Optimal utilization of MSK imaging during COVID-19 pandemic

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A B S T R A C T

The COVID-19 pandemic has caused multi-dimensional global crisis in the recent times. There is an increasing necessity of understanding and developing a strategy for optimal utilization of healthcare resources in this time of crisis. Radiology department remains the backbone for diagnosis and for appropriate management of orthopaedic ailments. Amidst COVID-19 pandemic, there is a need to change in imaging algorithm, for various clinical conditions taking care of the exposure risk to patients and healthcare workers and to handle the volume of diagnostic and intervention work. Radiology preparedness is to set the workflow protocols and policies applicable to radiology investigations for different clinical conditions, which will help to attain these objectives. Radiologists are in best position to decide the most appropriate imaging investigation and protocol making it vital to have a frequent Orthopaedic surgeon-Radiologist interaction, which is one of the most important steps in patient management pathway.

The COVID-19 pandemic has caused multi-dimensional global crisis in the recent times. The pandemonium of pandemic has affected every aspect of human lives and the healthcare delivery is not an exception. With a rapid rise in the number of cases, global healthcare systems are facing their worst testing times. It is important to ensure optimal utilization of healthcare resources for the treatment of COVID and non-COVID patients to win this long-drawn war against COVID-19.

Musculo-Skeletal (MSK) Radiology plays a crucial role in the evaluation of bone and joint diseases and traumatic injuries. The imaging armamentarium in MSK Radiology includes wide range of options, right from the humble plain radiograph to advanced functional MRI sequences. Due to high soft tissue resolution, Magnetic resonance imaging offers non-invasive delineation of soft tissues with high accuracy. This has made MRI a primary imaging option for meniscal, ligament and tendon tears, soft tissue injuries and occult bone injuries. Contrast enhanced MRI is an excellent modality for evaluation of patients with early manifestation of rheumatoid arthritis. Whole-body MRI is increasingly being used for imaging of marrow infiltrative disorders and tumor screening – staging in musculo-skeletal system.

Imaging studies play important roles in musculo-skeletal biopsies and procedures. The exact biopsy approach must be always discussed with the surgical team who will perform the actual appropriate resection of the tumor. This is important because the needle track resection at the time of definitive surgery is strongly advised in bone tumours. Multidisciplinary approach, with Radiologist working closely with the orthopaedic surgeon, medical oncologist, radiation oncologist, and pathologist is essential to maximize the chance of definitive diagnosis and simultaneously minimizing potential complications in biopsy procedures. Ultrasound-guided injections are increasingly being performed for wide range of joint, muscle, tendon, nerve, ganglion and bursal lesions. These are minimally invasive procedures and provide prompt and effective results. Local anesthetics and corticosteroids are the most commonly injected pharmaceuticals, in usual scenario. However, in the present situation, it has been advocated that intra-articular, soft tissue and perineural steroid injections should be avoided, whenever possible during the COVID-19 pandemic to reduce the risk of reduced immunity to viral exposure.

Platelet rich plasma and autologous blood injections are also used which provide acceptable results. Optimal utilization of imaging services becomes much more relevant and necessary during the present COVID-19 pandemic. It is important to clearly understand and follow the correct imaging algorithm for an efficient use of imaging modalities. Apart from the standard precautions, Image-guided biopsies and injection procedures should be performed with personnel protection measures for the patients and the
Fig. 1. Algorithm for radiology investigations in COVID positive/suspected patients.

Fig. 2. Algorithm for radiology investigations in COVID negative patients.
doctors in present times to minimize the risk of virus transmission during the procedure.

Amidst COVID-19 pandemic, the Radiology departments across the globe aim to provide prompt and efficient imaging services for COVID and non-COVID patients, without increasing the risk of infection to the patients as well as healthcare workers. The workflow protocols and schedules are realigned to accommodate the COVID positive or suspect patients in such a way that non-COVID patients are not exposed to increased risk of infection. This requires thorough sanitization of imaging rooms after scanning the COVID positive or suspect patients. These necessary preventive measures are unavoidable for the safety of patients and staff but adversely affect the workflow efficiency of the Radiology departments. Optimal utilization of the MSK imaging services would certainly help to improve the efficiency of imaging services but may also help to maintain the quality standards of imaging.

The use of an appropriate imaging algorithm with broad outline of imaging studies for different clinical conditions may be useful to attain these objectives. The recommended imaging algorithm is shown in Fig. 1 (for COVID positive/suspect patients) and in Fig. 2 (for COVID negative patients).

Imaging over-utilization describes the use of imaging procedures where the chances of improving the patient outcome are very less. Imaging overutilization thus adds unjustifiable costs to healthcare and may expose individuals and the general population to unnecessary radiation doses. In the recent times, this has also increased the strain on the Radiology services and has increased the COVID-19 infection risk for the patients.

Using decision support algorithms, referring orthopaedic surgeons will usually advise the appropriate Radiology studies and many will be sure of appropriate imaging protocols. But they cannot be expected to know the gamut of complex studies and protocols available to the Radiologists. Radiologists are in best position to decide the most appropriate imaging investigation and protocol for a particular clinical condition and settings. Therefore it is vital to have a frequent Orthopaedic surgeons–Radiologist interaction, which is one of the most important steps in patient management pathway. It can ensure prompt disease diagnosis and efficient healthcare delivery, without undue increase in the treatment costs. These discussions can help to assign the imaging study in various categories:

A) Category 1: Elective or non-urgent
B) Category 2: Time-sensitive
C) Category 3: Critical

Such triaging will help to decide the priority and urgency of the imaging study. The imaging schedules can be accordingly modified. This approach will also help to maintain the quality standards of imaging studies despite the present crisis. Imaging referrals, scheduling and utilization based on objective clinical algorithms will help to evolve a robust system, which will be useful and effective during the COVID-19 pandemic and even after the dust settles over the present crisis.

Optimal imaging utilization, based on clinical settings and imaging recommendations will be certainly useful to provide prompt and efficient healthcare delivery to all the patients, despite the complex challenges posed by COVID-19 pandemic. The main goals for MSK imaging during the pandemic should remain focused on helping to reduce the COVID-19 related mortality through early diagnosis of the disease, especially the fractures, bone and joint infections and COVID-19 related pneumonia by Computed Tomography (CT) scan, and in addition to prevent the disease transmission to the staff working in the Radiology department and to the patients and their medical attendants. We suggest that as far as possible, the treatment of patients with MSK pathology should be done though a clinical diagnosis by the attending orthopaedic surgeons e.g., uncomplicated back and neck pain, knee pain, simple joint sprains etc. It is highly relevant because postponing non-urgent imaging and invasive procedures would help in preserving the already compromised resources during these testing times and would also help the patient from unnecessary exposure and hospital visits to the radiology department.

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