Commentary

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Orthopedic oncology residency education, how broad and how deep?

SADEGH SABERI[1], MD; NIMA BAGHERI[1], MD; SEYYED HADI KALANTAR[1], MD; SEYYED SAEED KHABIRI[1*], MD

[1]*Joint Reconstruction Research Center, Department of Orthopedics, Tehran University of Medical Sciences, Keshavarz Boulevard, Tehran 1419733141, Iran*

Abstract

Orthopedic residency training has long been an area of active research and discussion, and as the knowledge and concepts in subspecialties evolve, it is crucial to investigate the implications of these advancements in the musculoskeletal oncology field. It is important to note that the acquisition of surgical skills and scientific knowledge from orthopedic texts alone is not sufficient in this area. Orthopedic residents must also acquire multidisciplinary communication and leadership skills, as well as the mental capacity to make sound clinical decisions. Therefore, this commentary highlights the importance of assessing whether the current curriculum provides adequate preparation for residents' future careers, despite the fact that the expansion of subspecialties in orthopedic education has undoubtedly enhanced the depth of knowledge and concepts in the field. In addition, orthopedic residents must adopt an open-minded and scientific approach toward orthopedic oncology, which has unique principles. Moreover, it is crucial that general orthopedic surgeons have the necessary skills to manage patients and know when to refer them. By exploring these issues, we hope to continually contribute to ongoing discussions about how to improve orthopedic residency education.

Keywords: Orthopedics; Oncology; Residency; Education; Leadership; Multidisciplinary

**Corresponding author:*
Seyyed Saeed Khabiri, MD; Department of orthopedic surgery, Imam Khomeini Hospital Complex, Tehran University of Medical Science, Tehran, Iran
Tel: +98-9126394002
Email: Saeed.khabiri@gmail.com

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Introduction

Due to the diversity and complexity of diseases and patients in orthopedic surgery, the education of this field has had some challenges (1). Moreover, the emergence of various subspecialties has added to the breadth and depth of the content, as reflected in the American Academy of Orthopaedic Surgeons (AAOS) Orthopaedic In-Training Examination® (OITE) exams (2). So, this discussion aims to explore the implications of these developments in greater depth in the musculoskeletal oncology field.

Orthopedic oncology is a specialized field within orthopedic surgery that focuses on diagnosing, treating, and managing bone and soft tissue tumors. As with any specialty, orthopedic oncology requires specific education and training to ensure that residents are well-equipped to provide their patients with the highest level of care. It is an area that deserves special attention due to advancements made in basic sciences, the growing body of data despite the rarity of these cases, and the development of new surgical treatment methods (3).

One point of discussion is the appropriate level at which residents should undertake tumor rotations. While most centers follow a rotating basis for all subspecialties, there is variation in the timing of rotations. A survey conducted on this issue found that some centers reserve tumor rotations for third and fourth-year residents.

Additionally, the duration of tumor rotations also differs across centers. The survey revealed that, on average, residents only spend two months of their five-year residency in a tumor rotation, with some periods taking place outside their home institution (3).

In our opinion, achieving the goals of an orthopedic rotation at the end of the residency period can be accomplished through various means. Effective management of bone and soft tissue lesions involves making informed decisions on treatment options and determining which patients require referral to specialized centers. These decisions are based on factors such as patient and lesion characteristics, available treatment modalities, case complexity, required expertise and resources, and potential benefits and risks. Gaining a comprehensive understanding of these considerations during residency is essential to achieving optimal patient outcomes.

In addition to knowledge acquisition, achieving leadership, and communication skills are also crucial in the field of orthopedic oncology. Developing a good working relationship with oncologists and radiation oncologists can help residents make more informed decisions regarding patient care (4). Because even if the surgeon achieves optimal resection and reconstruction in an osteosarcoma patient, without interdisciplinary cooperation, the patient's mortality rate remains high and a disease-free outcome is low. Therefore, the multidisciplinary team approach is essential in orthopedic oncology, and mastering communication and leadership principles among colleagues is particularly critical.

Another example is when discussing treatment options such as the Van Ness rotational plasty, which is often performed on children and may be less aesthetically acceptable; effective communication and empathy are necessary to manage expectations and support the patient's recovery and overall quality of life. The ability to convey information clearly and compassionately can significantly affect how patients and their families perceive and cope with their condition (5). In this regard, taking into account the patient's socioeconomic status can greatly influence our management process. By empathizing and involving the patient in the decision process, we can better understand their condition and make informed decisions.

Clinical decision-making is a fundamental aspect of orthopedic residency training, requiring not only scientific knowledge and experience but also an understanding of anatomy and imaging modalities. Residents must develop the skill of evaluating imaging studies, particularly X-rays and MRIs, to make informed clinical decisions. When examining images showing a bone lesion or soft tissue mass, residents should create a mental algorithm or flowchart to systematically evaluate the lesion. This enables residents to develop an acceptable list of differential diagnoses based on radiological images and determine whether further action is required, which is crucial for appropriate patient management.

Residents should be taught the basic principles of MRI, including the different types of sequences, the importance of different fat suppression techniques, gradient echo sequences, post-contrast MRI analysis, and the use of artificial intelligence in radiology. Having an open clinical and radiological vision can help residents better cooperate with radiologists and make more informed decisions about the type of MRI requested and diagnosis without replacing the work of radiologists.

To examine pathologic lesions, it's crucial to review indices and variables through lectures and patient examinations in the clinic. However, only reviewing admitted and operated cases may lead to bias in decision-making. Therefore, incorporating clinic programs into the residency curriculum, including the diagnosis of lesions and responsible follow-up of incidental lesions, is necessary to avoid bias. In short, a well-rounded education in clinical decision-making involves a combination of knowledge, experience, and collaboration with other medical professionals to provide optimal patient care. A case that illustrates this multidisciplinary and holistic approach is the biopsy of lesions. Besides knowing the proper principles of biopsy techniques (6), the resident needs to collaborate with a pathologist to ensure the optimal quality and quantity of tissue samples. The resident also needs to collaborate with a radiologist to determine the best method and route for biopsy, using interventional techniques if necessary. This way, we can avoid complications such as neurovascular contamination or unplanned biopsy.

The ability to perform surgery is a critical aspect of orthopedic residency training, particularly in the context of oncology. Several principles must be considered when deciding to perform surgery on a patient. The patient's unique characteristics and anatomical considerations must be thoroughly evaluated to ensure proper resection and reconstruction of the remaining defect, both in terms of bone and soft tissue. The surgery also requires careful attention to skin incisions, neurovascular exploration and protection, and the use of proper hemostasis

techniques to manage bleeding.

In the case of malignant or benign-aggressive lesions, it is essential to achieve a wide margin while avoiding entering the tumor while also restoring organ function. The surgeon's expertise in balancing these goals is critical. Familiarity with different biological and non-biological reconstruction methods can also be valuable. Specifically, possessing knowledge and information about prostheses is beneficial. Furthermore, consideration should be given to surgical complications, unplanned resections, and the unique challenges posed by post-radiotherapy cases. This can be accomplished through a combination of didactic lectures, hands-on surgical training, and exposure to various cases.

Conclusion

In conclusion, while the expansion of subspecialties in orthopedic education has undoubtedly enhanced the depth of knowledge and concepts in the field, we must also consider whether the current curriculum is sufficiently broad and comprehensive to ensure that residents receive the best possible preparation for their future careers. It is essential for residents to adopt an open-minded and scientific approach toward orthopedic oncology as it differs from other fields in terms of its principles. By exploring these issues, we hope to continually contribute to ongoing discussions about how to improve orthopedic residency education.

Authors' Contributions

All authors contributed to the discussion, read and approved the manuscript and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated resolved.

Conflict of Interest

All authors listed above mentioned that there was no conflict of interest in this study, and no benefits in any form have been or will be received from a commercial party related directly or indirectly to the subject of this manuscript.

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