OHSU Department of Orthopaedics and Rehabilitation

Rotation Specific Objectives for Resident Education

Rotation: Orthopaedic Oncology Resident year-in-training: PGY3

Attending Physicians

1. **James Hayden, MD**
Orthopedic Surgeon, ABOS Board Certified
Fellowship: Orthopaedic Oncology

2. **Yee-Cheen Doung, MD**
Orthopaedic Surgeon, ABOS Board Certified
Fellowship: Orthopaedic Oncology

3. **Kenneth Gundle, MD**
Orthopaedic Surgeon, ABOS Board Certified
Fellowship: Orthopaedic Oncology

Overview

Orthopedic oncology is a unique subspecialty within orthopedics. We will see patients of all ages. We will deal with problems involving the upper extremities, lower extremities, pelvis, and spine. We will see a variety of tumors, including benign and malignant primary bone tumors, benign and malignant soft tissue tumors, and metastatic tumors. We may also see a variety of metabolic bone abnormalities, skeletal dysplasias, and genetic disorders.

The oncology service operates throughout the body, including upper extremity, pelvis, lower extremity, and occasionally the spine. We will rarely use a standard approach for our operations. We will use a variety of methods for bony reconstructions, including PMMA, allograft bone, autograft bone, and oncology prosthesis. We may use standard plates and rods, as well as specially designed plates and rods for any area of the body. We can use a variety of techniques for soft tissue reconstruction, including complex closures, negative pressure wound vacs, split thickness skin grafts, and rotation flaps. Some of our surgeries will require other surgical teams, including vascular for vascular reconstructions or large vascular injuries, microvascular for free flaps, and the spine service for spinal instrumentation. We occasionally do combined cases with the general surgery and thoracic surgery services as well.

Learning Objectives

- Be familiar with the clinical presentation of the most common bone and soft tissue tumors.
- Be familiar with the imaging appearance of the most common bone and soft tissue tumor.
- Understand the principles of biopsies including what type of biopsy should be done and how it should be done.
- Be familiar with the staging studies required for the common bone and soft tissue tumors.
- Understand the basic treatment principles for the common bone and soft tissue tumors.
- Understand the importance of a team approach for treating complex bone tumors.

- Understand the importance and schedules for long-term surveillance of common bone and soft tissue tumors.
- Understand basic science principles as they apply to bone and soft tissue tumors
- Understand the diagnosis and procedural coding for common bone and soft tissue tumors and the resections.
- Common tumors should be considered to include but not limited to:
    1. Benign bone tumors: unicameral bone cyst, aneurysmal bone cyst, giant cell tumor of bone, osteoid osteoma, osteoblastoma, enchondroma, chondroblastoma, eosinophilic granuloma, and fibrous dysplasia.
    2. Benign soft tissue tumors: lipoma, myxoma, aggressive fibromatosis
    3. Malignant bone tumors: osteosarcoma, Ewings sarcoma, chondrosarcoma
    4. Lymphoid tumors: lymphoma of bone, multiple myeloma
    5. Metastatic tumors to bone: breast, prostate, lung, renal, thyroid
    6. Malignant soft tissue tumors: soft tissue sarcoma

Clinical Expectations

Each resident will rotate through the tumor service only once during residency, consisting of a roughly 10 week block. The resident on the service will alternate every two weeks between Dr. Hayden's service and Dr. Doung and Dr. Gundle's combined service. Every two weeks the resident will switch back until the rotation's completion.

When a DO resident is visiting, they will be on the opposite team from the OHSU resident. There is a DO resident for 24 weeks each year.

Dr. Hayden's Service
Monday: Clinic
Tuesday: Joints conference (0645-0730); OR
Wednesday: Clinic, Tumor Board, Multidisciplinary Clinic; at least one Wednesday per month, Dr. Hayden is given block time at Doernbecher OR.
Thursday: OR
Friday: Admin day with cases frequently added on. 1st Friday every month is clinic.

Dr. Doung and Gundle's Service
Monday: Clinic with Dr. Doung
Tuesday: Joints conference (0645-0730); OR with Dr. Doung
Wednesday: Clinic, Tumor Board, Multidisciplinary Clinic.
Thursday: OR, with either Dr Doung or Dr. Gundle (PA will cover the other)
Friday: Admin day with cases frequently added on

Management of Inpatients

The resident is responsible for daily rounds and appropriate rounding coverage on weekends. Weekend rounding on Joints and Tumor patients is split up between the Joints and Tumor

residents. The resident will coordinate tumor service admissions from the ED with the consult/trauma team.

Clinic

The residence is expected to attend all of their attending's clinics for orthopedic oncology. This includes the clinics that are exclusively orthopedic oncology and those that are multidisciplinary with medical oncology and radiation oncology.

The clinical time is the best opportunity for the resident to understand the patient histories, evaluate initial diagnostic studies, understand treatment protocols, and understand long-term surveillance protocols. It is also a great time to go over imaging with the attending, differential diagnoses, etc.

The resident is expected to attend the sarcoma tumor board that takes place immediately prior to the multidisciplinary sarcoma clinic. This is an opportunity for the resident to see how treatment plans for complex problems are designed as well as review the imaging and pathology with attending from these disciplines.

Operating Room

The resident is expected to attend operative cases with the orthopedic oncology attending. As this is a rotation for a junior resident and the tumor resections and reconstructions are often very complex, the majority of the operative experience will be as an assistant. The extent of resident involvement in cases will heavily depend on the resident's skill level. At the end of the rotation, the resident is expected to function as the primary surgeon for open biopsies, prophylactic fixation of impending pathologic fractures of long bones, and many benign bone and soft tissue tumors. Due to the inherent difficulties and risks associated with surgery on malignant tumors, it is unlikely that the resident will be primary surgeon for these cases.
It is expected that the residents prepare for each surgical case. Anatomy is extremely important for the tumor surgeon. It is expected that the resident will be well versed in anatomy. Preparation for each case should also include general reading about the tumor and its treatment, a review of the patient history and labs, and an understanding of the surgical approach.

Summary

The oncology rotation is designed based on a mentorship model, with equal time spent between attendings, two weeks at a time. This is a busy service with roughly equal time scheduled between clinic and the OR. Add on cases are frequent some weeks, so long hours should not be unexpected. Time spent in the hospital per week is generally between 60-80 hours.

Orthopaedic Oncology Rotation Goals & Mechanisms/Core Competencies

Patient Care

- Attain competence in performing a comprehensive evaluation of new and return patients in clinic. Comprehensive and concise history, physical examination, and diagnostic test ordering and interpretation are emphasized.
- A comprehensive evaluation of oncology and other complicated patients, including formulation of a complete treatment plan:
    1. History & Physical
    2. Ordering of appropriate studies/consults
    3. Diagnosis
    4. Therapy (Non-Op, Medicinal, Surgical and Post-operative)

Medical Knowledge

At the conclusion of a rotation, each resident is expected to have a basic understanding of:

- Case based learning, focusing on topically driven reading
- Preparation for surgical care by learning surgical approaches.
- Prepare patients for operative and nonoperative management and empathetically guide them through the recovery process of each.
- Familiarize oneself with current standards of care by reading Orthopedic Knowledge Update (OKU), including the edition on orthopaedic oncology.
- Be thoroughly knowledgeable of basic textbook information and current journal articles on orthopaedic specialties pertinent to this rotation.
- Read and understand the key orthopaedic literature on the orthopaedic specialties pertinent to this rotation.
- Understand the techniques and modalities used by physical therapists and learn how to provide appropriate guidance and coordination of care for common and complex rehabilitation guidelines
- Understand the role of the Orthopaedic Oncologist as part of the health care team and our relationship to the working environment with; Nurses, PA's, PT's, OT's, Orthotists, other healthcare professionals, & families
- Understand the presentation, manifestation and therapy of the following common problems that present or are referred to the orthopaedic oncology service (e.g.): benign and malignant soft tissue tumors; benign and malignant bone tumors; infections, including infected prostheses; total joints in need of revision; metabolic bone diseases; other musculoskeletal disorders.

Practice-Based Learning and Improvement

- Participate as an assistant in surgical procedures and as primary surgeon where level of skill/complexity of the case makes this appropriate.
- Demonstrate ability to effectively perform preoperative planning for surgical procedures, even complex cases.
- Set up an operating room for surgery; know which implants and trays to request; know how to position patients (know risks, pros and cons for each position)
- Understand and direct the role/limitations of Operating personnel: Scrubs, Nurses, Charge nurse, Company representatives, Schedulers and Surgeons.
- Identify and clearly communicate the indication for every operation; Prior to scrubbing to the attending and students
- Know the algorithm for several techniques for each indication (if applicable)

- Be prepared in advance to complete the operation
- Understand the choices for anesthesia and indications
- Be ready to describe how to change course mid-operation

- Assist, direct, or perform the following procedures:
  1. Needle biopsies in clinic
  2. Open biopsies (emphasis on anatomy and principles)
  3. Excisional biopsies
  4. Wide resection of tumors
  5. Irrigation and debridement
  6. Total knee arthroplasty
  7. Revision total knee arthroplasty
  8. Total hip arthroplasty
  9. Revision total hip arthroplasty
  10. Amputations, including below knee, through knee, above knee, hip disarticulation, among others
  11. Prophylactic stabilization of long bones and the pelvis
  12. Fixation of pathologic fractures throughout the body
- Plan a complete rehabilitation program for all post-operative patients.
- Plan follow-up visits, PT, pain management and return to limits

Professionalism

- Learn to organize patient clinic practice while participating in more advance patient evaluation and management activities.
- Coordinate signout and communication with NPs, Pas, and other residents as appropriate. This includes especially time away such as vacation and conference time. Daily check-ins with the PA should happen every morning.
- Actively and competently participate in supervising the educational and clinical activities of the junior level residents.
- Model appropriate professional values and behaviors for peers, faculty, and staff.
- Mature in the development of patient care, considering the cost, quality, outcomes, and impact on patient and healthcare system as essential variables in the equation.
- Demonstrate ability to engage in supportive, clear, and compassionate communication with patients and family members.
- Answer requests in a timely, cordial manner

Interpersonal and Communication Skills

- The resident is expected on this rotation and all others to interact as a professional and team member with all the other staff and services within the hospital.
- The demeanor and tone of the resident in both verbal and nonverbal communication is expected to be exemplary.
- The same communication skills above are expected to be used with the patients and families.

Systems Based Practice

- Develop methods of analyzing complex data and prioritizing principles and issues to solve complex and ill-defined problems related to orthopaedic patient care.
- Demonstrate appropriate judgment, particularly as related to indications for surgical treatment of patients, nonoperative treatment options and algorithm.

- Understand the daily business of Medicine/Orthopedic Surgery
- Become facile with billing and coding issues
- Manage the patient and health system to manage a disease/injury in the context of the biopsycho-social model.

Literature Resources

The primary resources is OKU Musculosketal Tumors,version 3. American Academy of Orthopedic Surgeons.

The following tumor reading curriculum, consisting of classic articles, can be found on the x:drive (Resident Education Resources → Articles→Tumor→Tumor Classic Articles). All articles are in pdf form and are listed as follows:

SECTION 1 - BIOPSY

{S1-1} Current Concepts Review – Biopsy of Musculoskeletal Tumors
Michael A. Simon, M.D.

{S1-2} Musculoskeletal Biopsy
D.J. Stoker, M.D.

{S1-3} Diagnostic Accuracy and Charge-Savings of Outpatient Core Needle Biopsy Compared with Open Biopsy of Musculoskeletal Tumors
Mary Claire Skrynski, M.D., J Sybil Biermann, M.D., Anthony Montag, M.D. and Michael A. Simon, M.D.

{S1-4} Editorial. Biopsy: Complicated and Risky
Dempsey S. Springfield, M.D. and Andrew Rosenberg, M.D.

{S1-5} Metastatic Disease in Long Bones: A Proposed Scoring System for Diagnosing Impending Pathologic Fractures.
Hilton Mirels

{S1-6} The Hazards of the Biopsy, Revisited
Henry J. Mankin, M.D., Carole J. Mankin, M.S.L.S, and Michael A. Simon, M.D.

SECTION 2 - STAGING

{S2-1} Bone And Soft Tissue Sarcomas - A Rational Approach To Their Curative Management
Gerald Rosen, M.D.

{S2-2} Diagnostic Strategy For Bone And Soft-Tissue Tumors
Michael A. Simon, M.D. and Henry A. Finn, M.D.

{S2-3} Evaluation, Diagnosis And Classification Of Benign Soft-Tissue Tumors
Frank J. Frassica, M.D. and Roby C. Thompson, Jr., M.D.

{S2-4} Principles Of Staging Of Bone And Soft-Tissue Sarcomas
Michael A. Simon, M.D.

{S2-5} A System For The Surgical Staging Of Musculoskeletal Sarcoma
William F. Enneking M.D., Suzanne S. Spanier, M.D ., and Mark A. Goodman, M.D.

{S2-6} Current Concepts Review. Evaluation And Staging Of Musculoskeletal Neoplasms
Terrance D. Peabody, M.D., C. Parker Gibbs, Jr., M.D., and Michael A. Simon, M.D.

SECTION - 7 SOFT TISSUE TUMORS

{S7-1} Peripheral Nerve Sheath Tumors - Histogenesis, Classification, And Progress
Steven I. Hajdu, M.D.

{S7-2} Principles Of Surgical Treatment Of Soft Tissue Sarcomas
Henry J. Mankin, M.D., Dempsey S. Springfield, M.D. and Mark C. Gebhardt, M.D.

{S7-3} Adjuvant Chemotherapy For Localised Resectable Soft-tissue sarcoma of adults: Meta-analysis of Individual Data
J.F. Tierney, L.A. Stewart, M.K.B. Parmar

{S7 -4} Radiation Therapy For Aggressive Fibromatosis. The Experience At The University Of Florida.
W. Mark McCollough, M.D., James T. Parsons, M.D., Robert van der Griend, M.D., William F. Enneking, M.D., and Travis Heare, M.D., Gainesville, Florida

{S7 -5} Randomized Prospective Study Of The Benefit Of Adjuvant Radiation Therapy In The Treatment Of Soft Tissue Sarcomas Of The Extremity
James C. Yang, Alfred E. Chang, Alan R. Baker, William F. Sindelar, David N. Danforth, Suzanne L. Topalian, Thomas Delaney, Eli Glatstein, Seth M. Steinberg, Maria J. Merino, and Steven A. Rosenberg

SECTION - 8 METABOLIC DISEASE

{S8-1} Paget's Disease Of Bone: Clinical Features and Treatment
J. Zajac, M.D. and P. E. Phillips, M.D.

SECTION - 9 INFECTION

{S9-1} Chronic Osteomyelitis: Results Of Treatment
George Cierny, M.D.

SECTION - 10 BASIC SCIENCE

{S10-1} Articular Cartilage
Joseph A. Buckwalter, M.D.

{S10-2} Crystal-Associated Arthropathies
Joel Rubenstein, M.D. and Kenneth P. H. Pritzker, M.D.

{S10-3} Current Concepts Review Articles – Acute Monoarthritis
Daniel G. Baker, M.D. and H. Ralph Schumacher, Jr., M.D.

{S10-4} Current Concepts Review - The Response Of Articular Cartilage To Mechanical Injury
Henry J. Mankin, M.D.

{S10-5} Heritable Diseases Of Connective Tissue
Deborah A. Redford, M.D. and David W. Rowe, M.D.

{S10-G} The Cell And Molecular Biology Of Fracture Healing
Thomas A. Einhorn, M.D.

SECTION 11 - BONE GRAFTING

{S11-1} Current Concepts Review - Bone Grafts
Gary E. Friedlaender, M.D.

{S11-2} Role Of Bone Substitutes
Jeffrey O. Hollinger, D.D.S., Ph.D.; John Brekke, D.D.S.; Elliott Gruskin, Ph.D.; and Dosuk Lee, Ph.D.

SECTION 12 - MISCELLANEOUS

{S12-1} Current Concepts Review - Osteonecrosis Of The Knee
Paul A. Lotke, M.D. and Malcolm L. Ecker, M.D.

{S12-2} Issues In The Pathology Of Sarcomas Of The Soft Tissue And Bone
Serge Leyvraz, M.D. and Jose' Costa, M.D.

{512-3} Radiotherapy In The Management Of Bone Pain
P. J. Hoskin, M.D.

{S12-4} Tumors Of The Spine
Robert F. McLain, M.D. and James N. Weinstein, M.D.

{S12-5} Preoperative versus postoperative radiotherapy in soft-tissue sarcoma of the limbs: a randomized trial
Brian O'Sullivan, Aileen M Davis, Robert Turcotte, Robert Bell, Carlos Catton, Pierre Chabot, Jay Wunder, Rita Kandel, Karen Goddard, Anna Sadura, Joseph Pater, Benny Zee

ABOS recommended articles

1. Paget's Disease of Bone: A Review of Epidemiology, Pathophysiology and Management.
2. Shaker JL. Ther Adv Musculoskelet Dis. 2009 Apr;1(2):107-25
3. Metastatic bone disease: diagnosis, evaluation, and treatment. Biermann JS, Holt GE, Lewis VO, Schwartz HS, Yaszemski MJ. J Bone Joint Surg Am. 2009 Jun;91(6):1518-1530.
4. MRI techniques: a review and update for the orthopaedic surgeon. Hartley KG, Damon BM, Patterson GT, Long JH, Holt GE. J Am Acad Orthop Surg. 2012 Dec;20(12):775-787.
5. Survival of modern knee tumor megaprostheses: failures, functional results, and a
6. comparative statistical analysis. Pala E, Trovarelli G, Calabrò T, Angelini A, Abati CN, Ruggieri P.
7. Clin Orthop Relat Res. 2015 Mar;473(3):891-899.
8. The effect of surgical synovectomy and radiotherapy on the rate of recurrence of pigmented villonodular synovitis of the knee: an individual patient meta-analysis. Mollon B, Lee A, Busse JW, Griffin AM, Ferguson PC, Wunder JS, Theodoropoulos J. Bone Joint J. 2015 Apr;97-B(4):550-557.
9. Osteosarcoma: A Meta-Analysis and Review of the Literature. Friebele JC, Peck J, Pan X, Abdel-Rasoul M, Mayerson JL. Am J Orthop (Belle Mead NJ). 2015 Dec;44(12):547-553.
10. Bone sarcomas: an update of the recent literature. Jones LB, Barr JS. Current Orthop Practice: 2016 Nov/Dec -27(6):582–586.
11. Systematic Review of Clinical Outcomes Following Various Treatment Options for Patients with Extraabdominal Desmoid Tumors. Smith K, Desai J, Lazarakis S, Gyorki D. Ann Surg Oncol. 2018 Jun;25(6):1544-1554.
12. Clinical presentation, histopathology, diagnostic evaluation, and staging of soft tissue sarcoma.

13. Ryan CW, Meyer J. UpToDate.com, Wolters Kluwer.

Other Resources:

1. Musculoskeletal Cancer Surgery: Treatment of Sarcomas and Allied Diseases. Martin Malawar and Paul Sugarbaker.
2. Surgery for Bone and Soft Tissue Tumors. Michael Simon and Dempsey Springfield.
3. Tumours of Soft Tissue and Bone: Pathology & Genetics. CDM Fletcher, KK Unni, and F Mertens.
4. Atlas of Orthopedic Pathology. Wold, McLeod, Sim and Unni.
5. Primer on the Metabolic Bone Diseases and Disorders of Mineral Metabolism. American Society for Bone and Mineral Research