RESEARCH ARTICLE

Spine surgery after the COVID-19 emergency: an algorithm for management of elective surgical cases

ALBERTO BALESTRINO[1], PASQUALE ANANIA[1], MARCO CERAUDO[1], MONICA TRUFFELLI[1], PIER FILIPPO SBAFFI[1], ILARIA MELLONI[1], ANGELO GRATAROLA[2], GIANLUIGI ZONA[1,3], PIETRO FIASCHI[1,3]
[1] Division of Neurosurgery, Department of Neurosciences (DINOGMI), IRCCS Ospedale Policlinico San Martino, Genoa, Italy;
[2] Division of Anesthesia and Intensive Care, San Martino Policlinic Hospital, IRCCS for Oncology, Genoa, Italy;
[3] Dipartimento di Neuroscienze, Riabilitazione, Oftalmologia, Genetica e Scienze materno infantili (DINOGMI), IRCCS Ospedale Policlinico San Martino, Università di Genova, Genoa, Italy

Keywords

COVID-19 • Spine surgery • Elective surgery • Nosocomial transmission

Summary

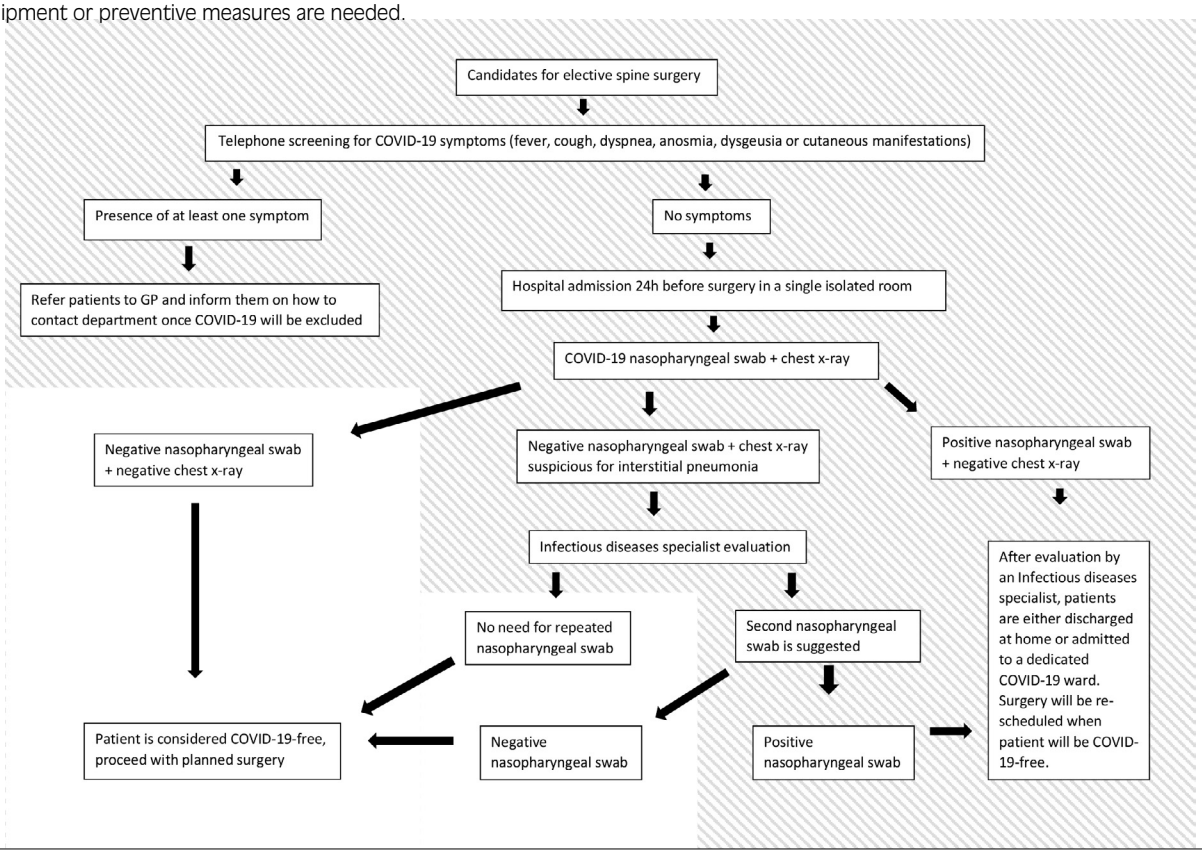
Introduction. *During the COVID-19 pandemic emergency, all non-urgent surgical procedures including elective spine surgery were performed. Now many countries have passed over the epidemic peak and the time to organize re-opening of non-essential activities has come. After the emergency phase of the COVID-19 pandemic, the viral outbreak is supposed to reduce but 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.*

Introduction

Since the beginning of the Coronavirus-disease-2019 (COVID-19) pandemic, more than 52 million people have been infected and more than 1 million people have died [1].
Due to high inter-human transmissibility, COVID-19 is taking an unprecedented toll on emergency departments and hospitals. With the aim of reducing pressure over the already stressed healthcare system and minimizing risks of nosocomial transmission, during the COVID-19 emergency period all non-urgent surgical procedures that might have been safely delayed without negatively affecting patients' prognosis have been delayed [2, 3].
Spine surgeons frequently manage conditions that cause pain and functional impairment with subsequent reduction of quality of life. Despite the benign nature of these diseases, they present significant impact on social and community life [4], therefore their treatment is of paramount importance. During the COVID-19 pandemic emergency all these non-urgent procedures were performed.
Italy has passed over the first epidemic peak and, the time to organize the performance of all non-urgent surgical procedures has come, even if we are currently experiencing a second epidemic peak [5]. As long as it will be safely possible, it is of paramount importance to provide medical and surgical treatment even to non-urgent patients.
Even after the emergency phases of the COVID-19 pandemic, the viral outbreak is supposed to reduce but will not reasonably disappear until a vaccine is available [6]. The need for reorganization of healthcare systems in order to cope with both suspected COVID-19 and non-COVID-19 patients has become urgent. In present times and in the next future physicians and particularly spine surgeons will face the challenge of performing non-urgent procedures ensuring safety of both patients and healthcare workers (HCW).
Different indications for spine surgery during the COVID-19 pandemic have been so far provided [7-12]. To the best of the authors' knowledge, the issue of resuming non-urgent spine surgery procedures after the COVID-19 emergency phase has not yet been addressed.
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 HCW (Fig. 1).

https://doi.org/10.15167/2421-4248/jpmh2021.62.1S3.1913

Fig. 1. Algorithm for management of elective spine surgery cases after the COVID-19 lockdown. Grey color indicates steps in which patients are considered suspect for COVID-19, therefore health-care workers should use adequate personal protective equipment and preventive measures should be put in place. White color indicates steps in which patients are considered COVID-19-free and no specific protective equipment or preventive measures are needed.



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 of 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

24 hours before surgery. A SARS-Cov-2 nasopharyngeal swab and a chest X-ray will be performed at admission. All patients need to be treated as COVID-19 positive patients until proven otherwise, HCW should therefore use adequate personal protective equipment (PPE [16]. Until negativity for COVID-19 is proven patients should be hospitalized in a single room. Suspect patients cannot be grouped together in order prevent nosocomial transmission in case a positive patient is found. Patients' isolation at admission is crucial for prevention of nosocomial transmission. Considering the elective nature of the procedures, we think that departments that are not able to guarantee patients' isolation at admission should not perform elective spine surgery operations during these delicate times.

If both nasopharyngeal swab and chest X-ray are found to be negative, patients will be considered COVID-19-free. Patients with a negative nasopharyngeal swab and a chest X-ray suspicious for interstitial pneumonia are evaluated by an IDS. After this evaluation, a second nasopharyngeal swab is performed if judged necessary, otherwise the patient is considered COVID-19-free. When the second swab is found to be negative, the patient will be anyway considered negative. COVID-19-positive patients will be evaluated by an IDS as well, but surgery will not be performed and they will be either discharged at home with proper indications or admitted to a dedicated department for COVID-19 patients.

Our algorithm allows performance of elective spine surgery exclusively on COVID-19-free patients. Increased rates of complications and mortality have been reported when surgery is performed on a COVID-19 positive patient during the incubation period[17]China, has spread rapidly worldwide. In the early stage, we encountered a small but meaningful number of patients who were unintentionally scheduled for elective surgeries during the incubation period of COVID-19. We intended to describe their clinical characteristics and outcomes. Methods: We retrospectively analyzed the clinical data of 34 patients underwent elective surgeries during the incubation period of COVID-19 at Renmin Hospital, Zhongnan Hospital, Tongji Hospital and Central Hospital in Wuhan, from January 1 to February 5, 2020. Findings: Of the 34 operative patients, the median age was 55 years (IQR, 43À63. Therefore, considering the non-urgent nature of elective spine surgery, we think that a surgical operation on a patient, either positive or suspected for COVID-19, symptomatic or not, is not justifiable.

Results

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 [18].

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 [19]. 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 [20].

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 [2].

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.

Acknowledgements

Funding sources: this research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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.

References

[1] COVID-19 Map - Johns Hopkins Coronavirus Resource Center. Available at: https://coronavirus.jhu.edu/map.html (accessed on 18 Nov 2020).

[2] Balestrino A, Fiaschi P, Melloni I, Riccardi N, Prior A, Zona G. Reply: the coronavirus disease 2019 global pandemic: a neurosurgical treatment algorithm. Neurosurgery 2020;87:E214-5. https://doi.org/10.1093/neuros/nyaa177

[3] Ceraudo M, Balestrino A, Cama A, Macrina G, Piatelli G, Consales. A pediatric neurosurgery after the COVID-19 pandemic: management strategies from a single pediatric hospital in Italy. World Neurosurg 2021;146:e1079-82. https://doi.org/10.1016/j.wneu.2020.11.088

[4] Hoy D, March L, Brooks P, Blyth F, Woolf A, Bain C, Williams G, Smith E, Vos T, Barendregt J, Murray C, Burstein R, Buchbinder R. The global burden of low back pain: estimates from the Global Burden of Disease 2010 study. Ann Rheum Dis 2014;73:968-74. https://doi.org/10.1136/annrheumdis-2013-204428

[5] Mantica G, Niccolò Riccardi, Terrone C, Gratarola A. Non-COVID-19 visits to emergency departments during the pandemic: the impact of fear. Public Health 2020;183:40-1. https://doi.org/10.1016/j.puhe.2020.04.046

[6] Graham BS. Rapid COVID-19 vaccine development. Science 2020;368:945-6. https://doi.org/10.1126/science.abb8923

[7] Alturkistany A, Abduljabbar FH, Alhelal F, Dajim N Bin, Khalifah S, Konbaz F, Aleissa S, Al-Habib A, Kattan M, Alqahtani Y, Alatassi R. The Saudi Spine Society guidelines on spinal surgery during the COVID-19 pandemic. J Orthop Surg Res 2020;15:211. https://doi.org/10.1186/s13018-020-01732-4

[8] Prost S, Charles YP, Allain J, Barat J-L, d'Astorg H, Delhaye M, Eap C, Zairi F, Guigui P, Ilharreborde B, Meyblum J, Huec J-C Le, Lonjon N, Lot G, Hamel O, Riouallon G, Litrico S, Tropiano P, Blondel B. French Spine Surgery Society guidelines for management of spinal surgeries during COVID-19 pandemic. World J Clin Cases 2020;8:1756-62. https://doi.org/10.12998/wjcc.v8.i10.1756

[9] Meyer M, Prost S, Farah K, Denis J-B, Dufour H, Blondel B, Fuentes S. Spine surgical procedures during coronavirus disease 2019 pandemic: is it still possible to take care of patients? results of an observational study in the first month of confinement. Asian Spine J 2020;14:336-40. https://doi.org/10.31616/asj.2020.0197

[10] Lombardi JM, Bottiglieri T, Desai N, Riew KD, Boddapati V, Weller M, Bourgois C, McChrystal S, Lehman RA. Addressing a national crisis: the spine hospital and department's response to the COVID-19 pandemic in New York City. Spine J 2020;20:1367-78. https://doi.org/10.1016/j.spinee.2020.05.539

[11] Ghogawala Z, Kurpad S, Falavigna A, Groff MW, Sciubba DM, Wu J-C, Park P, Berven S, Hoh DJ, Bisson EF, Steinmetz MP, Wang MC, Chou D, Sansur CA, Smith JS, Tumialán LM Editorial. COVID-19 and spinal surgery. J Neurosurg Spine 2020;1-3. https://doi.org/10.3171/2020.4.spine20468

[12] Sciubba DM, Ehresman J, Pennington Z, Lubelski D, Feghali J, Bydon A, Chou D, Elder BD, Elsamadicy AA, Goodwin CR, Goodwin ML, Harrop J, Klineberg EO, Laufer I, Lo SL, Neuman BJ, Passias PG, Protopsaltis T, Shin JH, Theodore N, Witham TF, Benzel EC. Scoring system to triage patients for spine surgery in the setting of limited resources: application to the COVID-19 pandemic and beyond. World Neurosurg 2020;140:e373-80. https://doi.org/10.1016/j.wneu.2020.05.233

[13] Pacetti M, Fiaschi P, Gennaro S. Percutaneous radiofrequency thermocoagulation of dorsal ramus branches as a treatment of "lumbar facet syndrome" - How I do it. Acta Neurochir (Wien) 2016;158:995-8. https://doi.org/10.1007/s00701-016-2759-7

[14] Grasselli G, Pesenti A, Cecconi M. Critical care utilization for the COVID-19 outbreak in Lombardy, Italy: early experience and forecast during an emergency response. JAMA 2020;323:1545-6.

[15] Giacomelli A, Pezzati L, Conti F, Bernacchia D, Siano M, Oreni L, Rusconi S, Gervasoni C, Ridolfo AL, Rizzardini G, Antinori S, Galli M. Self-reported olfactory and taste disorders in SARS-CoV-2 patients: a cross-sectional study. Clin Infect Dis 2020;71:889-90. https://doi.org/10.1093/cid/ciaa330

[16] Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected. Available at: https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-(ncov)-infection-is-suspected-20200125 (accessed on 10 May 2020)

[17] Lei S, Jiang F, Su W, Chen C, Chen J, Mei W, Zhan L-Y, Jia Y, Zhang L, Liu D, Xia Z-Y, Xia Z Clinical characteristics and outcomes of patients undergoing surgeries during the incubation period of COVID-19 infection. EClinicalMedicine (2020) 100331. https://doi.org/10.1016/j.eclinm.2020.100331

[18] Balestrino A, Robba C, Ceraudo M, Anania P, Melloni I, Negrini S, Pelosi P, Zona G, Fiaschi P. Turning tables: a war-like approach to neurosurgical emergencies in the Covid-19. J Neurosurg Sci Online first. 2021 Jan 22. https://doi.org/10.23736/S0390-5616.21.05226-7

[19] Winter AK, Hegde ST. The important role of serology for COVID-19 control. Lancet Infect Dis 2020;20:758-9. https://doi.org/10.1016/S1473-3099(20)30322-4

[20] Peeling RW, Wedderburn CJ, Garcia PJ, Boeras D, Fongwen N, Nkengasong J, Sall A, Tanuri A, Heymann DL. Serology testing in the COVID-19 pandemic response. Lancet Infect Dis 2020;20:e245-e249.

Received on December 10, 2020. Accepted on March 15, 2021.

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

How to cite this article: Balestrino A, Anania P, Ceraudo M, Truffelli M, Sbaffi PF, Melloni I, Gratarola A, Zona G, Fiaschi P. Spine surgery after the COVID-19 emergency: an algorithm for management of elective surgical cases. J Prev Med Hyg 2021;62(Suppl. 1):E46-E49. https://doi.org/10.15167/2421-4248/jpmh2021.62.1S3.1913