

Pediatric Orthopedic Imaging: More Isn't Always Better

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Three excellent instructional cases from Dr. Lawrence Wells and colleagues from the Children's Hospital of Philadelphia follow in this E-Focus on Imaging in Pediatric Orthopedics of the February issue of *The American Journal of Orthopedics* (AJO). These cases highlight the important role of imaging in the practice of pediatric orthopedics, particularly its usefulness in problem solving for conditions that are difficult to diagnose clinically. Given the wide array of imaging techniques currently available, there is a tendency for surgeons to over-investigate. But more isn't always better.

For example, while magnetic resonance (MR) imaging has the well-known advantages of avoidance of the potential hazards of ionizing radiation, multiplanar imaging capability, and superior soft-tissue contrast and resolution, the relatively long time period for acquisition of MR images make it relatively user-unfriendly for imaging in children. Movement artifacts can be a big problem, leading to image degradation and interpretation difficulties. For young children, having to administer heavy sedation or general anesthesia often negates the benefits of this diagnostic technique. Multidetector computed tomography (CT) produces images of excellent quality and resolution, particularly of bone. However, the price to pay for the thinner contiguous slices that enable production of the beautiful reformatted 2-dimensional sagittal and coronal images, and the stunning 3-dimensional (3D) images, is a markedly increased radiation dose to the young patient.

It appears that the solution lies in a return to basic principles of good clinical practice. As illustrated by these 3 pediatric orthopedic cases in this month's AJO, formulating a provisional diagnosis and short list of differential diagnoses starts with a well-taken and detailed clinical history and a meticulous physical examination. Simple hematologic investigations should be interpreted in light of the clinical findings. Imaging should be reserved for problem solving and should not be considered as a screening tool. There



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must be an imaging plan that aims to address the following questions: Is there a lesion? If so, what and where exactly is it? And how can I best treat this patient's condition—in this respect, is imaging really necessary?

For orthopedic problems, the time-honored radiograph still remains the initial imaging investigation in today's practice. Too often, more expensive and advanced imaging modalities are requested first, even when the diagnosis can be made on the basis of the plain film. This is poor clinical practice, and it reflects a lack of training and common sense. Radiographs are readily available, technically easy to perform, and give an overview of bone and joint lesions. It is the imaging investigation of choice for the detection of fractures and dislocations and also for the diagnosis of bone tumors and many other bone conditions. CT should be considered a supplementary examination to radiographs and is helpful when radiographs are equivocal or findings are subtle. CT is particularly suited for complex skeletal anatomy, for example, the spine, scapula, pelvis, and hindfoot. In pediatric patients, reconstructed 3D CT images are useful for sorting out congenital spinal deformities.

For children and adolescents, ultrasonography can be used in place of MR imaging for many indications, particularly for assessing superficial structures such as tendons, muscles, ligaments, blood vessels, and other soft tissues. However, performing musculoskeletal ultrasonography well entails a rather long and steep learning curve before technical expertise can be achieved. More advanced techniques such as MR imaging, nuclear medicine imaging, and imaging-guided interventional procedures should be used sparingly.

In fact, less may be better. If in doubt, pause before asking for more imaging and do consult your friendly neighborhood musculoskeletal radiologist. ■

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