



The Ethics of Treating Acute Achilles Tendon Ruptures During the COVID-19 Pandemic: A Case Report

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Introduction

Infection with severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), also known as coronavirus disease 2019 (COVID-19), is a novel respiratory disease that reached pandemic proportions in March 2020 [26]. As the clinical picture and risks of transmission were not fully known, uncertainty surrounding the virus mandated abrupt changes in the practice of medicine. In the USA, states and healthcare systems undertook extensive measures, such as canceling elective surgeries, to mitigate transmission of the virus [1, 3, 5, 17]. These efforts were part of a larger public focus on decreasing transmission and reallocation of healthcare workers and personal protective equipment (PPE) to treat patients with COVID-19 [19].

During this time of canceled elective surgeries, a subset of patients still required surgery. Several institutions, such as

the Centers for Medicare and Medicaid Services (CMS), published general guidelines for surgical intervention [4, 6], categorizing cases as elective, urgent, or emergent surgical, on the basis of acuity [19]. Although what to do with elective and emergent cases is relatively clear, there is less clarity regarding how to manage urgent cases. Surgeons have been faced with difficult decisions, decisions that would be more straightforward in a time without a crisis.

The purpose of this case report is to discuss the ethics and decision-making process surrounding a patient with a common foot and ankle injury, Achilles tendon rupture, and whether or not surgical repair would be performed in light of the COVID-19 pandemic.

Case Report

C. K. was a 43-year-old man who presented for an outpatient orthopedic foot and ankle consultation at Northwell Health on Long Island in New York, with a chief complaint of right ankle pain after an injury that he sustained while jogging on March 21, 2020. Notably, the injury occurred just 6 days after Northwell canceled all elective surgeries because of the COVID-19 pandemic. The patient described the episode as a “popping” sensation in his right lower calf and had been given a preliminary diagnosis of an Achilles tendon rupture at a local emergency department (ED). The patient presented for the outpatient evaluation 3 days after the episode with complaints of throbbing posterior ankle pain and an inability to ambulate. He denied any past medical or surgical history but did report “social” tobacco use on weekends. He additionally denied any history of steroid use or recent antibiotic use.

On prone examination, a notable defect over the midsubstance of the Achilles tendon and a loss of resting plantarflexion tone on the affected side were detected. Thompson testing showed a lack of reproducible plantarflexion. Active range of motion testing of the affected ankle revealed 10° of active dorsiflexion and 40° of active

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plantarflexion. The patient was neurovascularly intact with appropriate perfusion distally. The remainder of his secondary exam was benign. Plain radiographs taken at the time of his ED visit were negative for any fracture or bony abnormalities. The patient's history and clinical examination were consistent with a right Achilles tendon rupture.

In light of the COVID-19 pandemic, a lengthy discussion was had with the patient regarding his diagnosis and potential treatment options. The risks of operative and nonoperative treatment, including re-rupture, wound healing complications, tendon lengthening, poor tendon healing, gait abnormality, scar adhesions, decreased range of motion, deep vein thrombosis and pulmonary embolism, and infection, were discussed with the patient. Additionally, due to the escalation of the COVID-19 crisis in the area and health system, risks of COVID-19 transmission were reviewed with the patient.

After a thorough discussion of the benefits and risks of operative and nonoperative treatment, as well as the particular risks associated with COVID-19, a mutual agreement was reached to pursue nonoperative treatment. The patient was placed into a well-fitting short leg cast with 20° of resting plantarflexion. He was advised to be non-weight bearing in the cast, given crutches, and placed on aspirin 325 mg twice daily for deep vein thrombosis prophylaxis. The patient was advised to follow up in the office in 2 weeks.

The patient returned at 2 weeks, which was near the peak of COVID-19 cases within our healthcare system. On presentation, he reported that his pain and swelling had improved dramatically and that he had complied with the non-weight bearing instruction and taken aspirin for deep vein thrombosis prophylaxis. The short leg cast was removed, and the skin was clean and dry.

At this time, the patient and team again discussed the benefits and risks of nonoperative and operative treatment, as well as COVID-19 transmission. Agreeing to continue with conservative management, the patient was fitted with a long controlled ankle movement (CAM) boot with heel lifts to incorporate resting plantarflexion; he was educated on the boot wear pattern and use and was instructed to remain non-weight bearing for an additional 2 weeks. He would begin physical therapy at the 4-week mark and progress to weight bearing as tolerated in the CAM boot, per standard treatment protocol [25]. The patient was scheduled for a 6-week in-office follow-up visit to monitor his progression.

Discussion

The COVID-19 pandemic caused a rapid and fundamental shift in the framework of our healthcare system [26]. Physicians are trained with a patient-first mentality, but during a public health crisis, they must adopt a strategy that recalibrates healthcare priorities. Such rapid changes can result in internal and external pressures that disrupt practice norms and ultimately challenge physicians in making ethically appropriate decisions. Moral distress is likely to occur as a result of physicians' being prevented from acting as they

normally would to keep their patients' best interests at the fore [7, 8, 13]. Although the case presented here may seem to be routine, the heightened stressors due to the COVID-19 pandemic provided unique obstacles to surgical decision making. The CMS guideline for determining surgical cases is based on surgical acuity, which at its heart is a risk-benefit analysis [4]. As others have suggested [6], evaluating the risk of COVID-19 exposure and its impact on short- and long-term surgical risk is the best way to evaluate whether or not a procedure should be performed during a public health emergency.

In this case, COVID-19 posed several unique considerations. First, although studies have documented the risks of respiratory failure in patients with COVID-19 [9, 26], a growing abundance of literature suggests that many more people with COVID-19 may be asymptomatic [3, 28]. While our patient lacked COVID-19 symptoms, he may have in fact been an asymptomatic carrier. At the time of the index intervention, the healthcare system had a shortage of available testing kits and consequently had a policy in place of testing only symptomatic patients. Because we were unable to determine the patient's COVID-19 status, we had to consider two important risks resulting from the possibility that the patient could be an asymptomatic carrier. First, while he was asymptomatic prior to the proposed surgery, he may have gone on to develop symptoms post-operatively. Lei et al. [21] reported on the outcomes of 34 COVID-19 patients undergoing elective surgery and found that all developed post-operative pneumonia, 44% required admission to an intensive care unit, and 20.5% died shortly after surgery. Second, an asymptomatic carrier may pose an exposure risk to hospital workers, including nurses, surgical technicians, surgeons, and support staff. In addition, due to the need for prone positioning for the proposed surgery, the patient might need to be intubated, which is an aerosolizing event that puts the anesthesia team at risk [10, 14, 16]. As personnel and PPE were in short supply in the region [19], this was an important consideration. At the time, our healthcare system had adequate PPE, but given the rates of COVID-19 in our region and the potential need for intubation due to prone positioning, there is a non-negligible risk of transmission to the healthcare team.

The risks of surgical management were also discussed with the patient [20, 22]. Routinely, the care team discusses the risks of wound complications, infection, sural nerve damage, scar adhesions, and venous thromboembolism. As studies have suggested that patients with COVID-19 have an increased risk of hypercoagulation [23], we devoted special attention to discussing the risks of deep vein thrombosis and pulmonary embolism. Again, it was noted that nonoperative management would reduce the risk of such complications.

Although operative and nonoperative management of Achilles tendon ruptures have been shown to have equivalent functional outcomes [22], nonoperative management of an Achilles tendon rupture poses three primary risks: tendon re-rupture, loss of strength, and longer time to return to work [12, 14, 24, 25]. First, the increased risk of re-rupture with nonoperative treatment is controversial.

Kocher et al. [14] reported a re-rupture risk as high as 10 to 12% for nonoperative treatment, compared with 2.6% for operative treatment. Other studies, however, have suggested that the risk of re-rupture is the same for nonoperative and operative treatment when functional rehabilitation is used [22]. In our case, the patient was cautioned about a potential increased risk of re-rupture with nonoperative treatment; a functional rehabilitation protocol was used with a short leg cast for 2 weeks, followed by a CAM boot. Second, studies have suggested that nonoperative treatment could result in a loss of strength, compared with operative treatment [12, 24, 25]; although some have questioned the clinical significance of this weakness [22, 25], it was discussed with the patient. Finally, the patient was made aware that studies suggest that patients who undergo surgery are able to return to sport [24] and work [22] faster than patients who undergo nonoperative treatment. In light of COVID-19, the delayed recovery was thought likely to decrease the patient's risk for exposure to and transmission of the virus.

We reviewed the aforementioned risks with the patient on two occasions. Both times, we educated the patient based on the available literature and made him aware of these possible risks (the principle of nonmaleficence). The goal of these discussions was to educate the patient (the principle of autonomy) to allow him to be involved in a shared decision-making process. Although we support the notion of shared decision making even in a pandemic, some argue that a pandemic requires a greater shift toward public health (the principle of justice) than was represented in this case. The management of Achilles tendon ruptures presents a scenario of clinical equipoise—that is, outcomes are comparable with either operative or nonoperative treatment [22]. One can argue that for this reason, we should not have offered surgery to this patient, even if we had adequate personnel and PPE. Given the patient's relatively young age and high activity level and the availability of resources at the time, we felt that a shared decision-making process was appropriate; however, if we had been faced with more profound resource scarcity, we would have advised against surgery (the principle of stewardship).

Although at this writing the first wave of the COVID-19 pandemic may be plateauing, experts anticipate that the virus may continue to disrupt our lives for some time [15, 27], and surgeons will continue to encounter difficult ethical questions. In order to take the ethical burden off of physicians, healthcare institutions need to create clear and just guidelines on resuming nonemergent care. No one is in a better position to assess the need for surgical care than the physician.

In situations of clinical equipoise, when nonoperative and operative outcomes are similar, physicians must weigh the unique short- and long-term risks associated with surgical intervention during the pandemic. Although acute Achilles tendon rupture represents one classic example, many others exist, including management of closed displaced humeral shaft fractures [18], closed proximal humerus fractures [11], and closed displaced distal radius fractures in low-demand individuals [2]. While these pathologies have

unique nuances in their management, each has high-quality evidence suggesting similar outcomes between nonoperative and operative management [2, 11, 18, 22]. In such situations, the decision regarding surgical intervention is usually based upon shared decision making. Yet pandemics require a public health approach, which can render shared decision making infeasible. Therefore, physicians must be aware of their institution's available resources and stay up to date on the rapidly evolving literature on the pandemic. By doing so, physicians can evaluate the short- and long-term risks that the pandemic poses when determining which patients are appropriate to take to the operating room.

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Compliance with Ethical Standards

Conflict of Interest: The authors declare that they have no conflicts of interest.

Human/Animal Rights: All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2013.

Informed Consent: Informed consent was waived for the patient included in this case study.

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