

The effect of the coronavirus disease 2019 lockdown on type A acute aortic dissection: Insights from Bologna



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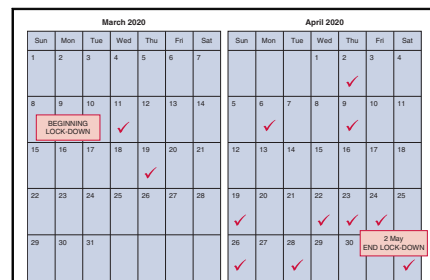
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Incidence of type A acute aortic dissection in Bologna during the Italian lockdown.

CENTRAL MESSAGE

The current COVID-19 pandemic could indirectly influence in the frequency and manifestation of type A acute aortic dissection.

See Commentary on page 55.

Italy was among the first countries dealing with the spread of the coronavirus disease 2019 (COVID-19) pandemic, with more than 200,000 positive cases and about 27,000 deaths at the end of April 2020.¹ According to the rapid surge in the number of cases, the Italian government imposed, from March 9 to May 4, 2020, specific mobility restrictions (ie, lockdown).

At the same time, the progressively increasing number of patients with pneumonia who needed intensive care unit treatment led to a reorganization of the entire health care system, with a significant reduction in cardiac surgery and research activities.² In the epicenter of the Italian epidemic, 16 of 20 cardiac surgery units completely discontinued their activities, resulting in the remaining 4 centers being considered the hub hospitals where emergency and urgent operations have been performed.³ However, Italy is a long peninsula and it was not uniformly affected by the pandemic. Bologna, located in Emilia Romagna (the third region of Italy for number of infections) was among the main regional hub centers attending the COVID-19 network.

The aim of this brief report was to investigate the influence of COVID-19 during the spring 2020 peak of the pandemic on the incidence and manifestation of type A acute aortic dissection (type A-AAD) in Italy.

Bologna University's Institutional Review Board determined that this study is exempt from institutional review board submission although all patients (and/or relatives) gave us consent to use personal information. It was also conducted in accordance with the ethical principles established in the Declaration of Helsinki.

SPECIFIC ASPECTS AND REFLECTIONS REGARDING TYPE A-AAD

Our department at S Orsola Hospital represents the hub center for cardiac interventions in the metropolitan area of Bologna and the only referral hospital for all acute aortic syndromes.

Surgical activity was confined to emergency/urgent cases and to operations that could not be postponed beyond a month. Our intensive care unit and ward were 75% dedicated to COVID-19 patients, and during the first quarter of this year we performed 222 cardiovascular surgical procedures, a 30% reduction compared with the same period of 2019.

However, during the lockdown restrictions an unusual trend in the incidence of type A-AAD was observed (Figure 1). During the springtime peak of the pandemic in March 2020, we had a severe reduction in the diagnosis of type A-AAD (only 2 patients were treated). On the contrary, during April 2020 we faced a progressive increase of type A-AAD ($n = 10$) with a peak of incidence at the end of the national lockdown (Figure 2). Clinical and radiological signs of organ malperfusion were frequently observed (6 out of 10 patients). Moreover, we detected an increase in the

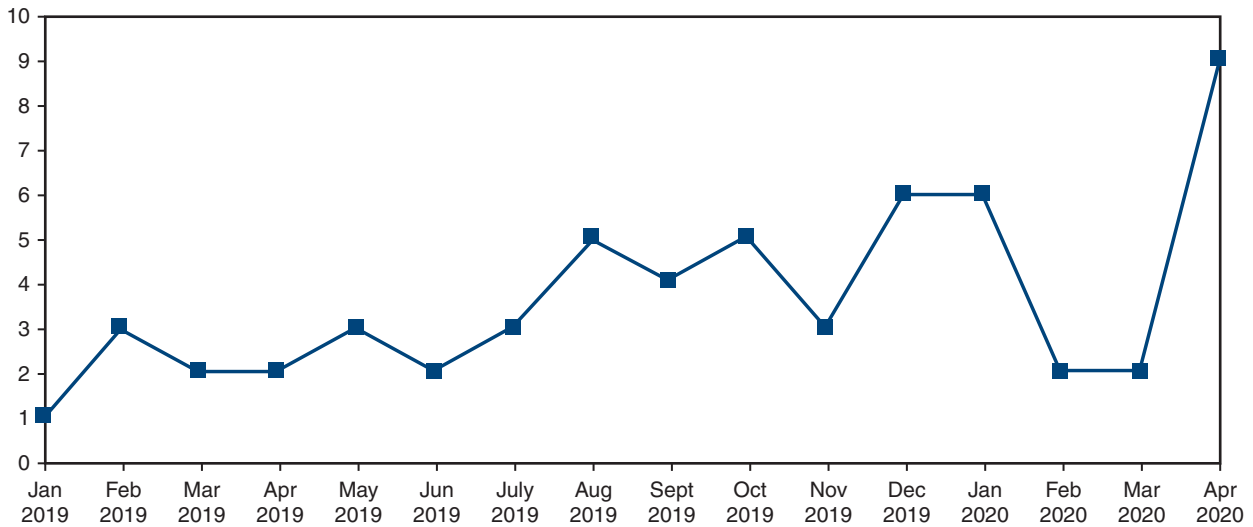


FIGURE 1. Graph showing the trend of patients with type A acute aortic dissection admitted to our department from January 2019 to the end of the spring 2020 coronavirus disease 2019 lockdown.

time between the onset of symptoms and the hospital admission (mean, 10.3 hours). Three patients died before arriving in the operating room. A fourth patient died 2 days after the implantation of an uncovered stent-graft in the abdominal aorta before surgical repair due to severe mesenteric malperfusion and extremely poor clinical conditions.

The unusually high incidence of complicated type A-AAD was probably related to a treatment delay and to the consequent progression of the aortic disease. To understand this phenomenon, all surviving patients, relatives, and medical personnel involved during this period were interviewed (Table 1).

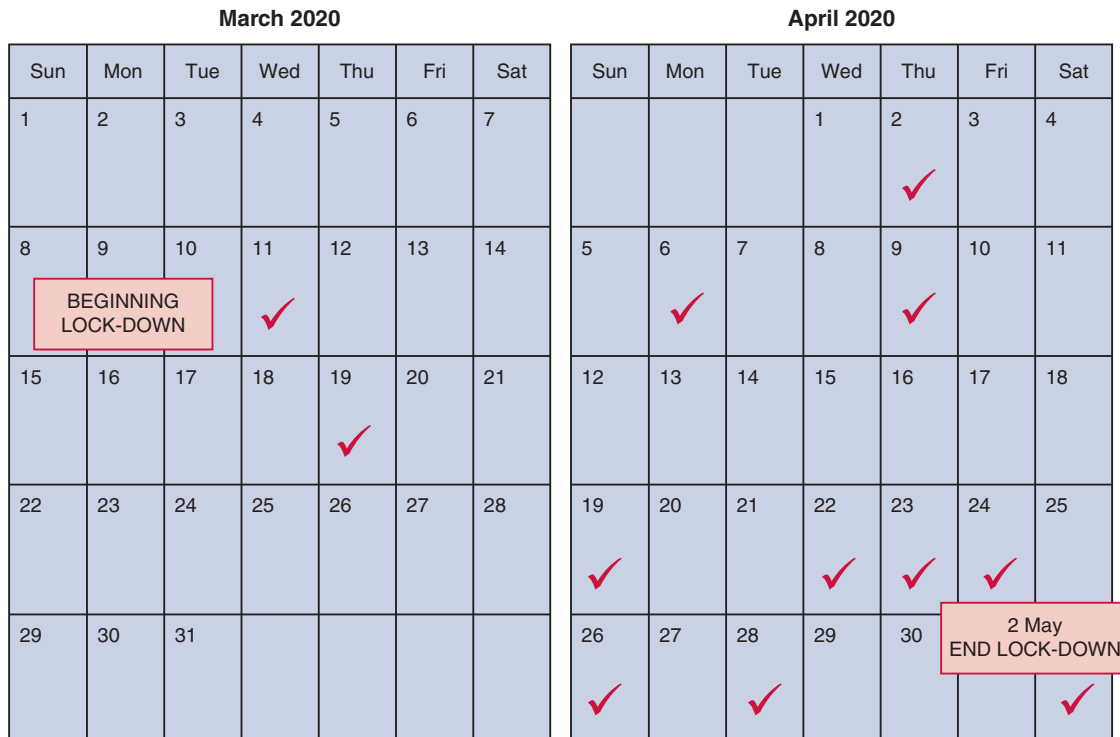


FIGURE 2. Incidence of type A acute aortic dissection in Bologna during the Italian lockdown.

TABLE 1. Description of patients admitted to the local emergency department (ED) in Bologna with diagnosis of type A acute aortic dissection during the spring 2020 Italian lockdown (N = 10)

Patient	Time (min)				Characteristics of angio-CT	Radiologic signs of ground-glass area	Preoperative malperfusion	Death before operation	Operation performed	Postoperative stroke	Hospital mortality	Hospital stay (d)
	From onset of symptoms to hospital presentation	From triage to diagnosis	From ED to hub center for cardiac surgery	From ED to skin incision								
79 aa, female	220	130	188 (+58)	320 (+132)	Intimal tear in the ascending aorta, IMH in the descending and abdominal portions	Yes	Mesenteric	No	AVR + Hemiarch	No	No	15
41 aa, male	240	150	240 (+90)	350 (+110)	Complete obstruction of the TL in the abdominal portion	No	Mesenteric	No	Bentall + FET	No	No	31
66 aa, male	2880	1620	1771 (+151)	1866 (+95)	Aortic dissection limited to the ascending aorta and arch	No	No	No	Hemiarch	No	No	12
51 aa, male	80	120	140 (+20)	270 (+130)	Ipoperfusion of the inferior mesenteric artery	No	No	No	Complete arch	No	No	12
85 aa, male	300	180	259 (+79)	439 (+180)	Type A IMH with extravasation of contrast in the ascending portion	No	No	No	AVR + Hemiarch	No	No	12
73 aa, male	NA	60	214 (+154)	330 (+116)	Complete obstruction of TL in the descending thoracic and abdominal portions	No	Mesenteric	Yes, patients underwent emergent TEVAR to treat mesenteric ischemia	TEVAR	–	Yes	3

(Continued)

TABLE 1. Continued

Patient	Time (min)				Characteristics of angio-CT	Radiologic signs of ground-glass area	Preoperative malperfusion	Death before operation	Operation performed	Postoperative stroke	Hospital mortality	Hospital stay (d)
	From onset of symptoms to hospital presentation	From triage to diagnosis	From ED to hub center for cardiac surgery	From ED to skin incision								
68 aa, male	540	47	120 (+73)	–	Severe Tamponade, involvement of both coronary arteries	No	Coronary and cerebral	Yes	–	–	Yes	0
79 aa, male	60	30	90 (+60)	–	Mediastinal hematoma and acute TED	Yes	Cerebral	Yes, patients died in the intensive care unit while preparing for the operating room	–	–	Yes	0
63 aa, male	NA	10*	–	–	Severe involvement of epiaortic vessels	No	Cerebral	Yes	–	–	Yes	0
81 aa, female	NA	140	220 (+140)	Postponed for clinical reason	Severe dilatation of the ascending aorta (7.2 cm)	Yes	No	No	AVR + Hemiarch	No	No	20
Summary	617 (60-2880)	248.7 (10-1620)	360.2 (90-1771)	595.8 (270-1866)	–	3/10	6/10	4/10	–	0/10	4/10	10.5 (0-31)

Values are presented as median (range). *CT*, Computed tomography; *ED*, emergency department; *aa*, age; *IMH*, intramural hematoma; *AVR*, aortic valve replacement; *TL*, true lumen; *FET*, frozen elephant trunk; *TEVAR*, thoracic endovascular aortic repair; *TED*, acute thromboembolic disease, *NA*, not available. *Patient was found in a coma at home.

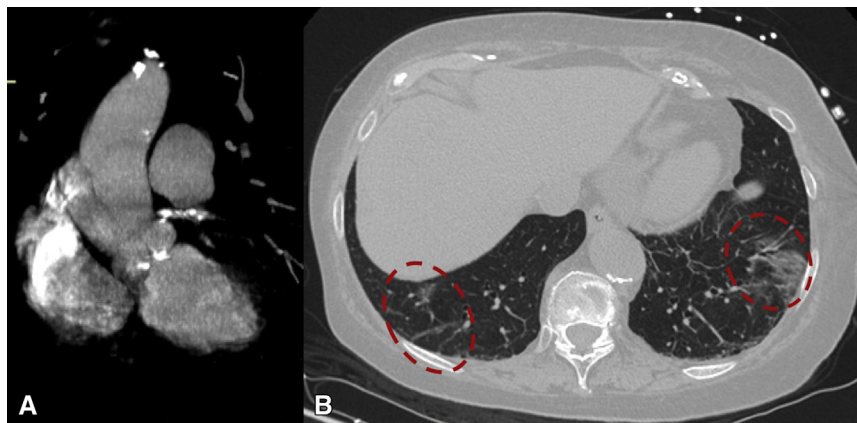


FIGURE 3. Angio-computed tomography scan of a patient with type A acute aortic dissection (A) suspected to be infected with coronavirus disease 2019 due to unspecific bilateral pulmonary infiltrates suggestive of interstitial pneumonia (B).

According to the clinical records and interviews these are our final observations:

- A delay in the diagnosis was observed. The reason was related to patients' fear of leaving their home during a period of severe imposed restrictions. The ban on personal contacts forced or inhibited patients from going to the hospital. According to what we observed in April 2020, 4 out of 10 cases were influenced by this phenomenon. This could explain the significant increase of type A-AAD admissions close to the end of the lockdown period. A second possible explanation might be correlated to the longer time required to organize diagnostic examinations and patients transfers between departments in the hospital. Mean time from triage to angio-computed tomography scan and to operating room was 1.5 and 9.9 hours, respectively.
- All patients admitted to our department were considered to be suspect for infection with COVID-19 (while waiting for the swab result). Three out of 10 cases were strongly suspected for COVID-19 infection because of radiological signs of ground-glass area suggestive for interstitial pneumonia (Figure 3). Misdiagnosis at computed tomography scan has already been described.⁴ According to our safety protocols, each surgeon wore specific personal protective equipment: surgical masks, visor (face shield), long gown, 2 pairs of gloves, 2 caps, and shoe covers. However, our routine management of patients with acute aortic dissections in terms of pre-operative planning and operative strategy did not change during the pandemic.
- Zero patients had a positive COVID-19 test according to the nasal swab and all 6 patients who arrived alive in the operating room were successfully treated with a regular

postoperative course. Despite the major difficulty in the management of emergency patients during the COVID-19 pandemic, we reported good surgical results: all 6 patients who arrived alive in the operating room were successfully treated and they did not present any significant complications during the postoperative course. However, we recognize that none of these patients were infected with COVID-19 and this may have had a favorable influence on the outcomes.

CONCLUSIONS

The outbreak of COVID-19 continues to constitute a public health emergency of international concern influencing time to diagnosis and causing a delay in the treatment of cardiac diseases. Many countries are now facing the peak of the pandemic, whereas others are aware of a new diffusion of the infection in the coming months; therefore, it is essential to promote medical care assistance for all elective and acute pathologies in this evolving scenario. This concept is even more appropriate when considering type A-AAD because time saves lives!

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