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HOW I DO IT

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Management of orthopedic oncology patients during coronavirus pandemic

Yavuz Şahbat MD | Omer Buyuktopcu MD | Osman Mert Topkar MD | Bulent Erol MD

Department of Orthopaedics and Traumatology, Marmara University Faculty of Medicine, Istanbul, Turkey

Correspondence
Yavuz Şahbat, MD, Fevzi Cakmak Mah. Muhsin Yazicioglu Cad. No: 10 Ust Kaynarca, Pendik, 34899 Istanbul, Turkey.
Email: yavuzsahbat@gmail.com

Abstract

The new measures implemented in hospitals also altered the operation of orthopedics and traumatology departments. The main purpose of this article is to discuss how orthopedic oncology clinics should be organized during the pandemic and to present the process management scheme for patients requiring orthopedic surgery, including trauma surgery, from diagnosis to treatment, together with our experiences. Instead of thinking about the global emergence of the epidemic, it is time to act decisively. At first glance, the coronavirus disease 2019 (COVID-19) pandemic and orthopedics may seem to be unrelated disciplines, but the provision of healthcare services to patients who require them proves that these two fields are parts of the same whole. Our experiences in treating neutropenic, lymphocytopenic, and chemotherapy patients seem to have proven beneficial during this process. We operated on 10 biopsy patients, 15 primary bone sarcomas, 9 soft tissue sarcomas, and 82 trauma patients within this time frame. Only three patients were suspected to have COVID-19 before admission. The early identification, strict isolation, and effective treatment of these patients prevented any nosocomial infections and disease-related comorbidities. This success is the result of the multidisciplinary cooperation of the Ministry of Health, our hospital, and our clinic.

KEYWORDS

COVID-19, management, orthopedic oncology, surgical oncology

1 | INTRODUCTION

The novel coronavirus was first reported as a zoonotic agent in Wuhan, China, in late December 2019. The disease manifested itself with fever, fatigue, and pneumonia symptoms that emerged after an incubation period. The incubation period of 2 to 14 days made it possible for people infected with the disease to travel and socialize without showing symptoms and therefore was an important factor in the spread of the coronavirus.[1] According to data from Jinyant Hospital and the Wuhan Pulmonary Hospital, the spectrum of disease severity ranged from mild upper respiratory symptoms to extensive pneumonia. The most common symptoms were fever and cough, and the most common clinical finding was lymphocytopenia.[2]

By the time the first confirmed case of coronavirus was reported in Turkey on 11 March 2020, the country had already begun taking nonmedical measures against the disease. As per the rapid decisions and the circulars issued by the Ministry of Health, all hospitals stopped their routine practices and implemented the measures taken by countries that were already affected by the coronavirus. The measures taken by the Ministry of Health reduced the contact of healthcare workers with carriers of the virus. Elective procedures in hospitals were halted and extraordinary measures were initiated to control the outbreak across the country. Those measures includes; hand hygiene with soap and water or by alcohol based hand rub, avoiding touching eyes, nose and mouth, wearing face masks, and practicing respiratory hygiene by coughing or sneezing into a bent elbow or tissue and then immediately disposing of the tissue,

maintaining social distance (minimum of 1 m).[3] All health workers have to use personal protective equipment (PPE) during procedures of COVID-19 suspected or diagnosed patients. In addition to these measures, people who had been in close contact with newly diagnosed cases, including medical personnel, were traced and put under a 14-day house quarantine. The consensus opinion issued by the Turkish Society of Orthopedics and Traumatology (TOTBID) indicated that authorized clinics in public hospitals should continue trauma and tumor surgeries.[4]

The new measures implemented in hospitals also altered the operation of orthopedics and traumatology departments. The main purpose of this article is to discuss how orthopedic oncology clinics should be organized during the pandemic and to present the process management scheme for patients requiring orthopedic surgery, including trauma surgery, from diagnosis to treatment, together with our experiences. Instead of thinking about the global emergence of the epidemic, it is time to act decisively.

2 | MATERIALS AND METHODS

We searched for the keywords "coronavirus" and "hospital management scheme" in the PubMed advanced search engine. We determined the statements published by the Turkish Ministry of Health and TOTBID as the bases of the patient management scheme. We obtained data from the hospital information system regarding all oncologic orthopedics and trauma surgery patients operated on and followed between 11 March 2020, the date of the first confirmed case of coronavirus in Turkey, and 11 May 2020. As per the World Health Organization's pathogen screening system, patients were questioned regarding their symptoms and their contacts. The patients who were operated previously or who have been followed conservatively were continued following in outpatients clinics with precautions for coronavirus.

All preoperative patients were questioned and examined for signs and symptoms related to COVID-19. Besides routine preoperative laboratory and radiological evaluation all preoperative patients have axial thorax computed tomography (CT). Symptomatic and suspected patients were tested for coronavirus by real time reverse transcriptase polymerase chain reaction (RT-PCR) test. We have separated and isolated our outpatient clinic where we preoperatively evaluate and postoperatively follow oncology patients from the other outpatient clinics. All patients were operated on in a single center and all orthopedic oncology patients were operated on by a single chief surgeon.

The orthopedic oncology patients who underwent biopsy, were diagnosed histologically by the Pathology Department of Marmara University. The patients who were diagnosed as primary bone sarcoma or soft tissue sarcoma were operated. The following data were obtained from the hospital information system and recorded: age, sex, tumor type, preoperative blood values, complications before and after surgery, length of hospital stay, and treatment methods. The treatment procedure and management scheme (Figure 1) was determined before the operation for all patients and the surgeries were performed in two operating rooms by one chief surgeon and three surgeon.

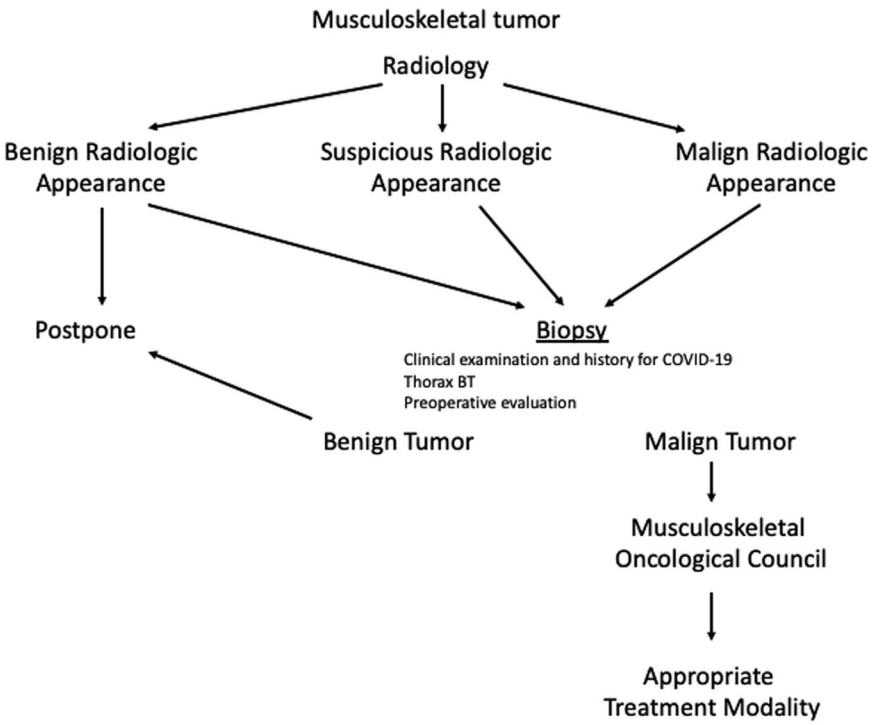

FIGURE 1 Scheme representing our treatment approach to orthopedic oncology patients during coronavirus disease 2019 (COVID-19) pandemics

3 | RESULTS

3.1 | Orthopedic oncology

During this process, we contacted patients with benign bone lesions and soft tissue masses that required surgery and postponed their operations. We continued to perform the surgeries of patients with primary bone sarcomas, metastatic lesions with impending or eventuated pathological fractures, and malignant soft tissue masses, after taking the adequate precautions for health care workers from getting infected. We recommended and performed biopsies for patients whose medical history and physical and radiological examinations indicated a high risk of malignancy. The 10 patients who required biopsy (four males and six females, aged 7-84 years) were scheduled for outpatient surgery. They were asked to come to the hospital in the morning ready for surgery and were sent home after the nerve block or general anesthesia wore off. The patients were not hospitalized overnight. This outpatient surgery approach allowed the patients to remain in the hospital for less than 24 hours and helped avoid nosocomial infections.

We operated on 15 patients (aged 1-70 years) diagnosed with primary sarcoma. These cases included Ewing sarcoma (n = 6), osteosarcoma (n = 4), chondrosarcoma (n = 4), and malignant transformation of giant cell tumor (n = 1) (Table 1) (Figure 2). The timing of the surgery was based on the urgency of the patients' conditions and the timing of the completion of neoadjuvant chemotherapy. Ten patients had received neoadjuvant chemotherapy and four patients had pancytopenia at the time of admission. Following the patient's admission to the hospital, the patient was evaluated together with the oncologist or pediatric oncologist who oversaw the neoadjuvant chemotherapy process, and the surgical preparation process was conducted in collaboration. All oncology units of the hospital continued to operate and the treatment processes of the patients were not interrupted. Medical oncology, pediatric oncology, radiation oncology, and pathology departments continued to operate during this time. The patients underwent surgery after pancytopenia improved. The remaining five patients were hospitalized 1 day before the operation, which allowed sufficient time to prepare the patient for surgery. We also operated on eight patients (aged 5-76 years) diagnosed with malignant soft tissue tumors. These cases included malignant mesenchymal tumor (n = 4), synovial sarcoma (n = 1), Ewing's sarcoma (n = 1), malignant peripheral nerve sheath tumor (n = 2), and alveolar rhabdomyosarcoma (n = 1) (Table 2) (Figure 3). These patients were hospitalized 1 day before the operation.

One patient with soft tissue sarcoma who was being followed for surgical wound care was determined to have a fever, cough, fatigue, and pancytopenia in the preadmission screening. The blood test results of this patient were as follows: hemoglobin, 6.8 g/dL; white blood cells, 0.1×10^3/μL; platelets, 65×10^3/μL; lymphocytes, 0.1×10^3/μL; procalcitonin, 1.43 μg/L; C-reactive protein, 220 mg/L; D-dimer, 1.74 mg/L; ferritin, 2023 μg/L; and fibrinogen, 752 mg/dL. The CT scan results of the patient revealed ground-glass opacities in both lungs and the patient was tested for COVID-19 by real time RT-PCR, which came back negative (Figure 4). In the meantime, the patient was isolated and treated (plaquenil + azithromycin) in a different ward as per the recommendation of the infectious diseases department.

3.2 | Preoperative process

All medical staff were screened for fever the morning of the operation. All staff were also screened for fever during entry to and exit from the hospital. Only healthcare workers were allowed in the clinic to reduce the risk of nosocomial infections originating from other people. All medical staff were provided with online COVID-10 training in accordance with the directives of the Ministry of Health. All patients were screened for fever twice a day and lymphocyte counts were evaluated daily. Parallel to the measures taken by the medical staff, certain rules were introduced for the patients. The patient's relatives were provided with information on COVID-19 before the patient being admitted to the clinic. Wearing masks was made mandatory and daily fever screenings were implemented. The windows in hospital rooms were kept open for at least 16 hours a day. All patients were instructed to wear masks when the medical

TABLE 1 Demographical data, diagnosis and treatment of bone sarcomas

Cases	Age, (y. o.)	Sex	Diagnosis	Locazilation	Treatment
1	15	M	EWS	Distal femur	WR + EPR
2	14	F	EWS	Proksimal tibia	WR + EPR
3	1	M	EWS	Femoral diaphysis	WR + VFGr
4	16	M	EWS	Scapula	WR
5	52	F	EWS	Tibial diaphysis	WR + VFGr
6	14	K	EWS	Pelvis	WR
7	13	M	OS	Distal femur	WR + EPR
8	41	F	OS	Proksimal tibia	WR + EPR
9	17	M	OS	Distal femur	WR + EPR
10	15	M	OS	Distal femur	WR + EPR
11	50	F	CS	Femoral diaphysis	WR + EPR
12	18	M	CS	Pelvis	WR
13	70	M	CS	Femoral diaphysis	WR + EPR
14	34	M	CS	Kuboid	WR
15	36	F	GCT-MT	Distal femur	WR + EPR

Abbreviations: CS, chondrosarcoma; EPR, endoprosthetic reconstruction; EWS, Ewing's sarcoma; F, female; GCT-MT, giant cell tumor malignant transformation; M, male; OS, osteosarcoma; VFGr, vascularized fibular graft reconstruction; WR, wide resection; y.o., years old.

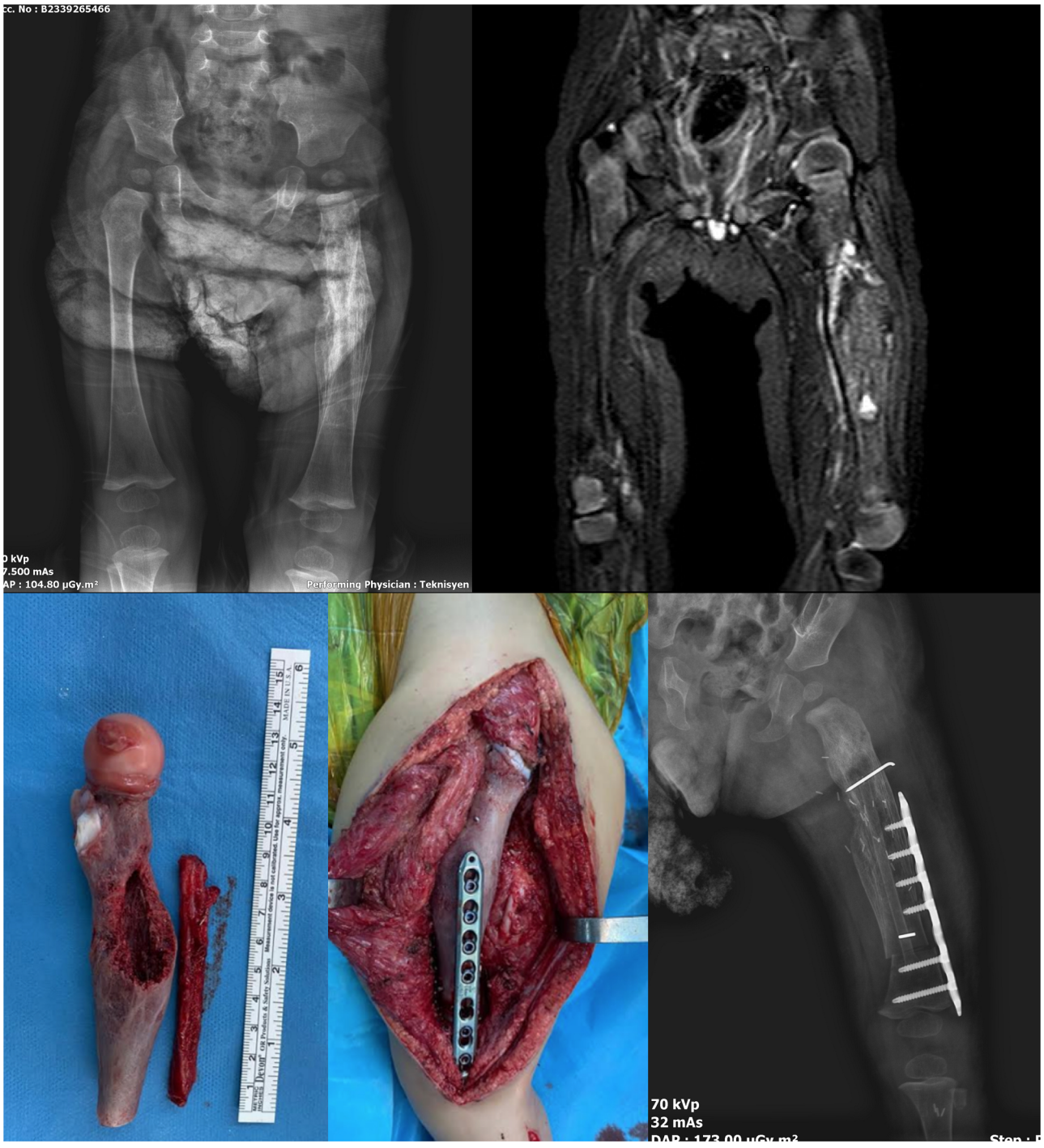

FIGURE 2 A 1 year old boy diagnosed Ewing Sarcoma in left femur, has undergone wide surgical resection and biological reconstruction [Color figure can be viewed at wileyonlinelibrary.com]

staff entered the room. The carts that were used to distribute food or for patient care were not allowed in patient rooms. All patients had thoracic CT results because they were examined for metastasis.

We evaluated all patients that were scheduled for biopsy and surgery both preoperatively and postoperatively at weekly orthopedic oncology committee meetings that included a pediatric oncologist, a medical oncologist, a radiation oncologist, a radiologist, an orthopedic surgeon, and a pathologist. To reduce contact, we reduced the number of physicians on the committee from three specialists per branch to one. A seating plan was organized in which the members of the committee would be at least 1.5 m apart. Also use of mask was encouraged during those meetings. We thus ensured that the treatment of orthopedic oncology patients that required a multidisciplinary approach would not be disrupted.

TABLE 2 Demographical data, diagnosis, treatment of soft tissue sarcomas

Cases	Age (y. o.)	Sex	Diagnosis	Locazilation	Treatment
1	44	M	MMT	Thigh	WR
2	46	M	MMT	Thigh	WR
3	31	M	MMT	Ankle	WR + free muscle flep
4	77	F	MMT	Thigh	WR
5	5	E	RB	Paraspinal	WR
6	7	F	EWS	Shoulder	WR
7	22	F	MPNST	Pelvis	WR
8	14	F	SS	Knee	WR
9	27	M	MPNST	Shoulder	WR

Abbreviations: EWS, Ewing's sarcoma; F, female; M, male; MMT, malignant mesenchymal tumor; MPNST, malignant peripheral nerve sheath tumor; RB, rhabdomyosarcoma; SS, synovial sarcoma VFGr; WR, wide resection; y.o., years old.

FIGURE 4 Computed tomography scan of 20-year-old male patient treated with a diagnosis of soft tissue sarcoma, showing ground-glass opacities in both lungs inspite of negative real time RT-PCR results. RT-PCR, reverse transcription-polymerase chain reaction

3.3 | Perioperative process

The patients were operated by an experienced surgical team. Entrance to and exit from the operating room were kept to minimum. The operating room ventilation system should minimize the presence of airborne pathogens. The ventilation system in our operating room provided at least 20 air changes per hour. We reduced the amount of equipment in the operating room and only kept the essentials for the surgical procedure. We minimized the number of people in the operating room, especially during the intubation or extubation of the patient. We applied tranexamic acid to every patient unless contraindicated to reduce complications related to perioperative and postoperative bleeding (Figure 5).

3.4 | Postoperative process

Visitors were not allowed after the operation. We administered standard postoperative antibiotic and anticoagulant prophylaxis since there is no evidence suggesting the preferred postoperative

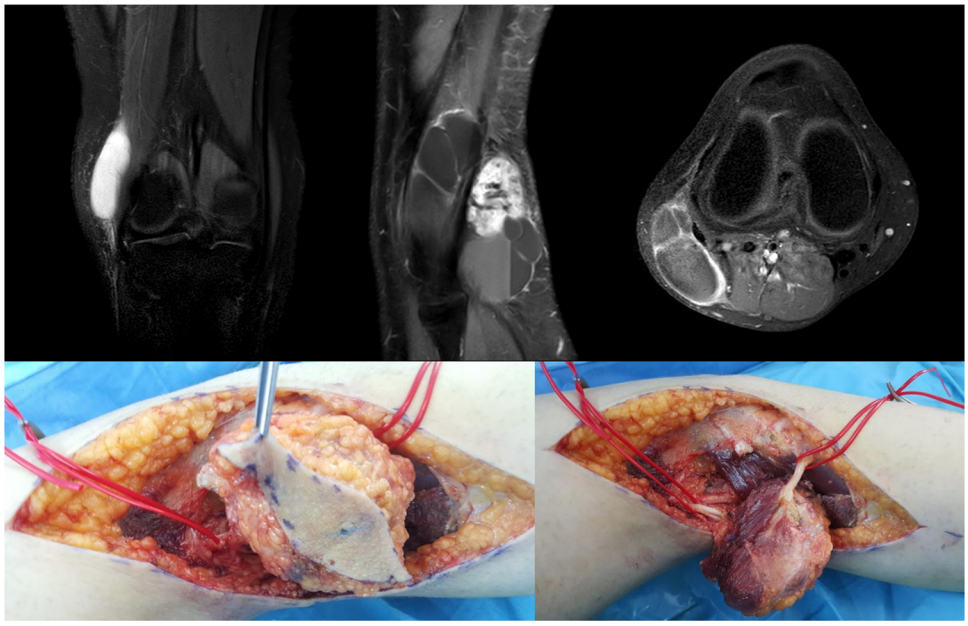

FIGURE 3 13 years old girl with a diagnose of Synovial Sarcoma around knee region has undergone wide surgical resection [Color figure can be viewed at wileyonlinelibrary.com]

FIGURE 5 Our perioperative protection measures during COVID-19 pandemic. COVID-19, coronavirus disease 2019 [Color figure can be viewed at wileyonlinelibrary.com]

anticoagulant and antiplatelet agents and surgical antibiotic prophylaxis need to be changed. Since there is no evidence regarding the use of nonsteroidal anti-inflammatory drugs (NSAIDs), we used non-NSAID analgesics for postoperative pain management and epidural analgesia for patients who underwent lower extremity surgery. Two patients postoperatively developed superficial wound necrosis and required prolonged hospitalization. Doctor's visits were reduced to once per day and carried out only by the doctor who performed the ward round. Entrance to and exit from the patients' rooms were halted other than treatment-related nurse visits, doctor's visits for wound dressing, and ward rounds.

4 | DISCUSSION

We aim to use our results to contribute a treatment management scheme and treatment procedure to the literature for orthopedic oncology patients during the COVID-19 outbreak.

Orthopedic clinics in hospitals should be organized according to three basic principles:

(1) Clinical urgency
(2) Staff safety
(3) Continuity of medical resources

Hospital resources and health services should be planned in light of this information.[5]

In our clinic, we primarily decided to reduce all forms of contact. We halted general orthopedic and nonurgent specialty outpatient services (foot and ankle surgery, sports surgery, deformity surgery, arthroplasty, hand and wrist surgery, pediatric orthopedic surgery). We aimed to reduce both the healthcare workers' contact with patients and the patients' contact with other patients while coming to and from the hospital. We reduced the number of actively working outpatient clinics from seven to two, where we followed up only early postoperative patients, patients followed for conservative treatments or casts, and tumor patients. We created a separate outpatient service for tumor patients and prevented any contact with other patients during follow-ups. We determined early postoperative patients who were operated on before the COVID-19 outbreak through the hospital information system and used teleconferencing for consultations. We only called in patients who were deemed necessary to come into the hospital for assessment. During teleconference consultations, we provided the patients with information about the continuity of medical treatment. We also provided information about wound care. Chang Liang et al[5] similarly reported conducting patient consultations and providing information with teleconferencing during the SARS outbreak.

Massey et al[6] classified their patients according to clinical urgency from A through E and organized operations accordingly. In line with the recommendations of the TOTBID, we decided to operate only in cases of actual orthopedic emergencies, trauma patients, and orthopedic oncology patients. We delayed nonurgent operations (eg, anterior cruciate ligament injuries, benign soft tissue tumors, deformity surgery, and arthroplasty).

Herein, there were three significant factors. First, operations like spine surgery, arthroplasty, and deformity correction surgery require prolonged hospitalization periods of 3 to 7 days, which both increase the requirement of hospital resources and the possibility of contact. Second, a significant number of patients who require arthroplasty have comorbidities. Comorbidities are associated with an increased risk of pulmonary embolism, deep vein thrombosis, and pneumonia.[7] In their series of coronavirus patients, Chen et al[8] reported that half of all subjects had comorbidities, and Zhou et al[2] reported this rate to be 48%. The consensus opinion by Parvizi et al[9] recommends resuming elective surgeries since it is unclear how long the COVID-19 pandemic will last. However, as we work in a multidisciplinary public hospital where patients with active COVID-19 are being treated in

other branches, we decided to postpone these surgeries, particularly because it would be challenging to manage any potential complications. Third, performing more surgeries means requiring a number of medical staff present in the hospital.

Clinics from both Turkey and other countries provide various approaches for arthroscopic interventions. Liang et al[5] argue that the operations of patients that require arthroscopic interventions and day surgeries can still be allowed to continue due to the short length of hospital stay and not causing a major strain on the hospital. We have decided to postpone foot, wrist, knee, and shoulder arthroscopies so as not to increase the number of staff and human contact.

Guo et al[10] reported that in 34 patients who were in the incubation period and thus were not diagnosed, the mortality rate was 20.5% and the rate of major complications was 44.1%. This article alone proves that surgery should only be performed when absolutely necessary.

Anesthesia, sedation, and intubation procedures were carried out according to the Singapore protocol.[11] It is crucial to minimize the number of staff present in the operating room during intubation and extubation.

Parvizi et al recommended not changing preferred anticoagulant and antiplatelet drugs and surgical antibiotic prophylaxis in elective surgery.[9] The postoperative use of NSAIDs is still not clear.[12]

Mi et al argue that the clinical outcome and early prognosis are worse for COVID-19 patients with fractures compared with the normal population. The fact that 7 out of 10 patients diagnosed with fractures developed nosocomial infections supports the necessity of reducing the number of healthcare workers and elective surgeries.[13]

Our patients were asked to arrive in the morning ready for surgery and were sent back home after nerve block or general anesthesia wore off. The patients were not hospitalized overnight. The outpatient surgery approach allowed the patients to remain in the hospital for less than 24 hours and helped avoid nosocomial infections.[5]

Considering the possibility that the fight against the COVID-19 outbreak may be long-term, it is crucial to ensure the safety of healthcare workers and the rational use of medical resources. For this reason, like all healthcare workers, the orthopedic team was instructed to regularly wash their hands and to wear surgical masks during clinical practice.

The infectious diseases clinic and ward were isolated and separated as a follow-up and treatment zone for patients with COVID-19. The number of beds was increased using supplies from other departments as needed. The number of elective outpatient appointments was reduced throughout the hospital, thus reducing the number of elective patient admissions. By reducing the number of actively operating outpatient clinics, available resources, and healthcare workers could be directed to fight against COVID-19. All patient who presented to the outpatient clinic were screened for fever and COVID-19 symptoms. Patients who had recently returned from abroad were referred to the triage area. In the triage area, clinical evaluation was performed by medical personnel who used PPE. According to the suspicion or presence of COVID-19, these patients were treated in COVID-19 services.

Two healthcare workers who worked in the orthopedics clinic had recently returned from abroad and were put under 14 days of home quarantine. Four staff working in the outpatient clinic during the outbreak presented with fever and flu-like symptoms and tested positive by real time RT-PCR. They were subsequently put under 14 days of home quarantine and were treated at home as per the suggestion of the infectious diseases clinic. These six workers returned to active duty after two consecutive real time RT-PCR test results came back negative. One employee of the hospital had lymphocytopenia (lymphocyte count of <500) due to using immunosuppressive drugs for multiple sclerosis and was removed from active duty and quarantined. Healthcare workers' safety is one of the key goals.[5,14]

One of the key strategies here is to reduce the number of surgeries and elective operations in the entire hospital.[15]

At first glance, the COVID-19 pandemic and orthopedics may seem to be unrelated disciplines, but the provision of healthcare services to patients who require them proves that these two fields are parts of the same whole. Our orthopedics and traumatology clinic was established in 1983 and has been specializing in orthopedic oncology since the early 2000s, having gathered 20 years of experience. Patients are not only operated on in this clinic but also undergo neoadjuvant and adjuvant chemotherapy. Our experiences in treating neutropenic, lymphocytopenic, and chemotherapy patients seem to have proven beneficial during this process. We operated on 10 biopsy patients, 15 primary bone sarcomas, 9 soft tissue sarcomas, and 82 trauma patients within this time frame. Only three patients were suspected to have COVID-19 before admission. The early identification, strict isolation, and effective treatment of these patients prevented any nosocomial infections and disease-related comorbidities. This success is the result of the multidisciplinary cooperation of the Ministry of Health, our hospital, and our clinic.

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DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

ORCID

Yavuz Şahbat http://orcid.org/0000-0002-9963-5334
Omer Buyuktopcu https://orcid.org/0000-0001-9017-1433
Osman Mert Topkar https://orcid.org/0000-0003-2452-1954
Bulent Erol https://orcid.org/0000-0001-7099-6374

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