Introduction. During the COVID-19 pandemic emergency, all non-urgent surgical procedures including elective spine surgery were performed. Now many countries have passed over the epidemic peak and the time to organize re-opening of non-essential activities has come. After the emergency phase of the COVID-19 pandemic, the viral outbreak is supposed to reduce but we will not reasonably disappear until a vaccine is available. Resuming elective spine surgery while ensuring safety for patients and healthcare workers has become an issue of critical importance. We propose a simple algorithm with the aim to help worldwide spine surgeons in management of elective spine surgery cases after the COVID-19 emergency ensuring safety for patients and healthcare workers.

Methods. An expert panel composed by Spine Surgeons, Neurosurgeons, Anesthesiologists and Intensivists with direct experience in COVID-19 management developed an algorithm for management of elective spine surgery based on evidence-based indications. The algorithm has been used for management of hospital admissions of undelayable spine surgery cases during the COVID-19 emergency period. Data regarding COVID-19 nosocomial transmission on patients and healthcare workers have been retrospectively reviewed and reported.

Results. Hospital admissions of 159 patients have been managed according to the proposed algorithm. Since the application of the protocol, we have not reported COVID-19 nosocomial transmission in our department.

Conclusions. According to our preliminary results, we think that the proposed algorithm may successfully help management of spinal elective surgical patients in the post-COVID-19 emergency era, avoiding unnecessary risks for patients and healthcare workers.
Methods

An expert panel composed by Spine Surgeons, Neurosurgeons, Infectious Diseases Specialists (IDS), Anesthesiologists and Intensivists with direct experience in COVID-19 management from our institution (Ospedale Policlinico San Martino, IRCCS for Oncology and Neuroscience, Genova, Italy), discussed and reviewed the criteria that should be taken into account in the management of elective spine surgery during the COVID-19 pandemic.

A brief literature review was performed in order to provide evidence-based suggestions. Our review mainly focused on articles in English language published in PubMed from December 21st 2019 to the October 30th 2020 regarding COVID-19 disease.

The proposed algorithm reflects the current guidelines of our institution and has been used since the COVID-19 lockdown period for management of undelayable spine surgery cases. Data regarding COVID-19 nosocomial transmission in operated patients and HCW have been retrospectively reviewed and reported in an attempt to evaluate safety and feasibility of the algorithm.

Preoperative screening protocol

Before scheduling patients for elective spine surgery several considerations should be made:

- for degenerative spine surgery cases a maximal conservative treatment should be always attempted. Conservative treatment gains even more importance in pandemic times in order to minimize the number of surgical operations [13];

- the availability of COVID-19-free Intensive Care Units (ICU) should be evaluated in order to be prepared to treat possible surgical or anesthesiological complications, without providing additional risks of infection to the patients;

- due to the risks of significant blood loss of many spine surgery procedures, the availability of blood products from the local transfusion center must be preoperatively ascertained as a shortage of blood products is possible during the COVID-19 pandemic [14].

After these considerations, if surgery is still considered safely feasible, patients who definitely need surgical operation will be telephonically screened before hospitalization for evaluation of COVID-19 symptoms (fever, cough, dyspnea, anosmia, dysgeusia or cutaneous manifestations) [15]. In case any symptom is present, surgery will be postponed, patients will be referred to the general practitioner and will be informed on how to contact our department when COVID-19 will be ruled out.

At this point, patients who are considered eligible for surgery are scheduled. Hospital admission will take place...
Since March 16th 2020 we have used this algorithm for spine surgery procedures. During the national lockdown period (until May 4th 2020) we operated on patients whose treatment could not be delayed; after the end of lockdown, we progressively resumed surgery also for non-urgent cases. Hospital admissions of 159 spine surgery patients were managed according to our algorithm. In 8 cases (5%) the nasopharyngeal COVID-19 swab performed at admission resulted positive; management of these patients according to the proposed algorithm allowed the use of proper preventive measures. Since the application of the protocol, we have not reported COVID-19 nosocomial transmission in our department.

Discussion

Before scheduling surgery during the COVID-19 pandemic, even using the proposed algorithm, spine surgeons should consider some specific ethical issues. Unfortunately, it is not possible to provide universally valid suggestions as these considerations should be done on a national, regional or local basis. First, spine surgeons should always deal with the availability of human and technical resources in the treating hospital. This should be done before surgery for non-urgent cases in order not to reduce resource availability for eventual urgent cases. Furthermore, the availability of resources, as ICU beds and staff availability, should be considered in order to be always able to treat eventual complications. We have not included in our algorithm antibody testing for SARS-Cov-2 because these tests currently have an epidemiological value for population screening. For elective surgical patients, who have already been tested with a nasopharyngeal swab, it does not add useful clinical information. Even if these tests don’t seem to be useful in elective spine surgery planning, they may however play a role when little or no access to molecular testing is available.

Even if our algorithm allows to perform surgery over COVID-19-free patients, the regional COVID-19 pandemic situation should be always considered. In some cases, during a national lockdown, people’s movements outside their homes should be prevented, as happened during the first Italian national lockdown.

Conclusions

Considering our preliminary results with no reported nosocomial COVID-19 transmissions, we think that our algorithm may successfully help management of spinal elective surgical patients in the COVID-19 era, avoiding unnecessary risks for patients and HCW.

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Conflict of interest statement

The authors declare no conflict of interest.
Authors’ contributions

AB and PF conceived the study, AB and IM drafted the manuscript; MC, MT, PA and PF revised the manuscript. AB and IM reviewed the literature, GZ, PF, PFS and AG critically revised the manuscript. All authors have read and approved the latest version of the manuscript.

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Correspondence: Alberto Balestrino, Division of Neurosurgery, Department of Neuroscience, Ospedale Policlinico San Martino-IST, University of Genoa, largo Rosanna Benzi 10, 16132 Genoa, Italy - Tel.: +393405836354 - E-mail: alberto.balestrino@gmail.com

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