



Venture of a Tertiary Care Neurosurgical Center in Course of COVID-19 Lockdown without RT-PCR

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Abstract

“I will not permit considerations of age, disease or disability, creed, ethnic origin, gender, nationality, political affiliation, race, sexual orientation, social standing or any other factor to intervene between my duty and my patient.” Obligated by the aforementioned oath, no medical practitioner shall sit in a moral judgment on any patient but will treat their illness to the best of their ability whatever the circumstances. A clear concord was yet to be authorized after the World Health Organization (WHO) declared the global pandemic of severe acute respiratory syndrome coronavirus 2infection. As a diagnostic modality, WHO recommended real-time reverse transcription–polymerase chain reaction (RT-PCR) as a reliable test; however, its availability in a deprived nation like ours became a major restraining factor. Despite an asset of having high specificity, RT-PCR for coronavirus disease 2019has its own liability of having low sensitivity. Henceforth, as time passed by, the validity of the rapid diagnostic tests was put into question. In later months, a few centers around our periphery started conducting RT-PCR, but the time taken to obtain the result was long-drawn-out process and the patient who needed urgent neurosurgical intervention at Annapurna Neurological Institute and Allied Sciences had to wait. We would like to share our expedition through peaks and valleys of managing 215 patients during the vicious circle of lockdown and global pandemic.

Keywords

- ▶ Hippocratic Oath
- ▶ polymerase chain reaction
- ▶ rapid diagnostic test
- ▶ COVID-19

Introduction

Economically mediocre and geographically landlocked Nepal is sandwiched between two global forces, China and India.

The pandemic of coronavirus disease 2019 (COVID-19) started from China, and the first case in Nepal was documented to be in a patient who flew back to Nepal from Wuhan during the second week of January. Lockdown was

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first imposed on March 24, 2020.¹ As the symptomatic cases upsurged, the government of Nepal implemented screening and contact tracing with rapid diagnostic test (RDT).²

Established as a rehabilitation center in the year 2009, Annapurna Neurological Institution and Allied Sciences (ANIAS) transformed into a full-fledged dedicated tertiary center for neurosurgical and neurological cases dealing with referrals from all over the country. The elective caseload before the pandemic was high compared with the lockdown period. We were not among the government-designated institutes to treat COVID-diagnosed patients, but being a trusted center, we dealt with a great deal of neurosurgical cases. Public awareness of the disease in the form of brochures and pamphlets was enforced. As a precautionary measure, a distance of at least 2 m was maintained in the outpatient department with all patients wearing usual masks. The temperature was recorded, and the hand was sanitized with an aseptic solution. Limited visitors were allowed to look after the inpatients. Minimal exposure of doctors to patients was performed in the beginning by making rotation of residents and consultants, but as fear dissolved and Hippocratic Oath took its place, all of us came to the duty.³ However, as the neurosurgical and neurological cases were almost static, we followed the same routine. Strict precautionary measures were followed and until 21st July 2020 none showed any symptoms of COVID-19. We would like to share our experience of treating patients during the lockdown.

Material and Methods

A mandatory protocol was set for the front-line staffs to put on personal protective equipment with face shields and N95 masks while dealing with patients presenting to our emergency department. Besides neurological examination, relevant history with regard to COVID was taken. Government set protocols were followed, and those that appeared symptomatic of viral prodrome or had a contact history were tested and referred to dedicated COVID care centers if the infection was proven. Nonetheless, a true neurosurgical emergency was dealt without a second thought except for additional precautionary measures taken during gowning and draping. Preanesthetic workups such as baseline blood investigation, 12 lead electrocardiogram and chest X-ray, including relevant neurological imaging were performed. A retrospective review of all patients who underwent neurosurgical intervention in our center during the period of lockdown between March 24, 2019, and July 21, 2020, was conducted and this was made the inclusion criteria, while the nonsurgical candidates were excluded.

The study design was reviewed and approved by Institutional Research Committee (IRC) and Ethical board. Data were collected from the electronic medical health record system and entry was done using Microsoft Excel.

Results

Throughout the period of lockdown, the total number of neurosurgical cases operated in ANIAS was 215. The mean age was 45 years with the youngest patient who underwent

intervention being 14 months and the oldest being 90 years old gentleman. Of all these, there was male preponderance with 132 of them, and the remainder were female with 83 cases. Based on the site of lesion, the statistics showed 34% of spinal pathology, 22% of intracranial space occupying lesions (viz. glioma, metastasis, meningioma, pituitary macroadenoma, craniopharyngioma, vestibular schwannoma, brain abscess, tubercular mass, arachnoid cyst, etc.), and 11% of vascular neurosurgery (viz. aneurysm, arteriovenous malformation's, superficial temporal artery–middle cerebral artery bypass, carotid endarterectomy), 10% of trauma associates, 7% of cerebrospinal flow diversion surgery, 4% of functional neurosurgical cases, and 4% of tracheostomy as a treatment adjunct during postsurgical period in some cases (►Table 1; ►Fig. 1). Being a trusted tertiary neurosurgical center, we received cases and referrals from all seven provinces of the nation. Bounded by China to the north and the rest with India, the higher number of infectious cases were received from India, probably due to an open border government policy and, thus, was labeled a hot zone (►Fig. 2).

Discussion

With the increase in the number of skilled neurosurgeons and dedicated neurosurgical centers, the last decade has seen an upsurge in the neurosurgical scenario of the nation. A total of 86 active neurosurgeons are working throughout the nation to address the neurosurgical cases. With the fear of infection spread out, a strict lockdown policy was put into action between March 24, 2019 and July 21, 2020. Throughout the period, around 331,095 cases underwent real-time reverse transcription–polymerase chain reaction (RT-PCR) and 312,402 underwent RDTs as a part of diagnosis for symptomatic and contact tracing. There were a total of 18,241 positive cases. Of them, 12,840 recovered, and we lost 43 of them to the deadly viral infection, despite strict isolation and quarantine policy.⁴ Despite being a tool of doubt and question, the nation relied on RDTs during the early days as a screening tool.⁵ The near-end of the lockdown era met the introduction of a more reliable test, namely, the PCR, yet constrained by the time limit. In this period of fear and uncertainty, bounded by the responsibility, we received 215 patients coming from all over the nation who required neurosurgical care.

Hence, to abide by the moral rules and the patient-care-first responsibility of our profession, a true neurosurgical emergency was given the top-notch priority and the time-consuming RDTs or PCR was avoided. However, as precautionary measures, the cases were dealt with N95 surgical masks and face shields in addition to the usual gowning and gloving in a dire effort to avoid the possible risk of acquiring the contagious infection. To add to this dismay, we had to rely on cloth masks when the supply of surgical masks was inadequate as the public demand for the mask skyrocketed.

As time passed by, the number of infected patients escalated and the allocated government health center for the care of the COVID cases became so scarce that it almost

Table 1 Number of neurosurgical cases operated during the COVID-19 pandemic

Total cases operated from March 24, 2020 to July 21, 2020			
Vascular neurosurgery (11%)	Aneurysm	17	24
	AVM	5	
	STA-MCA bypass	1	
	CEA	1	
Intracranial space occupying lesion ICSOL (22%)	Glioma	30	49
	Meningioma	5	
	Pituitary macroadenoma	3	
	Vestibular schwannoma	2	
	Craniopharyngioma	4	
	Others	5	
Spinal surgery (34%)	Cervical disk surgery (ACD/laminectomy)	12	74
	Lumbar disk surgery (microdiscectomy/laminectomy)	38	
	Spinal tumor	13	
	Traumatic spinal injury (ACDF/pedicle screw)	3	
	Others	8	
Functional neurosurgery (4%)	Microvascular decompression (MVD)	2	9
	Epilepsy surgery	3	
	Lesioning for dystonia	4	
CSF diversion (EVD/VP shunt)		15	15
IIH (optic nerve fenestration)		1	1
Decompressive craniectomy		5	5
Cranioplasty		12	12
Total neurosurgical cases			215

Abbreviations: ACD, anterior cervical disc; ACDF, anterior cervical discectomy and fusion; AVM, arteriovenous malformation; CEA, carcinoembryonic antigen; COVID-19, coronavirus disease 2019; CSF, cerebrospinal fluid; EVD, external ventricular drainage; IIH, idiopathic intracranial hypertension; STA-MCP, superficial temporal artery–middle cerebral artery; VP, ventriculoperitoneal.

felt like a riot to assign the patient. We had a case worth sharing, who underwent an uneventful excision of a brain tumor with a swift recovery and was discharged as a functionally independent individual. Unfortunately, he developed a neurological deficit in 2-week time for which he was taken to a nearby health center. Mandatory RDT was performed which came out positive, and PCR test was advised which would take another 2 days. He was then referred to a government-allocated COVID dedicated center based on the RDT report but was denied the admission because the PCR report was awaited. We were informed about the case details, and we requested them to come to our care and managed to create a separate room as an isolation room. Considering the slumping of his neurological status, brain imaging was done that was suggestive of a cystic collection. So, the decision was made to operate on him and the cyst was aspirated with an implausible recovery. He was discharged as an unrestrained and self-sustaining individual. This was the landmark case that led to a milestone in our practice and abandonment of the obligatory RDT in emergencies. Unfortunately, two postoperative cases developed pneumonia during the intensive care unit stay and a

PCR test was performed as advised by the Department of Medicine suspecting an infection due to the severe acute respiratory syndrome coronavirus 2. Surprisingly, both of them tested negative. This led to another watershed in our practice where we pronounced that it is only the precautionary and protective measures that can be contemplated and not to compromise on the patient care citing them to the ghastly ailment. We had no choice but to accept this gruesome illness and attempt to treat cases just as we treat the menacing HIV-infected cases. Like they say, with great power comes great responsibility, with the knowledge and skill bestowed upon us to heal, we have to pluck up the courage and trade-in to treat those who harbor this pernicious infection and have a simultaneous amenable emergency.

A couple of hundred neurosurgical patients were treated all through the lockdown. Unexpectedly, the postoperative morbidity and mortality were akin with contrast to the previous era. There were a total of three mortalities, none of which were attributable to the COVID. On the contrary, there was a 60% decrease in the number of cases with 466 surgeries done the prior year during the same period. Paradoxically, an attempt by the telecommunication to

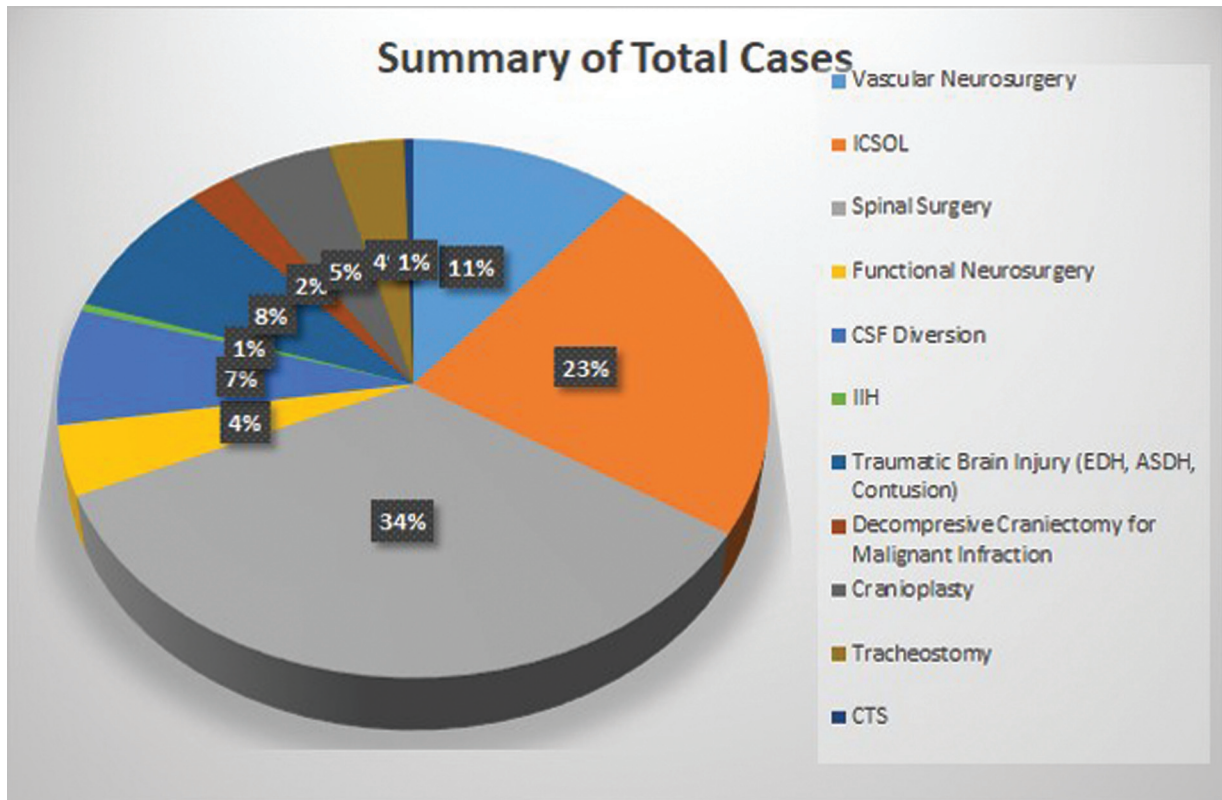


Fig. 1 Pie chart of surgeries performed.

provide awareness about the illness during each phone call made has bloomed a sense of fear in the public. Epidemiological statistics, to this date, have revealed an average of 7 deaths a day and a total of 9,500 deaths until July 2021. Out of these deaths, around 1,647 were due to economic destitution and psychological annihilation suicide according to the Nepal police report.^{4,6}

While the scarcity of hospital beds, manpower, supply of oxygen, and medications was yet to be squared, the fear among the public about the inglorious microbe should also be rectified unquestionably. As neurosurgeons, the concept of “new-normal” that has surfaced up should be appraised and fear should be kept aside while still embracing the safety measures.

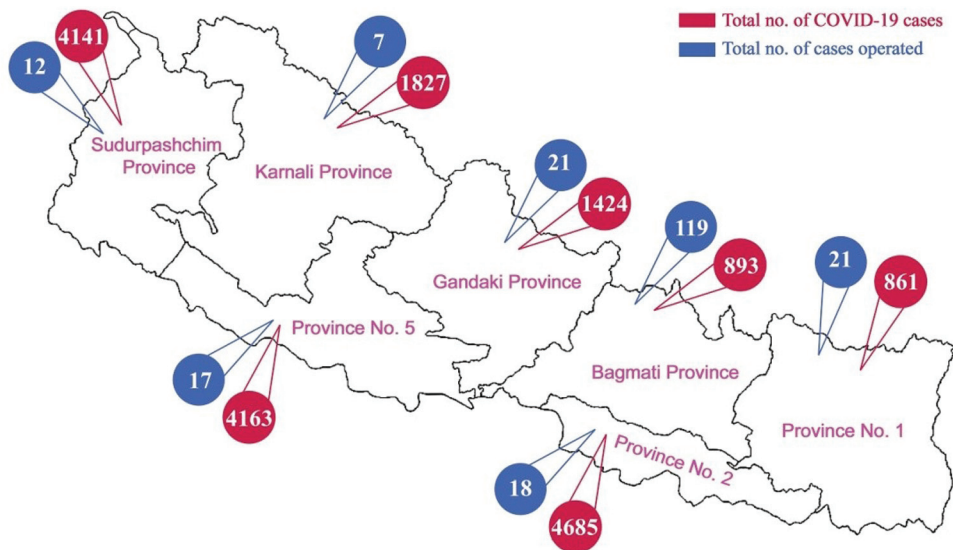


Fig. 2 Distribution of cases referred from hot zones to ANIAS.

The journey has been apprehensive but the number of patients saved during the lockdown spell is something to cheer and motivate upon. Had we not defied our fears and lingered upon the mandatory rules, we could have lost several lives. However, a 200% increase in maternal mortality rate compared with previous year is valuable information to be considered.⁷ Moreover, due to barricade in transportation and fear among people to consult health care professional, many came with irreversible deficits that is something to lament upon.

The novel COVID-19, a new microbial nuisance, needs time to be researched. With every other day, new details and facts are surfacing. Medications like remdesivir, hydroxychloroquine, and azithromycin supplemented by zinc and vitamins have been used in different countries without proven efficacy. Besides that, the financial constraints have handicapped our society to curb symptomatic treatment only. Several vaccines have been developed and are under trial. Until today, our approach to managing neurosurgical patients is as novel as the novel coronavirus itself and time will only discern if the decisions that we made were correct.

Conclusion

The conflict against the novel coronavirus is still in progress. The socioeconomic damage and the psychological trauma that have been inflicted are unamendable. However, from our professional point of view, we should always abide by the moral duty to address the patient's disease and help save lives. Despite the development of different vaccines, the newer mutant strains seem unstirred and the battle against the virus seems to last a little longer. While the waging war, we should stand together, follow the rules, stand by the

precautionary measures, and hope for a triumph against the contagion.

Conflict of Interest

None declared.

Acknowledgment

We would like to thank all the frontliners who have fought their fears and put their Hippocratic Oath ahead of all in the treatment of COVID-19 patients and pay tribute to the neurosurgeons and health care professionals who lost their lives during this combat.

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