



American Head & Neck Society
National Standardized Head & Neck Fellowship Curriculum
Goals & Objectives and Recommended Syllabus
Version 3.0

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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>)



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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. [Pubmed Link](#)

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 randomized, 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 more aggressive behavior
7. 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
8. Stage different cutaneous malignancies accurately based on AJCC classification system, BWH, and other staging systems
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 surgery, neurosurgery, if skull or skull base involvement is present)



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11. Determine the appropriate surgical margins for primary tumor resection, based on stage for:
 - A. Malignant melanoma
 - B. Squamous cell carcinoma
 - C. Basal cell carcinoma
 - 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. 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
18. Summarize the current status of molecular testing of melanoma
19. Recognize common complications of following parotid surgery, neck surgery, and wide skin undermining
20. Plan appropriate course of action for treating surgical complications of skin cancer surgery
21. Analyze clinical findings and radiologic studies appropriately to distinguish surgically resectable from unresectable cutaneous lesions
22. Discuss indications for orbital exenteration in periocular cutaneous malignancies
23. State what non-surgical options are available to treat aggressive cutaneous malignancies including
 - (a) neoadjuvant options for cutaneous squamous cell carcinoma and basal cell carcinoma
 - (b) indications for adjuvant radiotherapy
 - (c) indications for adjuvant chemotherapy, immunotherapy and targeted therapy
24. Formulate an evidence-based surveillance program for skin cancer and melanoma survivors based on established guidelines (such as NCCN)



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25. Recognize the common signs and symptoms of recurrent disease and plan an appropriate work up
26. Discuss the available options and recommend appropriate systemic therapies, including immunotherapy in a neoadjuvant setting or palliative setting
27. Understand the increased severity of skin cancer in the immunocompromised population and plan the appropriate multi-disciplinary treatment for these patients
28. Recognize incurable diseases and plan appropriate palliative care
29. Describe the indications for a parotidectomy
30. Describe the indications for a neck dissection
31. 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
9. Regional rotational flaps such as submental or supraclavicular
10. Complex scalp reconstruction with free flap (ex: latissimus dorsi, radial forearm)

Recommended Reading:

Malignant Melanoma

Melanoma

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. [MSLT-1] [Pubmed Link](#)

Leiter U, et al. Complete lymph node dissection versus no dissection in patients with sentinel lymph node biopsy positive melanoma (DeCOG-SLT): a multicentre, randomized, phase 3 trial. Lancet Oncol. 2016 Jun;17(6):757-767. [DeCOG-SLT] [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. [MSLT-2] [Pubmed Link](#)

Also in: [Neck](#)

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](#)



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Burmeister BH, et al. Adjuvant radiotherapy versus observation alone for patients at risk of lymph-node field relapse after therapeutic lymphadenectomy for melanoma: a randomized trial. *Lancet Oncol.* 2012 Jun;13(6):589-97. [Pubmed Link](#)

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. [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](#)

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. [Pubmed Link](#)

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](#)

Eggermont AM, et al. Adjuvant Pembrolizumab versus Placebo in Resected Stage III Melanoma. *N Engl J Med.* 2018 May 10;378(19):1789-1801. [Pubmed Link](#)

Tawbi HA, et al. Relatlimab and Nivolumab versus Nivolumab in Untreated Advanced Melanoma. *N Engl J Med.* 2022 Jan 6;386(1):24-34. [Pubmed Link](#)

Luke JJ, et al. Pembrolizumab versus placebo as adjuvant therapy in completely resected stage IIB-IIC melanoma (Keynote – 716): a randomized, double-blind, phase 3 trial. *Lancet* 2022;399:1718-29. [Pubmed Link](#)

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](#)

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. Cemiplimab in locally advanced cutaneous squamous cell carcinoma: results from an open-label, phase 2, single-arm trial. *Lancet Oncol.* 2020 Feb;21(2):294-305. [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. [Pubmed Link](#)

Hughes BGM, et al. Pembrolizumab for locally advanced and recurrent/metastatic cutaneous squamous cell carcinoma (KEYNOTE-629 study): an open-label, nonrandomized, multicenter, phase II trial. *Ann Oncol.* 2021 Oct;32(10):1276-1285. [Pubmed Link](#)

Ferrarotto R, et al. Pilot Phase II Trial of Neoadjuvant Immunotherapy in Locoregionally Advanced, Resectable Cutaneous Squamous Cell Carcinoma of the Head and Neck. *Clin Cancer Res.* 2021 Aug 15;27(16):4557-4565. [Pubmed Link](#)

Schmalbach CE, et al. American Head and Neck Society position statement on the use of PD-1 inhibitors for treatment of advanced cutaneous squamous cell carcinoma. *Head Neck.* 2023 Jan;45(1):32-41. [Pubmed Link](#)

Gross ND, et al. Neoadjuvant Cemiplimab for Stage II to IV Cutaneous Squamous-Cell Carcinoma. *N Engl J Med.* 2022 Oct 27;387(17):1557-1568. [Pubmed Link](#)



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Gross ND, Miller DM, Khushalani NI, Divi V, Ruiz ES, Lipson EJ, Meier F, Su YB, Swiecicki PL, Atlas J, Geiger JL, Hauschild A, Choe JH, Hughes BGM, Schadendorf D, Patel VA, Homsy J, Taube JM, Lim AM, Ferrarotto R, Yoo SY, Mathias M, Han H, Seebach F, Lowy I, Fury MG, Rischin D. Neoadjuvant cemiplimab and surgery for stage II-IV cutaneous squamous-cell carcinoma: follow-up and survival outcomes of a single-arm, multicentre, phase 2 study. *Lancet Oncol.* 2023 Oct 19:S1470-2045(23)00459-X. doi: 10.1016/S1470-2045(23)00459-X. Epub ahead of print. PMID: 37875144.

Merkel Cell Carcinoma

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. [Pubmed Link](#)

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](#)

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. [Pubmed Link](#)

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. [ERIVANCE] [Pubmed Link](#)

Bertrand N, et al. [Vismodegib in neoadjuvant treatment of locally advanced basal cell carcinoma: First results of a multicenter, open-label, phase 2 trial \(VISMONEO study\): Neoadjuvant Vismodegib in Locally Advanced Basal Cell Carcinoma.](#) *EClinicalMedicine.* 2021 Apr 26;35:100844.

Stratigos AJ, et al. Cemiplimab in locally advanced basal cell carcinoma after hedgehog inhibitor therapy: an open-label, multi-centre, single-arm, phase 2 trial. *Lancet Oncol.* 2021 Jun;22(6):848-857 [Pubmed Link](#)

Do you know your guidelines

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](#)

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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 that 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
 - B. Discuss the unique disparities between major and minor salivary gland cancers, including presentation, tumor microenvironment, recurrence rates and prognosis
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 in 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



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- i. Neuro-otology for aggressive parotid malignancies and/or those with complete facial paralysis
 - ii. Head and neck reconstructive surgeon for large bone or soft tissue defects
 - iii. Neurosurgery for skull base involvement
 - iv. Maxillofacial prosthodontics when palate resection is indicated
 - B. Analyze clinical findings and radiologic studies appropriately to distinguish surgically resectable from unresectable salivary lesions
14. Summarize the different approaches to identify and preserve the facial nerve during parotidectomy and outline indications for when facial nerve resection is appropriate
15. 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 Musculoaponeurotic System (SMAS), digastric, submental, supraclavicular, pectoralis, sternocleidomastoid muscle, occipital, lower island trapezius), and free flaps (anterolateral thigh, lateral arm, radial forearm, rectus abdominus, and latissimus)
 - B. Discuss the role of facial nerve reconstruction, including timing, options (primary neuroorrhaphy, cable graft, jump grafts (V-VII, XII-VII), cross face grafting), indications for each option, technique for grafting, donor sites, and use of vein graft conduits
 - C. Outline techniques for eye protection in instances where upper facial nerve paralysis or paresis occurs following surgery
 - D. Recognize static techniques for facial soft tissue suspension (brow lift, static sling to improve oral symmetry and competence, etc)
 - E. Develop a strategy for dynamic facial reanimation including regional (temporalis tendon transfer) or free flap options (gracilis muscle transfer)
16. Determine when a facial nerve drill-out and/or a lateral temporal bone resection is indicated
17. Recognize the utility of frozen section and its limitations in salivary gland tumor management
18. Determine the extent of parotidectomy needed for different benign and malignant salivary tumors (extracapsular dissection, partial superficial parotidectomy, superficial parotidectomy, total parotidectomy, radical parotidectomy)
19. Describe the surgical approach to a parapharyngeal space deep lobe parotid tumor
20. Recognize the benefits and potential cost/risk of the use of facial muscle intra-operative EMG monitoring during parotid surgery
21. Describe the indications and extent of dissection for elective lymphadenectomy in clinically node-negative salivary malignancies, including which histopathologies have the highest risk for the presence of occult nodal metastases
22. Define indications for adjuvant therapy following surgery for salivary gland cancer based on staging, pathologic characteristics, operative findings, and the NCCN guidelines
23. Discuss the role of radiation therapy for recurrent pleomorphic adenoma
24. Diagram and counsel patients about the current status of molecular testing and potential targeted therapy for salivary gland cancers
25. Recognize and manage common complications following parotid and neck surgery
26. For purposes of preoperative patient counseling:



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- 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, trismus, cutaneous sensory loss, and salivary fistula; tumor seeding and recurrence rates; and treatments/prognosis for these conditions.
 - C. Discuss the risks of adjuvant radiation therapy: xerostomia, osteoradionecrosis, dysgeusia, trismus.
 - D. Outline pre-operative findings that may increase the likelihood of facial nerve resection
27. Plan and execute appropriate course of action for treating surgical complications of salivary procedures, including the range of techniques available for facial reanimation as outlined above
28. 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 therapy in salivary gland cancer in accordance with NCCN guidelines
 - D. Role of anti-hormonal and targeted therapy and the availability of clinical trials in the treatment of salivary gland cancer
29. Utilize ancillary services such as nutrition and speech therapy appropriately in treatment planning and long-term care of salivary gland cancer patients
30. Formulate an evidence-based surveillance program for salivary cancer survivors based on established guidelines (such as those by the NCCN)
31. 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. Set up and use of intra-operative facial nerve EMG monitoring
- 2. Parotidectomy
 - A. Superficial
 - B. Deep/total
- 3. Submandibular gland excision (can be part of a level 1 neck dissection)
- 4. Transcervical approach to the parapharyngeal space and infratemporal fossa
- 5. Transmandibular approach to the infratemporal fossa (if applicable)
- 6. Selective, modified radical and/or radical lymphadenectomy
- 7. Parotid bed reconstruction, any technique
- 8. Primary nerve repair
- 9. Cable graft nerve repair in facial nerve injuries
- 10. Sublingual gland excision and excision of ranula



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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](#)

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

[Pubmed Link](#)

Tranchito E et al. [Occult nodal metastasis in major salivary gland malignancy: An update from the National Cancer Database.](#) *Oral Oncol.* 2022 May;128:105829.

Yan F et al. [Elective neck dissection in salivary gland malignancies: Systematic review and meta-analysis.](#) *Head Neck.* 2022 Feb;44(2):505-517.

Gu H et al. [Elective Neck Dissection Improves Regional Control in cN0 Minor Salivary Gland Carcinoma in the Oral Cavity.](#) *J Oral Maxillofac Surg.* 2023 Apr;81(4):504-510

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.

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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.

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Xu W et al. [Recurrent pleomorphic adenoma of the parotid gland: A population-based study with emphasis on re-recurrence and malignant transformation.](#) *Head Neck.* 2023 Mar;45(3):697-705.

Szewczyk M et al. [Prognostic markers in salivary gland cancer and their impact on survival.](#) *Head Neck.* 2019 Sep;41(9):3338-3347.

Palsgrove D et al. [Genomic Analysis of Salivary Gland Cancer and Treatment of Salivary Gland Cancers.](#) *Surg Pathol Clin.* 2021 Mar;14(1):151-163.

Mimica X et al. [Distant metastasis of salivary gland cancer: Incidence, management, and outcomes.](#) *Cancer.* 2020 May 15;126(10):2153-2162.

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

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De Luca P et al. [Parapharyngeal space tumors: a twenty-year single-center retrospective analysis on the effectiveness of transcervical and transoral approaches on local control and disease-specific survival.](#) Am J Otolaryngol. 2023 Mar-Apr;44(2):103741.

Radiation Therapy

Choi SH et al. [Role of postoperative radiotherapy in resected adenoid cystic carcinoma of the head and neck.](#) Radiat Oncol. 2022 Dec 1;17(1):197.

Hong WJ et al. [The effect of adjuvant radiotherapy on clinical outcomes in early major salivary gland cancer.](#) Head Neck. 2022 Dec;44(12):2865-2874.

Park JB et al. [Adjuvant radiotherapy in node-negative salivary malignancies of the parotid gland: A multi-institutional analysis.](#) Radiother Oncol. 2023 Feb 21;183:109554.

Targeted Therapy

Weaver AN et al. [A molecular guide to systemic therapy in salivary gland carcinoma.](#) Head Neck. 2023 May;45(5):1315-1326.

Tazeen S et al. [Molecular and hormonal targets for malignant salivary gland tumors.](#) Oral Oncol. 2022 Dec;135:106225.

Theocharis S et al. [Salivary gland cancer in the era of immunotherapy: can we exploit tumor microenvironment?](#) J. Expert Opin Ther Targets. 2020 Oct;24(10):1047-1059.

Review Articles

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van Herpen C et al. [Salivary gland cancer: ESMO-European Reference Network on Rare Adult Solid Cancers \(EURACAN\) Clinical Practice Guideline for diagnosis, treatment and follow-up.](#) ESMO Guidelines Committee. ESMO Open. 2022 Dec;7(6):100602.

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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.



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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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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.

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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:

Billkay 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.

[Pubmed Link](#)

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.

[Pubmed Link](#)

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.

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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.

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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. Define the anatomy of the nasopharynx and surrounding structures
2. Describe the epidemiology of the nasopharyngeal cancer and discuss the role of EBV.
3. Identify high risk populations for nasopharyngeal carcinoma.
4. Perform a detailed history and physical examination for a patient with a suspected nasopharyngeal lesion
 - a. Detailed cranial nerve exam
 - b. Evaluate for serous middle ear effusion
 - c. Mirror nasopharyngoscopy
 - d. Neck examination
5. Recognize signs and symptoms of early stage and advanced stage nasopharyngeal cancer.
6. 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.
7. Recommend an appropriate, evidence based staging plan for newly diagnosed disease.
 - a. Recommend MRI in appropriate cases
 - b. Recommend PET Scan in appropriate cases
8. Stage nasopharyngeal disease based on the current AJCC staging system.
9. Recommend evidence-based course of treatment based on the stage and current guidelines (NCCN) including induction chemotherapy followed by concurrent chemoradiotherapy
10. Formulate a comprehensive plan for surveillance of nasopharyngeal cancers.
 - a. Discuss the role of EBV titers in surveillance.
11. Recognize common complications of treatment and formulate an appropriate investigative and therapeutic plan:
 - a. Osteoradionecrosis
 - b. Eustachian tube dysfunction
 - c. Hypothyroidism
12. 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)



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- b. Biopsy
13. Identify cases that could benefit from salvage surgery
 14. 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.
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Lee AWM, Ngan RKC, Ng WT, et al. NPC-0501 Trial on the Value of Changing Chemoradiotherapy Sequence, Replacing 5-Fluorouracil With Capecitabine, and Altering Fractionation for Patients With Advanced Nasopharyngeal Carcinoma. *Cancer* 2020;126:33674-3688.

Sun Y, Li WF, Chen NY, Zhang N, Hu GQ, Xie FY, Sun Y, Chen XZ, Li JG, Zhu XD, Hu CS, Xu XY, Chen YY, Hu WH, Guo L, Mo HY, Chen L, Mao YP, Sun R, Ai P, Liang SB, Long GX, Zheng BM, Feng XL, Gong XC, Li L, Shen CY, Xu JY, Guo Y, Chen YM, Zhang F, Lin L, Tang LL, Liu MZ, Ma J. Induction chemotherapy plus concurrent chemoradiotherapy versus concurrent chemoradiotherapy alone in locoregionally advanced nasopharyngeal carcinoma: a phase 3, multicentre, randomized controlled trial. *Lancet Oncol*. 2016 Nov;17(11):1509-1520. doi: 10.1016/S1470-2045(16)30410-7. Epub 2016 Sep 27. PMID: 27686945.

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.
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Recurrence and Surgical Salvage

Chan JY. Surgical management of recurrent nasopharyngeal carcinoma. *Oral Oncol*. 2014;50(10):913-917.
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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.
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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.
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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.
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Liu YP, Wen YH, Tang J, et al. Endoscopic surgery compared with intensity-modulated radiotherapy in resectable locally recurrent nasopharyngeal carcinoma: a multicenter, open-label, randomized, controlled, phase 3 trial. *Lancet Oncol* 2021;22:381-390.

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



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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.

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Riassin-Majed L, Marguet S, Lee AWM, et al. What Is the Best Treatment of Locally Advanced Nasopharyngeal Carcinoma? An Individual Patient Data Network Meta-Analysis. J Clin Oncol 2016;35:498-505.

Chen YP, Ismaila N, Chua ML, et al. Chemotherapy in Combination With Radiotherapy for Definitive-Intent Treatment of Stage II-IVA Nasopharyngeal Carcinoma: CSCO and ASCO Guideline. J Clin Oncol 2021;39:840-859.

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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)



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- 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



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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.

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

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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.

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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.

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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.

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

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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.

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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.

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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.

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Transoral and Robotic Surgery

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

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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.

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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.

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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.

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

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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

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

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

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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.

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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. Describe comorbidities related to laryngeal pathology, including speech and swallowing disturbance, tobacco abuse, and nutritional concerns to be addressed prior to treatment.
10. Discuss and compare the functional outcomes of surgical versus non-surgical treatment approaches for both early and advanced laryngeal malignancies
11. 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)
12. Describe the rationale for upfront total laryngectomy versus organ preservation approaches for treatment of stage III/IV advanced laryngeal cancer
13. Interpret clinical findings and radiologic studies appropriately to distinguish surgically resectable from unresectable laryngeal lesions
14. Recommend an appropriate surgical approach, when applicable, for excision of laryngeal tumors
 - A. Intraoperative airway management options
 - B. Postoperative airway plan
15. Plan appropriate reconstruction for laryngeal resection defects including those that require vascularized regional or free tissue transfer reconstruction



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

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)

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](#)



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

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Moreno MA, Wax MK, Gardner JR, Cannady SB, Graboyes EM, Bewley AF, Dziegielewski PT, Khaja SF, Bayon R, Ryan J, Al-Khudari S, El-Deiry MW, Ghanem TA, Huang A, Patel R, Higgins KM, Jackson RS, Patel UA. Reconstruction for Salvage Laryngectomy With Limited Pharyngectomy. *JAMA Otolaryngol Head Neck Surg*. 2024 Apr 18. doi: 10.1001/jamaoto.2024.0103. Epub ahead of print. PMID: 38635282. [Pubmed Link](#)

Chemoradiation

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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*

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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](#)



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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 appropriate adjuncts at the time of dilation (steroid injection, cryotherapy, mitomycin C)
 2. Describe and plan appropriate cautions during use of CO2 laser.
 - ii. Compare advantages of dilation versus segmental resection and repair



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



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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](#)

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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](#)

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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](#)



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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](#)

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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



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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](#)



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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

Zeleftsky 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 Hypopharyngeal 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):



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- 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, Abdelmeguid 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. [Pubmed 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](#)



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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](#)

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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](#)

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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



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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](#)



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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 preoperative 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.

Snieszek, 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 mucosal head and neck cancers (oral cavity, larynx, hypopharynx) 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. Recognize the role of fine needle aspiration with or without ultrasound guidance in the evaluation of a neck mass
9. Recognize indications for core biopsies and excisional biopsies of neck masses.
 - a. 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
10. Develop a thorough understanding of the incidence of cervical lymph node metastasis by primary tumor site, size, and depth of invasion (for oral cavity tumors)
 - A. Oral cavity
 - 1) oral tongue
 - 2) floor of mouth
 - 3) maxillary alveolus and hard palate
 - 4) buccal mucosa
 - 5) mandible
 - 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



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- F. Major salivary glands
 - G. Thyroid
 - H. Non-Melanoma Skin Cancer
 - I. Melanoma
11. Understand metastatic patterns to less common nodal basins (parotid, sub occipital and retropharyngeal) and therapeutic approaches to disease in these subsites.
 12. 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
 13. Describe the drainage patterns of different tumors sites to include cutaneous, oral cavity, nasopharynx, oropharynx, hypopharynx, larynx, and thyroid
 14. Recognize when bilateral metastases are a concern and recommend appropriate treatment
 15. Discuss when a central neck dissection is indicated for thyroid cancer
 16. Discuss when a lateral neck dissection is indicated for thyroid cancer and which levels should be dissected
 17. Describe nodal staging for thyroid cancers based on the AJCC classification system
 18. Describe and list the indications for neck dissection and levels of dissections for salivary gland malignancies
 19. Describe and list the indications for neck dissection and levels of dissections for non-melanoma cutaneous malignancies of the head and neck (including lip)
 20. 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
 21. Describe the current indications for adjuvant treatment based on pathologic nodal staging and operative findings and recommend appropriate adjuvant treatment
 22. Recognize neck defects requiring regional and free flap reconstruction
 - A. auriculectomy/parotidectomy
 - B. radical neck dissection
 - C. salvage neck
 23. Consent a patient for neck dissection with appropriate recognition of associated risks and complications
 24. Recognize and manage common complications of neck dissection (hematoma, chyle leak, cranial neuropathy)
 25. Recognize the common signs and symptoms of recurrent regional disease and plan an appropriate work up
 26. Analyze clinical findings and radiologic studies appropriately to distinguish surgically resectable from unresectable adenopathy



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Process:	By the end of fellowship the fellows have participated in a minimum number of neck procedures based on the following list:
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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
9. Retropharyngeal node excision

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



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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](#)

Miscellaneous

Gross ND, Ellingson TW, Wax MK, Cohen JI, Andersen PE. Impact of retropharyngeal lymph node metastasis in head and neck squamous cell carcinoma. *Archives of Otolaryngology–Head & Neck Surgery*. 2004 Feb 1;130(2):169-73. <https://pubmed.ncbi.nlm.nih.gov/30620443/>

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](#)

Shah JP. Patterns of cervical lymph node metastasis from squamous carcinomas of the upper aerodigestive tract. *Am J Surg* 1990;160(4): 405-409. [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. Characterize the blood supply to the thyroid and parathyroid glands
 - D. 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. Describe somatic and germline molecular mutations known to be associated with the different types of thyroid malignancies
7. Formulate non-surgical (including ablative approaches; alcohol ablation, radiofrequency ablation) and surgical treatment options for a benign thyroid nodule
8. Outline the risks and benefits of the therapeutic options for the different forms of hyperthyroidism
9. 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



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- B. Outline an approach to airway management in individuals with suspected anaplastic thyroid cancer
- 10. Stage different thyroid malignancies accurately based on AJCC classification system
- 11. Recognize when to consider additional work up
 - A. Utility of preoperative ultrasound to assess for concerning adenopathy in the central and lateral necks
 - B. Indications for CT of the chest, MRI and/or PET CT
 - C. Panendoscopy
- 12. 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
- 13. List the indications for elective neck dissection in N0 thyroid malignancies and how this might differ based on primary disease pathology
- 14. Outline an appropriate management strategy for patients with N+ disease
- 15. Outline the risks of primary and revision surgery for thyroid malignancies
- 16. Discuss the benefits and limitations of recurrent laryngeal nerve monitoring
- 17. 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. Describe the approach to a patient with loss of nerve function on the 1st side in planned bilateral surgery
 - C. 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
- 18. Relate the current approach to anaplastic cancers, including advanced, unresectable disease
- 19. Incorporate endocrinology in the multidisciplinary care of benign and malignant thyroid diseases
- 20. Perform core procedures in surgery on the thyroid gland as defined by the curriculum, based on the attestation of the program director
- 21. Identify the classic histopathologic findings for papillary thyroid cancer, follicular thyroid cancer, medullary thyroid cancer, anaplastic thyroid cancer, and thyroid lymphoma
- 22. 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



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- 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
23. Describe and discuss the status of molecular testing of thyroid cancer
24. Recognize common complications of thyroid and lateral neck surgery
25. Outline an approach to evaluation and management for perioperative hypoparathyroidism after thyroid surgery
26. Plan appropriate course of action for treating surgical complications of thyroid procedures
27. Analyze clinical findings and radiologic studies appropriately to distinguish surgically resectable from unresectable thyroid lesions
28. Discuss and recommend non-surgical options in the treatment of thyroid cancers
29. Utilize ancillary services such as nutrition and speech therapy appropriately in treatment planning and long-term care of thyroid cancer patients
30. 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)
31. 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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[AHNS Journal Club](#)



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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.
[Pubmed Link](#)

Matsuzo 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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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 Nov;25(11):1217-23.
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Nikiforov YE, Seethala RR, Tallini G, et al. Nomenclature Revision for Encapsulated Follicular Variant of Papillary Thyroid Carcinoma: A Paradigm Shift to Reduce Overtreatment of Indolent Tumors. *JAMA Oncol*. 2016;2(8):1023-1029. doi:10.1001/jamaoncol.2016.0386
<https://pubmed.ncbi.nlm.nih.gov/27078145/>

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.
[Pubmed Link](#)

Zhao X, Wang JR, Dadu R, et al. Surgery After BRAF-Directed Therapy Is Associated with Improved Survival in BRAFV600E Mutant Anaplastic Thyroid Cancer: A Single-Center Retrospective Cohort Study. *Thyroid*. 2023;33(4):484-491. doi:10.1089/thy.2022.0504, 10.1089/thy.2022.0504
<https://pubmed.ncbi.nlm.nih.gov/36762947/>

Review Articles

Haugen BR, 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 Jan;26(1):1-133.
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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.
[Pubmed Link](#)

Lubitz CC, Sadow PM, Daniels GH, Wirth LJ. Progress in Treating Advanced Thyroid Cancers in the Era of Targeted Therapy. *Thyroid*. . 2021;31(10):1451-1462. doi:10.1089/thy.2020.0962, 10.1089/thy.2020.0962
<https://pubmed.ncbi.nlm.nih.gov/33860688/>

Shonka DC Jr, Ho A, Chintakuntlawar AV, et al. American Head and Neck Society Endocrine Surgery Section and International Thyroid Oncology Group consensus statement on mutational testing in thyroid cancer: Defining advanced thyroid cancer and its targeted treatment. *Head Neck*. . 2022;44(6):1277-1300. doi:10.1002/hed.27025, 10.1002/hed.27025



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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
 - a. Detail their anatomic relationship to the recurrent laryngeal nerve.
 - b. Describe how this influences the location of the superior and inferior parathyroid glands including common ectopic (and supernumerary) locations
2. Describe the physiologic cycle of PTH production, half-life and explain its clinical significance
3. Describe the role of PTH and its physiologic actions on the various organ systems specifically bones, kidneys, and the intestinal system.
4. Describe the mechanisms behind calcium and phosphate homeostasis, and the role of Vitamin D.
5. Identify the histopathologic differences between normal parathyroid gland, carcinoma, adenoma, and multi-glandular disease.
6. Perform a complete history and physical exam of a patient with hyperparathyroidism.
 - a. Symptoms including bone pain, fatigue, constipation, abdominal pain, and depression
 - 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
7. 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 to assess for Familial Hypocalciuric Hypercalcemia
 - d. Vitamin D levels
8. 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



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9. List the indications for surgery in patients with hyperparathyroidism (symptomatic and asymptomatic) and formulate an appropriate surgical plan based on national guidelines
10. Appropriately treat Vitamin D deficiency
11. Discuss the role of intraoperative recurrent laryngeal nerve monitoring
12. Discuss how to utilize intraoperative PTH monitoring as a measure of success of surgery
13. Discuss the surgical management of solitary adenoma vs multigland disease, and identify which patients are candidates for a minimally invasive/unilateral approach
14. Discuss the role of parathyroid auto-transplantation and cryopreservation and perform these procedures in appropriate patients
15. Diagnose secondary hyperparathyroidism and appropriately plan treatment accordingly
16. 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
17. Counsel patients regarding the possibility of surgical failure and the need for reoperation in the future
18. 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. Discuss the problems with parathyroid FNA
 - e. Utilize frozen section assessment
 - f. Select lateral vs central approach
 - g. Discuss radio-guided parathyroid surgery and offer this technique in appropriate cases.
19. Recognize the clinical signs suspicious for diagnosis of parathyroid carcinoma
20. Discuss the aggressive nature of parathyroid carcinoma and its surgical management
21. Describe the setup and instruments required for endoscopic parathyroid surgery
22. Discuss and recommend non-surgical options (in addition to observation) available to patients who are not surgical candidates or who elect to defer surgery
 - a. Bisphosphonates
 - b. Calcimimetics
 - c. Ethanol ablation
23. Review the pathophysiology of ‘hungry bone syndrome’ and the management of post-surgical hypocalcemia.
24. Understand hyperthyroidism jaw tumor syndrome (HPT-JT), its genetic abnormality and management
25. Recognize the importance of multimodality management of parathyroid disease and establish working relationship with endocrinologist in management of parathyroid disease



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

1. Set up and intra-operative use of the EMG for intra-operative recurrent laryngeal nerve monitoring
2. Central neck exploration with parathyroidectomy
3. Parathyroid re-implantation (either in forearm, neck or pectoralis muscles)

Recommended Reading

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Babwah F, Buch HN. Normocalcaemic primary hyperparathyroidism: a pragmatic approach. *J Clin Pathol*. 2018;71(4):291-297. <https://doi.org/10.1136/jclinpath-2017-204455>

Hollowoa BR, Spencer HJ 3rd, Stack BC Jr. Normocalcemic and Normohormonal Primary Hyperparathyroidism: Laboratory Values and End-Organ Effects. *Otolaryngol Head Neck Surg*. 2021 Sep;165(3):387-397. Epub 2021 Jan 19. PMID: 33461421. <https://doi.org/10.1177/0194599820983728>

Stephen AE, Mannstadt M, Hodin RA. Indications for Surgical Management of Hyperparathyroidism: A Review. *JAMA Surg*. 2017;152(9):878-882. <https://doi.org/10.1001/jamasurg.2017.1721>

Sethi N, England RJA. Parathyroid surgery: from inception to the modern day. *Br J Hosp Med (Lond)*. 2017;78(6):333-337. <https://doi.org/10.12968/hmed.2017.78.6.333>

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<https://bestpractice.bmj.com/topics/en-gb/1107?q=Secondary%20hyperparathyroidism>

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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. Perform a thorough history of prior head and neck surgery and (chemo)radiation therapy and the impact this may have on the need for and approach to reconstruction.
 - a) Review of operative notes from prior open head and neck surgical procedures
 - b) Recognize aspects of history that may impact approach to reconstruction (Ex: advanced medical co-morbidities, frailty personal or family history of coagulopathies, history of deep venous thrombosis)
2. Perform a thorough physical examination
 - a) Anticipate surgical defects based on pre-operative physical exam and imaging characteristics
 - b) Recognize the impact of prior incisions, local tissue quality, and body habitus on approach to reconstruction
3. Describe and discuss general reconstructive goals for head and neck defects, including functional restoration, durability, optimal aesthetics, relative donor site morbidity, and impact on quality of life
4. Indicate how these goals are impacted by various reconstructive approaches
5. Recognize the importance of patient-specific goals in the process of reconstructive planning (patient's occupation, base-line functional deficits, etc)
6. 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
 - 8) Buccal/Vestibule of mouth Defects
 - 9) Retromolar Trigone cancers
 - B. Oropharyngeal
 - 1)Palatal Reconstruction
 - 2)Lateral Pharynx Reconstruction
 - 3)Hemi/subtotal tongue base reconstruction
 - C. Total laryngectomy
 - D. Laryngopharyngectomy
 - E. Infrastructure maxillectomy



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- F. Total maxillectomy including orbital floor, with orbit preservation
 - 1) Include indications for maxillary obturator use
 - G. Total maxillectomy with orbital exenteration
 - H. Resection of anterior skull base
 - I. Total parotidectomy defect with or without facial nerve resection
 - J. Nasopharyngectomy defects
 - K. Facial reanimation
7. 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
 8. Discuss the relative importance of nutrition in reconstruction; identify methods to optimize nutrition prior to advanced reconstructive surgery
 9. Describe the angiosome concept and discuss how it impacts flap selection and design
 10. Outline options for suitable recipient vessels (including internal mammary vessels) and recognize with pre-operative neck imaging is needed to assess for their availability
 11. 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
 12. 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
 - a) Perform an appropriate physical examination in the post-operative period to recognize complications such as arterial or venous insufficiency, hematoma, and wound infection with or without fistula
 13. Explain the concept of ischemia-reperfusion injury and understand the relevance to reconstruction with microvascular free tissue transfer
 14. Describe the methods of antithrombotic prophylaxis; explain the physiology of each approach and its utility after microvascular free tissue transfer
 15. Outline the indications and methodology for leech therapy; describe the medical implications (e.g., blood loss, infection, etc.) and appropriate management
 16. List the complications of various reconstructive approaches and describe the appropriate management strategy for each
 17. Formulate a plan to manage flap failure including initial approach to revascularization and subsequent secondary reconstructive approaches for unsalvageable flaps
 18. 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



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- 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
 - I. Medial Sural
 - J. Gracilis
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. Recommend when a local or pedicled flap is an appropriate alternative to free tissue
8. Reach proficiency level in harvest and preparation of the major regional pedicled flaps: pectoralis major, latissimus dorsi, supraclavicular, submental island, sternocleidomastoid and deltopectoral flaps
9. 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)
10. Formulate a plan to manage partial and total soft tissue flap failure with respect to long term function
11. 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:



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- 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
 - F. Need for versatile chimeric reconstruction
3. Define the anatomy and relevant vascular and neuronal elements of fibula, lateral scapula, iliac crest, scapula tip, medial femoral condyle, anterolateral thigh, 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 rigid fixation for 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 formulate a plan for management

Process: At the completion of the fellowship experience, the trainee should have participated in 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
- Pericranial

Free flaps:

- Radial forearm
- Anterolateral thigh
- Fibula
- Scapula
- Scapula tip
- Latissimus dorsi

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

- oral cavity (soft tissue)



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- 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](#)

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Mascha F, et al. Accuracy of computer-assisted mandibular reconstructions using patient-specific implants in combination with CAD/CAM fabricated transfer keys. *J Craniomaxillofac Surg*. 2017 Nov;45(11):1884-1897. [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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Blumberg JM et al. Mandibular reconstruction with the scapula tip free flap. *Head Neck*. 2019 Jul;41(7):2353-2358

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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. Employ basic and advanced techniques of facilitating medical decision making
 - a. Interpret patient-centric, goal-oriented risks and benefits for individual patient decisions
 - b. Prepare for and effectively share the delivery of difficult information (breaking bad news), active listening, engagement
 - c. Define and navigate motivational interviewing; shared decision making; risk stratification; outcomes and discharge destination prognostication



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6. Define the doctrine of double effect and explain how it is applied in the contexts of pain management and proportional palliative sedation
7. Use evidence-based decision-making for emergency airway management and other preference- and time-sensitive decisions
8. 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. Collaborate 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 a 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
9. 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. Distinguish between public health ethics and clinical ethics
 - A. Recognize the challenges of scarce resource allocation and rationing with respect to shortages and public health emergencies
 - B. Evaluate the impact of national policy on healthcare at the micro and macro levels
 - C. 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



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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 multimodal pain medication considering both the benefits and the risks of opioids
5. Discussion and observation of the process of withdrawal of technology to allow natural death
6. Informed consent discussions for clinical trials
7. Completed IRB applications 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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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.

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

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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.

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Mazor KM, Simon SR, Gurwitz JH. Communicating With Patients About Medical Errors. Arch Intern Med. 2004;164(15):1690-7.

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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



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Recommended Reading

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

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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 Med 2016;375(11), 1054-1067.

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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



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- 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 (e.g. 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](#)



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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.

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

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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.

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

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

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

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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 and technical limitations, patient selection, perioperative management and the role of robotic surgery in the context of multidisciplinary cancer care.

Objective: By the end of fellowship the fellow should be familiar with:

1. Preoperative evaluation for transoral robotic surgery (TORS)
 - A. Describe important aspects of the history that may evaluate for candidacy for transoral robotic surgery
 - B. Outline current FDA approved indications for TORS
 - C. Describe relative contraindications (patient/anatomic and tumor factors) for TORS, including findings on physical exam and radiographic evaluation
2. Describe the role of transoral surgical resection in management of cancers of the oropharynx and larynx
3. Describe the role of transoral surgical resection in diagnosis and management of head and neck cancers of unknown primary
4. Outline operating room safety, set up, and instrumentation for TORS
5. Outline the differences of transoral surgery systems (Medrobotics® Flex® System and Da Vinci® system)
6. Determine appropriate airway management for patients undergoing transoral robotic surgery
7. Describe the steps for the following procedures:
 - A. Robotic Radical Tonsillectomy
 - B. Robotic Tongue Base Resection
 - C. Robotic Supraglottic Laryngectomy
8. Recognize the key points of peri-operative management and complications of TORS and be able to provide informed consent to patients considering this approach
9. Compare the functional/quality of life outcomes and oncologic outcomes with transoral robotic surgical resection with or without adjuvant therapy and definitive non-surgical therapy
10. Outline indications for adjuvant therapy in patients undergoing transoral robotic surgical resection of oropharyngeal and laryngeal tumors
11. Compare and contrast transoral surgical versus non-surgical management approaches for oropharyngeal and supraglottic cancer
12. Recognize the role of transoral robotic resection in an effort to de-escalate adjuvant therapy in patients with HPV-related oropharyngeal cancer
13. Outline routes for robotic surgery of the thyroid gland
 - A. Recognize thyroid pathologies and patient factors that may make a patient a candidate for robotic thyroid or parathyroid surgery
 - B. Outline the potential benefits and associated risks for the different soft tissue approaches for robotic thyroidectomy or parathyroidectomy
14. Recognize the potential for transoral robotic surgical approaches to parapharyngeal space tumors
 - A. Outline patient and tumor factors that may make a patient a candidate for this approach
 - B. Contrast the benefits and potential risks of the transoral robotic versus transcervical approach to the parapharyngeal space

Process: By the end of fellowship the fellows have familiarity with the key steps of robotic surgical procedures based on the following list:

1. Transoral robotic radical tonsillectomy
2. Transoral robotic base of tongue resection



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3. Transoral robotic supraglottic laryngectomy
4. Transoral robotic thyroid lobectomy
5. Transaxillary thyroidectomy or parathyroidectomy
6. Transoral robotic parapharyngeal space tumor excision

In addition, fellows should complete:

1. Relevant online training for the robotic system at their respective institution
2. Robotic simulation opportunity, if available at their institution

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.

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

Olaleye O, Jeong B, Switajewski M, Ooi EH, Krishnan S, Foreman A, Hodge JC. Trans-oral robotic surgery for head and neck cancers using the Medrobotics Flex® system: the Adelaide cohort. J Robot Surg. 2022 Jun;16(3):527-536.

Sharbel DD, Abkemeier M, Sullivan J, Zimmerman Z, Albergotti WG, Duvvuri U, Byrd JK. Transcervical arterial ligation for prevention of postoperative hemorrhage in transoral oropharyngectomy: Systematic review and meta-analysis. Head Neck. 2021 Jan;43(1):334-344.

Concurrent vs. staged neck dissection

Ramchandani JP, Brunet A, Skalidi N, Faulkner J, Rovira A, Simo R, Jeannon JP, Arora A. Neck Dissection Timing in Transoral Robotic or Laser Microsurgery in Oropharyngeal Cancer: A Systematic Review. OTO Open. 2022 Oct 11;6(4):2473974X221131513.

Outcomes: Oropharynx

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 AC, Theurer J, Prisman E, Read N, Berthelet E, Tran E, Fung K, de Almeida JR, Bayley A, Goldstein DP, Hier M, Sultanem K, Richardson K, Mlynarek A, Krishnan S, Le H, Yoo J, MacNeil SD, Winquist E, Hammond JA, Venkatesan V, Kuruvilla S, Warner A, Mitchell S, Chen J, Corsten M, Johnson-Obaseki S, Odell M, Parker C, Wehrli B, Kwan K, Palma DA. Randomized Trial of Radiotherapy Versus Transoral Robotic Surgery for Oropharyngeal Squamous Cell Carcinoma: Long-Term Results of the ORATOR Trial. J Clin Oncol. 2022 Mar 10;40(8):866-875.

Ferris RL, Flamand Y, Weinstein GS, Li S, Quon H, Mehra R, Garcia JJ, Chung CH, Gillison ML, Duvvuri U, O'Malley BW Jr, Ozer E, Thomas GR, Koch WM, Gross ND, Bell RB, Saba NF, Lango M, Méndez E, Burtness B. Phase II Randomized Trial of Transoral Surgery and Low-Dose Intensity Modulated Radiation Therapy in Resectable p16+ Locally Advanced Oropharynx Cancer: An ECOG-ACRIN Cancer Research Group Trial (E3311). J Clin Oncol. 2022 Jan 10;40(2):138-149.

Larynx/Hypopharynx

Lechien JR, Baudouin R, Circiu MP, Chiesa-Estomba CM, Crevier-Buchman L, Hans S. Transoral robotic cordectomy for glottic carcinoma: a rapid review. Eur Arch Otorhinolaryngol. 2022 Nov;279(11):5449-5456.



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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

Lechien JR, Fakhry N, Saussez S, Chiesa-Estomba CM, Chekkoury-Idrissi Y, Cammaroto G, Melkane AE, Barillari MR, Crevier-Buchman L, Ayad T, Remacle M, Hans S. Surgical, clinical and functional outcomes of transoral robotic surgery for supraglottic laryngeal cancers: A systematic review. Oral Oncol. 2020 Jun 10;109:104848.

Thyroid, Skull base

Pangal DJ, Cote DJ, Ruzevick J, Yarovinsky B, Kugener G, Wrobel B, Ference EH, Swanson M, Hung AJ, Donoho DA, Giannotta S, Zada G. Robotic and robot-assisted skull base neurosurgery: systematic review of current applications and future directions. Neurosurg Focus. 2022 Jan;52(1):E15.

Kim DH, Kim SW, Kim GJ, Basurrah MA, Hwang SH. Efficacy and Safety of Minimally Invasive Thyroid Surgery: A Network Meta-Analysis. Laryngoscope. 2023 Mar 9.

Unknown Primary

Farooq S, Khandavilli S, Dretzke J, Moore D, Nankivell PC, Sharma N, Almeida JR, Winter SC, Simon C, Paleri V, De M, Siddiq S, Holsinger C, Ferris RL, Mehanna H. Transoral tongue base mucosectomy for the identification of the primary site in the work-up of cancers of unknown origin: Systematic review and meta-analysis. Oral Oncol. 2019 Apr;91:97-106.

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, enlarged parathyroid, 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
 - D. Identify vocal cord mobility using ultrasonography
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:
 - A. 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 American Thyroid Association (ATA) thyroid nodule risk stratification systems.
 - B. Describe the Bethesda Classification for reporting thyroid cytopathology and the associated risk of malignancy for each category within this system.



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C. Describe the cause of phenomena such as comet-tail artifact, and the utility of ultrasound elastography in malignancy risk stratification.

7. Parathyroid:

A. Describe the embryology of the parathyroid glands as it relates to their expected and ectopic location.

B. 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

Process: By the end of fellowship, the fellows have participated in a minimum number of diagnostic neck ultrasound and ultrasound guided procedures based on the following list:

1. Diagnostic ultrasound
 - a. Neck levels 1-6
 - b. Thyroid and parathyroid
 - c. Parotid and submandibular gland
 - d. Vocal cord mobility
2. Ultrasound guided fine needle aspiration
 - a. Neck mass
 - b. Thyroid nodule
 - c. Salivary gland mass

Recommended Reading

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

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



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Bhatia KSS, Dai YL. Routine and Advanced Ultrasound of Major Salivary Glands. *Neuroimaging Clin N Am* 2018; 28(2): 273-2923.

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

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.

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

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

Floridi C, Cellina M, Buccimazza G et al. Ultrasound Imaging Classifications of thyroid nodules for malignancy risk stratification and clinical management: state of the art. *Gland Surg* 2019; 8(supp 3): S 233-244.

Noel JE, Orloff LA, Sung K. Laryngeal Evaluation during the COVID-19 Pandemic: Transcervical Laryngeal Ultrasonography. *Otolaryngol Head Neck Surg.* 2020 07;163(1):51-53. <https://doi.org/10.1177/0194599820922984>

Orloff LA, Noel JE, Stack BC Jr, Russell MD, Angelos P, Baek JH, Brumund KT, Chiang FY, Cunnane MB, Davies L, Frasoldati A, Feng AY, Hegedüs L, Iwata AJ, Kandil E, Kuo J, Lombardi C, Lupo M, Maia AL, McIver B, Na DG, Novizio R, Papini E, Patel KN, Rangel L, Russell JO, Shin J, Shindo M, Shonka DC Jr, Karcioğlu AS, Sinclair C, Singer M, Spiezia S, Steck JH, Steward D, Tae K, Tolley N, Valcavi R, Tufano RP, Tuttle RM, Volpi E, Wu CW, Abdelhamid Ahmed AH, Randolph GW. Radiofrequency ablation and related ultrasound-guided ablation technologies for treatment of benign and malignant thyroid disease: An international multidisciplinary consensus statement of the American Head and Neck Society Endocrine Surgery Section with the Asia Pacific Society of Thyroid Surgery, Associazione Medici Endocrinologi, British Association of Endocrine and Thyroid Surgeons, European Thyroid Association, Italian Society of Endocrine Surgery Units, Korean Society of Thyroid Radiology, Latin American Thyroid Society, and Thyroid Nodules Therapies Association. *Head Neck.* 2022 Mar;44(3):633-660. doi: 10.1002/hed.26960. Epub 2021 Dec 23. PMID: 34939714.

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