

# Orthopedic Patients with Delayed Presentation during the Coronavirus Disease 2019 Outbreak: Report of 7 Cases

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## Abstract

**Background:** Coronavirus disease 2019 (COVID-19) outbreak had some adverse effects on the management and treatment of patients with different medical conditions in several ways, and one of the most important and devastating ones is a delay in seeking medical care.

**Case Report:** During the first months of the outbreak, we had met seven patients with orthopedic problems and significant delays in receiving treatment which completely changed the treatment plan, course of the disease, and outcome.

**Conclusion:** As the COVID-19 pandemic has adverse effects on the management of orthopedic patients, like other medical conditions, it is necessary to make decisions and to implant some strategies to provide safe and effective care for patients with orthopedic conditions.

**Keywords:** Delayed Diagnosis; Coronavirus; Orthopedics

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## Background

Since the outbreak of novel coronavirus infection, it seems that the management and treatment of other medical conditions have been adversely affected. One of the most important causes of which is a delay in seeking medical care, even in life-threatening situations, due to the fear of admission in a hospital during the pandemic (1, 2).

In our hospital, as a tertiary center in providing care for both coronavirus disease 2019 (COVID-19) and orthopedic patients, by implementing some changes and screening protocols (3, 4), we were able to continue essential orthopedic surgeries (3).

Even during the COVID-19 outbreak, there are still several cases with definite need to immediate orthopedic intervention including acute septic arthritis, failure in fixation after osteotomy, and fracture. Many of these cases refer to the clinic with significant delay. Natural history, outcome, and management protocol in this group of patients were completely different from similar cases. Here, in this paper, we are going to report these cases.

## Case Report

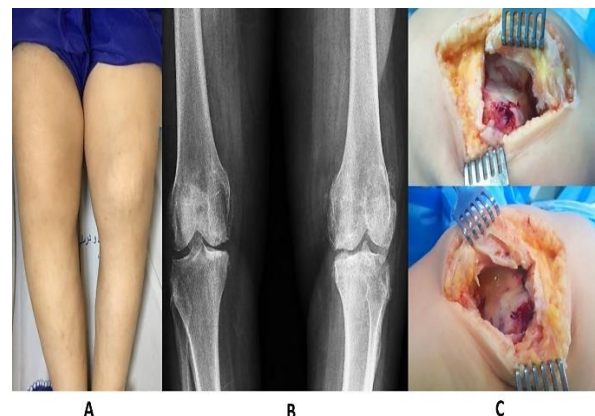
**Case 1:** A 57-year-old woman with diabetes presented to the emergency department (ED) with complaints of bilateral knee pain and swelling from 4 weeks ago without any trauma. The pain had a progressive pattern which gradually made the weight-bearing impossible for her. Intermittent fever and chills was another positive finding in history. She was on self-prescribed oral antibiotic therapy (ciprofloxacin and nitrofurantoin) from two weeks after the onset of pain.

Physical examination revealed normal vital signs and she was neither toxic nor febrile. In both knees, mild bilateral varus deformity and about 30 degrees of flexion

contracture with warmth and swelling were obvious beside generalized tenderness. Range of motions was severely restricted and painful and weight-bearing was impossible.

On laboratory studies, white blood cells (WBC) of 11000 cells per cubic millimeter of blood, erythrocyte sedimentation rate (ESR) of 70 millimeter per hour, and C-reactive protein (CRP) level about 85 milligrams per deciliter, all were indicative of an infectious process which was confirmed by elevated WBC count with polymorphonuclear (PMN) dominance in bilateral synovial fluid. Plain radiographs showed bilateral moderate degenerative joint disease with varus deformity.

Since the whole findings were diagnostic for septic arthritis, simultaneous bilateral arthrotomy with medial parapatellar approach was done and severe cartilage loss and synovial hypertrophy without obvious puss were found (Figure 1).

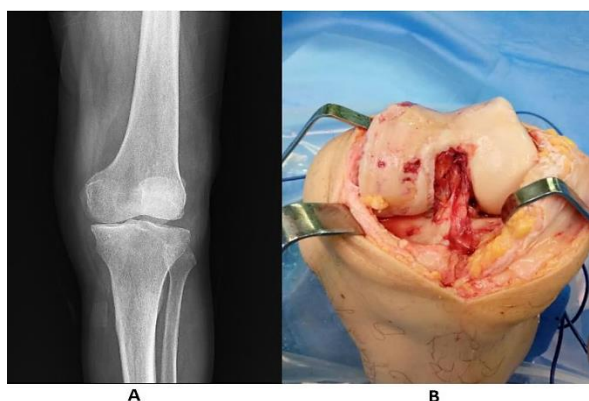


**Figure 1.** A: Bilateral varus deformity; B: Degenerative changes in both knees; C: Intraoperative photography revealing severe cartilage loss

After initial treatment with open joint drainage, debridement, and total synovectomy, intravenous (IV) antibiotic therapy was administered empirically and then switched according to the antibiogram [Methicillin-Sensitive Staphylococcus Aureus (MSSA)]. Monitoring with weekly laboratory examinations revealed no decrease in neither ESR nor CRP levels. High-volume discharge from drains, increase in ESR and CRP levels after 6 weeks, lack of improvement in joint range of motion (ROM), and presence of severe joint degeneration convinced us to plan for a primary two-stage knee arthroplasty with antibiogram cement spacer in the first stage (5). After explaining this plan, she refused to continue the treatment in our hospital.

**Case 2:** A 65-year-old healthy man with no history of knee pain presented with acute onset knee pain and swelling from 22 days ago. In the first few days, after a visit by a general practitioner (GP), he was advised to visit an orthopedic surgeon emergently but the patient and his family ignored the advice due to fear of being in a hospital during the pandemic situation. After the exacerbation of symptoms and inability to walk, he was admitted to our ED.

After a physical examination and initial general evaluation, the joint aspiration resulted in turbid fluid with low viscosity with increased leukocyte count (65000 cell/ml) up to 95% neutrophil, and a positive smear for gram-positive bacteria, all of which were in favor of septic arthritis. Just like the previous case, open arthrotomy and synovectomy was performed for the patient and severe cartilage loss and areas of bare bone were in favor of joint destruction and degeneration (Figure 2).



**Figure 2.** A: Plain X-ray demonstrating severe joint space decrease without obvious osteophyte formation; B: Intraoperative photograph of cartilage loss and bare bone in medial femoral condyle

According to our local protocols, treatment has been continued with IV antibiotic therapy and serial laboratory follow-up with ESR and CRP levels. As predicted, there was no improvement and we decided to treat the patient with primary two-stage arthroplasty but he too refused to receive this treatment during the peak of the pandemic.

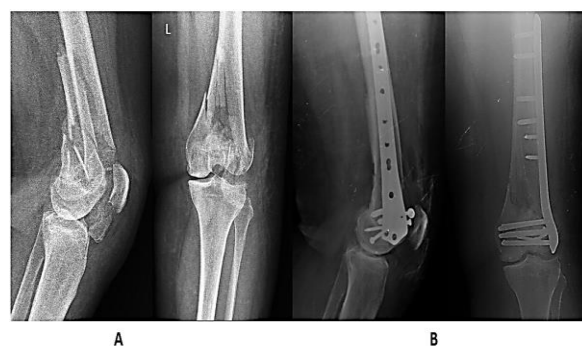
**Case 3:** A 52-year-old man was referred to us from a general clinic with right knee swelling, limping, and progressive constant pain from 16 days ago and fever and chills in the first few days. Clinical findings such as presence of the joint effusion, restricted ROM, and inability to walk, in addition to lab results were consistent with an inflammatory or infectious procedure.

During the diagnostic workup, the joint aspiration results were borderline (WBC: 1300 cell/ml with 87% neutrophils) but as the patient had been receiving IV

antibiotics for 2 days prior to aspiration, and as the clinical picture was clear, we ran an open arthrotomy and total synovectomy. Tissue and fluid culture were both negative but as the patient was on an antibiotic before aspiration and arthrotomy, we continued IV antibiotics according to an empiric regimen.

Following the significant decrease in inflammatory markers and after obtaining acceptable ROM (between 5 to 110 degrees), he was discharged with an oral antibiotic and at serial follow-up, there was no major complication except for some degrees of pain and limited knee flexion.

**Case 4:** A 46-year-old woman with a distal femoral fracture presented to our ED two months before the beginning of the outbreak in our region. Treatment with open reduction and internal fixation with a lateral approach was done (Figure 3).



**Figure 3.** A: Preoperative anteroposterior (AP) and lateral X-ray; B: Postoperative X-ray after open reduction and internal fixation (ORIF) with lateral plating

As there was good cortical contact in both the medial and lateral side and there was no comminution at the medial cortex, we decided not to do plating on the medial side.

After the 2<sup>nd</sup>, 4<sup>th</sup>, and 6<sup>th</sup> week follow-up visits, without any complication, she left the routine follow-up program and unfortunately 6 months after surgery came to our clinic with pain, inability to walk without aid, and radiographic findings indicating atrophic nonunion. As we questioned about the cause of the delay, she mentioned being afraid to come to the hospital which is also a referral center for patients with COVID-19.

After complete assessment to rule out infection, treatment of nonunion was done via sclerosis removal, double plating, and bone grafting from contralateral iliac wing in addition to obtaining tissue culture which was negative (Figure 4).



**Figure 4.** A: X-ray demonstrating atrophic nonunion with gap and sclerosis in fracture site; B: After double plating and bone grafting

**Case 5:** Two months before the beginning of the coronavirus outbreak, we did a high tibial osteotomy (HTO) and partial medial meniscectomy for a 45-year-old woman due to varus deformity and mild degrees of isolated medial side osteoarthritis (OA) plus degenerative complex tear of medial meniscus.

Three months after surgery, she came to us with the complaint of recurrent pain in the medial side. Comparing early postoperative images with the latest radiographs, intraarticular penetration of plate due to medial plateau collapse was revealed. As the osteotomy site was united and the plate was penetrating the joint, we planned to remove the plate to prevent any damage to the femoral condyle cartilage, but as we were in the peak of the COVID-19 pandemic and all the elective surgeries were suspended, we were forced to postpone the surgery.

Two months later by beginning of elective surgeries, the patient was scheduled for arthroscopy and plate removal.

Device penetration, a degenerative unrepairable meniscal tear in the medial meniscus, chondral lesion and erosion in the margin of the medial femoral condyle, and tibial plateau chondromalacia were the positive findings. As the union in osteotomy site was complete, arthroscopic partial meniscectomy and device removal was done for the patient (Figure 5).



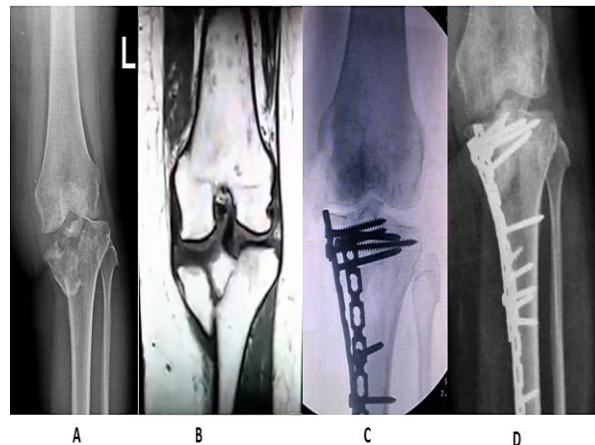
**Figure 5:** Arthroscopic view of intraarticular penetration of plate and postoperative X-ray demonstrating degenerative changes in the knee joint

**Case 6:** A 37-year-old woman with left knee trauma following a fall from ladder was admitted to a general hospital and had been advised to continue the treatment in our hospital as a tertiary center in orthopedics. As our center was known as a crowd referral center for patients with COVID-19 at that time, she decided to stay at home and did not come for treatment.

Five months after the trauma, she presented with a malunited medial condyle fracture-dislocation (Hohl and Moore fracture dislocation type II) which was fully different in management basics and final outcome in respect to acute ones.

After complete evaluation with the examination, imaging study including plain radiography, computed tomography (CT) scan, and magnetic resonance imaging (MRI), she underwent surgery by a single anteromedial approach. As the fracture had extended below the distal attachment of medial collateral ligament (MCL) and due to severe bone formation and adhesion, we had to divide the

capsular attachments of the medial meniscus to MCL to visualize the fracture fragments and also cut the anterior meniscal root for assessing the articular surface congruity. After osteotomy and freshening the fracture sites, fixation was done by double plating and autologous bone grafting for defects (Figure 6).



**Figure 6:** A: Plain X-ray revealing severe displacement in addition to bone resorption; B: Magnetic resonance imaging (MRI) showing extension of fracture of distal to the tibial attachment of medial collateral ligament (MCL); C and D: Intraoperative and postoperative imaging demonstrating anatomic restoration of tibial plateau

At last, reattaching the anterior medial meniscus root and distal attachment of MCL was done by suture anchors.

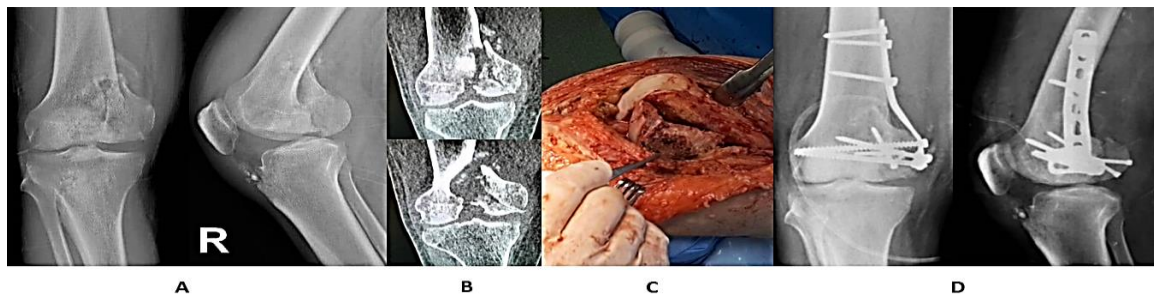
Treatment of fractures like this in a delayed manner is a challenge due to several factors like adhesion and fibrosis, bone resorption, and localized osteopenia due to disuse, difficulty in reduction, and postoperative problems, especially in regaining muscle force and ROM due to contracture and muscular atrophy (6). After a two-month follow-up, an active ROM was 0 to 100 degrees and the follow-up X-ray was acceptable.

**Case 7:** Our last case was a 50-year-old active man with a history of falling from the stairs about 40 days before presenting to our clinic with a distal femur fracture which was treated only by a long leg splint for about 30 days. On admission, knee swelling and deformity were obvious findings with a 40-degree flexion contracture and limited flexion up to 90 degrees.

On imaging studies, including plain radiographs and CT scan, a medial femoral condyle multifragmentary intraarticular malunited fracture with significant displacement and callus formation was detected. By considering the age, patient demand, and gross displacement, we scheduled the patient for corrective osteotomy and fixation.

Through a medial subvastus (SV) approach and after an arthrotomy, the fracture site was exposed. After osteotomy at the fracture site and callus debridement, fragments mobilization, anatomic reduction, and fixation were done (Figure 7).

In cases with delayed treatment of an intraarticular fracture, especially when it has changed to an intraarticular malunion, results including ability to obtain an anatomical reduction, restoration of normal ROM, and duration of the rehabilitation period are different and of course, have a worse prognosis in comparison with those treated in the acute phase (7).



**Figure 7.** A: Preoperative plain X-ray and B: Computed tomography (CT) scan showing intraarticular involvement with comminution and callus formation; C: Intraoperative photography showing articular fragment after osteotomy and mobilization; D: Postoperative X-rays

**Discussion**

COVID-19 pandemic, the situation that the world is trapped in, is a crisis without a predictable course that already has affected human life in every aspect. It has adverse effects on the management of other medical conditions, not only in elective cases but also in some essential and emergent ones (8).

During the first couple of months of the outbreak in our region, we detected seven cases with urgent or emergent orthopedic problems, including septic arthritis, failure of fixation, and acute intraarticular fractures, which have met the medical and orthopedic care with a significant delay (Table 1).

In all cases, the natural course, treatment strategy, complexity of the surgical procedure, final results, and also economical burden were completely different, and almost always worse than what is presumed in cases without overmentioned delay.

Overcrowded hospitals, fear of long hospital stay and being infected during treatment, limitations in transferring especially between primary centers to tertiary ones, lack of separate triage units, or even disorganization in screening disciplines all can be named as causes of hesitation in meeting medical care (9, 10).

The role of informing people about the adverse and irrecoverable effects of the delay in treating some orthopedic conditions can help prevent some disasters. In case number four, early bone grafting could have prevented the progression to the nonunion, but as it was neglected by the patient, a simple surgery like bone grafting changed to an invasive and major procedure like fixation revision with an extensile approach.

Besides, it should be clarified for people that delay in medical care visit not only does not decrease exposure to the healthcare system, but also can lead to a longer hospitalization and need for more aggressive procedures and even several reoperations, that altogether can increase the risk of infection by coronavirus (11, 12).

After facing three cases of knee septic arthritis with more than two weeks delay, we ran a retrograde

evaluation on patients with knee septic arthritis which were treated surgically in our hospital. We found that in the last 6 months before the COVID-19 outbreak, in 22 cases with established knee septic arthritis, the mean delay between the beginning of symptoms and the surgery was about 4 days and in this period, we had no case with a delay more than 10 days.

In similar cases without delay in treatment, an arthroscopic joint drainage and IV antibiotic therapy are all we need for a successful treatment, but in the presence of such a significant delay, an invasive and extended treatment policy including open arthrotomy, prolonged antibiotic administration, and, like our cases, multiple surgeries or even two-stage arthroplasty are necessary with increased risk for complications.

In case number five, early treatment with plate removal, fixation revision, or even limiting the weight-bearing could prevent further complications, but delay in plate removal led to tear and degeneration in the medial meniscus in addition to the progression of degenerative changes especially in the medial femoral condyle and changed the outcome completely.

In cases number six and seven, we had to use an extensile approach, and in both cases, a complete release of MCL was mandatory for proper mobilization of fragments and anatomical reduction. In both patients, we reattached MCL using suture anchor and it changed the postoperative rehabilitation course, and in these patients, we immobilized the knee for two weeks which had an adverse effect on obtaining the desired ROM.

Therefore, it seems that it can be concluded that the outbreak resulted in some obligatory delay in the treatment of patients with this orthopedic joint- and life-threatening condition. Also, any hospital and department should have its guidelines and protocols to continue essential or even some elective orthopedic surgeries (13, 14). Categorization into essential and non-essential procedures and prioritization of surgeries, use of outpatient and one-day surgery, and isolation of patients and staff as much as possible can be useful (13, 15).

**Table 1.** Summary of patients' demographic and clinical information

Case	Gender	Age (year)	Diagnosis	Delay (day)	Possible adverse effect and result of delay	Treatment and outcome
1	Female	57	Knee septic arthritis	28	Cartilage damage, resistant infection	Refusing to do two-stage TKA
2	Male	65	Knee septic arthritis	22	Cartilage damage, resistant infection	Refusing to do two-stage TKA
3	Male	52	Knee septic arthritis	16	No complication	Arthrotomy, infection resolved with antibiotic therapy
4	Female	46	Distal femoral fracture	120	Delay in bone grafting at 6 weeks led to large bone defect and nonunion	Re-ORIF
5	Female	55	HTO implant complication	120	Plate penetration into joint, meniscal and chondral injury	Implant removal and partial meniscectomy
6	Female	37	Tibial plateau fracture	150	Malunion	ORIF
7	Male	50	Distal femoral fracture	40	Malunion	ORIF

TKA: Total knee arthroplasty; ORIF: Open reduction and internal fixation; HTO: High tibial osteotomy

Another important point is that in the management of patients with such problems, a surgeon must be prepared to engage with unusual cases. Surgery must be done by the most experienced surgeon, who is familiar with extensile approaches and can manage possible future complications or need for reoperation or staged surgeries and is capable to shift between different planes as it could be necessary for responding to the possible scenarios (3). For example, in the case of neglected septic arthritis, it is important to inform the patient about the elevated probability of resistant infection, osteomyelitis (OM), need for several operations, or even two-stage arthroplasty, and patient compliance and socioeconomic condition must be taken into account during decision making. Of course, the surgeon must be prepared for complex OM treatment and be familiar with two-stage arthroplasty and its detailed technique (5, 16).

### Conclusion

As the COVID-19 pandemic has adverse effects on the management of orthopedic patients, like other medical conditions, it is necessary to make decisions and to implant some strategies to provide safe and effective care for patients with orthopedic conditions..

### Conflict of Interest

The authors declare no conflict of interest in this study.

### Acknowledgments

None.

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