American Head & Neck Society

National Standardized Head & Neck Fellowship Curriculum
Goals & Objectives and Recommended Syllabus

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It is recommended that all Fellows use both the 7th and the 8th Edition of the AJCC Staging systems. In addition, we recommend that they use the current Guidelines of the National Comprehensive Cancer Network (NCCN) (which can be accessed at www.nccn.org.) and American Thyroid association guidelines in discussion and management of cases (https://www.thyroid.org/professionals/ata-professional-guidelines)

Multi-Disciplinary Oncology – Recommended Reading

Bernier J, et al. Postoperative irradiation with or without concomitant chemotherapy for locally advanced head and neck cancer. N Engl J Med. 2004 May 6;350(19):1945-52.
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Chow LQM, et al. Antitumor Activity of Pembrolizumab in Biomarker-Unselected Patients With Recurrent and/or Metastatic Head and Neck Squamous Cell Carcinoma: Results From the Phase Ib KEYNOTE-012 Expansion Cohort. J Clin Oncol. 2016 Nov 10;34(32):3838-3845.
Pubmed Link

Cooper JS, et al. Long-term follow-up of the RTOG 9501/intergroup phase III trial: postoperative concurrent radiation therapy and chemotherapy in high-risk squamous cell carcinoma of the head and neck. Int J Radiat Oncol Biol Phys. 2012 Dec 1;84(5):1198-205.
Pubmed Link

Gillison ML, et al. Radiotherapy plus cetuximab or cisplatin in human papillomavirus-positive oropharyngeal cancer (NRG Oncology RTOG 1016): a randomised, multicentre, non-inferiority trial. Lancet. 2019 Jan 5;393(10166):40-50.
Pubmed Link

Moskovitz J, Moy J, Ferris RL. Immunotherapy for Head and Neck Squamous Cell Carcinoma. Curr Oncol Rep. 2018 Mar 3;20(2):22.
Pubmed Link

Weber J, et al. Adjuvant Nivolumab versus Ipilimumab in Resected Stage III or IV Melanoma. N Engl J Med. 2017 Nov 9;377(19):1824-1835.
Pubmed Link

Review Articles:

Ferris RL, et al. Nivolumab for Recurrent Squamous-Cell Carcinoma of the Head and Neck. N Engl J Med. 2016 Nov 10;375(19):1856-1867.
Pubmed Link

Cutaneous Malignancies

Goal:	**At the completion of the fellowship experience, the trainee should demonstrate proficiency in the diagnosis, management and appropriate surveillance for patients with melanoma and non-melanoma skin cancer.**
Objective:	**By the end of the fellowship, the fellows can:**

1. List the function of the skin and diagram its histologic anatomy
    A. Outline the different histologic layers and their cellular make-up, especially as it pertains to the development of different types of cutaneous malignancies
2. Perform a thorough oncologic examination of head and neck, with emphasis on the skin and scalp exam as well as the associated at-risk lymphatic basins based on the location of the primary tumor
    A. Perform a relevant sensory and cranial nerve examination based on the location of the tumor
3. Develop a differential diagnosis for pigmented and non-pigmented skin lesions
4. Recognize the risk factors for developing melanoma and non-melanoma skin cancer
5. Identify basic cutaneous histopathology
    A. Recognize the spectrum between normal, dysplastic and invasive skin lesions based on histopathology
    B. Determine what immunohistochemical stains differentiate various skin lesions
6. Describe the typical presentation of different types of skin cancer and recognize signs and symptoms that suggest a more aggressive behavior
7. Stage different cutaneous malignancies accurately based on AJCC classification system
8. Plan a staging work up for malignant skin lesions based on NCCN guidelines
    A. Determine when additional testing such as MRI, temporal bone imaging, chest imaging is indicated
    B. Determine when it is appropriate to consider PET/CT imaging in cutaneous malignancies
    C. Determine when it is appropriate to perform sentinel node biopsy for regional staging of cutaneous malignancies
9. Describe clinical and pathological features that make skin cancers at higher risk for local recurrence or regional metastasis (particularly for basal cell carcinoma and squamous cell carcinoma)
10. Formulate a treatment plan based on the characteristics of the disease and specific needs of the patient
    A. Outline the treatment options: surgical, nonsurgical, palliative
    B. For surgical patients, determine when it is appropriate to consult additional services to assist with management (neuro-otology for aggressive periauricular/auricular lesions and/or those with complete facial paralysis, head and neck reconstructive surgeon, neurosurgery, if skull or skull base involvement is present)
11. Determine the appropriate surgical margins for primary tumor resection, based on stage for:
    A. Malignant melanoma
    B. SCC
    C. BCC

   D. Merkel cell carcinoma
   E. Dermatofibrosarcoma protuberans
   F. Angiosarcoma

12. Cite the principles of Mohs Micrographic surgery as well as its indications and contraindications
13. Describe the indications for sentinel lymph node biopsy and/or elective neck dissection in N0 cutaneous squamous cell carcinoma
14. Determine when sentinel lymph node biopsy is indicated for cutaneous melanoma of the head and neck and Merkel cell carcinoma
15. Recognize when reconstruction is needed following resection of skin cancers
    A. Determine the best option for closure of small defects based on location and relaxed skin tension lines
    B. Outline the options for reconstruction: Allografts, skin grafts, local flaps, regional flaps (submental, supraclavicular, pectoralis, SCM, Occipital, lower island trapezius), and free flaps (ALT, forearm, rectus abdominus, latissimus)
    C. Recognize what defects and scenarios are appropriate for delayed reconstruction
    D. Recognize scalp defects that will require tissue expanders for reconstruction and formulate a plan for utilization of tissue expanders
16. Determine indications for a facial nerve drill-out and/or a lateral temporal bone resection
17. Perform core procedures in surgery on the skin of the head and neck, including design of local flap closures and sentinel lymph node biopsy, as defined by the curriculum, based on the attestation of the program director
18. Cite indications for adjuvant therapy following surgery for non-melanoma cancer, malignant melanoma and Merkel cell carcinoma based on staging, pathologic characteristics and operative findings
19. Summarize the current status of molecular testing of melanoma
20. Recognize common complications of following parotid surgery, neck surgery, and wide skin undermining
21. Plan appropriate course of action for treating surgical complications of skin cancer surgery
22. Analyze clinical findings and radiologic studies appropriately to distinguish surgically resectable from unresectable cutaneous lesions
23. Discuss indications for orbital exenteration in periocular cutaneous malignancies
24. State what non-surgical options are available to treat aggressive cutaneous malignancies
25. Utilize ancillary services such as nutrition and physical therapy appropriately in treatment planning and long term care of skin cancer patients
26. Formulate an evidence-based surveillance program for skin cancer and melanoma survivors based on established guidelines (such as NCCN)
27. Recognize the common signs and symptoms of recurrent disease and plan an appropriate work up
28. Discuss the available options and recommend appropriate systemic therapies, including immunotherapy
29. Recognize incurable diseases and plan appropriate palliative care
30. Describe the indications for a parotidectomy
31. Describe the indications for a neck dissection

32. If the facial nerve is involved and/or sacrificed, describe the options for reconstruction of the upper and lower divisions of the nerve.

Process:	**By the end of fellowship the fellows have participated in a minimum number of skin cancer resection and reconstruction procedures based on the following list:**

1. Wide local excision of facial skin cancers
2. Wide local excision of scalp skin cancers (+/- resection of outer table of calvarium)
3. Sentinel lymph node biopsy
4. Modified radical and/or radical lymphadenectomy
5. Local flap closure of facial skin defects
6. Split thickness skin grafting
7. Full thickness skin grafting
8. Parotidectomy for cutaneous malignancies

Recommended Reading:

Malignant Melanoma

Haydu LE, et al. Minimum Safe Pathologic Excision Margins for Primary Cutaneous Melanomas (1-2 mm in Thickness): Analysis of 2131 Patients Treated at a Single Center. Ann Surg Oncol. 2016 Apr;23(4):1071-81.
Pubmed Link

Angeles CV, Wong SL, Karakousis G. The Landmark Series: Randomized Trials Examining Surgical Margins for Cutaneous Melanoma. Ann Surg Oncol. 2020 Jan;27(1):3-12.
Pubmed Link

Morton DL, et al. Final trial report of sentinel-node biopsy versus nodal observation in melanoma. N Engl J Med. 2014 Feb 13;370(7):599-609.
Pubmed Link

Faries MB, et al. Completion Dissection or Observation for Sentinel-Node Metastasis in Melanoma. N Engl J Med. 2017 Jun 8;376(23):2211-2222.
Pubmed Link
Also in: Neck

Leiter U, et al. Complete lymph node dissection versus no dissection in patients with sentinel lymph node biopsy positive melanoma (DeCOG-SLT): a multicentre, randomised, phase 3 trial. Lancet Oncol. 2016 Jun;17(6):757-767.
Pubmed Link

Schmalbach CE, Bradford C. Completion lymphadenectomy for sentinel lymph node biopsy positive cutaneous head and neck melanoma. Laryngoscope Investig Otolaryngol. 2018 Feb 5;3(1):43-48.
Pubmed Link

Agrawal S, et al. The benefits of adjuvant radiation therapy after therapeutic lymphadenectomy for clinically advanced, high-risk, lymph node-metastatic melanoma. Cancer. 2009 Dec 15;115(24):5836-44.
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Long GV, et al. Adjuvant Dabrafenib plus Trametinib in Stage III BRAF-Mutated Melanoma. N Engl J Med. 2017 Nov 9;377(19):1813-1823.
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Weber J, et al. Adjuvant Nivolumab versus Ipilimumab in Resected Stage III or IV Melanoma. N Engl J Med. 2017 Nov 9;377(19):1824-1835.
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Wolchok JD, et al. Overall Survival with Combined Nivolumab and Ipilimumab in Advanced Melanoma. N Engl J Med. 2017 Oct 5;377(14):1345-1356.
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Amaria, et al. Neoadjuvant Immune Checkpoint Blockade in High-Risk Resectable Melanoma. Nat Med. 2018 Nov;24(11):1649-1654.
Pubmed Link

Andtbacka, et al. Talimogene Laherparepvec Improves Durable Response Rate in Patients With Advanced Melanoma. J Clin Oncol. 2015 Sep 1;33(25):2780-8.
Pubmed Link

Cancer Genome Atlas Network. Genomic Classification of Cutaneous Melanoma. *Cell*. 2015;161(7):1681-1696.
Pubmed Link

Snyder A, Makarov V, Merghoub T, et al. Genetic basis for clinical response to CTLA-4 blockade in melanoma [published correction appears in N Engl J Med. 2018 Nov 29;379(22):2185]. *N Engl J Med*. 2014;371(23):2189-2199.
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Squamous Cell Carcinoma

Phillips TJ, et al. Pathological margins and advanced cutaneous squamous cell carcinoma of the head and neck. J Otolaryngol Head Neck Surg. 2019 Oct 25;48(1):55.
Pubmed Link

Karia PS, et al. Evaluation of American Joint Committee on Cancer, International Union Against Cancer, and Brigham and Women's Hospital tumor staging for cutaneous squamous cell carcinoma. J Clin Oncol. 2014 Feb 1;32(4):327-34.
Pubmed Link

Mooney CP, et al. Sentinel Node Biopsy in 105 High-Risk Cutaneous SCCs of the Head and Neck: Results of a Multicenter Prospective Study. Ann Surg Oncol. 2019 Dec;26(13):4481-4488.
Pubmed Link

Rotman A, et al. Elective neck dissection in metastatic cutaneous squamous cell carcinoma to the parotid gland: A systematic review and meta-analysis. Head Neck. 2019 Apr;41(4):1131-1139.
Pubmed Link

Moore BA, et al. Lymph node metastases from cutaneous squamous cell carcinoma of the head and neck. Laryngoscope. 2005 Sep;115(9):1561-7.
Pubmed Link

Likhacheva A, et al. Definitive and Postoperative Radiation Therapy for Basal and Squamous Cell Cancers of the Skin: Executive Summary of an American Society for Radiation Oncology Clinical Practice Guideline. Pract Radiat Oncol. 2020 Jan-Feb;10(1):8-20.
Pubmed Link

Porceddu SV, et al. Postoperative Concurrent Chemoradiotherapy Versus Postoperative Radiotherapy in High-Risk Cutaneous Squamous Cell Carcinoma of the Head and Neck: The Randomized Phase III TROG 05.01 Trial. J Clin Oncol. 2018 May 1;36(13):1275-1283.
Pubmed Link

Migden MR, et al. PD-1 Blockade with Cemiplimab in Advanced Cutaneous Squamous-Cell Carcinoma. N Engl J Med. 2018 Jul 26;379(4):341-351.
Pubmed Link

Maubec E, et al. Phase II Study of Cetuximab as First-Line Single-Drug Therapy in Patients With Unresectable Squamous Cell Carcinoma of the Skin. J Clin Oncol . 2011 Sep 1;29(25):3419-26.
Pubmed Link

Manyam B, et al. A Multi-Institutional Comparison of Outcomes of Immunosuppressed and Immunocompetent Patients Treated With Surgery and Radiation Therapy for Cutaneous Squamous Cell Carcinoma of the Head and Neck. Cancer. 2017;123:2054-60.
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Merkel Cell Carcinoma

Paulson KG, et al. Merkel Cell Carcinoma: Current US Incidence and Projected Increases Based on Changing Demographics. J Am Acad Dermatol. 2018 Mar;78(3):457-463.
Pubmed Link

Stakaitytė G, et al. Merkel cell polyomavirus: molecular insights into the most recently discovered human tumour virus. Cancers (Basel). 2014 Jun 27;6(3):1267-97.
Pubmed Link

Fields RC, et al. Recurrence and Survival in Patients Undergoing Sentinel Lymph Node Biopsy for Merkel Cell Carcinoma: Analysis of 153 Patients From a Single Institution. Ann Surg Oncol . 2011 Sep;18(9):2529-37.
Pubmed Link

Fields RC, et al. Recurrence after complete resection and selective use of adjuvant therapy for stage I through III Merkel cell carcinoma. Cancer. 2012 Jul 1;118(13):3311-20.
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Lyer JG, et al. Response rates and durability of chemotherapy among 62 patients with metastatic Merkel cell carcinoma. Cancer Medicine 2016; 5(9):2294–2301.
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Kaufman HL, et al. Avelumab in patients with chemotherapy-refractory metastatic Merkel cell carcinoma: a multicentre, single-group, open-label, phase 2 trial. Lancet Oncol. 2016 Oct;17(10):1374-1385.
Pubmed Link

Nghiem PT, et al. PD-1 Blockade with Pembrolizumab in Advanced Merkel-Cell Carcinoma. N Engl J Med. 2016 Jun 30;374(26):2542-52.
Pubmed Link

Topalian SL, et al. Neoadjuvant Nivolumab for Patients With Resectable Merkel Cell Carcinoma in the CheckMate 358 Trial. J Clin Oncol. 2020 Apr 23:JCO2000201.
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Basal Cell Carcinoma

Sekulic A, et al. Efficacy and safety of vismodegib in advanced basal-cell carcinoma. N Engl J Med. 2012 Jun 7;366(23):2171-9.
Pubmed Link

Review Articles

Mile BA, et al. Merkel cell carcinoma: Do you know your guidelines? Head Neck. 2016 May;38(5):647-52. doi: 10.1002/hed.24359. Epub 2015 Dec 30.
Pubmed Link

Ow TJ, Grethlein SJ, Schmalbach CE. Education Committee of the American Head and Neck Society (AHNS). Do you know your guidelines? Diagnosis and management of cutaneous head and neck melanoma. *Head Neck*. 2018;40(5):875-885.
Pubmed Link

Ow TJ,et al. AHNS series – Do you know your guidelines? Diagnosis and management of cutaneous squamous cell carcinoma. Head Neck. 2017;39:1483.
Pubmed Link

Kim JYS, et al. Guidelines of care for the management of basal cell carcinoma. J Am Acad Dermatol. 2018 Mar;78(3):540-559.
Pubmed Link

Epstein EH. Basal cell carcinomas: attack of the hedgehog. Nat Rev Cancer. 2008 Oct;8(10):743-54.
Pubmed Link

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Salivary Gland

Goal:	**At the completion of the fellowship experience, the trainee should demonstrate proficiency in the diagnosis, management and appropriate surveillance for patients with salivary gland cancer.**
Objective:	**By the end of the fellowship, the fellow can:**

1. Define the anatomy and distribution of the major and minor salivary glands
    A. Outline the glandular make-up of the different types of salivary tissue, as well as the anatomy of the fundamental salivary unit
    B. Define the innervation of the different major salivary glands
    C. Describe the anatomy of the parapharyngeal space to include types of tumors are present in the pre-styloid versus post-styloid space
2. Perform a thorough examination of the head and neck, with emphasis on the major salivary glands and surrounding structures
3. Identify the most common locations for the development of salivary gland tumors and recognize examination findings that suggest malignancy
    A. Recognize key relevant cranial nerve findings based on the location of the tumor
    B. Recall signs of primary cutaneous malignancy in patients with carcinomas of the parotid gland that can be metastatic
4. Express the relative distribution of benign versus malignant salivary gland tumors
    A. List the most common malignancies in the parotid, submandibular, sublingual and minor salivary glands as well as the overall most common salivary cancer
5. Outline the risk factors for developing certain salivary tumors (i.e. smoking for Warthin's tumors, Sjogren's disease for lymphoma, etc)
6. Define the difference from the reserve cell theory and multicellular theory of tumor development
7. Recognize the typical presentation of benign and malignant salivary tumors and certain signs and symptoms that might suggest a more aggressive behavior
8. Form a differential diagnosis for neck masses and salivary masses
9. Review the indications and limitations of fine needle aspiration and core needle biopsy for salivary gland masses
10. Plan a staging work up for malignant salivary lesions based on NCCN guidelines
11. Determine the need for additional imaging such as MRI, temporal bone imaging, chest imaging
    A. State when to consider PET/CT
12. Stage different salivary malignancies accurately based on AJCC classification system
13. Formulate a treatment plan based on the characteristics of the disease and specific needs of the patient based on the NCCN guidelines.
    A. For surgical patients, know when it is appropriate to consult additional services to assist with management (neuro-otology for aggressive parotid malignancies and/or those with complete facial paralysis, head and neck reconstructive surgeon, neurosurgery, if skull base involvement is present, maxillofacial prosthodontics, if palate resection is indicated)

14. Describe the indications and extent of dissection for elective lymphadenectomy in clinically node-negative salivary malignancies
15. Summarize the different approaches to identify and preserve the facial nerve during parotidectomy
16. Recognize when reconstruction is needed following resection of salivary gland cancers
    A. Discuss the options for reconstruction: allografts, autografts (fat graft and dermal fat graft), regional muscle/myofascial and fasciocutaneous flaps (Superficial Myoaponeurotic System (SMAS), digastric, submental, supraclavicular, pectoralis, sternocleidomastoid muscle, occipital, lower island trapezius), and free flaps (anterolateral thigh, radial forearm, rectus abdominus, and latissimus)
17. Determine when a facial nerve drill-out and/or a lateral temporal bone resection is indicated
18. Recognize the utility of frozen section and its limitations in salivary gland tumor management
19. Perform core procedures in surgery on the salivary glands as defined by the curriculum, based on the attestation of the program director
20. Define indications for adjuvant therapy following surgery for salivary gland cancer based on staging, pathologic characteristics, operative findings, and the NCCN guidelines
21. Diagram and counsel patients about the current status of molecular testing and potential targeted therapy for salivary gland cancers
22. Recognize and manage common complications following parotid and neck surgery
23. For purposes of preoperative patient counseling:
    A. Describe and discuss relative risks of transient and permanent facial nerve weakness following various extents of parotidectomy and for submandibular gland excision.
    B. Counsel patients regarding additional risks: Frey's syndrome, first bite phenomenon, cutaneous sensory loss, and salivary fistula
24. Plan and execute appropriate course of action for treating surgical complications of salivary procedures, including the range of techniques available for facial reanimation
25. Analyze clinical findings and radiologic studies appropriately to distinguish surgically resectable from unresectable salivary lesions
26. Discuss and select appropriately the existent non-surgical options to treat salivary gland cancers and the different types of radiotherapy modalities that can be used in these lesions
    A. Proton beam radiation for perineural spread and skull base involvement
    B. Neutron beam radiation for adenoid cystic carcinoma and unresectable tumors
    C. Role of chemotherapy in salivary gland cancer in accordance with NCCN guidelines
    D. Role and availability of clinical trials
27. Utilize ancillary services such as nutrition and speech therapy appropriately in treatment planning and long term care of salivary gland cancer patients
28. Formulate an evidence based surveillance program for salivary cancer survivors based on established guidelines (such as those by the NCCN)
29. Recognize the common signs and symptoms of recurrent disease and plan an appropriate work-up algorithm

Process:	**By the end of fellowship the fellows have participated in a minimum number of salivary gland procedures based on the following list:**

1. Parotidectomy
   A. Superficial
   B. Deep/total
2. Submandibular gland excision (can be part of a level 1 neck dissection)
3. Transcervical approach to the parapharyngeal space and infratemporal fossa
4. Transmandibular approach to the infratemporal fossa (if applicable)
5. Modified radical and/or radical lymphadenectomy
6. Parotid bed reconstruction, any technique
7. Primary nerve repair
8. Cable graft nerve repair in facial nerve injuries
9. Sublingual gland excision and excision of ranula

Recommended Reading

Lymph Node Management

Xiao CC, et al. Predictors of Nodal Metastasis in Parotid Malignancies: A National Cancer Data Base Study of 22,653 Patients. Otolaryngol Head Neck Surg. 2016 Jan;154(1):121-30.
Pubmed Link

Armstrong JG, et al. The indications for elective treatment of the neck in cancer of the major salivary glands. Cancer. 1992;69(3):615-9.
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Yoo SH, Roh JL, Kim SO, Cho KJ, Choi SH, Nam SY, Kim SY. Patterns and treatment of neck metastases in patients with salivary gland cancers. J Surg Oncol. 2015;111(8):1000-6.
Pubmed Link

Chisholm EJ, et al. Anatomic distribution of cervical lymph node spread in parotid carcinoma. Head Neck. 2011. 33(4):513-5.
Pubmed Link

Klussmann JP, et al. Patterns of lymph node spread and its influence on outcome in resectable parotid cancer. Eur J Surg Oncol. 2008;34(8):932-7.
Pubmed Link

Wang YL, et al. Predictive index for lymph node management of major salivary gland cancer. Laryngoscope. 2012. 122(7):1497-506.
Pubmed Link

Epidemiology

Ferrell JK, et al. Contemporary treatment patterns and outcomes of salivary gland carcinoma: a National Cancer Database review. Eur Arch Otorhinolaryngol. 2019 Apr;276(4):1135-1146.
Pubmed Link

Bradley PJ, McGurk M. Incidence of salivary gland neoplasms in a defined UK population. *Br J Oral Maxillofac Surg*. 2013;51(5):399-403.
Pubmed Link

Spiro RH. Salivary neoplasms: overview of a 35-year experience with 2,807 patients. Head Neck Surg. 1986 Jan-Feb;8(3):177-84.
Pubmed Link

Management and Surgery

Olsen KD. Tumors and surgery of the parapharyngeal space. Laryngoscope. 1994 May;104(5 Pt 2 Suppl 63):1-28.
Pubmed Link

Weber RS, et al. Submandibular gland tumors. Adverse histologic factors and therapeutic implications. Arch Otolaryngol Head Neck Surg. 1990 Sep;116(9):1055-60.
Pubmed Link

Silver NL, et al. Surgery for Malignant Submandibular Gland Neoplasms. Adv Otorhinolaryngol. 2016;78:104-12.
Pubmed Link

Garden AS, et al. The influence of positive margins and nerve invasion in adenoid cystic carcinoma of the head and neck treated with surgery and radiation. Int J Radiat Oncol Biol Phys. 1995 Jun 15;32(3):619-26.
Pubmed Link

Byrd SA, et al. Predictors of recurrence and survival for head and neck mucoepidermoid carcinoma. Otolaryngol Head Neck Surg. 2013 Sep;149(3):402-8.
Pubmed Link

Review Articles

Douville NJ, Bradford CR. Comparison of ultrasound-guided core biopsy versus fine-needle aspiration biopsy in the evaluation of salivary gland lesions. Head Neck. 2013 Nov;35(11):1657-61.
Pubmed Link

Mantravadi AV, Moore MG, Rassekh CH. AHNS Series: Do You Know Your Guidelines? Diagnosis and Management of Salivary Gland Tumors. Head Neck. 2019 Feb;41(2):269-280.
Pubmed Link

Mehta V, Nathan CA. Extracapsular dissection versus superficial parotidectomy for benign parotid tumors. Laryngoscope. 2015 May;125(5):1039-40.
Pubmed Link

Griffith CC, et al. New Developments in Salivary Gland Pathology: Clinically Useful Ancillary Testing and New Potentially Targetable Molecular Alterations. Arch Pathol Lab Med. 2017 Mar;141(3):381-395.
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Oral Cavity

Goal:	**By the end of fellowship, the fellows have reach proficiency level of knowledge, skills and attitudes in diagnosis, surgical management and surveillance of potentially malignant disorders and malignant oral cavity diseases.**
Objective:	**By the end of the fellowship, the fellows can:**

1. Describe the epidemiology of the oral cavity cancers based on different population and different subsites of the oral cavity.
2. List the major risk factors in development of oral cavity malignancies
3. Perform a thorough oncologic examination of oral cavity and neck
4. Differentiate between benign and malignant lesions of oral cavity
5. Formulate a diagnostic plan for lesions of oral cavity
6. Stage different oral cavity malignancies accurately based on AJCC classification system
7. Plan a staging work up for malignant lesions based on NCCN guidelines
8. Formulate a treatment plan based on the characteristics of the disease and specific needs of the patient
9. Describe the indications for elective neck dissection and sentinel node biopsy in oral cavity malignancies
10. Describe the different types of neck dissection and the difference in technique, structures sacrificed or preserved and levels dissected in elective and therapeutic neck dissections
11. Recognize the indications for addressing the mandible and maxilla in oral cavity lesions
12. Differentiate between lesions which require marginal, segmental or hemi mandibulectomy
13. Formulate an appropriate diagnostic work up to assess the need for segmental vs. marginal vs. hemi mandibulectomy
14. Plan appropriate reconstruction options for oral cavity defects
15. Recognize lesions and defects that might require free tissue transfer reconstruction
16. Perform core procedures in oral cavity as defined by the curriculum, based on the attestation of the program director
17. Recommend appropriate adjuvant radiotherapy based on pathologic characteristics and operative findings
18. Describe the indications for adding chemotherapy to adjuvant radiotherapy in oral cavity malignancies.
19. Recognize common complications of oral cavity procedures
    A. Orocutaneous fistula
    B. Flap failure
    C. Oral dysphagia
    D. Pathologic fractures of mandible
    E. Tethered tongue/dysarthria
    F. Tongue numbness
20. Plan appropriate course of action for treating surgical complications of oral cavity procedures.

21. Utilize ancillary services such as nutrition, physical therapy and speech therapy appropriately in treatment planning and long term care of oral cavity patients
22. Formulate an evidence based surveillance program for oral cavity cancer survivors based on established guidelines (such as NCCN)
23. Recognize the common signs and symptoms of recurrent disease and second primary cancers; plan an appropriate work up plan
24. Analyze clinical findings and radiologic studies appropriately to distinguish surgically resectable from unresectable oral cavity lesions
25. Discuss the importance of the depth of invasion and the elective neck dissection
26. Describe the different approaches to the oral cavity

Process:	**By the end of fellowship the fellows have participated in a minimum number of oral cavity procedures based on the following list:**

1. Glossectomy
2. Marginal mandibulectomy
3. Segmental mandibulectomy and composite resections
4. Mandibulotomy and mandibulotomy repair
5. Lip resection
6. Maxillectomy
7. Neck dissection for oral cavity procedures
8. Floor of mouth resection
9. Reconstruction of oral cavity defect (skin graft, locoregional flaps, free tissue transfer)

Recommended Reading

Margin management:

Maxwell JH, et al. Early Oral Tongue Squamous Cell Carcinoma: Sampling of Margins From Tumor Bed and Worse Local Control. JAMA Otolaryngol Head Neck Surg. 2015 Dec;141(12):1104-10.
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Zanoni DK, et al. A proposal to redefine close surgical margins in squamous cell carcinoma of the oral tongue. JAMA Otolaryngol Head Neck Surg. 2017 Jun 1;143(6):555-560.
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Management of the neck:

Medina JE, Byers RM. Supraomohyoid neck dissection: Rationale, indications, and surgical technique. Head Neck. 1989 Mar-Apr;11(2):111-22.
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Shah JP, Candela FC, Poddar AK. The patterns of cervical lymph node metastases from squamous carcinoma of the oral cavity. Cancer, 66(1), 109–113.

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Huang SH, et al. Predictive value of tumor thickness for cervical lymph-node involvement in squamous cell carcinoma of the oral cavity. Cancer. 2009 Apr 1;115(7):1489-97.
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Civantos FJ, et al. Sentinel lymph node biopsy accurately stages the regional lymph nodes for T1-T2 oral squamous cell carcinomas: results of a prospective multi-institutional trial. J Clin Oncol. 2010 Mar 10;28(8):1395-400.
Pubmed Link

Schilling C, et al. Sentinel European Node Trial (SENT): 3-year results of sentinel node biopsy in oral cancer. Eur J Cancer. 2015 Dec;51(18):2777-84.
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D'Cruz AK, et al. Elective versus therapeutic neck dissection in node-negative oral cancer. N Engl J Med. 2015 Aug 6;373(6):521-9.
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Ho AS, et al. Metastatic Lymph Node Burden and Survival in Oral Cavity Cancer. J Clin Oncol. 2017 Nov 1;35(31):3601-3609.
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Management of the mandible:

Barttelbort SW, Ariyan S. Mandible preservation with oral cavity carcinoma: rim mandibulectomy versus sagittal mandibulectomy. Am J Surg. 1993 Oct;166(4):411-5.
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Shaw RJ, et al. The influence of the pattern of mandibular invasion on recurrence and survival in oral squamous cell carcinoma. Head Neck. 2004 Oct;26(10):861-9.
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Specific sites:

Bilkay U, et al. Management of lower lip cancer: a retrospective analysis of 118 patients and review of the literature. Ann Plast Surg. 2003 Jan;50(1):43-50.
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Camilon PR, et al. Does Buccal Cancer Have Worse Prognosis Than Other Oral Cavity Cancers? Laryngoscope. 2014 Jun;124(6):1386-91.
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Givi B, et al. Impact of elective neck dissection on the outcome of oral squamous cell carcinomas arising in the maxillary alveolus and hard palate. Head Neck. 2016 Apr;38 Suppl 1:E1688-94.
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Fagan JJ, et al. Perineural invasion in squamous cell carcinoma of the head and neck. Arch Otolaryngol Head Neck Surg. 1998 Jun;124(6):637-40.
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Adjuvant Therapy:

Ebrahimi A, et al. Depth of invasion alone as an indication for postoperative radiotherapy in small oral squamous cell carcinomas: An International Collaborative Study. Head Neck. 2019 Jun;41(6):1935-1942.
Pubmed Link

Fridman E, et al. The role of adjuvant treatment in early-stage oral cavity squamous cell carcinoma: An international collaborative study. Cancer. 2018 Jul 15;124(14):2948-2955.
Pubmed Link

Bernier J, et al. Postoperative irradiation with or without concomitant chemotherapy for locally advanced head and neck cancer. N Engl J Med. 2004 May 6;350(19):1945-52.
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Cooper JS, et al. Long-term follow-up of the RTOG 9501/intergroup phase III trial: postoperative concurrent radiation therapy and chemotherapy in high-risk squamous cell carcinoma of the head and neck. Int J Radiat Oncol Biol Phys. 2012 Dec 1;84(5):1198-205.
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Premalignant lesions:

Iocca O, et al. Potentially malignant disorders of the oral cavity and oral dysplasia: A systematic review and meta-analysis of malignant transformation rate by subtype. Head Neck. 2020 Mar;42(3):539-555. Pubmed Link

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Nasopharynx

Goal:	**By the end of the fellowship the trainees are proficient in diagnosis, principles of treatment, surveillance and management of complications of nasopharynx cancers.**
Objectives:	**By the end of the fellowship, the trainee will be able to:**

1. Describe the epidemiology of the nasopharyngeal cancer and discuss the role of EBV.
2. Identify high risk population for nasopharyngeal carcinoma.
3. Recognize signs and symptoms of early stage and advanced stage nasopharyngeal cancer.
4. Formulate a diagnostic plan for diagnosis of suspected nasopharynx lesion:
    a. Perform in office flexible nasopharyngoscopy.
    b. Recognize suspicious lesion and recommend biopsy (in office or operative) in appropriate cases.
    c. Formulate a comprehensive plan for assessment of cervical lymphadenopathy that include investigation of nasopharynx.
5. Recommend an appropriate, evidence based staging plan for newly diagnosed disease.
    a. Recommend MRI in appropriate cases
    b. Recommend PET Scan in appropriate cases
6. Stage nasopharyngeal disease based on the current AJCC staging system.
7. Recommend evidence based course of treatment based on the stage and current guidelines (NCCN)
8. Formulate a comprehensive plan for surveillance of nasopharyngeal cancers.
    a. Discuss the role of EBV titers in surveillance.
9. Recognize common complications of treatment and formulate an appropriate investigative and therapeutic plan:
    a. Osteoradionecrosis
    b. Eustachian tube dysfunction
    c. Hypothyroidism
10. Recognize suspicious signs of recurrence and formulate an appropriate plan for confirmation or ruling out of recurrence. Specifically discuss the role of:
    a. Advanced imaging (MRI, PET)
    b. Biopsy
11. Identify cases that could benefit from salvage surgery
12. Discuss findings of very advanced, surgically non-curable recurrent disease in imaging.

Recommended Reading (** *indicates mandatory; others are recommended)*

Bimodality Treatment

Al-Sarraf M, et al. Chemoradiotherapy versus radiotherapy in patients with advanced nasopharyngeal cancer: phase III randomized Intergroup study 0099. J Clin Oncol. 1998 Apr;16(4):1310-7.
Pubmed Link

Wee J, et al. Randomized trial of radiotherapy versus concurrent chemoradiotherapy followed by adjuvant chemotherapy in patients with American Joint Committee on Cancer/International Union against cancer stage III and IV nasopharyngeal cancer of the endemic variety. J Clin Oncol. 2005 Sep 20;23(27):6730-8.
Pubmed Link

Screening and Surveillance

Chan KCA, et al. Analysis of Plasma Epstein-Barr Virus DNA to Screen for Nasopharyngeal Cancer. N Engl J Med. 2017 Aug 10;377(6):513-522.
Pubmed Link

Lin, JC, et al. Quantification of plasma Epstein-Barr virus DNA in patients with advanced nasopharyngeal carcinoma. N Engl J Med. 2004 Jun 10;350(24):2461-70.
Pubmed Link

Recurrence and Surgical Salvage

Chan JY. Surgical management of recurrent nasopharyngeal carcinoma. *Oral Oncol.* 2014;50(10):913-917.
Pubmed Link.

Hao, SP, et al. Salvage surgery for recurrent nasopharyngeal carcinoma. Arch Otolaryngol Head Neck Surg. 2002;128:63-67.
Pubmed Link

Leong YH, Soon YY, Lee KM, Wong LC, Tham IWK, Ho FCH. Long-term outcomes after reirradiation in nasopharyngeal carcinoma with intensity-modulated radiotherapy: A meta-analysis. *Head Neck.* 2018;40(3):622-631.
Pubmed Link.

Wei WI, et al. Surgical salvage of persistent or recurrent nasopharyngeal carcinoma with maxillary swing approach - Critical appraisal after 2 decades. Head Neck. 2011 Jul;33(7):969-75.
Pubmed Link

You R, Zou X, Hua YJ, et al. Salvage endoscopic nasopharyngectomy is superior to intensity-modulated radiation therapy for local recurrence of selected T1-T3 nasopharyngeal carcinoma – A case-matched comparison. *Radiother Oncol.* 2015;115(3):399-406.
Pubmed Link.

Review Articles

Perri F, Della Vittoria Scarpati G, Caponigro F, et al. Management of recurrent nasopharyngeal carcinoma: current perspectives. *Onco Targets Ther.* 2019;12:1583-1591.
Pubmed Link

Yu-Pei Chen, Chan ATC, Le QT, Blanchar P, Sun Y, Ma J. Nasopharyngeal Carcinoma. Lancet. 2019: 394(10192): Epub.
Pubmed Link

Lee AWM, et al. Management of locally recurrent nasopharyngeal carcinoma. Cancer Treat Rev. 2019 Sep;79:101890.
Pubmed Link

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Oropharynx

Goal:	**By the end of fellowship, the fellows have reach proficiency level of knowledge, skills and attitudes in diagnosis, surgical management and surveillance of oropharynx malignancies.**
Objective:	**By the end of the fellowship, the fellows can:**

1. Describe the epidemiology of oropharynx squamous cell carcinoma.
2. List the major risk factors in development of HPV-positive and HPV-negative squamous cell carcinoma.
3. Describe role of HPV in oropharynx cancer and understand
    A. Risk factors for HPV related cancer
    B. Immunization for HPV
    C. Behaviors that are likely to transmit HPV
4. Compare and contrast the clinical presentation of HPV-positive and HPV-negative squamous cell carcinoma
5. Compare and contrast the relative prognosis for patients with HPV-negative OPC and HPV-positive OPC with or without a history of tobacco abuse
6. Perform a thorough oncologic examination of the oropharynx
7. Differentiate between benign and malignant lesions of oropharynx
8. Formulate a diagnostic plan for evaluation and staging of oropharynx lesions
    A. Understand strategies for managing the unknown primary with suspected oropharynx primary site
9. Stage oropharyngeal tumors based on the most current AJCC staging system for HPV-positive and HPV-negative oropharynx cancer
10. Plan a staging work up for malignant oropharynx cancer based on NCCN guidelines
11. Formulate a treatment plan for various oropharynx malignancies (e.g., HPV+ and HPV- squamous cell carcinoma, mucoepidermoid carcinoma, etc.) based on the characteristics of the disease, staging and by taking into account the specific needs of the patient
    A. Describe transoral approaches to the oropharynx, such as transoral laser microsurgery (TLM) and transoral robotic surgery (TORS)
        1) Describe and list the inside out anatomy required for safe surgery using these approaches
        2) Discuss limitations of each approach:
            a. Tumor factors (e.g., involvement of medial pterygoid or mandible, tumor that would require sacrifice of both lingual arteries, tumor contiguous with neck disease, tumor abutting carotid artery, degree of soft palate involvement, etc.)
            b. Exposure factors (e.g., trismus, OSA, narrow mandible/maxilla, etc.)
            c. Anatomical limitations (e.g., retropharyngeal carotid)
        3) Discuss potential complications of transoral surgery and plan how to manage them
            a. Prevention by ligation of vessels at the time of neck dissection (lingual, facial, superior thyroid)

b. Management of airway in case of acute post-op bleed

12. Discuss management of neck disease in oropharynx cancer
    A. Describe typical patterns of metastasis
    B. Discuss issues in management of advanced neck disease: skin involvement, carotid involvement
    C. Discuss management of retropharyngeal (Rouviere's) nodes
13. Describe the different types of neck dissection and the differences in technique, structures sacrificed or preserved and level dissected
14. Plan appropriate reconstruction for oropharynx defects
15. Recognize lesions and defects that might require free tissue transfer reconstruction
16. Perform core procedures in the oropharynx as defined by the curriculum, based on the attestation of the program director
17. Recommend appropriate evidence-based adjuvant treatments based on pathologic characteristics and operative findings
18. Describe the indications for adding chemotherapy to adjuvant external beam radiation in oropharynx malignancies
19. Utilize ancillary services such as nutrition and speech therapy appropriately in treatment planning and long term care of oropharynx cancer patients
20. Discuss the principles of IMRT for treatment of oropharynx cancer
    a. List the common types of radiation therapy (IMRT, IMPT)
    b. Discuss the typical doses for primary and adjuvant radiation therapy
    c. Describe the common radiated fields: primary tumor bed, ipsilateral and contralateral neck and retropharyngeal nodes
21. List open approaches to the oropharynx, describe potential complications and how to manage them
    A. Mandible split: median and lateral
    B. Transhyoid
    C. Composite resection of retromolar trigone and mandible for tumors that extend to mandible
22. Recognize the indications for addressing the mandible in oropharynx lesions and formulate an appropriate diagnostic work up to assess the need for segmental mandibulectomy
23. Plan appropriate course of action for treating surgical complications of oropharynx procedures (e.g., bleeding, fistula, aspiration, etc.)
24. Describe functional issues that may arise from oropharynx cancer treatment and ways to treat or prevent these
    A. Trismus
    B. Hypernasality and velopharyngeal insufficiency (VPI)
    C. Cricopharyngeus dysfunction/stricture
    D. Late dysphagia and aspiration following primary CRT
25. Describe late complications of primary CRT for treatment of oropharynx cancer
26. Compare and contrast immunohistochemistry (IHC) for p16 with in situ hybridization (ISH) for HPV DNA

27. Compare and contrast cisplatin versus cetuximab with regard to limitations and typical toxicities when used to treat oropharynx cancer
28. Formulate an evidence based surveillance program for oropharynx cancer survivors based on established guidelines (such as NCCN)
29. Recognize the common signs and symptoms of recurrent oropharynx cancer and plan an appropriate work up
30. Discuss and recommend appropriate management of distant metastatic disease for both HPV+ and HPV- oropharynx squamous cell carcinoma.
31. Analyze clinical findings and radiologic studies appropriately to distinguish surgically resectable from unresectable oropharynx lesions
32. Discuss the concept of de-escalation of therapy and the status of ongoing clinical trials to evaluate the safety and efficacy of different de-escalation protocols in management of HPV-positive OPC

Process:	**By the end of fellowship the fellows have participated in a minimum number of oropharynx procedures based on the following list:**

1. Open approaches to oropharynx including mandibulotomy and mandibulotomy repair
2. Transoral approaches for resection of oropharynx malignancies (TLM or TORS)
3. Segmental mandibulectomy and composite resections
4. Neck dissection procedures for oropharynx cancer
5. Reconstruction of oropharynx defects (locoregional flaps, free tissue transfer)

Recommended Reading

HPV Related Landmark Articles

Ang KK, et al. Human papillomavirus and survival of patients with oropharyngeal cancer. N Engl J Med. 2010 Jul 1;363(1):24-35. doi: 10.1056/NEJMoa0912217. Epub 2010 Jun 7.
Pubmed Link

Gillison Ml, et al. Radiotherapy plus cetuximab or cisplatin in human papillomavirus-positive oropharyngeal cancer (NRG Oncology RTOG 1016): a randomised, multicentre, non-inferiority trial. Lancet. 2019 Jan 5;393(10166):40-50.
Pubmed Link

Sinha P, et al. Extracapsular spread and adjuvant therapy in human papillomavirus-related, p16-positive oropharyngeal carcinoma. Cancer. 2012 Jul 15;118(14):3519-30.
Pubmed Link

Maxwell JH, et al. Quality of life in head and neck cancer patients: impact of HPV and primary treatment modality. Laryngoscope. 2014 Jul;124(7):1592-7.
Pubmed Link

Gillison ML, et al. Evidence for a causal association between human papillomavirus and a subset of head and neck cancers. J Natl Cancer Inst. 2000 May 3;92(9):709-20.
Pubmed Link

Xu L, et al. Projected oropharyngeal carcinoma incidence among middle-aged US men. Head Neck. 2019 Sep;41(9):3226-3234
Pubmed Link

Staging and Nodal Management

O'Sullivan B, et al. Development and validation of a staging system for HPV-related oropharyngeal cancer by the International Collaboration on Oropharyngeal cancer Network for Staging (ICON-S): a multicentre cohort study. Lancet Oncol. 2016 Apr;17(4):440-451.
Pubmed Link

Lydiatt WM, et al. Head and Neck cancers-major changes in the American Joint Committee on cancer eighth edition cancer staging manual. CA Cancer J Clin. 2017 Mar;67(2):122-137.
Pubmed Link

Last AS, et al. Risk and Rate of Occult Contralateral Nodal Disease in Surgically Treated Patients With Human Papillomavirus-Related Squamous Cell Carcinoma of the Base of the Tongue. JAMA Otolaryngol Head Neck Surg. 2019 Nov 7;146(1):50-56.
Pubmed Link

Transoral and Robotic Surgery

Weinstein GS, et al. Transoral robotic surgery: radical tonsillectomy. Arch Otolaryngol Head Neck Surg. 2007 Dec;133(12):1220-6.
Pubmed Link

Pollei TR, et al. Analysis of postoperative bleeding and risk factors in transoral surgery of the oropharynx. JAMA Otolaryngol Head Neck Surg. 2013 Nov;139(11):1212-8.
Pubmed Link

Hatten KM, et al. Transoral Robotic Surgery-Assisted Endoscopy With Primary Site Detection and Treatment in Occult Mucosal Primaries. JAMA Otolaryngol Head Neck Surg. 2017 Mar 1;143(3):267-273.
Pubmed Link

Mehta V, et al. A new paradigm for the diagnosis and management of unknown primary tumors of the head and neck: a role for transoral robotic surgery. Laryngoscope. 2013 Jan;123(1):146-51.
Pubmed Link

O'Malley BW, et al. Transoral robotic surgery (TORS) for base of tongue neoplasms. Laryngoscope. 2006 Aug;116(8):1465-72.
Pubmed Link

de Almeida JR, et al. Oncologic Outcomes After Transoral Robotic Surgery: A Multi-institutional Study. JAMA Otolaryngol Head Neck Surg. 2015 Dec;141(12):1043-1051
Pubmed Link

Nichols AC, et al. Radiotherapy versus transoral robotic surgery and neck dissection for oropharyngeal squamous cell carcinoma (ORATOR): an open-label, phase 2, randomised trial. Lancet Oncol. 2019 Oct;20(10):1349-1359.
Pubmed Link

Moore EJ, et al. Transoral robotic surgery for oropharyngeal carcinoma: Surgical margins and oncologic outcomes. Head Neck. 2018 Apr;40(4):747-755.
Pubmed Link

Review Articles

Galloway TJ, Ridge JA. Management of Squamous Cancer Metastatic to Cervical Nodes With an Unknown Primary Site. J Clin Oncol. 2015 Oct 10;33(29):3328-37.
Pubmed Link

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Larynx

Goal:	**By the end of fellowship, the fellow should be proficient in the diagnosis, management and surveillance of patients with cancer of the larynx.**
Objective:	**By the end of the fellowship, the fellow can:**

1. Define the anatomic subsites of the larynx and the associated tumor characteristics to include metastatic spread, at risk nodal basins, and disease free/overall survival rates
2. Describe the epidemiology of laryngeal squamous cell carcinoma
3. Perform an appropriate history for a patient presenting with throat complaints such as dysphagia, throat pain or otalgia, dysphonia, and/or dyspnea
4. Perform a thorough oncologic examination of the larynx – via flexible nasolaryngoscope with and without stroboscopy, and operative endoscopy
5. Formulate a diagnostic plan for benign and malignant lesions of the larynx
6. Plan a staging work up for malignant laryngeal lesions based on NCCN guidelines
7. Stage laryngeal malignancies accurately based on AJCC classification system
8. Formulate a treatment plan based on the characteristics of the disease and specific needs of the patient
    A. Describe the different open partial laryngectomy procedures and what tumor and patient characteristics would impact this decision (prior therapy, underlying lung disease, tumor extent, prior surgery, etc)
    B. Describe the different endoscopic approaches to laryngeal tumors (Transoral laser microsurgery, including fundamentals of laser surgery/laser safety, Transoral robotic surgery)
    C. Discuss and compare the oncologic outcomes of surgical versus non-surgical treatment approaches for both early and advanced laryngeal malignancies
9. Discuss and compare the functional outcomes of surgical versus non-surgical treatment approaches for both early and advanced laryngeal malignancies
10. Recognize the patterns of spread of laryngeal tumors and the implications on surgical treatment planning (including lymphatic drainage and regional metastatic potential for the various subsites and degrees of tumor progression)
11. Describe the rationale for upfront total laryngectomy versus organ preservation approaches for treatment of stage III/IV advanced laryngeal cancer
12. Interpret clinical findings and radiologic studies appropriately to distinguish surgically resectable from unresectable laryngeal lesions
13. Recommend an appropriate surgical approach, when applicable, for excision of laryngeal tumors
    A. Intraoperative airway management options
    B. Postoperative airway plan
14. Plan appropriate reconstruction for laryngeal resection defects including those that require vascularized regional or free tissue transfer reconstruction
15. List the options for voice rehabilitation following total laryngectomy

16. Perform core procedures in larynx as defined by the curriculum, based on the attestation of the program director
17. Recommend appropriate adjuvant treatments based on pathologic characteristics and operative findings
18. Recognize common complications of laryngeal procedures
19. Plan appropriate course of action for treating surgical complications of laryngeal surgery, including salivary fistula management, airway considerations, and swallowing dysfunction
20. Utilize ancillary services such as nutrition and speech therapy appropriately in treatment planning and long term care of laryngeal cancer patients
21. Formulate an evidence based surveillance program for laryngeal cancer survivors based on established guidelines (such as NCCN)
22. Recognize the common signs and symptoms of recurrent disease and plan an appropriate work up
23. Describe the reconstructive options of the pharynx following total laryngectomy, partial or total pharyngectomy

Process:	**By the end of fellowship, the fellows have participated in a minimum number of laryngeal subsite procedures based on the following list:**

Open Procedures:

1. Partial laryngectomies
   A. Open: vertical hemilaryngectomy, supraglottic laryngectomy, supracricoid laryngectomy)
   B. Transoral: Robotic; laser
2. Total laryngectomy with or without partial pharyngectomy
3. Total laryngopharyngectomy
4. Total laryngectomy with total glossectomy
5. Neck dissection for laryngeal tumors
6. Direct laryngoscopy with biopsy
7. Tracheoesophageal puncture procedure with or without cricopharyngeal myotomy
8. Zenker's diverticulum repair (endoscopic; open).
9. Endoscopic Zenker's diverticulum repair

Recommended Reading

Surgery

Ambrosch P, Kron M, Steiner W. Carbon dioxide laser microsurgery for early supraglottic carcinoma. Ann Otol Rhinol Laryngol. 1998 Aug;107(8):680–8. Pubmed Link

Hinni ML, Salassa JR, Grant DG, Pearson BW, Hayden RE, Martin A, Christiansen H, Haughey BH, Nussenbaum B, Steiner W. Transoral laser microsurgery for advanced laryngeal cancer. Arch Otolaryngol Head Neck Surg. 2007 Dec;133(12):1198-204. Pubmed Link

Sandulache VC, Vandelaar LJ, Skinner HD, Cata J, Hutcheson K, Fuller CD, Phan J, Siddiqui Z, Lai SY, Weber RS, Zafereo ME. Salvage total laryngectomy after external-beam radiotherapy: A 20-year experience. Head Neck. 2016 Apr;38 Suppl 1:E1962-8. doi: 10.1002/hed.24355. Epub 2016 Feb 16. Pubmed Link

Sessions DG, Lenox J, Spector GJ. Supraglottic laryngeal cancer: analysis of treatment results. Laryngoscope. 2005 Aug;115(8):1402-10. Pubmed Link

Sperry SM, Rassekh CH, Laccourreye O, Weinsten GS. Supracricoid laryngectomy for primary and recurrent laryngeal cancer. JAMA Otolaryngol Head Neck Surg. 2013 Nov;139(11): 1226-35. Pubmed Link

Steiner W. Results of curative laser microsurgery of laryngeal carcinomas. Am J Otolaryngol. 1993 Mar-Apr;14(2):116-21. Pubmed Link

Weber RS, Berkey BA, Forastiere AA, et al. Outcome of salvage total laryngectomy following organ preservation therapy: the Radiation Therapy Oncology Group trial 91-11. Arch Otolaryngol Head Neck Surg. 2003 Jan;129(1):44-9. Pubmed Link

Patel UA, Moore BA, Wax M, Rosenthal E, Sweeny L, Militsakh ON, Califano JA, Lin AC, Hasney CP, Butcher RB, Flohr J, Arnaoutakis D, Huddle M, Richmon JD. Impact of pharyngeal closure technique on fistula after salvage laryngectomy. JAMA Otolaryngol Head Neck Surg. 2013 Nov;139(11):1156-62. Pubmed Link

Chemoradiation

Forastiere AA, Goepfert H, Maor M, et al. Concurrent chemotherapy and radiotherapy for organ preservation in advanced laryngeal cancer. N Engl J Med. 2003 Nov 27;349(22):2091-8. Pubmed Link

Wolf G, Hong K, Fisher S, et al. Induction chemotherapy plus radiation compared with surgery plus radiation in patients with advanced laryngeal cancer: the Department of Veterans Affairs Laryngeal Cancer Study Group. N Engl J Med.1991;324:1685-1690. Pubmed Link

Miscellaneous

Birkeland AC, Rosko AJ, Issa MR, Shuman AG, Prince ME, Wolf GT, Bradford CR, McHugh JB, Brenner JC, Spector ME. Occult Nodal Disease Prevalence and Distribution in Recurrent Laryngeal Cancer Requiring Salvage Laryngectomy. Otolaryngol Head Neck Surg. 2016 Mar;154(3):473-9. Pubmed Link
Also in: Neck

Gourin CG, Conger BT, Sheils WC, Bilodeau PA, Coleman TA, Porubsky ES. The Effect of Treatment on Survival in Patients with Advanced Laryngeal Carcinoma. The Laryngoscope 2009;119:1312-7. Pubmed Link

Hoffman HT, Porter K, Karnell LH, et al. Laryngeal cancer in the United States: changes in demographics, patterns of care, and survival. Laryngoscope. 2006 Sep;116(9 Pt 2 Suppl 111):1-13. Pubmed Link

Review Articles

Yoo J, Lacchetti C, et al. Role of endolaryngeal surgery (with or without laser) versus radiotherapy in the management of early (T1) glottic cancer: A systematic review. Head Neck. 2013; 36(12):1807-1819. Pubmed Link

American Society of Clinical Oncology clinical practice guideline for the use of larynx-preservation strategies in the treatment of laryngeal cancer. J Clin Oncol. 2006 Aug 1;24(22):3693-704. Pubmed Link

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Tracheal Disease

Goal:	**At the completion of the fellowship experience, the trainee should demonstrate proficiency in the diagnosis and management for patients with tracheal neoplasms or stenosis.**
Objective:	**By the end of the fellowship, the fellow can:**

1. Describe the anatomy of the cervical and thoracic trachea and immediately surrounding structures
    A. Outline the blood supply of the trachea
    B. Identify the relative location of surrounding structures including the recurrent laryngeal nerves, the cervical and thoracic esophagus, the innominate artery, the thyroid gland, and larynx
2. Recognize the typical presentation history of different tracheal pathologies and aspects that are important in their history
    A. History of prior intubation or tracheostomy
    B. History of systemic inflammatory or autoimmune disease
    C. Recognize the importance of any smoking history or history of prior thyroid cancer diagnosis
3. Develop a differential diagnosis for stenosis of the trachea and subglottis
4. Develop a differential diagnosis for a tracheal tumor
    A. List the most common benign tumors.
    B. List the most common malignant tumors.
5. Describe the appropriate initial office evaluation of tracheal pathology
6. Formulate an appropriate plan for imaging and laboratory work up for patients with tracheal pathology
7. Analyze clinical findings and radiologic studies appropriately to distinguish surgically resectable from unresectable tracheal lesions and to develop a treatment plan for benign tracheal diseases
8. Stage tracheal tumors accurately based on TNM staging system for tracheal malignancies
9. Outline indications for when to consult additional services including thoracic surgery, pulmonology, rheumatology, and radiation or medical oncology
10. Outline a plan for airway management in individuals who may require a diagnostic bronchoscopy and/or surgical intervention of the trachea
    A. Describe the indications for jet ventilation and its contraindication.
    B. Describe intermittent apnea use in appropriate cases.
    C. Describe the potential advantages and disadvantages of tracheostomy in patients with tracheal pathology
11. Outline options for surgical management of:
    A. Narrow segment tracheal stenosis
        i. Options for endoscopic management
            1. Utilized appropraite adjuncts at the time of dilation (steroid injection, cryotherapy, mitomycin C)
            2. Describe and plan appropriate cautuions during use of CO2 laser.
        ii. Compare advantages of dilation versus segmental resection and repair

B. Long segment tracheal stenosis
C. Cervical tracheal tumors
D. Thoracic tracheal tumors
E. Thyroid tumors invading into the trachea
    i. Discuss indications for laryngectomy versus tracheal resection and reconstruction

12. Describe the basis fundamentals of tracheal surgery
    A. Dissection techniques to avoid disruption of vascularity
    B. Techniques to minimize stenosis following segmental tracheal resection and re-anastomosis
    C. Options for mobilization of the trachea
        i. Anterior tracheal dissection
        ii. Suprahyoid release
        iii. Infrahyoid release
        iv. Release of the inferior pulmonary ligament
        v. Bronchial re-implantation
13. List and describe the different types of tracheal stents, tracheostomy tube options, and T-tubes that can be used as well as their indications and advantages and disadvantages
14. Formulate an appropriate plan for peri-operative management following a segmental tracheal repair
    A. Use of Grillo sutures
    B. Nasogastric tube to minimize laryngeal elevation with swallowing
    C. Voice rest
15. Perform core procedures in surgery on the trachea, including open tracheostomy and rigid and flexible bronchoscopy, including removal of an airway foreign body
16. Recognize common complications of following tracheal surgery and describe how to manage:
    A. Tracheostomy tube dislodgement or occlusion
    B. Low volume hemoptysis
    C. High volume hemoptysis
    D. Tracheal granulation tissue
    E. Recurrent tracheal stenosis
17. Plan appropriate course of action for treating surgical complications of tracheal surgery.
18. State what non-surgical options there are to treat inflammatory tracheal lesions as well as tracheal malignancies
19. Recognize the common signs and symptoms of recurrent disease and plan an appropriate work up plan.

Process:	**By the end of fellowship, the fellows have participated in a minimum number of tracheal procedures based on the following list:**

1. Rigid bronchoscopy with or without biopsy or foreign body removal
2. Flexible bronchoscopy
3. Open tracheostomy
4. Tracheal resection and re-anastomosis

Recommended Reading

Tracheal Neoplasms

Bhattacharyya, N. Contemporary staging and prognosis for primary tracheal malignancies: a population-based analysis. Otolaryngol Head Neck Surg. 2004;131(5):639-642. Pubmed Link

Gaissert HA, Grillo HC, Shadmehr BM, Wright CD, Gokhale M, Wain JC, Mathisen DJ. Laryngotracheoplastic resection for primary tumors of the proximal airway. J Thorac Cardiovasc Surg. 2005;129(5):1006-9. Pubmed Link

Gaissert HA, Grillo HC, Shadmehr MB, Wright CD, Gokhale M, Wain JC Mathisen DJ. Uncommon primary tracheal tumors. Ann Thorac Surg. 2006;82(1):268-272. Pubmed Link

Grillo HC, Mathisen DJ. Primary tracheal tumors: Treatment and results. Ann Thoracic. 1990 Surgery;49:69-77. Pubmed Link

Moziak DE, Todd TRJ, Keshavjee SH, et al. Adenoid cystic carcinoma of the airway: Thirty-two year experience. J Thoracic Cardiovasc Surg 1996;112:1522-1532. Pubmed Link

Webb BD, Walsh GL, Roberts DB, Sturgis EM. Primary tracheal malignant neoplasms: The University of Texas MD Anderson Cancer Center Experience. J Am Coll Surg. 2006;202(2):237-46. Pubmed Link

Tracheal Stenosis

Ashiku SK, Kuzucu A, Grillo HC, Wright CD, Wain JC, Lo B, Mathisen DJ. Idiopathic laryngotracheal stenosis: Effective definitive treatment with laryngotracheal resection. J Thorac Cardiovasc Surg. 2004;127(1):99-107. Pubmed Link

Gadkaree SK, Pandian V, Best S, Motz KM, Allen C, Kim Y, Akst L, Hillel AT. Laryngotracheal Stenosis: Risk Factors for Tracheostomy Dependence and Dilation Interval. Otolaryngol Head Neck Surg. 2017;156(2):321-8. Pubmed Link

Wang H, Wright CD, Wain JC, Ott HC, Mathisen DJ. Idiopathic Subglottic Stenosis: Factors Affecting Outcome After Single-Stage Repair. Ann Thorac Surg. 2015;100(5):1804-11. Pubmed Link

Tracheal Resection

Auchincloss, HG; Wright, CD. Complications after tracheal resection and reconstruction: prevention and treatment. J Thorac Dis. 2016 Mar;8(Suppl 2):s160-7. Pubmed Link

Bibas BJ, Terra RM, Oliverira AL Jr., Tamagno FL et al: Predictors for Postoperative Complications After Tracheal Resection. Ann Thorac Surg 2014;98:277-82. Pubmed Link

Miscellaneous

Benissan-Messan DZ, Merrit RE, Bazan JG, D'Souza DM, et al. National Utilization of Surgery and Outcomes for Primary Tracheal Cancer in the United States. Ann Thorac Surg. 2020 Apr; doi: 10.1016.

Halum SL, Ting JY, PlowmanEK, Belafsky PC, Harbarger CF, Postma GN, Pitman MJ, LaMonica D, Moscatello A, Khosla S, Cauley CE, Maronian NC, Melki S, Wick C, Sinacori JT, White Z, Younes A, Ekborn DC, Sardesai MG, Merati AL. A multi-institutional analysis of tracheotomy complications. Laryngoscope. 2012;122(1):38-45. Pubmed Link

Honings J, Stephen AE, Marres HA, Gaissert HA. The management of thyroid carcinoma invading the larynx or trachea. Laryngoscope 2010;120(4):682-9. Pubmed Link

Review Articles

Lewis S, Earley M, Rosenfeld R, Silverman J. Systematic review for surgical treatment of adult and adolescent laryngotracheal stenosis. Laryngoscope. 2017;127(1):191-8. Pubmed Link

Gaissert HA, Honings J, Gokhale M. Treatment of tracheal tumors. Semin Thorac Cardiovascular Surg. 2009;21(3):290-5. Pubmed Link

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Hypopharynx

Goal:	**By the end of fellowship, the fellow will reach proficiency in fund of knowledge, as well as skills and attitudes in diagnosis, surgical management and surveillance of malignant hypopharyngeal diseases.**
Objective:	**By the end of the fellowship, the fellow can:**

1. Perform an appropriate history for a patient presenting with throat complaints such as dysphagia, throat pain or otalgia, dysphonia, and/or dyspnea
2. Perform a thorough oncologic examination of the larynx and pharynx via flexible nasolaryngoscope with and without stroboscopy, and operative endoscopy
3. Formulate a diagnostic plan for benign and malignant lesions of the hypopharynx
   A. At the time of endoscopy with biopsy, the fellow should recognize what areas to evaluate specific to the primary tumor and nodal disease (mobility of the larynx to assess for involvement of prevertebral fascia, extension to the cervical esophagus, extension below the level of the thoracic inlet, nodal disease)
   B. Discuss the role of different imaging modalities (i.e. PET/CT scan, MRI with gadolinium, CT scan w/contrast) for treatment planning of hypopharyngeal carcinoma and select the appropriate modality.
4. Plan a staging work-up for malignant hypopharyngeal lesions based on NCCN guidelines
5. Stage hypopharyngeal malignancies accurately based on AJCC classification system
6. Formulate a treatment plan for patients with hypopharyngeal cancer based on the characteristics of the disease and specific needs of the patient
7. Outline the functional outcomes of surgical versus non-surgical treatment approaches for both early and advanced hypopharyngeal malignancies
8. Describe the patterns of spread of hypopharyngeal tumors and the implications on surgical treatment planning (including submucosal spread, skip lesions, lymphatic drainage)
9. Recommend an appropriate surgical approach, when applicable, for excision of hypopharyngeal tumors
10. Discuss the role of transoral robotic surgery in the management of early staged hypopharyngeal carcinoma and recommend TORS in appropriate cases
11. Plan appropriate reconstruction for hypopharyngeal defects including those that require vascularized tissue transfer reconstruction. Select pedicled flaps versus free flaps versus gastric pull-up based on the defect and patient characteristics
12. Perform core procedures in hypopharynx as defined by the curriculum, based on the attestation of the program director
13. Discuss the role of total laryngectomy for both oncologic and functional purposes when planning hypopharyngeal resection
14. Describe the different options for voice rehabilitation following total laryngopharyngectomy (or laryngopharyngoesophagectomy) with reconstruction and how these might differ from patients who had a total laryngectomy alone
15. Recommend appropriate adjuvant treatments based on pathologic characteristics and operative findings

16. Recognize common complications of hypopharyngeal procedures
17. Plan appropriate course of action for treating surgical complications of hypopharyngeal surgery, including salivary fistula and pharyngoesophageal stenosis management
18. Utilize ancillary services such as nutrition and speech therapy appropriately in treatment planning and long term care of hypopharyngeal cancer patients
19. Formulate an evidence based surveillance program for hypopharyngeal cancer survivors based on established guidelines (such as NCCN)
20. Recognize the common signs and symptoms of recurrent disease and plan an appropriate work up
21. Analyze clinical findings and radiologic studies appropriately to distinguish surgically resectable from unresectable hypopharyngeal lesions

Process:	**By the end of fellowship, the fellows have participated in a minimum number of hypopharyngeal subsite procedures based on the following list:**

1. Partial pharyngectomy (lateral pharyngotomy, transhyoid, transoral robotic or TLM approach)
2. Total laryngectomy with partial pharyngectomy
3. Total laryngopharyngectomy
4. Neck dissection for hypopharyngeal tumors

By the end of fellowship, the fellows have familiarity with hypopharyngeal site procedures based on the following list:

1. Hypopharyngeal reconstruction with free or pedicled flaps
2. Cervical esophagectomy or total esophagectomy with gastric pull-up procedure or visceral interposition

Recommended Reading

Chemoradiation

Lefebvre JL, Chevalier D, Luboinski B, et al. Larynx preservation in pyriform sinus cancer: preliminary results of a European Organization for Research and Treatment of Cancer phase III trial. EORTC Head and Neck Cancer Cooperative Group. J Natl Cancer Inst. 1996 Jul 3; 88(13):890-9. Pubmed Link

Lefebvre JL, Andry G, Chevalier D, et al, Laryngeal preservation with induction chemotherapy for hypopharyngeal squamous cell carcinoma: 10-year results of EORTC trial 24891. Ann Oncol. 2012 Oct;23(10):2708-14. Pubmed Link

Garden AS, Morrison WH, Clayman GL, et al. Early squamous cell carcinoma of the hypopharynx: outcomes of treatment with radiation alone to the primary disease. Head Neck. 1996 Jul-Aug. 18(4):317-22. Pubmed Link

Surgery

Harrison DF, Thompson AE. Pharyngolaryngoesophagectomy with pharyngogastric anastomosis for cancer of the hypopharynx: review of 101 operations. Head Neck Surg 1986; 8:418-428. Pubmed Link

Frank JL, Garb JL, Kay S, et al. Postoperative radiotherapy improves survival in squamous cell carcinoma of the hypopharynx. Am J Surg. 1994 Nov. 168(5):476-80. Pubmed Link

Steiner W, Ambrosch P, Hess CF, et al. Organ preservation by transoral laser microsurgery in piriform sinus carcinoma. Otolaryngol Head Neck Surg. 2001 Jan. 124(1):58-67. Pubmed Link

Clark JR, Gilbert R, Irish J, et al. Morbidity after flap reconstruction of hypopharyngeal defects. Laryngoscope 2006; 116: 173–181. Pubmed Link

Miscellaneous

Zelefsky MJ, Kraus DH, Pfister DG, et al. Combined chemotherapy and radiotherapy versus surgery and postoperative radiotherapy for advanced hypopharyngeal cancer. Head Neck. 1996 Sep-Oct. 18(5):405-11. Pubmed Link

Newman JR, Connolly TM, Illing EA, Kilgore ML, Locher JL, Carroll WR. Survival trends in hypopharyngeal cancer: a population-based review. Laryngoscope. 2015 Mar;125(3):624-9. doi: 10.1002/lary.24915. Epub 2014 Sep 15. Pubmed Link

Wilson DD, Crandley EF, Sim A, Stelow EB, Majithia N, Shonka DC Jr, Jameson MJ, Levine PA, Read PW. Prognostic significance of p16 and its relationship with human papillomavirus in pharyngeal squamous cell carcinomas. JAMA Otolaryngology Head Neck Surg. 2014 Jul;140(7):647-53. Pubmed Link

Buckley, J. G. and MacLennan, K. (2000), Cervical node metastases in laryngeal and hypopharyngeal cancer: A prospective analysis of prevalence and distribution. Head Neck, 22: 380–385. Pubmed Link

Takes RP, Strojan P, Silver CE, et al. Current trends in initial management of hypopharyngeal cancer: the declining use of open surgery. Head Neck. 2012 Feb;34(2):270-81. Pubmed Link

Harris BN, Biron VL, Donald P, Farwell DG et al. Primary Surgery vs Chemoradiation Treatment of Advanced-Stage Hyopharyngeal Squamous Cell Carcinoma. JAMA Otolaryngolol Head Neck Surg. 2015; 141(7): 636-40. Pubmed Link

Review Articles

Gourin CG, Terris DJ. Carcinoma of the hypopharynx. Surg Oncol Clin N Am. 2004 Jan;13(1):81-98. Pubmed Link

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Skull Base

Goal:	**At the completion of the fellowship experience, the trainee should demonstrate a fundamental level of knowledge regarding the evaluation and management of patients with neoplasms of the skull base, cranium, and adjacent areas and master basic diagnostic and surgical skills as it relates to the evaluation and management of skull base tumors.**
Objective:	**By the end of the fellowship, the fellows can:**

1. List the risk factors for developing certain sinonasal malignancies and common presenting symptoms of such tumors
2. Describe the biologic behavior of benign sinonasal and skull base lesions
3. Describe the biologic behavior and natural history of malignant sinonasal and skull base neoplasms
4. Perform a comprehensive history and physical examination for a patient with a suspected sinonasal or skull base neoplasm
    A. Elicit history of prior surgery or trauma
    B. Evaluate for loss of cranial nerve function
5. Outline an appropriate plan for additional work-up for skull base lesions including what imaging and/or laboratory tests should be performed
    A. Interpret radiographs to identify anatomical landmarks and develop differential diagnosis
    B. Interpret tests and laboratory studies:
        1) Cerebrospinal fluid
        2) Pituitary function
        3) Visual fields
6. Stage sinonasal tumors accurately based on AJCC classification or other relevant classification systems
7. Develop a treatment algorithm for malignant sinonasal neoplasms
8. Discuss the role of non-surgical therapy as well as adjuvant radiation and chemotherapy
9. Identify key anatomical landmarks of the sinonasal cavity and skull base
10. Identify the neurovascular anatomy of the sinuses, skull base and orbit
11. Describe the anatomy of the scalp layers and reconstructive flaps
12. Describe the sequence of steps for craniofacial resection of the anterior cranial base
13. Describe and discuss the concepts of craniofacial disassembly (osteotomies) for access to the anterior and lateral skull base
14. Compare different approaches to the skull base
15. Recognize the potential need for consulting serves to include neurosurgery, ophthalmology, and neuro-otology in treatment planning
16. Perform core procedures in skull base surgery as defined by the curriculum, based on the attestation of the program director
    A. Demonstrate ability to perform surgical procedures (surgical simulation):

1) External frontal sinusotomy
2) Pericranial scalp flap
3) Temporalis muscle transposition
4) Orbital exenteration
5) Medial maxillectomy (external and endonasal approaches)
6) Nasoseptal flap

17. Provide postoperative care in hospital
    A. Recognize and manage neurological complications
        1) Describe management of postoperative cerebrospinal fluid leak
        2) Identification of signs and symptoms of increased intracranial pressure that could be caused by pneumocephalus and/or intracranial hemorrhage
        3) Perform appropriate diagnostic tests
18. Provide postoperative care in clinic
    A. Remove nasal packing and splints
    B. Debride nasal crusting
    C. Assess for cerebrospinal fluid leak
19. Develop a plan for disease surveillance and survivorship for patients with skull base lesions using established guidelines (such as the NCCN)

Recommended Reading

Sinonasal Undifferentiated Carcinoma

Amit M, Abdelmegiud AS, Watcherporn T, Takahashi H et al. Induction Chemotherapy Response as a Guide for Treatment Optimization in Sinonasal Undifferentiated Carcinoma. J Clin Oncol. 2019; 37(6): 504-512. Pubmed Link

Gamez ME, Lal D, Halyard MY, et al. Outcomes and patterns of failure for sinonasal undifferentiated carcinoma (SNUC): The Mayo Clinic Experience. Head Neck. 2017 Sep; 39(9): 1819-1824. Pubmed Link

Khan MN, Konuthula N, Parasher A, et al. Treatment modalities in sinonasal undifferentiated carcinoma: an analysis from the national cancer database. Int Forum Allergy Rhinol. 2017 Feb; 7(2): 205-210. Pubmed Link

Kuo P, Manes RP, Schwam ZG, et al. Survival Outcomes for Combined Modality Therapy for Sinonasal Undifferentiated Carcinoma. Otolaryngol Head Neck Surg. 2017 Jan; 156(1): 132-136. Pubmend Link

Kuan EC, Arshi A, Mallen-St Clair J, et al. Significance of Tumor Stage in Sinonasal Undifferentiated Carcinoma Survival: A Population-Based Analysis. Otolaryngol Head Neck Surg. 2016 Apr; 154(4): 667-73. Pubmed Link

Morand GB, Anderegg N, Vital D, et al. Outcome by treatment modality in sinonasal undifferentiated carcinoma (SNUC): A case-series, systematic review and meta-analysis. Oral Oncol. 2017 Dec; 75: 28-34. Pubmed Link

Esthesioneuroblastoma

Bell D, Saade R, Roberts D, et al. Prognostic utility of Hyams histological grading and Kadish-Morita staging systems for esthesioneuroblastoma outcomes. Head Neck Pathol. 2015;9(1):51-59. Pubmed Link

Harvey RJ, Nalavenkata S, Sacks R, Adappa ND, Palmer JN, Purkey MT, Schlosser RJ, Snyderman C, Wang EW, Woodworth BA, Smee R, Havas T, Gallagher R. Survival outcomes for stage-matched endoscopic and open resection of olfactory neuroblastoma. Head Neck. 2017 Dec;39(12):2425-2432. Pubmed Link

Komotar RJ, Starke RM, Raper DM, Anand VK, Schwartz TH. Endoscopic endonasal compared with anterior craniofacial and combined cranionasal resection of esthesioneuroblastomas. World Neurosurg 2013; 80:148-159. Pubmed Link

Patel SG, Singh B, Stambuk HE, et al. Craniofacial surgery for esthesioneuroblastoma: report of an international collaborative study. J Neurol Surg B Skull Base. 2012;73(3):208-220. Pubmed Link

Miscellaneous

Carrau RL, Segas J, Nuss DW, et al. Squamous cell carcinoma of the sinonasal tract invading the orbit. Laryngoscope. 1999;109:230-5. Pubmed Link

Ganly I, Patel SG, Singh B, Kraus DH, Bridger PG, Cantu G, Cheesman A, De Sa G, Donald P, Fliss DM, Gullane P, Janecka I, Kamata SE, Kowalski LP, Levine PA, Medina Dos Santos LR, Pradhan S, Schramm V,Snyderman C, Wei WI, Shah JP. Craniofacial resection for malignant paranasal sinus tumors: Report of an International Collaborative Study. Head Neck. 2005 Jul;27(7):575-84. Pubmed Link

Hernberg S, Westerholm P, Schultz-Larsen K, et al. Nasal and sinonasal cancer. Connection with occupational exposures in Denmark, Finland and Sweden. Scand J Work Environ Health. 1983;9:315-26. Pubmed Link

Kassam AB, Thomas A, Carrau R, Snyderman CH, Vescan A, Prevedello D, Mintz A, Gardner P. Endoscopic Reconstruction of the Cranial Base Using Pedicled Nasoseptal Flap. Operative Neurosurgery 2008;63; 44-53. Pubmed Link

Resto, VA, Chan AW, Deschler DG, Lin DT. Extent of surgery in the management of locally advanced sinonasal malignancies. Head Neck 2008;30(2):222-9. Pubmed Link

Reyes C, Mason E, Solares CA, Bush C, Carrau R. To preserve or not to preserve the orbit in paranasal sinus neoplasms: a meta-analysis. J Neurol Surg B Skull Base. 2015;76(2):122-128. Pubmed Link

Warren TA, Nagle CM, Bowman J, Panizza BJ. The natural history and treatment outcomes of perineural spread of malignancy within the head and neck. J Neurol Surg B 2016;77:107-112. Pubmed Link

Review Articles

Lund VJ, Stammberger H, Nicolai P, et al; European Rhinologic Society Advisory Board on Endoscopic Techniques in the Management of Nose, Paranasal Sinus and Skull Base Tumours. European position paper on endoscopic management of tumours of the nose, paranasal sinuses and skull base. Rhinol Suppl. 2010 Jun 1;22:1-143. Pubmed Link

Byrd JK, Clair JM, El-Sayed I. AHNS Series: Do you know your guidelines? Principles for treatment of cancer of the paranasal sinuses: A review of the National Comprehensive Cancer Network guidelines. Head Neck 2018; 40:1889-1896. Pubmed Link

Eloy JA, Setzen M, Liu JK (eds). Sinonasal and ventral skull base malignancies. Otolaryngol Clin North Am. 2017 Apr;50(2):205-504. Pubmed Link

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Head and Neck Paragangliomas

Goal:	**At the completion of the fellowship experience, the trainee should demonstrate proficiency in the evaluation and management of patients with head and neck paragangliomas.**
Objective:	**By the end of the fellowship, the fellow can:**

1. List the most common head and neck paragangliomas and describe the relevant epidemiology of these tumors
2. Discuss the frequency of tumors that are malignant and bilateral
3. Describe the histologic make up of paragangliomas and how to determine if a paraganglioma is benign or malignant
4. Perform a thorough history and physical examination of head and neck
    A. List the risk factors for developing paragangliomas
    B. Elicit aspects of the history that may raise suspicion for a secretory tumor
    C. Perform a detailed family history and identify familial syndromes that may be related to head and neck paragangliomas
    D. Perform a relevant cranial nerve examination based on the location of the tumor
    E. Evaluate for other tumors and/or associated lymphadenopathy
    F. Perform fiberoptic laryngoscopy to assess for vocal fold mobility and laryngeal sensation
5. Choose the appropriate imaging work-up to complete evaluation of the primary tumor and to assess for multifocal tumors
6. Establish an appropriate differential diagnosis for vascular tumors of the head and neck
7. Select the appropriate tests to evaluate candidacy for carotid resection and vascular reconstruction
    A. What is the false negative rate of this test? (10% stroke risk even following a successful balloon occlusion test)
    B. What are options for vascular reconstruction and what additional tests may be needed (saphenous vein mapping)
8. Select the necessary tests to evaluate for secreting tumors in patients with a concerning history
9. Cite the different staging systems used to classify carotid body and jugular foramen/tympanic paragangliomas
10. Formulate a treatment plan based on the characteristics of the disease and specific needs of the patient
    A. What are the treatment options: observation, surgical, external beam radiation, stereotactic radiosurgery, and palliation
    B. For surgical patients, know when it is appropriate to consult additional services to assist with management [neuro-otology for tumors involving the temporal bone or lateral skull base, vascular surgery, neurosurgery (if skull base involvement is present), speech and swallowing therapy]
11. Describe the options for surgical approaches for carotid body, jugular foramen, tympanic, and vagal paragangliomas

12. Discuss points relevant to providing informed consent for such surgeries
13. Determine an appropriate surveillance regimen for individuals being managed with observation and what would be an indication to consider treatment
14. Recall the different genetic syndromes that may be associated with head and neck paragangliomas and when a genetics consult is indicated
    A. What is the frequency of genetic mutations in these tumors?
    B. What is the most common family of genes that are affected in patients with head and neck paragangliomas
15. Recognize the significance of bilateral tumors and how that impacts treatment decision planning and patient counseling
16. Perform core surgical procedures on neck paragangliomas as defined by the curriculum, based on the attestation of the program director
17. Recognize indications for adjuvant therapy following surgery for head and neck paragangliomas based on pathologic characteristics and operative findings
18. Recognize common complications head and neck paraganglioma surgery
19. Plan appropriate course of action for treating surgical complications of head and neck paraganglioma procedures
20. Utilize ancillary services such as speech therapy appropriately in treatment planning and long term care of patients suffering from head and neck paragangliomas
21. Formulate an evidence based surveillance program for head and neck paraganglioma survivors
22. Recognize the common signs and symptoms of recurrent disease and plan an appropriate work up

Process:	**By the end of fellowship the fellows have participated in a minimum number of surgical approaches/procedures based on the following list:**

1. Transcervical approach to the parapharyngeal space and infratemporal fossa
2. Transmandibular approach to the infratemporal fossa
3. Preauricular approach to the jugular foramen (with or without associated mastoidectomy)
4. Resection of head and neck paraganglioma

Recommended reading for head and neck paragangliomas

Surgical Management

Lim JY, Kim J, Kim SH, et al. Surgical treatment of carotid body paragangliomas: outcomes and complications according to the Shamblin classification. Clin Exp Otorhinolaryngol. 2010;3:91-95. Pubmed Link

Linskey ME, Jungreis CA, Yonas H, et al. Stroke risk after abrupt internal carotid artery sacrifice: accuracy of preoperative assessment with balloon test occlusion and stable xenon-enhanced CT. Am J Neuroradiol. 1994;15:829-843. Pubmed Link

Netterville JL, Reilly KM, Robertson D, Reiber ME, Armstrong WB, Childs P. Carotid body tumors: a review of 30 patients with 46 tumors. Laryngoscope. 1995;105:115-126. Pubmed Link

Power AH, Bower TC, Kasperbauer J, et al. Impact of preoperative embolization on outcomes of carotid body tumor resections. J Vasc Surg. 2012;56:979-989. Pubmed Link

Abu-Ghanem S, Yehuda M, Carmel NN, Abergel A, Fliss DM. Impact of preoperarive embolization on the outcomes of carotid body tumor surgery: A meta-analysis and review of the literature. Head Neck 2016 Apr;38 Suppl:E2386-94.

Sniezek, J. C., Netterville, J. L. & Sabri, A. N. Vagal paragangliomas. *Otolaryngol Clin North Am* 2001;**34**, 925-39.

Radiation Therapy

Chun SG, Nedzi LA, Choe KS, et al. A retrospective analysis of tumor volumetric responses to five-fraction stereotactic radiotherapy for paragangliomas of the head and neck (glomus tumors). Stereotact Funct Neurosurg. 2014;92:153-159. Pubmed Link

Hinerman RW, Amdur RJ, Morris CG, Kirwan J, Mendenhall WM. Definitive radiotherapy in the management of paragangliomas arising in the head and neck: a 35-year experience. Head Neck. 2008;30:1431-1438. Pubmed Link

Sugawara Y, Kikuchi T, Ueda T, et al. Usefulness of brain SPECT to evaluate brain tolerance and hemodynamic changes during temporary balloon occlusion test and after permanent carotid occlusion. J Nucl Med. 2002;43:1616-1623. Pubmed Link

Observation

Carlson ML, Sweeney AD, Wanna GB, Netterville JL, Haynes DS. Natural history of glomus jugulare: a review of 16 tumors managed with primary observation. Otolaryngol Head Neck Surg. 2015;152:98-105. Pubmed Link

Langerman A, Athavale SM, Rangarajan SV, Sinard RJ, Netterville JL. Natural history of cervical paragangliomas: outcomes of observation of 43 patients. Arch Otolaryngol Head Neck Surg. 2012;138:341-345. Pubmed Link

Miscellaneous

Gimenez-Roqueplo AP, Dahia PL, Robledo M. An update on the genetics of paraganglioma, pheochromocytoma, and associated hereditary syndromes. Horm Metab Res. 2012;44:328-333. Pubmed Link

Ivan ME, Sughrue ME, Clark AJ, et al. A meta-analysis of tumor control rates and treatment-related morbidity for patients with glomus jugulare tumors. *J Neurosurg*. 2011;114:1299-1305. Pubmed Link

Shamblin WR, ReMine WH, Sheps SG, Harrison EGJ. Carotid body tumor (chemodectoma). Clinicopathologic analysis of ninety cases. Am J Surg. 1971;122:732-739. Pubmed Link

Langerman A, Rangarajan SV, Athavale SM, Pham MQ, Sinard RJ, Netterville JL. Tumors of the cervical sympathetic chain-diagnosis and management. Head Neck. 2013 Jul;35(7):930-3. Pubmed Link

Review Articles

Moore MG, Netterville JL, Mendenhall WM, Isaacson B, Nussenbaum B. Head and neck paragangliomas: an update on evaluation and management. Otolaryngol Head Neck Surg.2016 Apr;154(4):597-605. Pubmed Link

Sager O, Dincoglan F, Beyzadeoglu, M. Stereotactic radiosurgery of glomus jugulare tumors: current concepts, recent advances and future perspectives. CNS Oncol. 2015;4:105-114. Pubmed Link

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Neck

Goal:	**By the end of fellowship, the fellows have reach proficiency level of knowledge, skills and attitudes in diagnosis, surgical management and surveillance of the neck in patients with unknown primary, thyroid, cutaneous, salivary gland and mucosal upper aerodigestive tract malignancies.**
Objective:	**By the end of the fellowship, the fellows can:**

1. Describe the anatomy of the neck echelons using radiological and surgical landmarks
2. Describe the biologic cascade of events involved in the development of a cervical lymph node metastasis
3. Develop an evidence-based algorithm for the management of a neck mass including differential diagnosis, investigations and when a surgical resection for diagnosis may be required
4. Perform a thorough neck examination
5. Stage the neck for unknown primary/oropharynx cancers clinically and pathologically based on the current AJCC classification system
6. Describe nodal staging for other head and neck cancers based on the AJCC classification system
7. Recognize the indications for PET-CT, to include sensitivity and specificity in the assessment of a cancer of unknown primary, and the importance of the timing of the scan
8. Upon performing an excisional lymph node biopsy, develop an algorithm for the use of frozen section pathology and how this might impact the remainder of the procedure
9. Develop a thorough understanding of the incidence of cervical lymph node metastasis by primary tumor site and size
    A. Oral cavity
        1) oral tongue
        2) floor of mouth
        3) maxillary alveolus and hard palate
        4) buccal mucosa
    B. Oropharynx
        1) tonsillar fossa
        2) base of tongue
        3) soft palate
        4) pharyngeal wall
    C. Nasopharynx
    D. Hypopharynx
    E. Larynx
        1) supraglottis
        2) glottis
    F. Major salivary glands
    G. Thyroid
    H. Cutaneous
10. Describe the different types of neck dissection and the difference in technique, structures sacrificed or preserved and level dissected

   A. Selective
   B. Modified Radical
   C. Radical

11. Describe the drainage patterns of different tumors sites to include cutaneous, oral cavity, nasopharynx, oropharynx, hypopharynx, and larynx
12. Recognize when bilateral metastases are a concern and recommend appropriate treatment
13. Recognize when the parotid bed is an at risk nodal basin warranting parotidectomy in conjunction with a formal neck dissection
14. Discuss when a central neck dissection is indicated for thyroid cancer
15. Discuss when a lateral neck dissection is indicated for thyroid cancer and which levels should be dissected and select appropriate neck treatment
16. Describe nodal staging for thyroid cancers based on the AJCC classification system
17. Describe and list the indications for neck dissection and levels of dissections for salivary gland malignancies
18. Describe and list the indications for neck dissection and levels of dissections for non-melanoma cutaneous malignancies of the head and neck (including lip)
19. Develop an understanding of the indications, risks and benefits of sentinel lymph node biopsy and completion lymphadenectomy in the management of head and neck melanoma with specific reference to:
    A. MSLT 1
    B. MSLT 2
20. Describe the current indications for adjuvant treatment based on pathologic nodal staging and operative findings and recommend appropriate adjuvant treatment
21. Recognize neck defects requiring regional and free flap reconstruction
    A. auriculectomy/parotidectomy
    B. radical neck dissection
    C. salvage neck
22. Consent a patient for neck dissection with appropriate recognition of associated risks and complications
23. Recognize and manage common complications of neck dissection
24. Recognize the common signs and symptoms of recurrent regional disease and plan an appropriate work up
25. Analyze clinical findings and radiologic studies appropriately to distinguish surgically resectable from unresectable adenopathy

Process:	**By the end of fellowship the fellows have participated in a minimum number of neck procedures based on the following list:**

1. Open Neck Biopsy
2. Selective Neck Dissection (Supraomohyoid I-III; with and without level IIb)
3. Selective Neck Dissection (Lateral II-IV; with and without level IIb)

4. Selective Neck Dissection (Posterolateral II-V) with dissection of CN XI in the posterior triangle
5. Posterior lateral neck dissection (to include suboccipital and retroauricular nodes)
6. Modified Radical Neck Dissection (Types I, II, III)
7. Radical Neck Dissection (familiarity with sacrifice of CN XI, SCM, IJV)
8. Sentinel Lymph Node Biopsy

Recommended Reading

Oral Cavity

D'Cruz, A. K., Vaish, R., Kapre, N., Dandekar, M., Gupta, S., Hawaldar, R., et al. Elective versus Therapeutic Neck Dissection in Node-Negative Oral Cancer. The New England Journal of Medicine 2015;373(6); 521–529. Pubmed Link
Also in: Oral Cavity

Givi B, Eskander A, Awad MI, Kong Q, Montero PH, Palmer FL, Xu W, De Almeida JR, Lee N, O'Sullivan B, Irish JC, Gilbert R, Ganly I, Patel SG, Goldstein DP, Morris LG. Impact of elective neck dissection on the outcome of oral squamous cell carcinomas arising in the maxillary alveolus and hard palate. Head Neck. 2016 Apr;38 Suppl 1:E1688-94. Pubmed Link

Huang, S. H., Hwang, D., Lockwood, G., Goldstein, D. P., & O'Sullivan,B. (2009). Predictive value of tumor thickness for cervical lymph-node involvement in squamous cell carcinoma of the oral cavity. Cancer, 115(7), 1489–1497. Pubmed Link
Also in: Oral Cavity

Shah JP, Candela FC, Poddar AK. The patterns of cervical lymph node metastases from squamous carcinoma of the oral cavity. Cancer 1990;66(1), 109–113. Pubmed Link
Also in: Oral Cavity

Oropharynx

Mehta V, Johnson P, Tassler A, Kim S, Ferris RL, Nance M, Johnson JT, Duvvuri U. A new paradigm for the diagnosis and management of unknown primary tumors of the head and neck: a role for transoral robotic surgery. Laryngoscope. 2013 Jan;123(1):146-51. Pubmed Link
Also in: Oropharynx

Larynx

Birkeland AC, Rosko AJ, Issa MR, Shuman AG, Prince ME, Wolf GT, et al. Occult Nodal Disease Prevalence and Distribution in Recurrent Laryngeal Cancer Requiring Salvage Laryngectomy. Otolaryngol Head Neck Surg. 2016;154:473-9. Pubmed Link
Also in: Larynx

Cutaneous

Durham AB, Lowe L, Malloy KM. Sentinel Lymph Node Biopsy for Cutaneous Squamous Cell Carcinoma on the Head and Neck. JAMA Otolaryngol Head Neck Surg 2016;142 (12): 1171-76. Pubmed Link
Also in: Cutaneous

Faries MB, et al. Completion Dissection or Observation for Sentinel-Node Metastasis in Melanoma. N Engl J Med. 2017 Jun 8;376(23):2211-2222. Pubmed Link

Also in: Cutaneous

Morton DL, Thompson JF, Cochran AJ, Mozzillo N, Nieweg OE, Roses DF, Hoekstra HJ, Karakousis CP, Puleo CA, Coventry BJ, Kashani-Sabet M, Smithers BM, Paul E, Kraybill WG, McKinnon JG, Wang HJ, Elashoff R, Faries MB; MSLT Group. Final trial report of sentinel-node biopsy versus nodal observation in melanoma. N Engl J Med. 2014 Feb 13;370(7):599-609. Pubmed Link
Also in: Cutaneous

Vauterin TJ et al. Patterns of lymph node spread of cutaneous squamous cell carcinoma of the head and neck. Head Neck, Sept 2006; 28(9): 785-791. Pubmed Link

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Byers, R. M. Modified neck dissection. A study of 967 cases from 1970 to 1980. The American Journal of Surgery 1985;150(4): 414-421. Pubmed Link

Byers, R. M., et al. Rationale for elective modified neck dissection. Head & Neck Surgery 1988;10(3): 160-167. Pubmed Link

Crile G. Landmark article: Excision of cancer of the head and neck with special reference to the plan of dissection based on one hundred and thirty-two operations. JAMA 1987;258:3286-3293. Pubmed Link

Eskander A, Merdad M, Freeman JL, Witterick IJ. Pattern of spread to the lateral neck in metastatic well-differentiated thyroid cancer: a systematic review and meta-analysis. Thyroid. 2013 May;23(5):583-92. doi: 10.1089/thy.2012.0493. Pubmed Link

Robbins KT, Clayman G, Levine PA, et al.: Neck dissection classification update: Revisions proposed by the American Head and Neck Society and the American Academy of Otolaryngology-Head and Neck Surgery. Arch Otolaryngol Head Neck Surg 2002; 128: 751–758. Pubmed Link

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Chernock RD, Lewis JS. Approach to Metastatic Carcinoma of Unknown Primary in the Head and Neck: Squamous Cell Carcinoma and Beyond. Head Neck Pathol. 2015 Mar; 9(1): 6–15. Pubmed Link

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Thyroid

Goal:	**By the end of fellowship, the fellows have attained a proficient level of knowledge, skills and attitudes in diagnosis, surgical management and surveillance of benign and malignant diseases of the thyroid gland**
Objectives:	**After completing directed reading and educational activities in head and neck fellowship, the trainee will be able to:**

1. Outline the embryology and anatomy of the thyroid and parathyroid glands
    A. Describe the histologic appearance of normal thyroid tissue and the components of a thyroid follicle
    B. Recognize the relationship of critical adjacent structures such as the recurrent and superior laryngeal nerves, as well as the relationship with the superior and inferior parathyroid glands
    C. Predict when a non-recurrent laryngeal nerve may occur
2. Perform a complete history of a patient with suspected thyroid disease
    A. Hyper and hypothyroid symptoms
    B. Impact on voice and swallowing and/or dyspnea and hemoptysis
    C. Describe the epidemiology of benign and malignant diseases of the thyroid gland.
    D. List the risk factors for thyroid nodules and thyroid cancer including a history of prior neck surgery or radiation
    E. Family history of thyroid cancer or multiple endocrine neoplasia
3. Perform a thorough oncologic examination of head and neck, with emphasis on the thyroid gland, the at-risk lymph node basins and the surrounding laryngotracheal complex
    A. Perform fiberoptic laryngoscopy
4. Outline the initial next steps in evaluating patients with thyroid nodules based on the ATA Guidelines
    A. Laboratory work-up
    B. Ultrasound
        1) Describe the ultrasonographic risk stratification of a thyroid nodule and indications for fine needle aspiration
    C. Describe the Bethesda Classification for the cytologic interpretations of thyroid lesions
    D. Indications for molecular testing of indeterminate thyroid FNA specimens
5. Form a differential diagnosis of thyroid lesions based on the findings of this initial work up
6. Formulate non-surgical and surgical treatment options for a benign thyroid nodule
7. Recognize the typical presentation of benign or malignant thyroid tumors and certain signs and symptoms that might suggest a more aggressive behavior
    A. Understand how your approach may differ for rapidly growing thyroid lesions
    B. Outline an approach to airway management in individuals with suspected anaplastic thyroid cancer
8. Stage different thyroid malignancies accurately based on AJCC classification system

9. Recognize when to consider additional work up
    A. Indications for CT of the chest, MRI and/or PET CT
    B. Panendoscopy
10. Formulate a treatment plan based on the characteristics of the disease and specific needs of the patient
    A. What are the treatment options: surgical, nonsurgical, palliation
    B. For surgical patients, plan appropriately to consult additional services to assist with management (Thoracic surgery for significant substernal involvement, tracheal involvement and/or esophageal involvement)
    C. Develop a plan for a pregnant patient with a newly diagnosed well differentiated thyroid cancer
    D. Outline a treatment algorithm for a patient with MEN 2a or 2b without evidence of a thyroid lesion
11. List the indications for elective neck dissection in N0 thyroid malignancies and how this might differ based on primary disease pathology
12. Outline an appropriate management strategy for patients with N+ disease
13. Outline the risks of primary and revision surgery for thyroid malignancies
14. Discuss the benefits and limitations of recurrent laryngeal nerve monitoring
15. Describe and perform the different approaches to identify and preserve the recurrent and superior laryngeal nerve during central neck surgery
    A. Recognize when to consider resection of an involved recurrent laryngeal nerve
    B. Outline an approach to rehabilitation of a patient needing recurrent nerve resection or suffering from a nerve injury
        1) Primary repair
        2) Cable graft
        3) Ansa to distal nerve repair
        4) Secondary approaches to vocal fold paresis and paralysis
16. Incorporate endocrinology in the multidisciplinary care of benign and malignant thyroid diseases
17. Perform core procedures in surgery on the thyroid gland as defined by the curriculum, based on the attestation of the program director
18. Identify the classic histopathologic findings for papillary thyroid cancer, follicular thyroid cancer, medullary thyroid cancer, anaplastic thyroid cancer, and thyroid lymphoma
19. Discuss indications for adjuvant therapy following surgery for thyroid cancer based on staging, pathologic characteristics, operative findings, and post-surgical imaging (radioactive iodine scan) and recommend adjuvant treatments when appropriate
    A. When is RAI indicated
    B. When to consider external beam radiation therapy
    C. What options exist for recurrent and metastatic disease
        1) Additional surgery
        2) Additional RAI
        3) Tyrosine kinase inhibitors
20. Describe and discuss the current status of molecular testing of thyroid cancers
21. Recognize common complications of following thyroid and lateral neck surgery

22. Plan appropriate course of action for treating surgical complications of thyroid procedures
23. Analyze clinical findings and radiologic studies appropriately to distinguish surgically resectable from unresectable thyroid lesions
24. Discuss and recommend non-surgical options in the treatment of thyroid cancers
25. Utilize ancillary services such as nutrition and speech therapy appropriately in treatment planning and long term care of thyroid cancer patients
26. Formulate an evidence based surveillance program for thyroid cancer survivors based on established guidelines (such as NCCN)
    A. Appropriately use these tests in surveillance:
        1) TSH, Tg, Anti-Tg Ab
        2) Neck ultrasound
        3) When to consider chest imaging and/or PET/CT (for non-avid well differentiated thyroid cancer or for medullary and anaplastic thyroid cancer)
27. Recognize the common signs and symptoms of recurrent disease and plan an appropriate work up plan

Process:	**By the end of fellowship the fellows have participated in a minimum number of thyroid procedures based on the following list:**

1. Thyroidectomy, lobectomy and total
2. Central neck dissection
3. Lateral neck dissection
4. Upper aerodigestive tract resection as a part of ablative procedure for thyroid cancer
5. Laryngotracheal reconstruction
6. Parathyroid autotransplantation
7. Goiter surgery – transcervical and transsternal
8. Intraoperative nerve monitoring

Recommended Reading

Brito JP, et al. A Clinical Framework to Facilitate Risk Stratification When Considering an Active Surveillance Alternative to Immediate Biopsy and Surgery in Papillary Microcarcinoma. Thyroid. 2016 Jan;26(1):144-9.
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Lang BH, et al. A systematic review and meta-analysis of prophylactic central neck dissection on short-term locoregional recurrence in papillary thyroid carcinoma after total thyroidectomy. Thyroid. 2013 Sep;23(9):1087-98.
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Matsuzu K, et al. Thyroid lobectomy for papillary thyroid cancer: long-term follow-up study of 1,088 cases. World J Surg. 2014 Jan;38(1):68-79.
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McLaughlin EJ, et al. Safety of outpatient thyroidectomy: Review of the American College of Surgeons National Surgical Quality Improvement Program. Laryngoscope. 2018 May;128(5):1249-1254.

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Pena I, et al. Management of the lateral neck compartment in patients with sporadic medullary thyroid cancer. Head Neck. 2018 Jan;40(1):79-85.
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Randolph GW, Kamani D. Intraoperative electrophysiologic monitoring of the recurrent laryngeal nerve during thyroid and parathyroid surgery: Experience with 1,381 nerves at risk. Laryngoscope. 2017 Jan;127(1):280-286.
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Kiess AP, et al. External-beam radiotherapy for differentiated thyroid cancer locoregional control: A statement of the American Head and Neck Society. Head Neck. 2016 Apr;38(4):493-8.
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Tufano RP, et al. Management of recurrent/persistent nodal disease in patients with differentiated thyroid cancer: a critical review of the risks and benefits of surgical intervention versus active surveillance. Thyroid. 2015 Jan;25(1):15-27.
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Parathyroid

Goal: At the completion of the fellowship experience, the trainee should demonstrate proficiency in the diagnosis, management and appropriate surveillance for patients with primary, secondary and tertiary hyperparathyroidism.

Objective: By the end of the fellowship the graduate is able to:

1. Describe the embryologic origin and development of the superior and inferior parathyroid glands and detail their anatomic relationship to the recurrent laryngeal nerve
2. Describe how embryology influences the location of the superior and inferior parathyroid glands including common ectopic (and supernumerary) locations
3. Describe the physiologic cycle of PTH production, half-life and explain its clinical significance
4. Describe the role of PTH and its physiologic actions on the various organ systems specifically bones, kidneys and intestinal system
5. Describe the mechanisms behind calcium and phosphate homeostasis, and the role of Vitamin D
6. Identify the histopathologic differences between normal parathyroid gland, carcinoma, adenoma and hyperplasia
7. Perform a complete history and physical exam of a patient with hyperparathyroidism
    A. symptoms including bone pain, fatigue etc
    B. family history, including MEN syndrome
    C. medication history including diuretics
    D. renal calculi and calcinosis
    E. prior neck/parathyroid surgery
    F. rule in/out MEN syndrome, referral for genetic counseling/testing when indicated
    G. perform flexible laryngoscopy
8. Plan a diagnostic workup for patients presenting with suspected primary hyperparathyroidism
    A. Preoperative PTH and calcium levels
    B. Role of dexa scan
    C. Role of 24-hr urinary calcium and creatinine, rule out FHH
    D. Vitamin D levels
9. Discuss in detail the scope and limitations/sensitivity and specificity of the radiologic investigations available for localization and select the appropriate study based on patient and disease characteristics
    A. Ultrasound (surgeon vs radiologist-performed)
    B. Tc99 Sestamibi and SPECT/CT fusion
    C. MRI
    D. 4-D CT
10. List the indications for surgery in patients with hyperparathyroidism (symptomatic and asymptomatic) and formulate an appropriate surgical plan based on national guidelines
11. Appropriately treat Vitamin D deficiency
12. Discuss the role of intraoperative recurrent laryngeal nerve monitoring
13. Discuss how to utilize intraoperative PTH monitoring as a measure of success of surgery

14. Discuss the surgical management of solitary adenoma vs four gland hyperplasia, and identify which patients are candidates for a minimally invasive/unilateral approach
15. Discuss the role of parathyroid auto-transplantation and cryopreservation and perform these procedures in appropriate patients
16. Identify secondary hyperparathyroidism patients appropriately and plan treatment accordingly
17. Identify patients with tertiary hyperparathyroidism/ESRD who are candidates for parathyroid surgery and formulate an appropriate surgical plan with regards to the extent of surgery
18. Counsel patients regarding the possibility of surgical failure and the need for reoperation in the future
19. Formulate an appropriate work up in patients who are candidates for re-operative parathyroid surgery including:
    A. Review and discussion of prior operative reports and previous pathology
    B. Select appropriate imaging modalities
    C. Discuss the role of invasive techniques such as selective venous sampling and arteriography
    D. Utilize Intraoperative FNA, PTH wash and frozen section control
    E. Select lateral vs central approach
    F. Discuss radio-guided parathyroid surgery and offer this technique in appropriate cases
20. Discuss the aggressive nature of parathyroid carcinoma and its surgical management
21. Recognize the clinical signs suspicious for diagnosis of parathyroid carcinoma
22. Describe the setup and instruments required for endoscopic parathyroid surgery
23. Discuss and recommend non-surgical options available to patients who are not surgical candidates or who elect to defer surgery
    A. Bisphosphonates
    B. Calcimimetics
    C. Ethanol ablation
24. Recognize the importance of multimodality management of parathyroid disease and establish working relationship with endocrinologist in management of parathyroid disease

Recommended Reading

Yamada T, Ikuno M, Shinjo Y, et al. Selective venous sampling for primary hyperparathyroidism: how to perform an examination and interpret the results with reference to thyroid vein anatomy. *Jpn J Radiol*. 2017;35(8):409-416.
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Liu ME, Qiu NC, Zha SL, et al. To assess the effects of parathyroidectomy (TPTX versus TPTX+AT) for Secondary Hyperparathyroidism in chronic renal failure: A Systematic Review and Meta-Analysis. *Int J Surg*. 2017;44:353-362.
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Wilhelm SM, Wang TS, Ruan DT, et al. The American Association of Endocrine Surgeons Guidelines for Definitive Management of Primary Hyperparathyroidism. JAMA Surg. 2016;151(10):959-968.
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Bilezikian JP, Brandi ML, Eastell R, et al. Guidelines for the management of asymptomatic primary hyperparathyroidism: summary statement from the Fourth International Workshop. *J Clin Endocrinol Metab*. 2014;99(10):3561-3569.
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Stephen AE, Mannstadt M, Hodin RA. Indications for Surgical Management of Hyperparathyroidism: A Review. *JAMA Surg*. 2017;152(9):878-882.
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Pubmed Link

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Microvascular Reconstruction

Goal:	**At the completion of the fellowship experience, the trainee should demonstrate understanding of the functional and cosmetic consequences of the full array of soft tissue and bony defects of the head and neck. The fellow should be able to identify defects that are appropriate for advanced reconstructive procedures with an aim to collaborate with head and neck reconstructive surgeons for joint care of patients.**
Objectives:	**After completing directed reading and educational activities in head and neck fellowship, the trainee will be able to:**

General Reconstructive Principles:

1. Anticipate surgical defects based on pre-operative physical exam and imaging characteristics
2. Describe and discuss general reconstructive goals for head and neck defects, including functional restoration, durability, optimal aesthetics, limited donor site morbidity, and quality of life enhancement
3. Indicate how these goals are impacted by various reconstructive approaches
4. Recognize the importance of patient-specific goals in the process of reconstructive planning
5. Describe the reconstructive ladder for the following defects:
    A. Oral cavity
        1) Hemiglossectomy
        2) Floor of mouth defect without bone resection
        3) Total/subtotal glossectomy
        4) Anterior mandible resection
        5) Lateral mandible resection
        6) Through and through resection (mandible resection with associated mucosal and skin defects)
        7) Subtotal lip defects
    B. Oropharyngeal
    C. Total laryngectomy
    D. Laryngopharyngectomy
    E. Infrastructure maxillectomy
    F. Total maxillectomy including orbital floor, with orbit preservation
    G. Total maxillectomy with orbital exenteration
    H. Resection of anterior skull base
    I. Total parotidectomy defect with or without facial nerve resection
6. Outline necessary pre-operative evaluations needed to assess candidacy for certain free flap donor sites
    A. Allen's test
    B. Lower extremity MRA/CTA or Doppler evaluation for 3-vessel run off
    C. Assessment of foot neurovascular status
7. Discuss the relative importance of nutrition in reconstruction; identify methods to optimize nutrition prior to advanced reconstructive surgery
8. Describe the angiosome concept and and discuss how it impacts flap selection and design
9. Prepare various recipient vessels (including internal mammary vessels)

10. Perform accurate, efficient and durable microvascular anastomoses; design pedicle geometry to maximize flap survival. Have the ability to perform hand-sewn venous anastomosis including end-to-side orientation
11. List signs of vascular (arterial and/or venous) compromise after flap reconstruction; describe methods for flap monitoring and recall the pros, cons, and practical utility of each approach
12. Explain the concept of ischemia-reperfusion injury and understand the relevance to reconstruction with microvascular free tissue transfer
13. Describe the methods of antithrombotic prophylaxis; explain the physiology of each approach and its utility after microvascular free tissue transfer
14. Outline the indications and methodology for leech therapy; describe the medical implications (e.g., blood loss, infection, etc.) and appropriate management
15. List the complications of various reconstructive approaches and describe the appropriate management strategy for each
16. Formulate a plan to manage flap failure including initial approach to revascularization and subsequent secondary reconstructive approaches for unsalvageable flaps
17. Develop an appropriate plan for functional rehabilitation for both donor and recipient sites after reconstructive surgery

Fasciocutaneous, myocutaneous, and enteric flaps:

1. Catalogue the available soft tissue armamentarium with respect to:
    A. Flap soft tissue characteristics such as bulk, pliability and epithelial lining
    B. Pedicle length
    C. Donor site morbidity
    D. Availability of a source for nerve grafting
    E. Simultaneous two-team harvest
    F. Free versus pedicled flap opportunities
2. Assess the soft tissue needs (bulk, epithelial surfaces, and shape) for various defects of the head and neck including:
    A. Floor of mouth defects
    B. Oral tongue defects: partial glossectomy, hemiglossectomy, near-total glossectomy, and total glossectomy
    C. Buccal and retromolar trigone defects
    D. Palate defects
    E. Pharyngeal defects (partial and total)
    F. Complex skin and soft tissue defects of head and neck, including lip, chin, orbit, parotid bed, scalp, and nasal defects
    G. Skull base defects
3. Choose optimal flap(s) for each of the aforementioned defects such that function and/or cosmesis is maximized.
4. Define the surgical anatomy and relevant vascular and neuronal elements of the soft tissue reconstructive armamentarium.
5. Master the elevation and preparation of the following free fasciocutaneous or myocutaneous flaps:
    A. Radial forearm
    B. Anterolateral thigh

   C. Rectus abdominus
   D. Latissimus dorsi
   E. Parascapular
   F. Lateral arm
   G. Temporoparietal fascia
   H. Ulnar forearm

6. Select an enteric flap for total pharyngeal reconstruction when appropriate; in particular, consider gastro-omental or jejunal flaps for high risk total pharyngeal defects
7. Evaluate patients for eligibility for various soft tissue flaps, considering comorbidities, donor site implications and functional status
8. Recommend when a local or pedicled flap is an appropriate alternative to free tissue
9. Reach proficiency level in harvest and preparation of the major regional pedicled flaps: pectoralis major, latissimus dorsi, supraclavicular, submental island, sternocleidomastoid and deltopectoral flaps
10. Diagnose an unsafe recipient wound for free tissue transfer and outline techniques to stabilize and maximize wound healing (initial decontamination and wound packing, introduce vascularized tissue, divert fistulae, advanced wound care/dressings)
11. Formulate a plan to manage partial and total soft tissue flap failure with respect to long term function
12. Implement speech, swallowing and donor site rehabilitation strategies for each defect and flap type

Osteocutaneous flaps:

1. Perform appropriate examination of head and neck defects/potential defects and flap donor sites
2. Describe a logical methodology for donor site selection based on:
   A. tissue needs for defect reconstruction
   B. optimal functional outcome
   C. donor site morbidity profile
   D. patient medical history and comorbidities
   E. patient lifestyle concerns
3. Define the anatomy and relevant vascular and neuronal elements of fibula, scapula, iliac crest, and radial forearm osteocutaneous free flaps
4. Recognize the advantages and disadvantages of the different osteocutaneous free flaps; identify the quality and quantity of bone from each and its functional capacity (e.g., likelihood of osseointegration, ability to bear implants for dental rehabilitation, etc.)
5. Demonstrate effective and efficient harvesting and inset techniques for osteocutaneous free flaps
6. Review the concepts of bone healing and its relationship to load and stress
7. Develop effective plans for reconstruction of mandible and midface bony defects; describe the process for and utility of pre-operative three-dimensional modeling and custom plate design
8. Discuss methods to reduce complications, including plate or bone fracture or extrusion
9. Formulate a plan to manage partial and total flap failure
10. Recall alternatives to osteocutaneous free flaps when their use is not medically appropriate

11. Discuss the process of and options for dental rehabilitation; recognize the advantages and disadvantages of primary vs. secondary osseointegrated implant placement\
12. Discuss the role and limitations of computer image modeling and cutting guides in fibular free flap reconstruction
13. Recognize the sign and symptoms of plate failure and Osteoradionecrosis and and formulate a plan for management.

Process: At the completion of the fellowship experience, the trainee should have participated in 25 major head and neck surgeries requiring free flap reconstruction:

The trainee should have detailed knowledge of the harvest techniques for the following:

Pedicled flaps:

- pectoralis major
- latissimus dorsi
- sternocleidomastoid
- supraclavicular
- submental

Free flaps:

- radial forearm
- anterolateral thigh
- fibula
- scapula
- latissimus dorsi

Site-based reconstructions: During the course of their training, the fellow should receive exposure to at least 2 free flap reconstructions of the following sites:

- oral cavity (soft tissue)
- oral cavity (bone)
- pharynx
- midface (soft tissue)
- midface (bone)
- face/neck/scalp
- parotid/ear

Recommended Reading for Head & Neck Reconstruction & Microvascular Surgery

Arshad H, et al. Intensive care unit versus non-intensive care unit postoperative management of head and neck free flaps: comparative effectiveness and cost comparisons. Head Neck. 2014 Apr;36(4):536-9. Pubmed Link AHNS Journal Club

Blackwell KE. Unsurpassed reliability of free flaps for head and neck reconstruction. Arch Otolaryngol Head Neck Surg. 1999 Mar;125(3):295-9. Pubmed Link

Ettinger KS, et al. Higher perioperative fluid administration is associated with increased rates of complications following head and neck microvascular reconstruction with fibular free flaps. Microsurgery. 2017 Feb;37(2):128-136. Pubmed Link

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Urken ML, et al. Microvascular free flaps in head and neck reconstruction. Report of 200 cases and review of complications. Arch Otolaryngol Head Neck Surg. 1994 Jun;120(6):633-40. Pubmed Link

Wei FC, et al. Have we found an ideal soft-tissue flap? An experience with 672 anterolateral thigh flaps. Plast Reconstr Surg. 2002 Jun;109(7):2219-26; discussion 2227-30. Pubmed Link

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Brown JS, Shaw RJ. Reconstruction of the maxilla and midface: introducing a new classification. *Lancet Oncol*. 2010;11(10):1001-1008. doi:10.1016/S1470-2045(10)70113-3 Pubmed Link

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Brown, J. S., Lowe, D., Kanatas, A., & Schache, A. (2017). Mandibular reconstruction with vascularised bone flaps: a systematic review over 25 years. The British Journal of Oral & Maxillofacial Surgery, 55(2), 113–126. doi.org/10.1016/j.bjoms.2016.12.010 Pubmed Link

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Frohwitter G, et al. Microvascular reconstruction in the vessel depleted neck - A systematic review. J Craniomaxillofac Surg. 2018 Sep;46(9):1652-1658. doi: 10.1016/j.jcms.2018.05.051. Epub 2018 Jun 7. Pubmed Link

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Ethics

Goal:	**At the completion of the fellowship experience, the trainee should demonstrate proficiency in clinical, professional and research ethics.**
Objective:	**By the end of the fellowship, the fellows can:**

Philosophical Basis for Medical Ethics

1. Define autonomy, paternalism, shared decision making, directive counsel, abandonment, personhood
2. Describe and critique different ethical frameworks:
    A. Principlism v. casuistry
    B. Virtue Ethics
    C. Deontology (Duty-based ethics, fiduciary)
    D. Consequentialism
    E. Narrative inquiry
    F. Justice theory

Clinical Ethics

1. Contrast the terms competence and capacity
    A. List the elements required to determine medical decision-making capacity
    B. Understand the importance of making wishes known and the possibility of loss of capacity
2. Recognize the ethical and legal guidelines governing privacy and confidentiality
    A. HIPAA
    B. Hippocratic Oath
    C. Institutional regulation thereof
3. Prepare for advance care planning
    A. Demonstrate the ability to introduce advance care planning in the outpatient setting
    B. Differentiate various forms of advance directive documents, e.g. directive to physicians, medical power of attorney, DNAR (in-patient v. out-patient)
    C. Describe how to implement an advance directive in clinical care
    D. Know the legal ramifications of advance care documentation
4. Differentiate the levels of surrogate decision making including advance directive, legal guardian, medical (durable) power of attorney, health care agent, next of kin, surrogate of highest priority, best interest standard (as compared to patient preference and substituted judgment)
    A. Understand management options for the unbefriended adult
5. Prepare for and effectively share the delivery of difficult information (breaking bad news), active listening, engagement
6. Interpret patient-centric, goal-oriented risks and benefits for individual patient decisions
7. Define the doctrine of double effect and explain how it is applied in the contexts of pain management and proportional palliative sedation
8. Employ basic and advanced techniques of facilitating medical decision making

   A. Motivational interviewing; shared decision making; risk stratification; outcomes and discharge destination prognostication

9. Use evidence-based decision-making for emergency airway management

10. Contrast palliative medicine and hospice care

    A. Practice meticulous symptom management for all patients with head and neck cancer from early to advanced, from survivorship to end of life care.
    B. Cooperate with specialists from palliative medicine and other relevant specialties to provide optimal care for individual patients and their caregivers
    C. Describe the evolving role of artificial nutrition and hydration from diagnosis of head and neck cancer to cachexia in advanced head and neck cancer

        1) Distinguish eating/drinking, from artificial nutrition/hydration from a legal, philosophical, and ethical perspective

    D. Define existential suffering and how it interferes with quality of life; distinguish pain v. suffering

11. Appraise critically the arguments for and against physician aid in dying in the context of advanced head & neck cancer

Professional Ethics

1. Demonstrate integrity, honesty and professional boundaries

    A. Explore the necessary traits and virtues of a physician, e.g. tolerance, moral courage, self-reflection, empathy, truth telling, integrity, humility, etc.
    B. Explain the importance of cultural competence
    C. Select strategies for identifying and controlling for unconscious bias
    D. Critically appraise the role of social media in defining or dissolving boundaries

2. Choose appropriate methods of error disclosure and understand the evidence and ethics thereof

3. Recommend resources for the impaired physician and reporting requirements

4. Manage billing and compliance and appreciate ethical components considering legal and regulatory precedent

5. Describe conflicts of interest and commitment

    A. Financial, intellectual, leadership

6. Discuss the role of industry in the development and control of biomedical advances

    A. Exemplify responsible and fair interaction with industry
    B. Relate inherent limitations of direct-to-consumer marketing

7. Recognize the challenges of scarce resource allocation and rationing

    A. Evaluate the impact of national policy on healthcare at the micro and macro levels
    B. Contextualize marginalized populations and disparities in cancer treatment

8. Apply sound educational and ethical principles to trainee supervision

9. Recognize the signs of burnout and select coping strategies for self-care

Research Ethics

10. Demonstrate protection of human subjects as stipulated in the Belmont Report, and the Common rule

11. Complete informed consent for research

12. Describe basic IRB regulations and processes
13. Understand fundamental ethical differences between clinical care versus research, duties to patient v. research participants (fiduciary v. protective)
14. Describe the concept of the therapeutic misconception

Process: By the end of fellowship, the fellows have participated in a minimum number of:

1. Family meetings to discuss treatment options, possible outcomes, caregiving responsibilities
2. Advance care planning discussions, including execution of advance directives, physician orders for life sustaining treatment, Do Not Attempt Resuscitation Orders (both inpatient and out of hospital DNAR)
3. Determinations of appropriate surrogate decision maker for patients, including for patients without an identified surrogate
4. Management of complex symptoms with multimodality pain medication considering both the benefits and the risks of opioids
5. Discuss and observe the process of withdrawal of technology to allow natural death
6. Obtain informed consent for clinical trials
7. Participate in completion of an IRB application for human subjects research, completion of the CITI course or equivalent, or attend a session dedicated to core reading

Recommended Reading

Back AL, Arnold RM. Dealing with conflict in caring for the seriously ill, "It Was Just Out of the Question."JAMA. 2005;293(11), 1374-1381.
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Baile WF, Buckman R, Lenzi R, Glober G, Beale EA, Kudelka AP. SPIKES: A six-step protocol for delivering bad news: application to the patient with cancer.Oncologist. 2000;5(4):302-11.
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Conley J. Ethics in otolaryngology. Acta Otolaryngol. 1981;91(5-6):369-74.
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Eves MM, Esplin BS. "She Just Doesn't Know Him Like We Do": Illuminating Complexities in Surrogate. Decision-Making. J Clin Ethics. 2015 Winter;26(4):350-4.
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Grady C. Enduring and Emerging Challenges of Informed Consent. N Engl J Med2015;372(9), 855-862. N Engl J Med. 2015 May 28;372(22):2172.
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Hinshaw DB, Pawlik T, Mosenthal AC, Civetta JM, Hallenbeck J. When do we stop, and how do we do it? Medical futility and withdrawal of care. J Am Coll Surg. 2003 Apr;196(4):621-51.
Pubmed Link

Joffe S, Miller F. Bench to bedside: mapping the moral terrain of clinical research. Hastings Cent Rep. 2008;38(2):30–42.
Pubmed Link

Langerman A, Siegler M, Angelos P. Intraoperative Decision Making: The Decision to Perform Additional, Unplanned Procedures on Anesthetized Patients. J Am Coll Surg. 2016 May;222(5):956-60.
Pubmed Link
AHNS Journal Club

Liao K, Blumenthal-Barby J, Sikora AG. Factors Influencing Head and Neck Surgical Oncologists' Transition from Curative to Palliative Treatment Goals. Otolaryngol Head Neck Surg. 2017 Jan;156(1):46-51.
Pubmed Link
AHNS Journal Club

Schenck DP. Ethical considerations in the treatment of head and neck cancer. Cancer Control. 2002;9(5):410-9.
Pubmed Link

Shuman AG, Fins JJ, Prince ME. Improving end-of-life care for head and neck cancer patients. Expert Rev Anticancer Ther. 2012;12(3):335-43.
Pubmed Link

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Basic Science

Goal:	**By the end of the fellowship, the trainee is proficient in Fundamentals of Cancer Biology / Immunology in head and neck oncology**
Objectives:	**After completing directed reading and educational activities in head and neck fellowship, the trainee will be able to:**

Cancer Biology

1. DEFINE the hallmarks of cancer
2. DISCUSS the major genomic alterations and known & hypothesized functional impact of such alterations in malignancies of the head and neck
3. DESCRIBE the mechanism of action of approved chemotherapeutic and molecular targeted agents used to treat head and neck malignancies
4. LIST and DESCRIBE different molecular and genetic tests used in the diagnosis and workup for head and neck malignancies
5. EXPLAIN how molecular and genetic testing for thyroid nodules was developed and the utility of these tests in the workup of thyroid nodules
6. APPLY molecular and genetic tests for the diagnosis and workup of head and neck malignancies and
7. AVOID unnecessary utilization of such tests

Cancer Immunology

1. DESCRIBE the mediators and process of both passive and active immunity
2. SUMMARIZE the process of antigen presentation and T-Cell responses
3. OUTLINE the process of immune evasion during tumorigenesis
4. EXPLAIN the mechanism of action of immune checkpoint inhibitors

Process

1. Dedicated Reading - The trainee will critically read, summarize, and interpret selected fundamental materials (see reading list)
2. Mentorship – The fellowship program should designate basic/translational scientists/collaborators that will interact regularly with the trainee in various capacities
3. Journal club sessions – a proportion of journal club sessions should focus on cancer biology/immunology. Trainees should learn to critically review basic/translational research and discuss implications or potential applications of such research
4. Attend Institutional/Regional/National meetings and attend dedicated sessions to cancer biology/immunology

Recommended Reading

Hanahan D, Weinberg RA. Hall marks of cancer: the next generation. Cell. 2011 Mar 4;144(5):646-74.
Pubmed Link

Puram SV, et al. Single-Cell transcriptomic analysis of primary and metastatic tumor ecosystems in head and neck cancer.Cell.2017 Nov 30. pii: S0092-8674(17)31270-9.
Pubmed Link

Liu B, et al. Spatio-Temporal Genomic Heterogeneity, Phylogeny, and Metastatic Evolution in Salivary Adenoid Cystic Carcinoma.J Natl Cancer Inst. 2017 Oct 1;109(10).
Pubmed Link

Stransky N, et al. The mutational landscape of head and neck squamous cell carcinoma. Science. 2011 Aug 26;333(6046):1157-60.
Pubmed Link

Nikiforov YE, et al. Impact of the multi-gene ThyroSeq next-generation sequencing assay on cancer diagnosis in thyroid nodules with atypia of undetermined significance / follicular lesion of undetermined significance cytology. Thyroid. 2015;25 (11), 1217-1223.
Pubmed Link

Fagin JA, Wells SA. Biologic and clinical perspectives on thyroid cancer. N Engl J Med2016;375(11), 1054-1067.
Pubmed Link

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Clinical Research

Goal:	**By the end of the fellowship the trainee is proficient in Fundamentals of Clinical Research Design & Fundamentals of Statistical Analysis**
Objectives:	**After completing directed reading and educational activities in head and neck fellowship, the trainee will be able to:**

Fundamentals of Clinical Research Design

1. STATE the differences in the objectives and design of clinical trials:
   A. Phase I
   B. Phase II
   C. Phase III
2. SUMMARIZE core ethical standards in human subjects research
3. DEVELOP a clinical research project
4. EXPLAIN the process of IRB review and factors under consideration when a protocol is reviewed
5. OUTLINE the process when opening multi-institutional and/or cooperative group trials
6. RECOGNIZE financial considerations when conducting a clinical trials and LIST various funding options
7. DESCRIBE how to develop a biorepository and how surgeons can play a key role in quality tissue and data acquisition.

Fundamentals of Statistical Analysis

1. Cite the application for the different observational study designs:
   A. Case report/case series
   B. Case-control studies
   C. Cohort studies
2. Define the indications for a systematic review and how this research strategy differs from a literature review
3. Define how a meta-analysis differs from a systematic review
4. Recite the advantages and disadvantages of a randomized controlled trial
5. DEFINE Type I and Type II Error.
6. STATE the definition of a “p” value and a confidence interval
7. INTERPRET common statistical analyses to include:
   A. Descriptive statistics – basic parametric and non-parametric tests
   B. Student’s t-test
   C. Chi-Square test/Fisher’s exact testing
   D. Kaplan Meier Survival Analysis and interpret the Log Rank Test
   E. Univariate analysis
   F. Multivariable regression models
      1) Linear regression

2) Logistic regression
3) Cox regression

8. List various types of research bias

Process:	**By the end of fellowship the fellows have participated in the following list of research educational opportunities:**

1. Dedicated didactic instruction (eg. lectures, journal club, etc.) focused on topics above
2. Identification of a clinical research mentor: fellows should identify surgeons/medical oncologists/radiation oncologists with clinical research and clinical trial experience
3. Complete a research project to include generation of a hypothesis, development of study design/methodology, submission of an IRB if appropriate, data collection, statistical analysis, and manuscript development
4. Attend an IRB / PRMC meeting (encouraged but not mandatory)
5. Attend at least one national meeting (AHNS, AAO-HNS, ASCO, etc.)

Recommended Reading	***(** indicates mandatory; others are recommended)***

Guller U, DeLong ER. Interpreting statistics in medical literature: a vade mecum for surgeons. J Am Coll Surg. 2004 Mar;198(3):441-58.
Pubmed Link

Rich JT, et al. A practical guide to understanding Kaplan-Meier curves. Otolaryngol Head Neck Surg. 2010 Sep;143(3):331-6.
Pubmed Link

Neely JG, et al. A practical guide to understanding systematic reviews and meta-analyses. Otolaryngol Head Neck Surg. 2010 Jan;142(1):6-14.
Pubmed Link

Wang EW, et al. A practical guide for understanding confidence intervals and P values. Otolaryngol Head Neck Surg. 2009 Jun;140(6):794-9.
Pubmed Link

Neely JG, et al. Tutorials in clinical research: VII. Understanding comparative statistics (contrast)--part B: application of T-test, Mann-Whitney U, and chi-square. Laryngoscope. 2003 Oct;113(10):1719-25.
Pubmed Link

Neely JG, et al. Tutorials in clinical research: part VII. Understanding comparative statistics (contrast)--part A: general concepts of statistical significance. Laryngoscope. 2003 Sep;113(9):1534-40.
Pubmed Link

Neely JG, et al. Practical guide to understanding Comparative Effectiveness Research (CER). Otolaryngol Head Neck Surg. 2013 Dec;149(6):804-12.
Pubmed Link

Neely JG, et al. Practical guide to understanding multivariable analyses: Part A. Otolaryngol Head Neck Surg. 2013 Feb;148(2):185-90.
Pubmed Link

Neely JG, et al. Practical guide to understanding multivariable analyses, Part B: conjunctive consolidation. Otolaryngol Head Neck Surg. 2013 Mar;148(3):359-65.
Pubmed Link

Slattery EL, et al. A practical guide to surveys and questionnaires. Otolaryngol Head Neck Surg. 2011 Jun;144(6):831-7.
Pubmed Link

Stewart MG, et al. A practical guide to understanding outcomes research. Otolaryngol Head Neck Surg. 2007 Nov;137(5):700-6.
Pubmed Link

Neely MG, et al. Practical guides to understanding sample size and minimal clinically important difference (MCID). Otolaryngol Head Neck Surg. 2007 Jan;136(1):14-8.
Pubmed Link

Neely JG, et al. Tutorials in clinical research, part VI: descriptive statistics. Laryngoscope. 2002 Jul;112(7 Pt 1):1249-55.
Pubmed Link

Stewart MG, et al. Tutorials in clinical research: part V: outcomes research. Laryngoscope. 2002 Feb;112(2):248-54.
Pubmed Link

Hartman JM, et al. Tutorials in clinical research: part IV: recognizing and controlling bias. Laryngoscope.2002 Jan;112(1):23-31.
Pubmed Link

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Robotic Surgery of the Head & Neck

Goal:	**At the completion of the fellowship experience, the trainee should be familiar with the use of robotics in head and neck surgery. They should be familiar with the technology, its technical limitations, patient selection limitations, and the role of robotic surgery in the multidisciplinary care of cancer.**
Objective:	**By the end of fellowship the fellow should be familiar with:**

1. Preoperative Evaluation for TORS (this section may be overlaps with oropharynx section)
    A. What are the indications for TORS?
    B. Describe relative contraindications for TORS
2. Operating Room Safety, set up, and Instrumentation for TORS
3. Anatomic Considerations in Transoral Robotic Surgery
4. Describe the steps for the following procedures:
    A. Robotic Radical Tonsillectomy
    B. Robotic Tongue Base Resection
    C. Robotic Supraglottic Laryngectomy
5. Describe potential complications of TORS (this section overlaps with oropharynx section)
6. Describe the role of transoral surgical resection in management of cancers of the oropharynx and larynx.
7. Describe postoperative management of patients undergoing TORS. What is the role of speech and swallowing rehabilitation following TORS? What are the short term and long term effects on swallowing after TORS for oropharyngeal cancer?
8. Transoral surgery systems (Medrobotics® Flex® System and Da Vinci® system)
9. Robotic Surgery of the Thyroid Gland
10. Robotic Surgery of the Parathyroid glands
11. Robotic surgery of parapharyngeal space tumors

Process:	**By the end of fellowship the fellows have participated in a minimum number of thyroid procedures based on the following list:**

1. Fellows should complete relevant online training for the robotic system at their respective institution
2. Fellows should engage in a robotic simulation opportunity if available
3. Reading list as follows
4. Continue to apply the knowledge outlined in the reading list and training in the treatment of TORS patients.

Recommended Reading

General

Byrd JK, Ferris RL. Is There a Role for Robotic Surgery in the Treatment of Head and Neck Cancer? Curr Treat Options Oncol 2016; 17:29.

Gun, R., et al. Transoral surgical anatomy and clinical considerations of lateral oropharyngeal wall, parapharyngeal space, and tongue base. Otolaryngol Head Neck Surg 2016;154(3):480-485.

Remacle M, V MNP, Lawson G, Plisson L, Bachy V, Van der Vorst S. Transoral robotic surgery (TORS) with the Medrobotics Flex System: first surgical application on humans. Eur Arch Otorhinolaryngol 2015; 272:1451-1455.

Weinstein et al. Understanding contraindications for transoral robotic surgery (TORS) for oropharyngeal cancer. European Archives of Oto-Rhino-Laryngology. 2015;272(7): 1551–1552

Weinstein GS, O'Malley BW, Jr., Magnuson JSet al. Transoral robotic surgery: a multicenter study to assess feasibility, safety, and surgical margins. Laryngoscope 2012; 122:1701-1707.

Concurrent vs. staged neck dissection:

Frenkel CH, Yang J, Zhang M, Altieri MS, Telem DA, Samara GJ. Compared Outcomes of Concurrent versus Staged Transoral Robotic Surgery with Neck Dissection. Otolaryngol Head Neck Surg 2017; 157:791-797.

Repanos C, Mirza AH, George M, Karkos PD. Timing of neck dissection in association with transoral surgery: A systematic review. Head Neck 2017; 39:1020-1032.

Outcomes

de Almeida JR, Byrd JK, Wu Ret al. A systematic review of transoral robotic surgery and radiotherapy for early oropharynx cancer: a systematic review. Laryngoscope 2014; 124:2096-2102.

de Almeida JR, Li R, Magnuson JSet al. Oncologic Outcomes After Transoral Robotic Surgery : A Multi-institutional Study. JAMA Otolaryngol Head Neck Surg 2015; 141:1043-1051.

Nichols et al. "Radiotherapy Versus Transoral Robotic Surgery and Neck Dissection for Oropharyngeal Squamous Cell Carcinoma (ORATOR): An Open-Label, Phase 2, Randomised Trial" Lancet Oncol. 2019 Oct;20(10):1349-1359. doi: 10.1016/S1470-2045(19)30410-3. Epub 2019 Aug 12.

Larynx/Hypopharynx specifically

Kayhan FT, Kaya KH, Sayin I. Transoral robotic cordectomy for early glottic carcinoma. Ann Otol Rhinol Laryngol 2012; 121:497-502.

Krishnan G, Krishnan S. Transoral Robotic Surgery Total Laryngectomy: Evaluation of Functional and Survival Outcomes in a Retrospective Case Series at a Single Institution. ORL J Otorhinolaryngol Relat Spec 2017; 79:191-201.

Lorincz BB, Busch CJ, Mockelmann N, Knecht R. Feasibility and safety of transoral robotic surgery (TORS) for early hypopharyngeal cancer: a subset analysis of the Hamburg University TORS-trial. Eur Arch Otorhinolaryngol 2015; 272:2993-2998

Mendelsohn AH, Remacle M, Van Der Vorst S, Bachy V, Lawson G. Outcomes following transoral robotic surgery: supraglottic laryngectomy. Laryngoscope 2013; 123:208-214.

Thyroid, Skull base

Hanna EY, Holsinger C, DeMonte F, Kupferman M. Robotic endoscopic surgery of the skull base: a novel surgical approach. Arch Otolaryngol Head Neck Surg 2007; 133:1209-1214.

Kupferman M, Demonte F, Holsinger FC, Hanna E. Transantral robotic access to the pituitary gland. Otolaryngol Head Neck Surg 2009; 141:413-415.

Singer MC, Seybt MW, Terris DJ. Robotic facelift thyroidectomy: I. Preclinical simulation and morphometric assessment. Laryngoscope 2011; 121:1631-1635

Terris DJ, Singer MC, Seybt MW. Robotic facelift thyroidectomy: II. Clinical feasibility and safety. Laryngoscope 2011; 121:1636-1641.

Unknown Primary

Fu TS, Foreman A, Goldstein DP, de Almeida JR. The role of transoral robotic surgery, transoral laser microsurgery, and lingual tonsillectomy in the identification of head and neck squamous cell carcinoma of unknown primary origin: a systematic review. J Otolaryngol Head Neck Surg. 2016;45(1):28.

Hatten KM, O'Malley BW, Jr., Bur AM, et al. Transoral Robotic Surgery-Endoscopy With Primary Site Detection and Treatment in Occult Mucosal Primaries. JAMA Otolaryngol Head Neck Surg. 2016

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Ultrasound

Goal:	**By the end of fellowship, fellows will have attained a proficient level of knowledge, skills and attitude in performance and interpretation of diagnostic ultrasound and ultrasound-guided fine needle aspiration (FNA) biopsy and similar procedures in the head and neck.**
Objectives:	**After completing directed reading and educational activities in head and neck fellowship, the trainee will be able to:**

1. Outline the physics of ultrasound and be able to
    A. Describe briefly the application for the use of various ultrasound transducers
    B. Achieve familiarity with the basic settings on high-resolution ultrasound equipment, including: frequency, gain, depth, focus, time-gain compensation, doppler (power, color flow), measurements, cine clips
    C. Describe the cause of phenomena/artifacts such as posterior shadowing, posterior enhancement, and reverberation
    D. Outline the optimal ambient conditions (lighting, patient positioning, examiner positioning)
2. Know how to scan in transverse and longitudinal (sagittal) planes
3. Outline normal head and neck ultrasound anatomy
    A. Skin, subcutaneous tissues, superficial and deep muscles, carotid sheath structures, additional major and minor vessels (e.g. subclavian, innominate transverse cervical, major neural structures (vagus nerve, middle sympathetic ganglion), inferior thyroid, facial arteries), glands (thyroid, parathyroid (when enlarged), submandibular, parotid), lymph nodes, larynx, esophagus and trachea
    B. Recognize sonographic boundaries of neck levels 1-6
    C. Measure thyroid gland, relevant thyroid nodules, other masses in 3 dimensions
4. Perform diagnostic ultrasound exam for evaluation of signs, symptoms, history concerning for pathology, and formulate differential diagnosis
5. Interpret findings including pathology of the thyroid, parathyroids, lymph nodes, salivary glands, neck masses
6. Thyroid – describe the ultrasonographic risk stratification of thyroid nodules and indications for proceeding with fine needle aspiration (FNA) biopsy, with specific attention to the Thyroid Imaging Reporting and Data System (TI-RADS) and ATA thyroid nodule risk stratification systems.

    Describe the Bethesda Classification for reporting thyroid cytopathology and the associated risk of malignancy for each category within this system

    Describe the cause of phenomena such as comet-tail artifact.
7. Parathyroid – describe the embryology of the parathyroid glands as it relates to their expected and ectopic location. Describe the optimal view and maneuvers for visualizing the parathyroid glands, appreciate that ultrasound evaluation of the parathyroid glands should not be done to diagnose hyperparathyroidism, rather specifically as a localization tool.
8. Formulate non-surgical and surgical management options based on ultrasonographic appearance

9. Describe the role of ultrasound as a surveillance tool for head and neck pathology
10. Utilize ultrasound guidance for needle placement (for FNA, other procedures such as aspirations, injections, thermal ablation)
    A. Long axis (parallel) technique
    B. Short axis (perpendicular) technique
11. Recognize the limitations and scope of application of ultrasound in the head and neck
    A. Determine when to consider additional imaging (especially cross-sectional) e.g.
        i. to evaluate behind bone or air-filled structures
        ii. pathology extending beyond field of view (e.g. substernal),
        iii. invasive disease (for additional soft tissue detail and definition of tissue planes)
        iv. parathyroid localization, deep lobe salivary, parapharyngeal space, retropharyngeal pathology

Recommended Reading

AIUM–ACR–SPR–SRU Practice Parameter for the Performance and Interpretation of a Diagnostic Ultrasound Examination of the Extracranial Head and Neck. J Ultrasound Med 2018; 37:E6–E12 . doi:10.1002/jum.14830

Tessler FN, Middleton Tessler FN, Middleton WD, Grant EG, et al. ACR Thyroid Imaging, Reporting and Data System (TI-RADS): white paper of the ACR TI-RADS committee. J Am Coll Radiol 2017; 14:587–595

Haugen BR, Alexander EK, Bible KC, et al. 2015 American Thyroid Association management guidelines for adult patients with thyroid nodules and differentiated thyroid cancer: the American Thyroid Association Guidelines Task Force on Thyroid Nodules and Differentiated Thyroid Cancer. Thyroid 2016; 26:1–133

Coltrera MD, Ultrasound physics in a nutshell. Otolaryngol Clin North Am. 2010 Dec;43(6):1149-59.

American Head and Neck Society Endocrine Surgery Section update on parathyroid imaging for surgical candidates with primary hyperparathyroidism. Zafereo M, Yu J, Angelos P, Brumund K, Chuang HH, Goldenberg D, Lango M, Perrier N, Randolph G, Shindo ML, Singer M, Smith R, Stack BC Jr, Steward D, Terris DJ, Vu T, Yao M, Tufano RP. Head Neck 2019 Jul; 41(7)2398-2409. Doi: 10.1002/hed.25781.

Yeh MW, Bauer AJ, Bernet VA, Ferris RL, Loevner LA, Mandel SJ, Orloff LA, Randolph GW, Steward DL, for the American Thyroid Association Surgical Affairs Committee Writing Task Force. American Thyroid Association Statement on Preoperative Imaging for Thyroid Cancer Surgery. Thyroid 2015;25(1):3-14. DOI: 10.1089/thy.2014.0096.

Orloff LA, ed. Head and Neck Ultrasonography, Essential and Extended Applications, Second Edition, Plural Publishing Inc., 2016. ISBN-13: 978-1597568586

Shin JH, Baek JH, Chung J, et al. Ultrasonography diagnosis and imaging-based management of thyroid nodules: revised Korean Society of Thyroid Radiology consensus statement and recommendations. Korean J Radiol 2016; 17:370–395

Brito JP, Ito Y, Miyauchi A, Tuttle RM. A Clinical Framework to Facilitate Risk Stratification When Considering an Active Surveillance Alternative to Immediate Biopsy and Surgery in Papillary Microcarcinoma. Thyroid 2016;26(1):144-149.

Tsao GJ, Orloff LA. Clinician-performed thyroid ultrasound-guided fine needle aspiration. Otolaryngol Clin North Am. 2014 Aug;47(4):509-18.

Su HK, Dos Reis LL, Lupo ML, Milas M, Orloff LA, Langer JE, Brett EM, Kazam E, Lee SL, Minkowitz G, Alpert EH, Dewey EH, Urken ML. Striving Toward Standardization of Reporting of Ultrasound Features of Thyroid Nodules and Lymph Nodes: A Multidisciplinary Consensus Statement. Thyroid 2014;24(9):1341-1349. DOI: 10.1089/thy.2014.011

American College of Surgeons Thyroid, Parathyroid and Neck Ultrasound Course. https://learning.facs.org/courses

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