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Narrative Review

Orthopedic Problems during the Covid-19 Pandemic

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Abstract

In recent months, a sudden pandemic of Covid-19 has led to high mortality throughout the world. The contagiousness and lethality of the disease, as well as the lack of confidence in a vaccine or drug to control or treat it, have necessitated fundamental changes in lifestyle, especially in people's careers. As the severity of this disease is directly related to the rate of loading and exposure to the virus, orthopedic surgeons need to maintain their own health, other staff's health and even orthopedic patients while properly managing orthopedic patients, especially emergency patients. The possibility of infection with this virus due to symptomatic or asymptomatic carriers should be considered as a potential risk of conventional orthopedic treatments such as prescribing analgesics and injections and surgeries and their possible effect on the exacerbation of Covid-19.

Keywords: Orthopedics, Covid-19, Fracture, SARS-COV2, Surgery, Elective

Introduction

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-COV2) virus, probably of zoonotic origin, is the cause of the Coronavirus Disease 2019 (Covid-19), which was identified in late December 2019 in Wuhan, China.[1,2,3,4] The incubation period (asymptomatic carrier) is five to 14 days [4,5,6,7,8] and the presence of asymptomatic carriers up to 80% [4,9] and high contagious power [10,11] led to the spread of the disease in the world and caused a pandemic.[12]

The disease is rapidly transmitted from person to person.[13,14] During a cough, sneeze, or talking through the nose of an infected person or carrier, it is often transmitted to another person.[15] The transmission of the disease through direct contact with blood, stool or urine is still unknown.[16,17] Although the disease can be asymptomatic throughout its total course or at least during its incubation phase,[7,18] dry cough, fever, dyspnea, shortness of breath, chills, malaise, muscular bone pain or muscle weakness and fatigue, gastrointestinal disorders, loss of smell and taste, etc. are common symptoms.[8,14,18-21]

Several months after the onset of the pandemic, there was no definitive available vaccine.[22] Drug treatment has only had a symptomatic role.[22] Due to the high transmission and high mortality rate (from 1.4 to 12.6%);[7,6,22] there is a possibility of recurrence or continuation of the pandemic.[9,12,15,20,24]

Under normal circumstances, orthopedic patients go to medical centers for emergency treatments, including trauma and non-emergency treatments (elective) and pain crisis. In general, hospitals and medical centers are not a good place to attend during a pandemic.[5,9,23,25] It is recommended to refer patients to orthopedic centers only in cases that are life or limb threatening.[5,10] It is better for these patients to be discharged immediately after the operation.[18,24,26,27]

Proper decision-making and screening is essential for the timing and type of surgery of patients during the Covid-19 pandemic[7] and is based on four factors:

1. Severity and urgency of trauma (emergency surgery, urgent surgery for major or minor limb injuries, and delayed and elective surgeries).[27]

2. The severity of pneumonia in a patient with Covid-19 who has had a positive PCR test or abnormal CT scan of the lungs (critical, symptomatic, asymptomatic, recovered, or unaffected).[19,27]

3. The presence of underlying or laboratory risk factors for severe types of Covid-19.[4,15,19,28,29]

4. Sufficient number of staff and a sufficient amount of Personal Protective Equipment (PPE), sufficient amount of blood products, and hospital beds in the Internal Care Unit (ICU) for patients.[5,14,24,30,31,32]

In terms of trauma urgency, surgeries are divided into three categories:

Emergency Patients

Emergency patients have a life-limb threatening problem. Patients with joint dislocation, open fracture or fracture with vascular injury or compartment syndrome, mangled extremity, polytrauma patients with fess, and spine emergencies are emergency patients who are in the emergency room. Surgical treatments should be considered for patients with a positive Covid-19 test, and then the patient should be isolated until the results are announced.[5,23,24,33] If the test and clinical signs of infection are negative, the standard protocols should be performed, otherwise the Covid-19 protocol should be performed for them.[23,24,27] In patients with emergency conditions, Damage Orthopedic Control (DOC) surgery is recommended. At the time of the Covid-19 pandemic crisis, primary treatment of femoral fracture with an internal fixator or external fixator is essential to reduce the risk of pulmonary embolism and to prevent massive bleeding.[27]

Urgent Patients

These patients Include hip fractures especially in the elderly, infections, especially acute infections, tumors, pathological fractures, and couda equina which should be carefully examined. These patients should be hospitalized and operated only in emergencies conditions.[5,23] In Covid-19 positive patients with hip fractures, non-surgical treatment is recommended due to its 50% mortality rate and longer hospital and ICU stay and higher need for blood transfusion.[7,34] In critically ill patients who require urgent (non-emergency) surgery, including major or minor surgery, it is best to delay surgery to improve the acute symptoms of a lung infection (up to four weeks).[27] In symptomatic lung patients, delayed emergency surgery is recommended.[27,33]

In less symptomatic lung patients, major orthopedic injuries (such as patients with acetabular, hip, proximal femoral, large bones, or spine fractures) and minor orthopedic injuries (such as tendon or nerve injury, and other bone fractures) definitive surgery can be performed. However, surgery, especially in patients with comorbidity, increases the risk of exacerbation of the disease and the need for an ICU, increases the risk of mortality and should be delayed.[7,14,24,26] If surgery is not possible, minimal invasive surgery should be performed.[10,33] However, in the recovered patient, any definitive necessary surgery should be performed.[27]

Elective surgery includes delayed surgery for fractures such as type one and two of open fractures. During the pandemic, elective surgery is not recommended due to the hospitalization of some Covid-19 positive patients in trauma centers, the closure of some outpatient surgery centers,[35] the increased risk of infection of physicians, staff and non-infected patients due to unnecessary referrals, inadequate staffing, and possible equipment failure and inadequacy of operating room implants and the increased need for postoperative follow-ups.[5,14,24,30,31,3] In addition, surgery increases the risk of weakening the immune system and making the disease symptomatic in asymptomatic people.[7,14,24,35] Therefore, it is recommended that elective surgeries be canceled during a pandemic.[12,26,36,37,38] In Singapore, elective surgeries requiring more than 23 h of hospitalization, such as knee and hip replacement and correction of spinal deformity were canceled.[39] In Imam Khomeini Hospital, Tehran, Iran, where about 460 orthopedic surgeries were performed in the month before the pandemic, surgeries were reduced to zero, especially due to the admission of patients with Covid-19 pneumonia.[40] However, delays in the treatment of traumatic patients lead to incurable diseases, misdiagnosis of injuries, long-term and unsuccessful non-surgical treatment, including risks in an orthopedic doctor.[24]

At the beginning of the pandemic, although social awareness and quarantine practices led to reduced mobility and travel, and the number of patients with fractures due to high-energy trauma and road accidents was significantly reduced, but traumas caused by home accidents and falling in the house was still noticeable.[25,33,35]

The second factor in deciding on the time and type of orthopedic treatment is the severity of the pneumonia

Patients who have a positive PCR test or positive

lung symptoms on a CT scan are divided into four groups based on the severity of the pneumonia:

- A critically ill patient has respiratory distress and a respiratory rate more than 33, PO2 saturation less than 93% at rest, rapid spread of more than 50% on CT scan within 24 to 48 h, respiratory failure, extra pulmonary organ failure, shock, need for mechanical assistance, need for an ICU.[27]

- A symptomatic patient has fever, respiratory symptoms and radiological signs of pneumonia.[27]

- A less symptomatic patient has a fever below 39 degrees in the absence of clinical symptoms and patients with a positive test of Covid-19 or a history of contact with people with a positive Covid-19.[19,27]

- If the patient does not have a fever after 14 days (three days without fever) and other symptoms of Covid-19 and has a significant improvement in radiological images and pulmonary function, the patient is considered to have improved.[19,27] A patient who has two negative Covid-19 tests is also considered healthy.[27]

- The third factor in deciding on the time and type of orthopedic treatment is the existence of risk factors. The underlying risk factors for the severe form of the Covid-19 disease are: cerebrovascular disease, cardiovascular disease, hypertension, diabetes, old age especially over 65 years, obesity, nursing home person, immunodeficiency disease, people taking ACE inhibitors (angiotension converting enzyme inhibitor) drugs and chronic lung disease, especially COPD (they are more likely to have severe illness and need the ICU).[4,5,15,19,28,29]

- The last factor is laboratory risk factors for severe forms of the Covid-19 disease including lymphopenia, thrombocytopenia, decreased serum albumin, increased WBC, ALT, PT (Prothrombin Time), CK, creatinine, CRP, LDH, ferritin, IL6, D Dimer, procalcitonin, and troponin.[41,42]

The D Dimer test is elevated in patients with Covid-19 and its level is associated with the severity of the disease and is a reliable prognostic factor for nosocomial mortality in patients with Covid-19.[43] Therefore, more caution should be considered for surgery in patients with risk factors including leukocyte count, serum lactate dehydrogenase, coagulation factors and lung CT scans are recommended.[4]

To prevent the spread and risks of Covid-19, especially in medical centers, the agreed general recommendations are:

Fever control at the entrance of the hospital and offices to identify possible patients, observing a distance of six feet (2 meters), using a surgical or n95 mask, using eye protection, using a positive pressure suite, frequent hand washing with soap and water or antiseptic gel before and after examination, frequent disinfection of chairs, pens, keyboards and mouse throughout the day, no eye or nose and mouth contact, and controlling of coughs and sneezing with a tissue or elbow are recommended to prevent transmission of surface-borne or aerosol infections. Emergency personnel should have PPE, including n95 masks, surgical gowns, gloves, shoe covers, and they must put them in the proper place at the end of the shift.[8,15]

Special Recommendations for Patients Hospitalized and in Need of Surgery:

All patients referred to medical centers, especially patients in need of orthopedic surgery, should be considered as a positive Covid-19 patient and must enter the hospital as a positive Covid-19 patient.[4] If the patient has flu-like symptoms, fever, respiratory symptoms and a history of travel or contact with people who were Covid-19 positive, must be transferred to a positive Covid-19 patient department to have the test result announced. Until then, the patient should be treated like a positive Covid-19 patient.[33]

Elective surgery in a patient with active Covid-19 should be delayed until recovery. The patient is quarantined for 14 days and the fever of the symptoms of his infection has to be improved before surgery.[8,33]

Reverse Transcriptase PCR (RT-PCR) test is a common test to prove that the disease is removed by swab from the nasopharyngeal or oropharyngeal area and has a sensitivity of about 60%. Due to the false negative rate of the test in 30 to 40% of cases [9,24,25] and limited access to it, this test is done before surgery only for symptomatic patients, people in contact with them, and asymptomatic people who have been in direct or high-risk contact with the patient. For closed (non-emergency) fracture surgery, we wait until the test results.[10]

Clinical, radiological and laboratory examination of asymptomatic patients requiring surgery is necessary. Checking the patient's history of positive Covid-19

disease and ESR, CRP and CBC and simple chest X-ray and CT scan of the chest and PCR test are included in these examinations. In the CBC, more than half of patients have lymphopenia.[1,2] The D Dimer level and Prothrombin Time (PT) are higher in patients admitted to the ICU. In patients with a positive PCR test, the CT scan is sometimes negative for up to three days, but in half of the patients at the time of admission they have ground glass opacity in CT scan.[44]

It is best for a selective surgical team to operate on only COVID-19 patients (symptomatic or asymptomatic carrier).[5,8]

It is preferable to keep fewer patients in the hospital and to accept less desirable non-surgical treatments.[26] For example, non-surgical treatment of ankle fractures, although increasing the risk of osteoarthritis, reduces the risk of developing COVID-19.[9] In general, minimally invasive and rapid surgical techniques are recommended for fractures.[4,26] It is preferable to use braces or splints and non-fiberglass plaster that reduce revisits and follow-ups.[4,9,24,25]

- There is a possibility of transmitting the virus from blood aerosols [6,17,35] and in addition to power tools such as saws, drills, suction and cutters and lavage pulses, reamer produce aerosols. So, it is preferable to use these tools less often during surgery.[5,9,24,35,45]

- The number of people entering the operating room should be reduced. It is ideal to use negative pressure ventilation and laminar flow in the operating room.[5,33] The patient should be transported to the operating room with a hat and, also if he/she can wear a mask, preferably transported with a surgical mask. The air should be changed regularly and an air generator should preferably be installed inside the operating room.[46] Surgery under the regional block is preferable [10,46] and if anesthesia is to be performed for the patient, it should be performed in the operating room with a minimum number of personnel. In case of general anesthesia, the personnel should not leave the operating room for 20 minutes after intubation.[46]

Early hospital discharge of young patients without risk factors is preferred. Controlled and delayed discharge is performed in other cases to control the comorbidity and the likelihood to prevent asymptomatic patients from becoming symptomatic.[24,26,27]

- It is preferable to have a post-operative visit via social media or telephone or video call.[14,15,24,26]

- Physiotherapy is recommended with the help of family members at home and under the advice of a physiotherapist through social messengers.[24,40]

- Multidisciplinary (MDC) approach is recommend for orthopedics surgery. In other words, the orthopedist cooperates with the pulmonologist and anesthesiologist reserves the bed and ventilation device in the ICU, especially for surgery in patients with carriers or symptomatic emergency with a risk factor.[5,9,22,33]

- Paying attention to blood reservation is recommended according to the type of patient's injury and reducing blood donation in pandemic conditions.[24]

Musculoskeletal Pain Control during a Pandemic

Patients with musculoskeletal pain and discomfort, especially neck and back pain referred to medical centers should be temporarily treated with conservative treatment [22,12] or, if necessary, joint aspiration.[12] On the other hand, Covid-19 causes muscular bone pain and fatigue (21%) and muscle weakness (14%), which is a common symptom. This disease itself is a cause of low-energy fractures, especially in the elderly.[7,25] There is no consensus on prescribing analgesics and corticosteroids for musculoskeletal pain.

There is no evidence of more side effects of ibuprofen on paracetamol in upper respiratory tract infections. There is no agreement on the administration of ibuprofen for pain relief during the Covid-19 pandemic. Opponents of NSAIDs use do not recommended them overall because of gastrointestinal or renal and rarely cardiovascular (in high doses) problems. Under normal circumstances, opponents also do not recommended NSAIDS due to the effects of cytokine storm and even the prevalence of streptococcal toxic shock syndrome and the lack of reduction in the severity and duration of lung infection in the presence of a pandemic.[47] Proponents of NSAIDs point to the lack of association between severe infection and ibuprofen use and the effects of NSAIDs on pain and fever. They recommend the lowest effective dose of NSAIDs to be used for the shortest possible time to control pain and fever in adults and children with Covid-19. In addition, patients who have previously taken NSAIDs for pain can continue treatment under the supervision of their physician.[47]

The decision to prescribe corticosteroids to relieve

pain and inflammation orally, by intramuscular injection, or by intra-articular injection has been discussed. In addition to exacerbating immunodeficiency and reducing the body's defenses against viruses, steroids increase the duration of virus transmission, the risk of psychosis, and avascular necrosis of the head of bone. Intra-articular injection and even intramuscular injection of corticosteroids disrupt the immune system and increases the risk of mortality in the influenza infection and reduces the effectiveness of its vaccination. The World Health Organization (WHO) recommends the use of methylprednisolone injection only in cases of Acute Respiratory Distress Syndrome (ARDS) following Covid-19.[47-51] Therefore, the points which should be considered in steroid injections are:

1. Severe pain, especially after surgery, disrupts the immune system, and on the other hand, drug use, for example, in radiculopathies as a substitute for corticosteroids while becoming susceptible to infection, it weakens the immune system due to an independent mechanism, so in these cases the use of steroids is preferable.[51]

2. Corticosteroids have systemic dose-dependent symptoms and suppress cytisol production and the hypothalamic axis sometimes for several weeks. However, longer-acting steroids such as triamcinolone and methylprednisolone suppress cortisol production for longer than most soluble agents such as betamethasone and dexamethasone, so betamethasone and dexamethasone are preferable in this regard.[51]

3. Risk factors for exacerbation of Covid-19 make steroid injections as risky as surgery.

4. The use of PPE and injection site (in an office or hospital or surgical clinic) and the prevalence of covid-19 factors affecting the risk of injection.[51]

5. It is recommend that the lowest effective dose of steroids be used for the shortest possible time to control pain in adults and children.[51]

Conclusion

The SARS-cov2 has a high mortality rate and due to the high transmission rate and lack of vaccine,[39] there is a possibility of recurrence or continuation of the pandemic. Therefore, for orthopedics surgery, it is recommended to pay attention to the severity and urgency of trauma, the severity of pneumonia in a patient with Covid-19 and the presence of underlying conditions or laboratory risk factors for severe types of Covid-19. In addition, controlled administration of common medications is also important to relieve muscle and skeletal pain crisis during a pandemic.

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