COVID-19 recommendations for neurosurgeons

Preoperative triage protocol

De Biase et al. described a multi-faceted preoperative triage protocol for safely performing nonelective neurosurgical cases during the COVID-19 pandemic, which could help other neurosurgical departments and hospitals minimize coronavirus exposure forpatients and healthcare workers. They believed this triage strategy could be implemented at other centers to gradually restart a process towards elective surgeries in a safe way ¹⁾.

On April 4, 2020, at 13.30 CET, a webinar was broadcasted, organized by Global Neuro, and supported by WFNS. Expert neurosurgeons from 6 different countries (China, Italy, South Korea, USA, Colombia, and the United Kingdom) reported on the impact of the COVID-19 pandemic on their health care systems and neurosurgical activity.

The first part focused on the epidemiology until that date. The USA were the most affected State with 450.000 cases, followed by Italy (140.000 cases and 19.000 casualties), China (83.305 cases and 3.345 had died), South Korea (10.156 cases with 177 casualties), the UK (38.168 cases and 3.605 deaths) and Colombia (1.267 cases and 25 deaths). The second part concerned Institution and staff reorganization. In every country all surgical plans have been modified. In Wuhan the staff was enrolled in COVID-units. In New York, the Mount Sinai Health System was in lockdown mode. In South Korea, sterilizing chambers have been placed. In Italy some Departments were reorganized in a Hub and Spoke fashion. In the Latin American region, they adopted special measures for every case. In the UK a conference center has been used to accommodate intensive care unit (ICU) beds. The third part was about neurosurgical practice during the COVID-19 pandemic. In Wuhan the main hospital was used for urgent non-COVID patients. In New York the neurosurgeon staff work in ICU as advanced practitioner (APP). In South Korea every patient is screened. In Italy the on-duty Hub neurosurgeons have been doubled. In the Latin American region recommendations have been developed by some neurosurgical societies. In the UK local non-specialists and traumatologists neurosurgical experts are collaborating in terms of best practice. The final part touched upon how to perform safe surgery and re-start after the pandemic. In China elective surgical procedures are performed very carefully. In New York, surgery planning will be based on patient's viral load. In South Korea and in Italy disinfection plans and negative-pressure O.R. were created. In the Latin American region, the aim is to have a rapid testing system. In the UK they have developed flowcharts to guide trauma patient management.

In general, the pandemic scenario was presented as a thought-provoking challenge in all countries which requires tireless efforts for both maintaining emergency and elective neurosurgical procedures ²⁾.

Recommendations

• Operate on as few patients as possible:

• Only perform surgeries that cannot be delayed

 $^\circ$ When an alternative to surgery exists and is equally valid, favor the alternative

 $^\circ\,$ If the healthcare system becomes overwhelmed, only offer surgery to patients who have a reasonable prognosis

• Involve as few people as possible in the surgical procedures:

 $^{\circ}\,$ Keep the number of individuals in the OR to the minimum required for safe completion of the surgery

• Do not involve observers, students, and even residents who do not have an indispensable role

 $^{\circ}$ Minimize personnel turnover by extending shifts and minimizing breaks

 \circ Segregate surgeons in specific hospitals to minimize nosocomial transmission from one hospital to another

 $^\circ\,$ If possible, assign all COVID-19 patients to a single team that will minimize contacts with other surgeons

 $^\circ$ Once immune status testing becomes available and reliable, consider assigning contamination-prone tasks and COVID-19 patients to staff with proven immunity.

• Depending on local epidemiology and resources, consider testing all surgical patients for SARS-CoV-2 or treating all patients (even asymptomatic) as potentially infected ³⁾.

Tan et al. focused on the surgical practice in the Neurosurgery Department, Tongji Hospital, Wuhan, and drafted several recommendations based on the latest relevant guidelines and experience.

As the largest neurosurgical center in Wuhan, Neurosurgery Department of Tongji Hospital performed surgical treatments for patients in the epidemic situation. They carried out some management proposals of the patients on the basis of conventional treatment guidelines and clinical experiences. These recommendations have helped them until now to achieve 'zero infection' of doctors and nurses in this department.⁴⁾.

Preoperative evaluation and management

All patients have first applied to the special fever clinics in the out-patient department. After temperature test, a careful history query (especially the fever and cough manifestations in the last 2 weeks) and physical examination were performed by doctors from both outpatient and neurosurgery departments under strict third level protection (surgical masks, protective goggles and suit). Surgical indications should be rigorously evaluated and surgical treatment should be preserved for patients with an emergency condition, such as ruptured aneurysm and intracranial hemorrhage. Operations for patients with relatively stable conditions should be postponed, for example, patients with benign

brain tumors. These patients were documented and followed up through phone calls. A pulmonary computed tomography (CT) scan and nucleic acid sequencing of throat swab were recommended for preliminary diagnosis of COVID-19 infection before hospitalization. Patients with positive results were identified to be confirmed cases and patients with preliminary negative results were considered to be suspected cases. However, these examinations should be canceled and direct emergency surgery should be performed for patients under life-threating conditions. Patients without immediate lifethreating were transferred to the neurosurgery ward through a special lane to avoid cross-infection. The neurosurgery ward was divided into several areas: patient rooms were regarded as an infected area, while the nurse station and doctor office were considered to be a clean area. Patient rooms were further divided into two partitions for suspected cases and confirmed cases. Individual accommodation was recommended for all patients and rigorous guarantine should be applied to the confirmed cases. Daily sterilization was performed for every single room. Doctors and nurses must take strict third level protection before entering patient rooms. Regular preoperative neuroimaging and laboratory examinations were performed after hospitalization. We must emphasize that consultation from anesthesiologists and perioperative nurses was necessary to decide the date of operation and the intraoperative cooperation strategies.

Intraoperative management

Covid-19 intraoperative management recommendations for neurosurgeons

Postoperative management

All postoperative patients should be assumed to be suspected cases and quarantined for at least 2 weeks. Pulmonary CT scan and nucleic acid sequencing of throat swab should be repeated at least 3 times (in 2 weeks) after operation. The conditions of most postoperative patients of neurosurgery were critical. The monitoring and ventilator were necessary equipment for postoperative supportive care. The air ducts of ventilator should be daily replaced. Nutrition support was important for maintaining immunological function and reducing the possibility of virus and bacterial infection. If the pulmonary CT scan and nucleic acid sequencing of throat swab were negative for COVID-19 after 2 weeks, the quarantine could be terminated and patients were transferred to patient rooms of suspected cases. The recovery patients without COVID-19 would be transferred to neurosurgery recovery ward located on another floor.

Precautions for endoscopic transnasal skull base surgery

The impact of COVID-19 on pituitary surgery ⁵⁾.

Precautions for endoscopic transnasal skull base surgery during the COVID-19 pandemic.

Operating room preparation for COVID-19

see Operating room preparation for COVID-19.

Emergency consideration

In the Lombardy region in Italy, the following clinical situations have been defined as neurosurgical emergencies:

Cerebral hemorrhages (subarachnoid and intraparenchymal)

Acute hydrocephalus

Tumors at risk of intracranial hypertension

Spinal cord compressions with neurological deficit or at risk of

Traumatic cranial and spinal trauma emergencies⁶⁾.

Recommendations for Deep Brain Stimulation Device Management

Most medical centers are postponing elective procedures and deferring non-urgent clinic visits to conserve hospital resources and prevent spread of COVID-19. The pandemic crisis presents some unique challenges for patients currently being treated with deep brain stimulation (DBS). Movement disorder (Parkinson's disease, essential tremor, dystonia), neuropsychiatric disorder (obsessive compulsive disorder, Tourette syndrome, depression), and epilepsy patients can develop varying degrees of symptom worsening from interruption of therapy due to neurostimulator battery reaching end of life, device malfunction or infection. Urgent intervention to maintain or restore stimulation may be required for patients with Parkinson's disease who can develop a rare but potentially lifethreatening complication known as DBS-withdrawal syndrome. Similarly, patients with generalized dystonia can develop status dystonicus, patients with obsessive compulsive disorder can become suicidal, and epilepsy patients can experience potentially life-threatening worsening of seizures as a result of therapy cessation. DBS system infection can require urgent, and rarely emergent surgery. Elective interventions including new implantations and initial programming should be postponed. For patients with existing DBS systems, the battery status and electrical integrity interrogation can now be performed using patient programmers, and employed through telemedicine visits or by phone consultations. The decision for replacement of the implantable pulse generator to prevent interruption of DBS therapy should be made on a case-by-case basis taking into consideration battery status and a patient's tolerance to potential therapy disruption. Scheduling of the procedures, however, depends heavily on the hospital system regulations and on triage procedures with respect to safety and resource utilization during the health crisis 7 .

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