



Spinal surgery in COVID-19 pandemic era: One trauma hub center experience in central-southern Italy



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ABSTRACT

The aim of the study is to analyze and report the results of the surgical activity in a spinal unit of a trauma hub in central Italy during COVID-19 pandemic. Surgical activity was compared between COVID 19 pandemic and the same period of time in 2019 at our institution. A 50% reduction of surgical procedures during the last three months was observed compared with the same period of time in 2019. The compliance with the containment rules for the spread of the infection, were sufficient to allow safe surgical activity for the medical teams and patients.

1. Introduction

The rapid onset and diffusion of COVID-19 disease in Italy (mostly in the northern regions) caused a thorough change in the clinical practice with reconversion of hospitals organization. Currently, on May 31, 2020, 233019 cases of COVID-19 disease were confirmed in Italy. Now, 42075 patients result positive. Among these 6387 are now hospitalized and 35253 are in home isolation. The deaths count increased to 33415 while 132282 patients were considered healed.¹ Since the beginning of pandemic in the late February 2020, in our Spinal Surgery unit, elective surgery was greatly reduced. According to the Italian national guidelines, elective surgical procedures were forbidden during the lockdown (phase 1) until May 3rd.^{2,3} In order to economize the hospital resources for COVID-19 pandemic emergency management, and to reduce the risk of elective patients hospital infection, only urgent and non-deferrable surgical procedures were allowed (Class A). Only on May 4th, a gradual increase in elective surgery was allowed with some limitations.

Considering the lack of reliable data on spinal surgical activity in the COVID-19 era, the present investigation was aimed to analyze and report the results of the surgical activity in a spinal unit of a traumatological hub in central Italy during COVID-19 pandemic.

2. Materials and methods

The present investigation consists in a retrospective one-center

analysis. All patients surgically treated at our Spinal Surgery unit between March 1st and June 1st 2020 were retrieved through our institutional Datawarehouse system. For all enrolled patients age, sex, comorbidities, hospital stay, diagnosis and type of surgery performed were recorded. The surgical procedure performed were divided in: I. Minor surgery; II. Intermediate surgery; III. Major surgery.

In the study period 54 patients were surgically treated in our Spinal Surgery unit. Patients features were reported in [Table 1](#). Among these, 8 were polytraumatized patients treated in emergency settings (surgery less than 24 h after acceptance in emergency department); 29 patients were classified as non-deferrable surgery (patients belonging to Class A according to Health Minister guidelines requiring surgery within 30 days since diagnosis); 17 patients were candidate to elective and planning surgery ([Table 2](#)). For each patient, a preoperative SarsCov2 test was performed using polymerase chain reaction (PCR) on nasal and oropharyngeal swabs. For patients with typical symptoms of COVID-19 disease such as fever, cough and dyspnea, a chest computed tomography (CT) scan and infective evaluation was obtained. For these patients a hospital stay in a dedicated COVID-19 ward was predisposed. Finally, surgical activity was compared between COVID 19 pandemic and the same period of time (from March 1st to June 1st) in 2019 at our institution to evaluate the COVID-19 pandemic impact of on the spinal surgery activities. We conducted this study in compliance with the principles of the Declaration of Helsinki. The study's protocol was reviewed and approved by the Institutional Review Board.

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Table 1

Demographics features of patients. COPD: Chronic Obstructive Pulmonary Disease OSAS: Obstructive Sleep Apnea Syndrome; SD: standard deviation.

Demographics	2019	2020
Number of patient	102	52
Gender	68 F, 34 M	20 F, 32 M
Age (years mean \pm SD)	66.1 \pm 9.2	57.2 \pm 8.3
Mean Hospital Stay (days mean \pm SD)	8.2 \pm 3.6	7.9 \pm 4.2
Traumatized patients	24	18
Traumatic mechanism		
Fall from height	4	10
Domestic trauma	2	6
Road traffic accidents	18	2
Polytrauma with Associated lesions	9	8
Head Injury	1	2
Visceral Injury	2	1
Thoracic injury	6	5
Patients with comorbidities	37 (36.2%)	29 (53.7%)
Arterial Hypertension	16	11
Diabetes	9	8
OSAS	6	4
COPD	5	4
Others	3	2

3. Results

A 50% reduction of surgical procedures during the last three months was observed compared with the same period of time in 2019. During the study period 18 patients (33.4%) were recruited from emergency unit, 19 patients (35.2%) were recruited by internal medicine ward while 17 patients (31.4%) were elective patients (among these 11 were treated in May, early phase 2). Surprisingly, despite the overall reduction of Emergency Unit access due to the lockdown, the number of polytraumatized patients did not decrease in the same period of time between 2019 and 2020 (9 patients vs 8 patients). The numbers of patients treated for tumor and infectious disease were increased between 2019 and 2020 (3 patients vs 7 patients). The etiology of spinal pathologies and comparison during the same period in 2019 are summarized in Table 2.

During the study period 20 minor surgery procedure (vs 38 in 2019), 19 intermediate surgery procedure (vs 38 in 2019) and 15 major surgery procedures (vs 19 in 2019) were performed. Data concerning surgical procedure were resumed in Table 3.

During the study period five patients were suspected COVID+. Two patients had positive tests (PCR and thoracic TC) and were conservative managed for lumbar and cervical amyelic fractures. Three patients had negative tests, but among these 1 were treated in a COVID + surgery room for a myelic thoracic fracture, 2. Although over 50% of the treated patients had multiple comorbidities (risk factors for COVID-19 infection), none contracted the disease during hospitalization. No cases of infection among medical or paramedical teams involved in surgical and medical treatment of patients were observed in the study period.

4. Discussion

Most of the published paper on the issue of Covid-19 management and prevention were conceived in the initial stages of the epidemic. Some articles aimed to suggest strategic recommendations on emergency patient management or to propose elective surgery treatment protocols during the pandemic without confirmed data and in a presumptive way.^{4–9}

In the present study instead, we reported verified and compared data at the end of COVID-19 pandemic critical phases.

Our spinal surgery unit, as a reference center in central-southern Italy for the spinal degenerative pathology and as a trauma center in the Lazio region, followed the government indications on the organization of surgical activity during COVID-19 pandemic. During this period the

daily work flow was changed and greatly reduced. At the end of phase 1 lockdown, we are able to analyze the data of the last 3 months of spinal surgical activity during the COVID-19 pandemic. As a reference center, in an Italian region, where an explosion of the pandemic had been estimated due to the high population density, elective surgery was delayed to favor other areas of medicine implicated in COVID-19 pandemic management.

Based on the data emerging from our retrospective analysis, some considerations can be made regarding the spine surgical activity impact on the hospital resource.

Spinal surgical activity during lockdown period had no additional impact on the hospital's resources in terms of care settings, perioperative and postoperative complications. All programmable surgery were performed in the operating room reserved for spinal surgery, with the exception of traumatized patients who were operated in the Covid-free operating rooms, reserved for the emergency.

Only 15 patients (elective 3, traumatized 12) needed intensive care after the operation and only for one night. No differences were found regarding the mean hospital stay between the same period in 2019 and in 2020 despite some of the treated patients had severe comorbidities.

With the exception of traumatized patients, who were hospitalized in the emergency room, the patients candidate to non-deferrable surgery were recruited from the internal medicine departments where they were admitted for no-COVID-19 related respiratory distress, uncontrolled diabetes, septic conditions or from neurology for neurological deficits caused by spine disease (e.g. cervical myelopathy). Although the higher risk factors, all the patients had a normal post-operative recovery without complication.

A considerable increase of cases treated for fractures and/or vertebral emergencies occurred during the transition period between phase 1 and phase 2 of the lockdown, from 18 to 31 May.

We observed a bi-modal behavior probably in relation to the resumption of intense work activity. The first peak occurred at the beginning of March, with a partial resumption of activities and a second peak in the second half of May coinciding with the end of the phase 1 and the resumption of all work activities. A further consideration concerns an important aspect emerging from our study. No Covid-free patient treated in our institution contracted the infection during the hospital stay.

5. Conclusion

The correct use of the individual protective devices, compliance with the containment rules for the spread of the infection, the correct surgical indication, timing and coordination between the various specialists, were sufficient to allow safe surgical activity for the medical teams and patients with no additional impact on hospital resources. Despite the proper restrictions and applications of the existing rules, at the near end of the lockdown phase 1, we can say that we have provided the same service, in comparison to last year, on cases of urgency and non-deferable elective surgery.

Compliance with ethical standards

All procedures performed were in accordance with the 1964 Helsinki declaration. This research has been approved by the IRB of the authors' affiliated institutions. Written informed consent for scientific purposes and clinical data collection was obtained according to institutional protocol.

Authors' contributions

FCT – conception, methodology, drafting, revision; MCM – drafting, editing, revision; AP– conception, methodology, revision; DAS – supervision, editing, revision; MG, GZ – methodology, drafting, revision; LP – conception, supervision, editing, revision.

Table 2
Comparison between surgical procedure performed in 2019 and 2020.

	2019									2020										
	Polytrauma			Not Deferrable			Elective			Total	Polytrauma			Not Deferrable			Elective			Total
	Mar	Apr	May	Mar	Apr	May	Mar	Apr	May		Mar	Apr	May	Mar	Apr	May	Mar	Apr	May	
<i>Cervical fracture (Amyelic)</i> rowhead	–	1	–	–	1	–	–	–	–	2	–	–	1	1	–	1	–	–	–	3
<i>Cervical fracture (Myelic)</i> rowhead	1	–	–	–	–	–	–	–	–	1	1	–	–	–	–	–	–	–	–	1
<i>Thoracic fracture (Amyelic)</i> rowhead	1	–	–	2	2	–	–	–	–	5	–	–	1	1	–	1	–	–	–	3
<i>Thoracic fracture (Myelic)</i>	3	1	–	–	–	–	–	–	–	4	–	1	1	–	–	2	–	–	–	4
<i>Lumbar Fracture (Amyelic)</i>	1	–	–	3	4	2	–	–	1	11	–	–	1	1	–	3	–	–	–	5
<i>Lumbar Fracture (Myelic)</i>	–	1	–	–	–	–	–	–	–	1	–	2	–	–	–	–	–	–	–	2
<i>Cervical Myelopathy</i>	–	–	–	1	2	–	–	–	–	3	–	–	–	4	3	1	–	–	–	8
<i>Cervical disc erniation</i>	–	–	–	–	–	–	–	1	2	3	–	–	–	–	–	–	–	–	1	1
<i>Thoracic stenosis</i>	–	–	–	–	–	–	1	1	–	2	–	–	–	–	1	–	–	–	–	1
<i>Lumbar stenosis</i>	–	–	–	–	–	–	3	6	2	11	–	–	–	–	–	–	2	1	2	5
<i>Lumbar spondylolisthesis</i>	–	–	–	–	–	–	9	3	8	20	–	–	–	–	–	–	2	–	2	4
<i>Lumbar disc erniation</i>	–	–	–	–	–	–	5	9	9	23	–	–	–	3	–	–	–	1	4	8
<i>Adult spinal deformity</i>	–	–	–	–	–	–	1	2	1	4	–	–	–	–	–	–	–	–	1	1
<i>Paediatric spinal deformity</i>	–	–	–	–	–	–	–	3	1	4	–	–	–	–	–	–	–	–	–	–
<i>Revision surgery</i>	–	–	–	–	–	–	3	1	1	5	–	–	–	–	–	–	–	–	1	1
<i>Spinal infections</i>	–	–	–	–	–	1	1	–	–	2	–	–	–	2	1	2	–	–	–	5
<i>Pathologic Vertebral Fracture (Amyelic)</i>	–	–	–	1	–	–	–	–	–	1	–	–	–	1	–	1	–	–	–	2
<i>Pathologic Vertebral Fracture (Myelic)</i>	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Total	6	3	0	7	9	3	23	26	25	102	1	3	4	10	8	11	4	2	11	54
	9			19			74				8			29			17			

Table 3
Surgical procedures performed in the same period of time; comparison between 2019 and 2020.

	2019	2020
Minor surgery	2019	2020
Microdiscectomy	23	9
Vertebroplasty/kyphoplasty	4	1
Lumbar posterior decompression	11	10
Intermediate surgery	2019	2020
Single level arthrodesis	23	6
Anterior cervical discectomy and fusion	3	6
Percutaneous fixation	12	7
Major surgery	2019	2020
Deformity correction	8	1
Revision surgery	5	1
Posterior arthrodesis (multiple level)	6	13

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Declaration of competing interest

Authors declare that they have no conflict of interest.

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