly of the digastric muscle, and the stylohyoid muscle.</td>
</tr>
<tr>
<td>Level IIA and Level IIB (upper jugular)</td>
<td>Bound by the skull base superiorly and hyoid bone inferiorly, the stylohyoid muscle medially, and the posterior border of the sternocleidomastoid muscle (SCM) laterally.</td>
</tr>
<tr>
<td>Level III (midjugular)</td>
<td>Bound by the hyoid superiorly, the inferior border of the cricoid cartilage inferiorly, the lateral border of the sternohyoid muscle medially, and the posterior border of the SCM laterally.</td>
</tr>
<tr>
<td>Level IV (lower jugular)</td>
<td>Bound by inferior border of the cricoid cartilage superiorly, the clavicle inferiorly, the lateral border of the sternohyoid muscle medially, and the posterior border of the SCM laterally.</td>
</tr>
<tr>
<td>Level VA and Level VB (posterior triangle)</td>
<td>Bound by the convergence of the SCM and trapezius muscle superiorly, the clavicle inferiorly, the posterior border of SCM medially, and the anterior border of the trapezius muscle laterally. Level VA is located superior to the level of the inferior aspect of cricoid cartilage; Level VB is located inferior to this horizontal plane.</td>
</tr>
<tr>
<td>Level VI (anterior or central compartment)</td>
<td>Bound by the hyoid bone superiorly, the suprasternal notch inferiorly, and the carotid arteries laterally.</td>
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**Neurologic Examination**

Complete neurologic examination should be performed with a focus on the cranial nerves (CN). Cranial nerve deficits may be indicators of underlying neoplastic processes and require further workup. Any paresis of the facial nerve (CN VII) must be characterized in accordance with the House-Brackmann grading scale. The House-Brackmann scale (Table 2.3) has been adopted by the American Academy of Otolaryngology–Head and Neck Surgery as the universal standard for the clinical assessment of facial nerve function. Characterization of facial nerve deficits using the House-Brackmann scale facilitates accurate communication between providers and clear documentation of symptom progression. However, it should be noted that the House-Brackmann scale may be misused and tested in neuro-otologic setting and has only limited usefulness in assessing tumors of the head and neck. Nevertheless, it is a common grading system that is now universally known and it does help with communication to other health professionals.

**Fiberoptic Endoscopy**

The nasopharynx, portions of the oropharynx, larynx, and hypopharynx cannot be assessed by unaided physical examination. These areas can be visualized using either mirror techniques or
nasopharyngeal tumors have a predilection for this site. The nasopharynx extends from the skull base superiorly to the soft palate inferiorly and communicates with the nasal cavity through the choanae. Midline posterior pharyngeal mucosa and the nasopharyngeal lymphoid tissue should be assessed.

The nasopharynx extends from the skull base superiorly to the posterior pharyngeal wall, and postcricoid region. Adequate visualization of the subglottis is not possible in the office examination. May be obscured by glottic pathology, and comprehensive evaluation in the operating room is often required.

The subglottis begins 5 to 10 mm below the free edge of the true vocal folds. Primary tumors of the subglottis are rare. However, transglottic extension of superior lesions has important staging and prognostic implications. Visualization of the subglottis may be obscured by glottic pathology, and comprehensive evaluation of the subglottis is not possible in the office examination.

The hypopharynx extends from the hyoid bone superiorly to the esophageal introitus inferiorly. It is continuous with the oropharynx and sits just behind the larynx. The hypopharynx is divided into three distinct subsites: the piriform sinus, posterior pharyngeal wall, and postcricoid region. Adequate visualization of the hypopharynx in the office setting may be difficult. Having the patient perform a Valsalva maneuver may enhance visualization due to clearance of pooled secretions. The majority of tumors that arise in the hypopharynx are SCC or an SCC-variant.

The larynx is divided into three subsites: the supraglottis, glottis, and the subglottis. The supraglottic region includes the epiglottis, the false vocal cords, the ventricles, the arytenoid cartilages, and the aryepiglottic folds. The glottis consists of the true vocal cords and anterior commissure. The supraglottic and glottic larynx are examined for any mucosal lesions or submucosal masses. It is vital to fully visualize the anterior cords and anterior commissure. Bilateral cord involvement, cord mobility, and involvement of surrounding subsites should all be documented. True vocal fold mobility is assessed by having the patient phonate, pant, and breathe quietly. Although clinical staging is partially based on cord mobility, in the setting of impaired cord movement, it is critically important to attempt assessment of the cricoarytenoid unit, which may represent a more specific involvement, rather than a mass effect related to deep muscle invasion. The cricoarytenoid is the basic functional unit of the hemilarynx, and mobility of the cricoarytenoid is often the critical factor determining patient eligibility for organ-preserving laryngeal surgery. Unfortunately, discrimination of vocal cord movement restriction due to paraglottic space involvement or mass effect of bulky lesions from true cricoarytenoid fixation based upon endoscopic examination is difficult, and evaluation in the operating room is often required.

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The larynx and hypopharynx may alternatively be visualized with rigid endoscopy. Patients with sensitive gag reflexes may need to be sprayed with topical anesthetic intraorally. Rigid nasal endoscopy with angled scopes allows for optimum visualization of the nasal cavity and should be performed in any patient with suspected skull-base or sinonasal tumors. Stroboscopic examination of the glottis allows for enhanced visualization of true vocal cords, and subtle changes in mucosal wave dynamics may be detected; it is especially valuable in judging the depth of glottic lesions.

Physical examination findings, considered in the context of patient’s symptomatology and risk factor profile, form the basis for further workup. In most cases, comprehensive evaluation of suspicious findings will require adjunctive imaging. Prior to treatment, definitive tissue diagnosis must be obtained by fine needle aspiration (FNA), core needle biopsy, or open biopsy. Operative endoscopy with biopsy may also assist in securing definitive tissue diagnosis and achieving accurate staging.

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### Table 2.3: House-Brackmann System of Grading Facial Nerve Paralysis

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Normal</td>
<td>Normal facial function</td>
</tr>
<tr>
<td>II</td>
<td>Mild dysfunction</td>
<td>Gross: weakness on close inspection, normal symmetry and tone at rest, may have slight synkinesis Motor: weakness on close inspection, complete closure of the eye with minimal effort, slight asymmetry of the mouth</td>
</tr>
<tr>
<td>III</td>
<td>Moderate dysfunction</td>
<td>Gross: obvious but not disfiguring difference between the two sides of the face, normal symmetry and tone at rest, noticeable but not severe synkinesis, contracture, hemifacial spasm Motor: slight to moderate forehead movement, complete eye closure with effort, weak mouth with medium effort</td>
</tr>
<tr>
<td>IV</td>
<td>Moderately severe dysfunction</td>
<td>Gross: disfiguring asymmetry and/or obvious weakness, normal symmetry and tone at rest Motor: no forehead movement, incomplete eye closure, asymmetric mouth with maximal effort</td>
</tr>
<tr>
<td>V</td>
<td>Severe dysfunction</td>
<td>Gross: barely perceptible motion, asymmetry at rest Motor: no forehead movement, incomplete eye closure, slight mouth movement</td>
</tr>
<tr>
<td>VI</td>
<td>Total paralysis</td>
<td>No movement</td>
</tr>
</tbody>
</table>

IMAGING MODALITIES

Prior to therapeutic intervention, precise tumor staging is critical. Accurate staging is generally best achieved with a combination of clinical evaluation and radiologic imaging. Pretreatment imaging assists in staging by helping to delineate tumor origin, size, extension, and presence of locoregional metastases. Imaging facilitates preplanning by defining the relationship between masses and nearby vital structures such as blood vessels and cranial nerves, and may also detect possible signs of malignancy not readily appreciable by physical examination such as ill-defined tumor borders, cartilage invasion, bone erosion, perineural spread, and multifocality. Traditionally, computed tomography (CT) and magnetic resonance imaging (MRI) have been the standard imaging modalities employed in the workup of head and neck cancer patients. More recently, positron emission tomography (PET) has emerged as a powerful tool in the diagnosis and management of these patients. Ultrasound (US) is radiation sparing and useful in the performance of directed biopsies, and is currently the first-line imaging modality for most thyroid and salivary lesions. Scintigraphy currently has a limited role in the evaluation of thyroid nodules. Emerging technologies in biologic neuroimaging, such as proton MR spectroscopy, CT-perfusion, perfusion-weighted MRI, and diffusion-weighted imaging, utilize biologic behavior patterns such as tumor cellularity and perfusion to depict additional imaging dimensions.

Chest X-Ray (CXR)

PA and lateral CXRs are indicated prior to any endoscopy or surgical intervention requiring general anesthetia. A CXR may assist in identifying cardiac pathology, chronic pulmonary disease, synchronous lung cancer, or distant metastases. However, CT and PET-CT are superior to CXR in ruling out second lung primaries and distant metastases.

Computed Tomography (CT)

CT is often the initial study of choice in evaluation of head and neck masses. Advantages include relative availability and cost-effectiveness relative to MRI and PET scanning along with rapid image acquisition. CT is a powerful tool for depicting the deep tissue of the aerodigestive tract, and thus complements endoscopic evaluation of mucosal lesions. CT is also a suitable means of radiologic staging of neck disease; however, modern CT and MRI scanners appear to have comparable effectiveness in staging the neck, with CT and MRI demonstrating similar sensitivities (82% and 85%, respectively) and specificities (80% and 90%, respectively) in detecting cervical lymph node metastases. CT is indicated in laryngeal and hypopharyngeal cancers and is particularly useful in determining the extent of bone involvement in oral cavity, oropharynx, and sinonasal tumors. Thoracic spiral CT is frequently used to assess early synchronous lung cancer or distant metastases.

Magnetic Resonance Imaging (MRI)

MRI is the preferred imaging modality for evaluation of sinonasal and nasopharyngeal tumors. MRI is capable of differentiating inflammatory sinus disease from neoplasms and is superior to CT in detecting intraorbital and intracranial extension of nasopharyngeal cancers. MRI is very accurate and far more sensitive than CT for detection of perineural tumor extension. MRI is limited in its ability to detect subtle skull-base erosion, while CT with bone algorithm is highly sensitive for detection of bony erosion of sinus walls and skull base. MRI is the most accurate imaging technique for assessment of salivary gland masses. MRI has superior soft-tissue resolution with the capacity to accurately reveal local extension of a tumor and demonstrate perineural tumor spread. CT with bone algorithm is superior in determining the extent of bone destruction and thus may be of value if bony fixation or invasion is suspected. MRI can have important advantages in the depiction of oral cavity and oropharyngeal tumors. Tumors at these sites can be difficult to identify on CT because of the adjacent dense mandible and dental amalgam artifact. MRI is less affected by dense bone and dental artifact allowing for visualization of even small tumors. Furthermore, MRI is superior for assessment of tumor spread into the bone marrow. Disadvantages of MRI include the relatively long imaging time required to obtain high spatial resolution images. Prolonged imaging time often leads to significant motion artifact, making accurate interpretation of imaging difficult; this is particularly frequent at the laryngeal and hypopharyngeal levels.

Positron Emission Tomography (PET)

PET takes advantage of the increased metabolic rate of tumors and the resultant increased absorption of 18F-fluorodeoxyglucose when compared to normal tissue. PET has become widely utilized in both initial staging and follow-up of patients with head and neck cancer. Recent evidence suggests that PET has a higher sensitivity and specificity for staging cancers of the head and neck when compared to CT and MRI. PET can provide additional information in roughly one-third of patients who have undergone previous CT or MRI with equivocal findings. A prospective, histopathologically controlled study demonstrated that PET is superior to CT, MRI, and US in detecting cervical lymph node metastases. PET imaging can identify synchronous primary neoplasms that may be missed with conventional imaging techniques. Whole-body scanning with PET-scanning has clear advantages in terms of ability to detect distant metastases. Lastly, patients with clinically evident nodal disease and unknown primaries despite application of conventional imaging techniques and clinical investigation should undergo PET imaging. In such cases, the PET scanning allows for identification of the primary site of tumor in 10% to 72% of cases. An important limitation of standard PET is limited resolution of anatomic detail. However, combined PET-CT techniques permit near-synchronous image acquisition and combine the anatomic detail of CT with the whole-body sensitivity of PET. Initial studies demonstrated that fused PET-CT improved anatomic localization of PET abnormalities and reduced the number of equivocal PET findings. When the diagnostic accuracy of PET for detection of head and neck cancer is compared to that of PET-CT, PET-CT improves accuracy and alters treatment plans in 18% of cases in the initial diagnostic workup of head and neck cancer patients, utilization of PET-CT alters treatment plans in 30% of cases. In posttreatment surveillance, PET-CT reduces the fraction of false-positive studies compared to PET alone while maintaining a very
high NPV. By consolidating imaging acquisition, PET-CR also reduces overall scan time compared to independent application of imaging modalities. PET/CT is thus emerging as the optimal diagnostic modality in many cases based on evidence of its superiority to either modality alone for initial evaluation, radiologic staging, and surveillance for disease recurrence.

### Ultrasound (US)

US is the preferred imaging modality for assessment of suspected benign salivary gland tumors and thyroid nodules. It is relatively inexpensive when compared to CT and MRI and spares the patient administration of radiation. Further it is safe, noninvasive, and readily available at most clinical sites for point-of-care evaluation and facilitation of fine-needle aspiration biopsy. US is the initial study of choice for suspected benign salivary gland tumors, as it can characterize tumor size, border regularity, vascularity patterns, multinodularity, and adjacent lymphadenopathy. However, US is unsuitable for assessing perineural spread, extraglandular invasion of bone or soft tissue, and oropharyngeal or retropharyngeal nodal metastases, which should be evaluated with MRI if suspected. A disadvantage of US is that its accuracy in assessment of salivary gland lesions is significantly operator-dependent, and interpretation of US images can be more challenging than corresponding MRI or CT images for those without extensive experience.

US is also the most useful imaging technique for assessment of thyroid nodules. High-resolution US can detect lesions as small as 3 mm. Sonographic features suggestive of thyroid nodule malignancy include microcalcifications, marked hypochoegenicity, poorly defined margins, direct invasion through the thyroid capsule, and central vascularity. Microcalcifications have a reported PPV for carcinoma of up to 70% and are the most concerning sonographic finding. The American Thyroid Association (ATA) recommends preoperative neck US on all patients undergoing thyroidectomy for biopsy-proven malignancy. The ATA also recommends surveillance cervical US 6 to 12 months posttreatment and periodically thereafter depending on risk factors and thyroglobulin status.

US may be employed for diagnostic imaging and guidance of biopsy in both the radiology suite and the clinician’s office. Although the utilization of portable US in evaluation of the head and neck in both outpatient and emergency settings is commonplace in Europe, it is much less frequently utilized in the United States. It is, however, becoming increasingly available to clinicians as an adjunctive modality, which may be selectively utilized as part of the initial evaluation of the head and neck cancer patient. This trend has been encouraged recently by the introduction of smaller, less expensive, high-resolution ultrasound machines into the marketplace. The selective application of US technology in the office setting is increasingly being viewed as “an important extension of the physical exam,” which allows clinicians to further investigate concerning findings by “seeing pathology below the skin” in real time without irradiation.

Portable US can be used in the office setting for evaluation of neck masses, cervical lymphadenopathy, salivary gland masses, parathyroid adenomas, and thyroid nodules. US can provide key information regarding a pathologic entity of the neck, including size, cystic quality, presence of solid elements, vascularity, and relationship to critical structures. US characteristics of cervical lymph nodes that are concerning for malignancy include size > 1 cm (except for the jugulodigastric node whose upper limit of normal size is 1.5 cm), round shape (nonpathologic lymph nodes tend to be oval with a 2:1 diameter ratio), irregular margins, focal necrosis, node clustering, loss of hilar architecture, anechoic echogenicity, peripheral nodal vascularity, focal vascularization defects, and microcalcification.

The scope of use of US within the office setting is expected to increase as units become smaller and less expensive. Several manufactures now offer laptop-sized models suitable to head and neck applications, and handheld units, which are already in use in other clinical settings, are on the horizon. At present, the primary barrier to increased usage of office-based US is adequate training and credentialing for nonradiologists. However, performance of head and neck US by the treating physician in the office setting can have important benefits in terms of treatment planning and surveillance. New US techniques, including elastography and sonoelastography, are likely to improve the accuracy of office-based testing. Lyschik and colleagues recently reported a 98% sensitivity and 92% accuracy rate utilizing US sonoelastography to determine malignancy in cervical lymph nodes.

### Scintigraphy

Scintigraphy is a nuclear medicine technique in which uptake of radiotracers by select tissues can be measured. Its routine use in the evaluation of thyroid nodules has significantly decreased, and its utility in the workup of thyroid carcinoma is limited. Iodine-123 and technetium-99m pertechnetate are radiotracers commonly used to evaluate thyroid nodules. Hyperfunctioning nodules are more likely benign, while hypofunctioning nodules are more suspicious for malignancy. The reported risk of cancer is 1% to 4% for a hot nodule and 15% to 25% for a cold nodule. However, since scintigraphy cannot reliably identify malignancy, it is of limited value in routine evaluation of the thyroid nodule. Whole body iodine-123 scanning can be performed as a posttreatment test and can provide information related to the presence of metastatic disease, completeness of surgical resection, and disease recurrence. Whole-body scanning is indicated for follow-up of patients at high or intermediate risk for persistent disease after radioactive iodine therapy. Scintigraphy with Technetium-99m Sestamibi, a parathyroid tissue-localizing agent, is the imaging modality of choice for the initial localization of parathyroid lesions.

### Fine-Needle Aspiration

Fine-needle aspiration (FNA) is the preferred tissue sampling method for initial evaluation of neck masses or thyroid nodules. FNA may be performed using either manual palpation techniques or under image guidance. Systematic review of FNA cytology from all head and neck sites, including pooled analysis of over 2,700 specimens, reported sensitivity, specificity, and accuracy levels of 89.5%, 98.5%, and 95.1%, respectively. Addition of US guidance to FNA yields increased sensitivity, specificity, and accuracy, while decreasing nondiagnostic sampling rates by approximately 50%. Multiple studies have suggested that the use of on-site adequacy assessment by cytopathologists improves the diagnostic yield of US-guided FNA. However, recent evidence suggests FNA in the office setting under US guidance by surgeons with experience in US techniques may afford comparable results in terms of diagnostic yield and accuracy.

Thyroid nodules detected by US should be selectively sampled via FNA on the basis of size and the presence of suspicious findings on US. Current guidelines mandate FNA of lesions ≥ 1 to 1.5 cm. Concerning findings on US include the following: microcalcifications, hypoechoic nodules, irregular or lobulated margins, intranodal vascularity, lymphadenopathy, or disruptions in the fascial sheath suggestive of extrathyroidal extension; FNA may be deferred at the physician’s discretion if the nodule is purely cystic with no solid elements on US. A multicenter study of 849 nodules revealed the following prognostic value for malignancy of sonographic criteria: hypoechoogenicity...
(sensitivity = 87%; PPV = 61%); shape (sensitivity = 40%; PPV = 78%); spiculation (sensitivity = 49%; PPV = 82%); and microcalcification (sensitivity = 44%; PPV = 78%). An oft-overlooked step is the submission of accompanying clinical information that can assist the cytopathologist in interpretation of findings and reduce the rate of nondiagnostic findings. The National Cancer Institute (NCI) guidelines mandate that office-based thyroid FNA specimens be submitted with the data listed in Table 2.4.58

**DIRECTED LABORATORY STUDIES**

Routine laboratories include a complete metabolic panel (CMP) and complete blood cell count (CBC) for all patients undergoing workup for suspected head and neck cancer. Head and neck cancer patients are frequently anemic; thus documentation of CBC is important in the pretreatment period and should be periodically followed throughout treatment. Coagulation studies are indicated in anticipation of surgical intervention. Heavy alcohol use and malnutrition are relatively prevalent among patients with head and neck cancer. Assessment of nutritional markers such as albumin, prealbumin, and Fe studies may help identify at-risk patients and allows for pretreatment nutrition optimization planning.59 Baseline thyroid function tests should be obtained prior to initiation of treatment. Liver function tests are sometimes used as part screening workup for metastatic disease, but have very poor PPV when used for screening purposes. In patients with suspected nasopharyngeal carcinoma, antibody titers against Epstein-Barr virus antigens may be useful as an accessory diagnostic test.60

**DELIVERING DIFFICULT MESSAGES TO PATIENTS AND FAMILIES**

A key element of the initial interaction with head and neck cancer patients is how the clinician addresses the fears and concerns of patients and their families. Although the physician may desire to defer discussion of diagnosis and possible treatment until after workup is complete and a firm diagnosis is determined, this is often not possible. Patients will often arrive having already received a diagnosis of cancer or may strongly suspect such a diagnosis. Moreover, a significant proportion of patients have previously been afflicted with a head and neck cancer. Thus, the process of dealing with the possibility (or certainty) of a cancer diagnosis generally begins during the initial interaction with the patient. The potential consequences of the manner in which critical prognostic information is communicated to patients and families has a demonstrable impact on long-term patient outcomes.62 A recent systematic review found that poor caregiver performance in terms of delivering bad news to cancer patients results in increased stress and anxiety levels, more severe adjustment difficulties, and worse overall disease outcomes.63 Dunn has characterized the delivery of bad news to patients and families regarding head and neck disease as an invasive procedure,64 regarding which clinicians should employ the same level of care and concern for adverse impact as they would use for other invasive interventions.

For patients who ultimately receive a diagnosis of the cancer, the impact of receiving such news is determined not just by the exchange in which they are specifically informed of their diagnosis and prognosis, but in the context of their overall relationship and experience with the cancer caregiver. Schaep desribes patients’ experience of learning and accepting a cancer diagnosis as a clinical process that may unfold over the course of multiple clinical interactions starting with first impressions of the caregiver and culminating in a realization event for the patient.65 Initial assessment and evaluation is the key initial step in the process that plays a determinative role in shaping patient experience, irrespective of whether a specific diagnosis is explicitly delivered at that time. Loge and colleagues assessed factors determining patients’ satisfaction regarding disclosure of a cancer diagnosis and found the factor with the most statistical impact to be patient perception that their physician was engaged and personally interested in their care. Perceived level of physician interest was significantly more impactful than the amount of time spent with the physician or whether patients completely understood their diagnosis.66 Using an open-ended interview method, Back and colleagues found that the most important qualities perceived by cancer patients regarding the delivery of cancer diagnoses by providers was recognition and guidance: patients wanted their clinicians to recognize and acknowledge their experiences in receiving such news, to provide specific guidance regarding the next steps in treatment, and to repeatedly move back and forth between these modes as needed by the patient during the course of the clinical encounter.67 Although the delivery of bad news must be calibrated to the needs of the individual patient, common themes have emerged in the literature on delivering cancer diagnoses that should inform the provider’s approach; Baile and colleagues developed the 6-step SPIKES protocol to help caregivers deliver bad news in accordance with evidence-based standards (Table 2.5).68

In communicating the implications of a cancer diagnosis, the clinician should strive to treat the patient with the appropriate

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**TABLE 2.4**  NCI Guidelines Regarding Data Submitted with Thyroid FNA Specimens

| - Comprehensive patient identification information  |
| - Location of the nodule  |
| - History of hypothyroidism, autoimmune thyroiditis, or a positive test for antithyroid antibodies  |
| - History of Graves disease  |
| - History of external radiation therapy  |
| - Personal history of cancer  |
| - Family history of thyroid cancer  |

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**TABLE 2.5**  The SPIKES Protocol for Delivering Bad News to Patients with Cancer

| Step 1: Setting up the interview  |
| Step 2: Assessing the patient’s perceptions  |
| Step 3: Obtaining the patient’s invitation  |
| Step 4: Giving knowledge and information to the patient  |
| Step 5: Addressing the patient’s emotions with empathic responses  |
| Step 6: Strategy and summary  |

cultural sensitivity and an appreciation of the culturally specific manner in which patients and their families may interpret and respond to a cancer diagnosis and how patients from different backgrounds may deal with issues such as pain and quality of life. In non-Western cultures, cancer illness tends to be a more collective experience involving the entire family, and there is accordingly a more inclusive and consensus-oriented approach to receipt of prognostic information and medical decision making. A recent systematic review of published literature on breaking bad news of cancer found that the most significant differences in patient preferences across cultures involved degree of specificity regarding the involvement of family members in delivery of a cancer diagnosis; less than 30% of Asian patients desired detail regarding life expectancy as compared to >60% of non-Asians. In some Asian societies, the diagnosis of cancer has extremely grave culturally specific implications, and patients and their families may be inclined to view a cancer diagnosis as inevitably terminal and thus view treatment measures as futile. It is thus critically important for providers to attempt to incorporate cultural factors in their approach both to communicating diagnostic and prognostic information and to formulating treatment plans.

**PRETREATMENT PLANNING**

Head and neck cancer involves a heterogeneous group of pathologic entities, with wide variation in terms of histopathogenesis, tumor biology, required pretreatment workup, optimal treatment modality, prognosis, and quality-of-life implications. Given this complexity, successful management of this disease process requires a concerted multidisciplinary approach. Comprehensive treatment of head and neck cancer patients involves participation by an array of specialists: head and neck surgeons, radiation oncologists, medical oncologists, neuroradiologists, head and neck pathologists, oral pathologists, endocrinologists, facial plastic and microvascular reconstructive surgeons, oral surgeons, maxillofacial prosthodontists, dental pathologists, speech pathologists, social workers, nutritionists, occupational therapists, nursing coordinators, research coordinators, nurses, and others. Coordinating such interdisciplinary care can be challenging, but is necessary in order to furnish optimal patient care.

In most institutions, weekly head and neck tumor boards have emerged as the institutional structure for coordinating the interdisciplinary care of head and neck cancer patients, and recent studies have examined the impact of multidisciplinary tumor boards on the provision of head and neck cancer care. In addition to providing a structured, regular mechanism for interdisciplinary collaboration, tumor boards also provide a forum for reevaluation of outside radiology and pathology findings. A prospective study evaluated 120 consecutive patients presented at a multidisciplinary head and neck tumor board and compared “preconference” and “postconference” diagnosis, stage, and treatment plans. The diagnosis, stage, or treatment was changed in approximately one out of every four patients reviewed. Of these patients, 68% (roughly 18% of the total study population) had their treatment plan altered.2 In regard to reinterpretation of radiographic studies, a retrospective review of 136 patients demonstrated that review of outside imaging studies by dedicated specialists led to changes in findings in 41% of cases; 34% of patients had a change in T, N, and/or M staging. Furthermore, changes in radiographic findings almost always altered treatment decisions and affected prognosis in 95% of patients. A retrospective review of 213 patients with locally advanced head and neck cancer demonstrated that overall survival in patients managed with tumor board recommendations was comparable to that reported in randomized clinical trials.

Multidisciplinary tumor board participation in evaluation and treatment planning is thus now the standard of care for management of head and neck cancer patients in most settings. Evidence from the literature demonstrates multiple benefits from routine engagement of multidisciplinary tumor boards, including improved staging accuracy, greater accordance with clinical practice guidelines, improved communication between providers, enhanced cost-effectiveness of care, shorter time lapse from diagnosis to initiation of treatment, and improved clinician and patient satisfaction.

**CONCLUSIONS**

This chapter outlines the required steps in the initial evaluation of head and neck cancer patients and describes the resources available to the clinician in planning further workup and treatment. However, it must be stressed that there is no such thing as a routine visit for the head and neck cancer patient. The complexity of the pathologic entities involved and the enormity of the potential impact on patients and their families precludes the adoption of a facile approach to evaluation, treatment, or patient interaction. Head and neck conditions have profound effects on patients because, in addition to the specter of cancer, fundamental qualities of life are often affected, including appearance, facial identity, and key functions of living including breathing, eating, and speaking. Undertaking the treatment of patients with head and neck cancer demands that the clinician maintain both vigilance and vigor in providing the best possible care.

**REFERENCES**


