



The COVID-19 outbreak in Italy: perspectives from an orthopaedic hospital

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Abstract

Purpose Italy is one of the more severely affected countries in the world by the recent COVID-19 outbreak. The aim of this report is to describe how COVID-19 affected the life and organization of one of the main orthopaedic hospitals of the country, and which measures were implemented to face the outbreak.

Methods A personal interview has been conducted with four doctors involved in the management of COVID-19 outbreak in one of the main orthopaedic hospitals of Italy.

Results Hospital was re-organized, elective surgeries were cancelled, and only trauma surgeries were allowed, together with oncologic and urgent cases. Since the number of cases among patients and healthcare workers increased, the hospital management responded not only with a massive testing campaign aimed at detecting contact histories but also with an additional testing campaign for asymptomatic healthcare workers.

Conclusion The main lesson is that any actions should be quick and decisive, for 1 week during the COVID-19 epidemic could make the difference.

Keywords COVID-19 · SARS-CoV-2 · Outbreak management · Orthopaedic hospital

Introduction

Italy is one of the countries more severely affected by the novel coronavirus disease (COVID-19) [1, 2], with more than 150,000 cases and nearly 20,000 deaths. After the isolation of two Chinese tourists in Rome who were found to be positive to coronavirus on January 31, the real outbreak officially started in northern Italy on February 21, less than two months ago [3, 4]. The following day, the virus entered Emilia-Romagna, which is a region of 4,500,000 inhabitants confining with Lombardy (the region of Bergamo, Brescia, and Milan, where the outbreak began). Bologna, the chief town of Emilia-Romagna accounting for nearly 1,000,000

inhabitants in its metropolitan area, registered the first positive case on February 29.

The Rizzoli Orthopaedic Institute is the main hospital dedicated exclusively to orthopaedic surgery of the Emilia-Romagna region, and among the largest of the whole Italy. In this hospital, which accounts of more than 300 beds, nearly 90 orthopaedic surgeons perform more than 12,000 procedures every year, mostly elective surgery such as joint replacements, arthroscopies, spine surgery, paediatric surgery, but also a relevant number of musculoskeletal oncologic cases and fractures.

The aim of this report is to describe how COVID-19 affected the life and organization of one of the main orthopaedic hospitals of the country, and which measures were implemented to face the outbreak managing either COVID and non-COVID patients with fractures, rationalize the activity and limit the contagious diffusion. Dealing for the first time with an unknown enemy pose to administrators, surgeons, and overall staff many new challenges. Unavoidably, mistakes could have been made, and others could follow; therefore, we think that our experience could be helpful to speed up the process of implementing effective measures in orthopaedic hospitals with settings similar to ours.

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Methods

A personal interview has been conducted with four doctors of Rizzoli Orthopaedic Institute: Dr. Tedesco, from the Medical Affairs Department; Prof. Zaffagnini, Director of II Orthopaedic and Traumatology Clinic; Dr. Grassi, Orthopaedic Surgeon and Dr. Pizza, third year Orthopaedic Surgery Resident.

Results

Dario Tedesco, MD PhD (Infection control, Medical Affairs Department)

When the World Health Organization (WHO) declared the novel coronavirus (later renamed SARS-CoV-2) outbreak an “emergency of international concern” on January 30, 2020, Rizzoli Orthopaedic Institute developed its first strategies to respond to the potential spread of the epidemic. At that time, though, Italy was not considered a high-risk country and the national and local guidelines were not particularly specific or detailed. On February 21, the first Italian COVID-19 case was reported in a small town 200 km from Bologna, and the same day another 20 citizens tested positive in the same area. On February 22, the Ministry of Health released detailed guidelines based on both clinical and epidemiological criteria for how to define suspect cases and how to organize the healthcare response. On February 23, the Rizzoli’s Medical Affairs Department adapted the national guidelines for the specific settings of care of its hospital facility by issuing the first of a series of local instructions. This document was particularly focused on two main aspects: (1) instructing doctors, nurses, and administrative employees to recognize patients with suspect of COVID-19 in the emergency setting, surgery wards and outpatient clinics, and define specific pathways for these patients; (2) providing the most appropriate PPE for each healthcare professional potentially exposed to the infection. It was apparent that the latter was a critical issue, because the risk of a pandemic had been globally underestimated, and national and local authorities had not secured sufficient stocks of protective equipment. In order to keep up with the swiftly changing epidemiological context, the hospital management updated protocols and instructions daily for a rational and evidence-oriented use of the PPEs, and organized educational meetings to instruct healthcare workers on their appropriate use.

The crisis worsened. The hospital, which is part of the National Health Service but was not assigned to be a COVID-hospital, had the first COVID-19 case in a patient and in a nurse on March 9. In the following days, the number of cases among patients and healthcare workers increased, and the hospital management responded not only with a massive swab testing campaign aimed at detecting contact histories

among patients and healthcare workers but also with an additional testing campaign for asymptomatic healthcare workers. At the same time, the level of PPE protection was raised, with the use of surgical masks in all patients with any respiratory symptoms and all healthcare workers who were in contact with these patients regardless of their clinical condition. In order to prevent the contamination of healthcare workers and other patients, specific pathways for patients with suspect or confirmed COVID-19 were established for the operating room, intensive care unit, emergency department, and surgical wards with specific hygiene and prevention protocols. Starting from March 20, a specific COVID-19 ward with 14 beds for patients with a musculoskeletal disease was opened.

As of April 10, 13.3% of the screened patients resulted positive for SARS-CoV-2. The percentage of healthcare workers who tested positive was 8.3%. Among the group of healthcare workers who did not have symptoms or were not contacts of positive patients or healthcare workers, only 1.6% tested positive. On April 6, the hospital launched serology tests seeking IgM and IgG against SARS-CoV-2 in the hospital’s asymptomatic healthcare workers. As of April 10, only 1.1% of them showed an immune response to the virus.

As the hospital’s infection control manager, since the beginning of the emergency I have felt the profound need to respond swiftly and appropriately to different and sometimes conflicting interests at play. For example, I was compelled to balance the need to address the potential PPE shortage by providing it only to professionals who were in close contact with suspect patients according to the WHO guidelines, with the duty of guaranteeing a safe work modality for all the employees. The entire period has been characterized by a general sense of uncertainty and continuous change, among the hospital’s employees and particularly the healthcare staff. Over the first 50 days of the COVID-19 outbreak, the Medical Affairs Department, together with Nursing Management, has constantly worked to inform, update and instruct the hospital’s staff by discussing the most recent evidence and policies at the local and regional level, sharing the decisions with the clinical and nursing leaders, and applying an open-door policy for anyone in need of help or clarification on this topic.

Stefano Zaffagnini, Prof. (Director of II Orthopaedic and Traumatology Clinic)

Two days after the discovery of the first positive patient, elective surgeries were cancelled and the hospital was reorganized to receive most of the fractures from the whole city, since all the smaller local hospitals were progressively closing in order to centralize the treatment of critical diseases and trauma, trying to limit the diffusion of virus. Therefore, only trauma surgery was allowed, together with oncologic and urgent cases such as osteomyelitis and wound infection dehiscence. All sports trauma, arthroscopy, joint replacement and

spine deformity, which represented the core activity of the Institute were suppressed. Ambulatory surgery was cancelled, as well, in order to promote social distancing and avoid population movement, in line with government decrees. Activity of outpatient clinic was reduced to allow only indispensable follow-up visits, suppressing first-time consultations and creating a task force to implement telemedicine. Orthopaedic surgeons were organized in two different teams to allow a weekly-based alternation in the management of surgical trauma cases. This alternation allowed to limit the interaction among colleagues and to make up for the possible lack of personnel due to quarantine. Two operating rooms, running from 7 AM to 7 PM were dedicated to trauma surgery, which were more than 50% hip fractures in elderly, followed by proximal humerus fractures and ankle fractures. Severe pelvic and spinal fractures were treated in the Trauma Center of the city, which is a multi-specialty hospital also designated as general COVID-center where an ICU for COVID patients was present.

One operation room, isolated from the others, was entirely dedicated to the treatment of positive or suspected COVID patients. There, separate “clean” and “dirty” spaces were created to allow safe dressing and undressing procedures, which are performed one member at a time under the supervision of a trained nurse, in order to avoid auto-contamination especially while removing headgear. Despite being the referral centre for most of the trauma in the whole city, the emergency department registered a drastic decrease in the number of trauma cases (especially minor) of more than 50%, due to the national lockdown.

To manage trauma or oncologic patients positive for COVID-19, or those with suggestive symptoms and positive radiological exams, a dedicated ward was created, converting one of those previously dedicated to elective surgery. A dedicated team was created selecting members from the existing hospital staff. The ward was organized to take care of the pre- and post-operative management of suspected or positive COVID-19 patients, providing nurses for monitoring of and administration of therapy, physiotherapists for patients’ rehabilitation and anesthesiologist consultants for the management of patient ventilation with non-invasive measures such as oxygen mask or cPAP. An isolated area of the hospital ICU was reserved, as well, for positive or suspected COVID patients; separate beds were also reserved for non-COVID patients requiring ICU support after trauma or oncologic surgery.

As a university center, all didactic activities were suppressed to avoid people gatherings, lectures, and oral exams for medical students were conducted remotely via webcam, as officially implemented by the local university.

Alberto Grassi MD, PhD Candidate (Orthopaedic Surgeon)

I am one of the orthopaedic surgeons assigned on a weekly-basis to manage the “trauma-COVID ward” in collaboration

with an Internal Medicine doctor. The population of the ward is composed of COVID-19 positive patients and patients who were transferred from the “clean” trauma ward to guarantee isolation due to symptoms suggestive of COVID infection. Logistically, the ward is divided into a “clean” area, where staff is allowed to circulate with surgical mask, regular scrubs, cap and gloves; then, half of room corridor and all the rooms represent the “dirty” area, where entrance is allowed only with ffp2 mask, glasses, double gloves, disposable coat, and shoe coverage. Instructions for dressing and undressing are present in multiple spots, and these actions are performed under the supervision of a second person that controls the appropriateness of the procedure in order to avoid auto-contamination while removing protective gear. Mirrors help the removal of head gear minimizing the risk of touching face skin. The distinction between a “clean” and “dirty” area is possible since patients are confined in isolation inside the rooms: two patients per room in the case of positivity for COVID-19, one patient per room in the case of suspected COVID or when diagnosis is in progress. Due to confinement of patients inside the rooms and limited droplet-generating procedures, this setting is considered a safe and smart environment for all the required medical activities. In fact, since patients with a non-confirmed COVID diagnosis could be admitted in this ward, isolation among patients—unless confirmed positive—and staff should be maintained in order to not create nosocomial contagion. One of the main challenges in the management of trauma-COVID patients is represented by the high mortality [5], especially of elderly patients. Of the first eight cases of hip fractures surgically treated (nail or replacement) in patients with COVID-19 diagnosis, three of them died within seven to ten days from surgery (unpublished preliminary data). Another challenge is obtaining an accurate and timely COVID diagnosis, as a relevant quote of false-negative swabs may be present [6]. Moreover, trauma patients are usually elderly with relevant co-morbidities often involving the respiratory system, and the typical “ground-glass” appearance of the lungs at high-resolution computerized tomography (HRCT) [7] could be present as baseline characteristics when screened for COVID diagnosis. It is also possible that symptoms such as fever, weakness, and desaturation may be part of the “classical” post-operative complications. If the general population with borderline presentation and indeterminate diagnosis can be safely managed with preventive home quarantine, this is not possible for post-operative trauma patients, since their condition does not allow basic self-care in complete isolation. On the other hand, their management in the usual non-COVID structures dedicated to post-operative rehabilitation would expose healthcare staff to contagious risk and local cluster onset, until 100% negativity is confirmed. The long-lasting treatment of these patients within the trauma-COVID ward does not represent a feasible option either, since the continuous surgical activity and the imminent risk of infection

outbreak causes a permanent need for free beds which requires prompt patient turnover with discharge home or transfer to care facilities for assistance continuation. The other possible pathways for COVID-positive or suspected COVID are represented by the “COVID-hospitals” equipped with high-volume ICUs in the case of complex patients possibly requiring ventilatory support, or the so-called COVID-resorts in the case of stable patients necessitating standard medical therapies. However, due to the special needs of trauma patients, like active physiotherapy and wound management, the isolation setting within all these paths in which a physiotherapeutic support is not contemplated, represents a dangerous threat for the quality of patient care and health maintenance. In fact, elderly patients, especially those with limited respiratory impairment, would enormously suffer from bed immobilization and isolation, due to the concrete risk of complications such as deep venous and pulmonary thromboembolism, bedsores, cognitive impairment and death [8, 9].

Nicola Pizza, MD (PGY3 in Orthopaedic and Traumatology)

I am a PGY3 orthopedic surgery resident, aged 29, who contracted the SARS-CoV-2 and luckily recovered. I spend most of my time in the hospital, between the clinic and the laboratory. As it is easy to imagine, our work leads to continually meet people, either patients or colleagues, which is sometimes necessary, despite the application of social distancing measures. Therefore, understanding how I came into contact with the virus is almost impossible.

As the infection reached my hospital, I had the possibility to be screened for the infection. In that moment, I was completely asymptomatic, so I took the test, sure that I would be negative, and only for personal and deontological safety towards the patients I would meet in the following days. The day after the test my phone rang. It was the Public Health Institution of my city, which called me to report the result of the test: it was positive. The first thought was for my family. When did I last see them? Was it within the virus incubation period? How far were we? Did we hug each other? Did I infect them too? Then I thought about the people I met in the Hospital; my colleagues but mostly the patients. In the end I thought about my own health. The quarantine began. After I came to know that I did not infect anyone, I started to fear about my own health. I was attentive to every symptom that could have possibly manifested. I was lucky enough to not have any of them, since some of my older orthopaedic colleagues had bad fevers and malaise for a couple of weeks, and few of them required hospitalization for non-invasive ventilator support. The more the days went by, the more I thought about when I could go back to work. According to the actual protocol, since I was

asymptomatic, I took the first control test ten days after: Negative. Two days later the second control test: again, Negative. Therefore, I was able to return to work, and the concern I had before for my health had been directed back to others again. If I were symptomatic, I should have waited at least one day after all symptoms resolution before taking the two consecutive tests.

What would have happened if I hadn't been screened? I am afraid to think about it. Screening healthcare workers should be considered in every hospital. In particular, hospitals like mine, which is dedicated to the care of trauma and urgent surgeries and therefore considered “non-COVID,” could come in contact with COVID-patients and the contagion could circulate among patients and healthcare professionals, despite all protections.

Table 1 Recommendations for the treatment of COVID and non-COVID patients with fractures requiring surgical fixation

Avoid non-urgent surgeries and consultations, in order to limit people movement as the strict necessary
Create a dedicated operator room for the treatment of positive and suspected COVID, training personnel to respect safely the dressing and undressing procedures
Create a dedicated ward and a dedicated area in the ICU to manage positive or suspected COVID, in order to limit the exposure of negative patients and staff.
Provide safety equipment, especially ffp2 masks, for all personnel involved in direct contact with positive or suspected COVID patients in operator room, ward and ICU. Ffp2 masks should be used also in regular operator rooms, because of possible surgeons and anesthesiologists to direct contact with asymptomatic carriers or false negative patients.
Re-organize medical and nurse staff within the regular wards and the COVID wards, providing an Internal Medicine doctor and Anesthesiologist consultants.
Use high suspicion in patients with fever and respiratory symptoms, especially in elderly, since false-negative tests could be present, even multiple; those patients should be managed as COVID unless diagnosis is ruled out (e.g., positive course of symptoms, response to non-COVID therapies, follow-up imaging...).
If COVID diagnosis is ruled out, consider moving patients in the normal ward to facilitate their management and not occupy vital space for positive COVID patients.
Discharge positive or suspected COVID patients as soon as possible to COVID-hospitals with dedicated ICU.
Consider implementing a pathway for positive or suspect COVID patients with no or few symptoms to allow wound management and physiotherapy in respect of isolation measures, wherever they are.
Maintain a human relationship with patients and their relatives.
Consider screening of healthcare personnel in order to identify and isolate asymptomatic carriers, especially in the case of contact with COVID patients without adequate protections.
Consider performing screening tests for any patients admitted to hospital and scheduled for surgery, and also before their discharge or transfer to other non-COVID structures.

Discussion

An interview of four doctors involved in the COVID-19 outbreak has been presented.

From the institutional point of view, one of the most important lessons learned so far is the absolute need to adapt daily to the new evidence and to find a constant balance between what guidelines prescribe and the legitimate concerns of the healthcare staff.

For healthcare provider, regarding the treatment of patients in this period, there is an urgent need to create dedicated pathways or structures for post-operative trauma patients to receive at a minimum (aside from medical care and possible need of respiratory support) basic physiotherapeutic assistance while respecting healthcare staff safety. Finally, it should not be overlooked that these elderly patients experience isolation and removal from their families for weeks. Therefore, the COVID experience could represent a dramatic event also for those with non-severe COVID clinical forms. Thus, it is important for all involved healthcare members to maintain humanity with patients, and especially with their relatives, due to the concrete possibility to never see their beloved alive. As their treating physician, he also spent a relevant amount of time on phone to update families regarding the overall status of their relatives, attempting to establish direct patient-family communication using phone and video-calls, whenever possible.

Finally, “asymptomatic positive” healthcare provider represents a further challenge as they could potentially become unaware carrier. Therefore, all efforts should be made to recognize and manage similar situations in order to avoid the propagation of the epidemic. Moreover, considering the possible delay between contagious and symptoms onset, also patients with fractures admitted to the trauma department from the emergency are now tested for the presence of COVID.

Conclusions

The outbreak of COVID-19 pandemic in Italy deranged the national healthcare system and poses new and imminent challenges to everyone involved. The absence of predetermined guidelines made us build our approach on a daily basis, based on incoming requests, new problems to face, internal feedback, and increasing (limited) evidences. Therefore, at the

moment, we are not able to provide an outcome of these measures or determine how their implementation has improved the management of COVID and non-COVID patients with fractures, but only to suggest useful recommendations (Table 1). However, the main lesson is that any actions should be quick and decisive, for one week during the COVID-19 epidemic could make the difference.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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