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Effect of the COVID-19 Pandemic on Patient Presentation and Perception to a Neurosurgical Outpatient Clinic

Daniel Pinggera, Johannes Kerschbaumer, Lukas Grassner, Matthias Demetz, Sebastian Hartmann, Claudius Thomé

■ **BACKGROUND:** The world currently faces the novel COVID-19 pandemic, with cutbacks in patient care. Little is known about the effects of a pandemic on the presentation and admission to an outpatient clinic. Our aim was to gain a better understanding of the effects of reduced neurosurgical care access from the patient perspective, especially in terms of anxiety and urgency of treatment, and to improve outpatient management in case of a potential second wave and potential restrictions on health care.

■ **METHODS:** We performed a questionnaire study over a period of 4 weeks following the COVID-19 lockdown at our academic neurosurgical department. A 15-item questionnaire was distributed to the patients with 3 additional questions to be answered by the treating neurosurgeon.

■ **RESULTS:** A total of 437 questionnaires were analyzed. Overall anxiety to visit a general practitioner or the outpatient facility within the hospital was very low among patients. A quarter of all appointments had to be postponed due to COVID-19, in 0.6% postponement was perceived as incorrect by the treating neurosurgeon. We noted that 43% did not get an appointment due to the restrictions, 20% did not want to bother the medical system, and only 4% were afraid to get infected in the hospital.

■ **CONCLUSIONS:** Despite COVID-19, patients in need of neurosurgical service were hardly afraid to visit doctors and/or hospitals. Nonetheless, because legal requirements, access has been restricted, causing

potential collateral damage in a small subset of neurosurgical patients.

INTRODUCTION

COVID-19 represents a great global health challenge. The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) emerged at the end of 2019 in the Chinese city of Wuhan and rapidly progressed to a global pandemic.^{1,2} The health care, economic, and social challenges posed by this novel disease are immense.³ The potentially serious course of this disease, especially in elderly or immunocompromised individuals, has been widely reported.⁴⁻⁷

Because of the rapid global spread of the virus and the quickly increasing number of infections, in combination with a missing vaccination/causative treatment, a lockdown for the state of Tyrol, Austria, was imposed in mid March 2020. The lockdown was characterized by a strict curfew and the shutdown of all non-essential infrastructure. Furthermore, governmental and hospital task forces determined that all elective surgeries had to be postponed and only emergencies should be addressed in order to maintain intensive care unit capacities for COVID-19 patients. These drastic measures also influenced the neurosurgical workflow and led to a massive change in our outpatient clinic, as all non-urgent appointments and control visits have been significantly curtailed. All elective procedures of the Department of Neurosurgery were rescheduled and only urgent or emergency operations were performed. The classification was based on the recommendation of executive committees of the German Society of Neurosurgery (DGNC) and the Professional Association of

Key words

- COVID-19
- Neurosurgery
- Outpatient clinic

Abbreviations and Acronyms

BDNC: Professional Association of German Neurosurgeons

COVID-19: Coronavirus disease 2019

DGNC: German Society of Neurosurgery

To whom correspondence should be addressed: Daniel Pinggera, M.D., Ph.D.
[E-mail: daniel.pinggera@tirol-kliniken.at]

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Department of Neurosurgery, Medical University Innsbruck, Innsbruck, Austria

Date of visit?

Place of residence (including political district)?

Sex?

Age?

Is this your first visit at the outpatient clinic for the current symptoms?

Yes

No

Was your appointment postponed due to COVID-19?

Yes

No

If yes, do you believe the postponement was justified?

Yes, definitely.

Yes, but only partly due to my severe symptoms

No.

Not applicable.

For how long are you having these symptoms?

Less than a week.

About a month.

Longer than a month.

Have you seen your general practitioner or outside specialist before?

Yes, before quarantine.

Yes, during quarantine.

No.

When did you see your general practitioner for the current symptoms first?

Not at all.

Approximately one week ago.

Approximately one month ago.

More than one month ago.

How long did you wait for an appointment at our outpatient clinic?

Less than a week.

Approximately one month.

More than one month.

More than three months.

Have you been afraid to visit your general practitioner or outside specialist due to COVID-19?
(0= no fear, 10= great fear)

Have you been afraid to visit the hospital due to COVID-19? (0= no fear, 10= great fear)

Why didn't you come earlier in the neurosurgical outpatient clinic?

I didn't have any problems earlier

I didn't get an appointment.

I didn't want to put burden on the public health system.

I was afraid to get infected in the hospital.

I was afraid to not get treated at its best.

I didn't have a possibility of transport due to quarantine.

Have you been tested for COVID-19?

Yes, positive.

Yes, but negative.

No.

Figure 1. Part 1 of the questionnaire handed to all patients in the neurosurgical outpatient clinic.

| | |
|--|-----------------------------------|
| Kind of pathology? | |
| <input type="checkbox"/> | Degenerative spine |
| <input type="checkbox"/> | Spondylodiscitis/Spinal infection |
| <input type="checkbox"/> | Brain tumor, intrinsic |
| <input type="checkbox"/> | Brain tumor, extrinsic |
| <input type="checkbox"/> | Vascular |
| <input type="checkbox"/> | Hydrocephalus |
| <input type="checkbox"/> | Functional |
| <input type="checkbox"/> | Pain |
| <input type="checkbox"/> | Other |
| Urgency of treatment? | |
| <input type="checkbox"/> | Emergency |
| <input type="checkbox"/> | Acute (within 24 hours) |
| <input type="checkbox"/> | Prior/Urgent (within days) |
| <input type="checkbox"/> | Plannable/Elective |
| Scheduling of appointment appropriate? | |
| <input type="checkbox"/> | Yes. |
| <input type="checkbox"/> | No. |

Figure 2. Part 2 of the questionnaire filled in by the treating neurosurgeon.

German Neurosurgeons (BDNC).⁸ Whereas the impact of COVID-19 on neurosurgical emergencies is already well researched, data on outpatient services and elective case management is rare.⁹⁻¹⁵

In mid April 2020, strict regulations were withdrawn in a stepwise fashion, resulting in rising numbers in our institutional outpatient clinic. The rescheduling of operations and outpatient appointments posed an unforeseen challenge for all employees. The clinical and psychological effects on individuals presenting as outpatients during an ongoing pandemic were unclear.

In order to evaluate the effect of the COVID-19 pandemic regulations on patients presenting to our outpatient clinic, a questionnaire study was undertaken. Our aim was to gain a better understanding of the effects of reduced neurosurgical care access from the perspective of patients, with a focus on patient's anxiety and urgency of treatment. Also, we tried to assess potential collateral damage in times of restricted access to the health care system.

METHODS

We conducted a questionnaire over a 4-week period following the lockdown at our academic neurosurgical department, namely, in

the period from April 20, 2020, to May 15, 2020. Strict restrictions in the federal state of Tyrol lasted from March 16 until April 6, 2020, with gradual easing afterwards. Some places in the districts of Landeck and Imst, including the famous skiing areas of Ischgl and Sölden, were under quarantine even until April 24, 2020. As our department is the only public neurosurgical unit in the state of Tyrol, patients with neurosurgical diseases are referred exclusively to our hospital, either after arranging a scheduled appointment or acutely in case of emergencies. In normal times about 60 to 70 patients per day present at our outpatient clinic, resulting in at least 1200 patients per 4-week period.

All patients frequenting our outpatient clinic, either scheduled or as emergencies, were asked to participate in the study. The outpatient clinic is located inside the hospital and reached via a public square and elevators. A questionnaire with 15 items (Figure 1) was distributed among the patients. Additionally, one part of the questionnaire with 3 items had to be filled out by the treating neurosurgeon (Figure 2). All patients gave informed consent to participate in the study. The study was approved by the local ethics committee of the Medical University Innsbruck (protocol number: AN 2020-1125).

Descriptive statistics were used to characterize the overall responses from the study cohort using IBM SPSS Statistics 21 (IBM Corp., Armonk, NY). Graphs were created using GraphPad Prism (version 6.0, GraphPad Software Inc.).

RESULTS

In this 4-week period, 605 patients visited our outpatient clinic. A total of 437 questionnaires (72%) were completed and analyzed. The mean age was 57 years (range: 14–93 years) with an almost equal sex distribution (55% female, 45% male). Thirty percent visited the neurosurgical outpatient clinic for the first time, in contrast to 70% presenting for a repeat or follow-up visit.

Half of the patients were either from the district of Innsbruck or its surrounding areas; 8.3% of the patients were from the COVID-19 hotspot districts of Landeck and Imst. Further distribution was in accordance with distribution of the population in Tyrol.

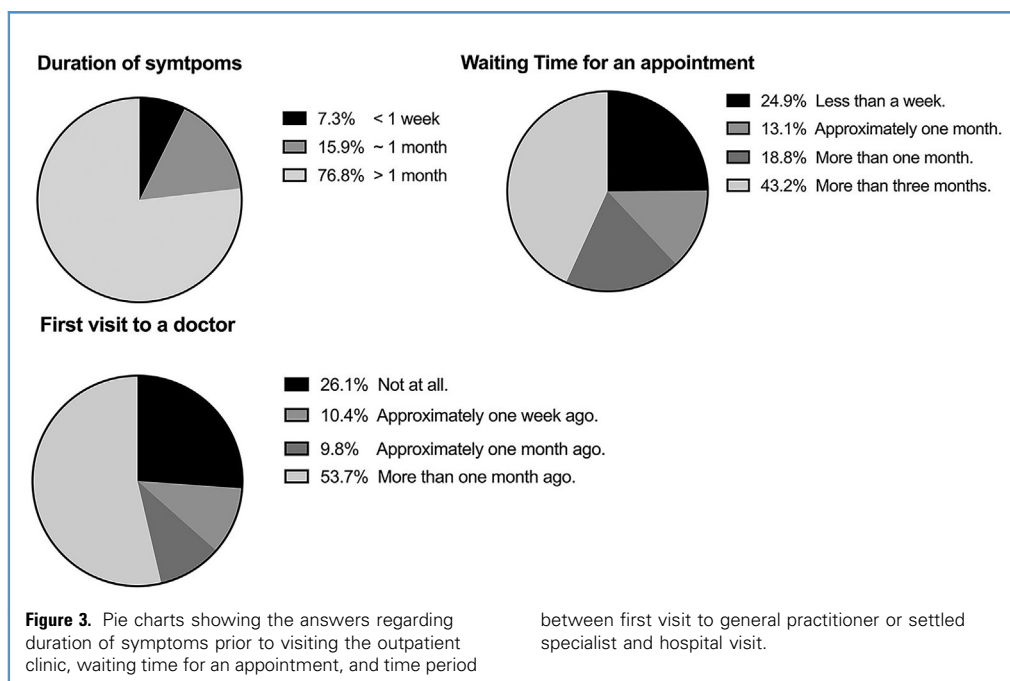
The majority of patients presented with long-lasting symptoms. The waiting time for an appointment exceeded 3 months in almost half the cases (43%). Fifty-three percent visited their general practitioner or outside specialist more than 1 month ago, and 26% did not visit any doctor before at all (details are shown in Figure 3).

In 23% of all cases the appointment was postponed due to COVID-19. In about 6% the patients did not believe that the delay was to be justified or only with limitations.

The main reason for postponement was impossibility to get an appointment (43.8%). Twenty percent did not want to put burden on the public health system and 4% were afraid to get infected. Further reasons are displayed in Figure 4.

Mean level of fear to visit the general practitioner was low, even the visit in the clinic was not associated with a higher fear of getting in contact with COVID 19 (Figure 5).

The most frequent neurosurgical diagnoses leading to a visit at the outpatient clinic were degenerative spine cases and spinal infections with 50%. The second most common diagnoses were intrinsic or extrinsic tumors (Table 1).



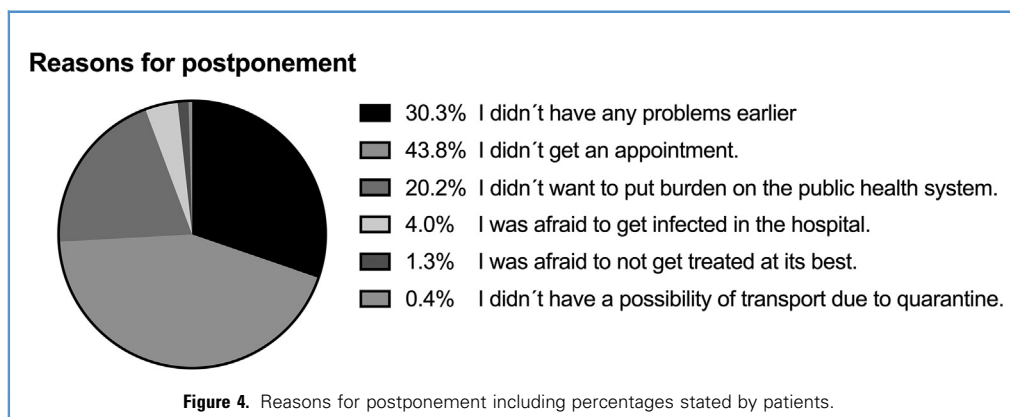
Of all 473 patients, 0.9% ($n = 4$) had tested positive for COVID-19 before the visit, 16% had tested negative, and 83.1% of the visiting patient were not tested because of an established screening method (temperature control, no contact with infected or potential infected patients). None of the 473 patients seen in the outpatient clinic were infected or sick.

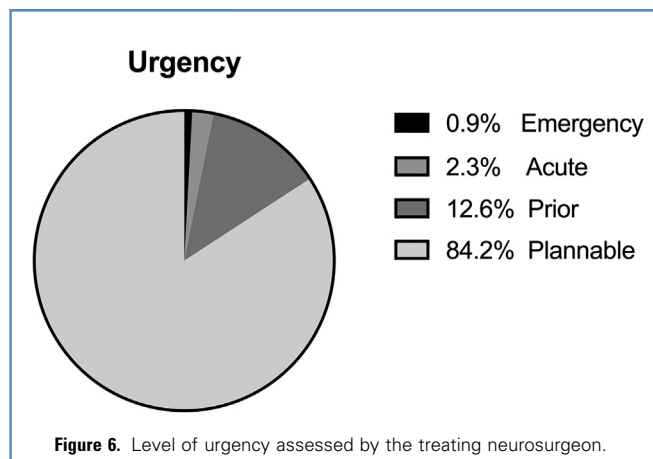
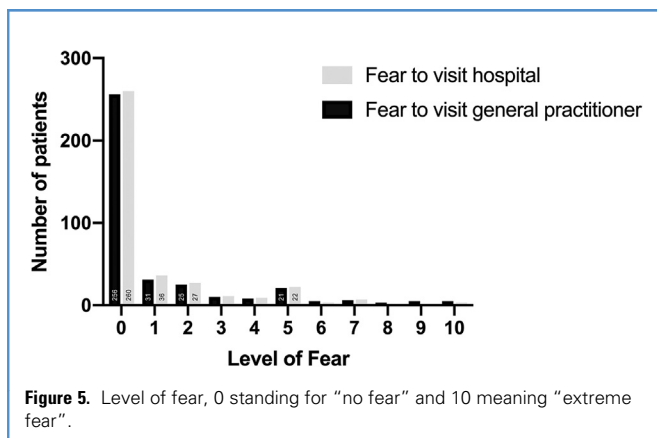
Results of part 2 of the questionnaire showed that in 0.6% ($n = 3$) of all cases, postponement was considered not to be justifiable by the treating neurosurgeon and urgent surgery was necessary. One patient presented with progressive paraparesis caused by a spinal tumor, 1 patient with a posterior fossa lesion, and 1 with an

empty drug pump. In 84.2%, the need for treatment was considered to be plannable. The urgency of the appointment and the further treatment is shown in [Figure 6](#).

DISCUSSION

The COVID-19 pandemic continues to have a significant impact on health care systems worldwide. This is caused not only by COVID-19 itself, but also due to collateral consequences by delaying treatment for people with non-COVID-related diseases.¹⁶⁻²² Our study provides first insights on the impact of the COVID-19





lockdown on a neurosurgical outpatient clinic in terms of fear of visiting it and urgency of treatment. Because our institution is the only public neurosurgical unit in the state of Tyrol, we are able to analyze comprehensive data surveying patient responses to reduced access to neurosurgical care. To the best of our knowledge, this is the first prospective study investigating the direct influence of the COVID-19 pandemic on outpatient clinic access in a neurosurgical department from the patient's perspective.

As the current situation is unparalleled in modern history, the effects of disrupting surgical services or postpone outpatient clinic appointments is unclear. The initial postponement of elective neurosurgical cases seemed crucial to obtain resources for COVID-19 infections.^{21,23-25} But apart from obvious urgent medical conditions like acute paresis or malignant glioma demanding prompt treatment, management of non-urgent conditions like severe low back pain was not clearly defined.²⁶ Regarding some published recommendations, patients with serious conditions were scheduled for outpatient visits or presented acutely without appointment.^{8,27,28} Most of the cases in our series could be planned, only in less than 1% did the COVID-19 pandemic lead to a potentially deleterious postponement. Despite a potential personal bias, this also demonstrates that strategic schemes to overcome endangering situations seem useful, same as acclaimed

telemedicine during COVID-19.^{21,24,29-31} However, it has to be taken into account that our health care system was never overwhelmed by COVID-19, which has less likely minimized malmanagement. Initial drastic decline in the number of in-person neurosurgery clinic visits with a subsequent ramping up of the outpatient services was seen in other neurosurgical departments as well.^{14,32}

Fear of becoming infected with COVID-19 is hypothesized to be one of the main reasons for the reluctance to seek medical care for acute diseases like stroke or myocardial infarction.^{18,20,22,33-35} This could not be confirmed in our patients, reporting a very low level of anxiety to visit the hospital and/or general practitioner. Despite the fact that the data were collected after the local peak of COVID-19 infections in Tyrol, we believe it to be reliable as people were still under strong influence of media and the global information tide about the pandemic. This statement is further supported by the low number of postponements caused by patient fear of getting sick and bad treatment and the long-lasting symptoms described in our cohort.

Nevertheless, there is obviously selection bias, as the questioned population has presented to the outpatient clinic. Those severely afraid may have never approached the hospital in the first place, even after the ease of restriction. With the overall low level of anxiety and the fact that there were hardly any patients with delayed presentation in the weeks following the study it may be hypothesized that anxiety levels remain low, as long as the health care system is not overwhelmed or perceived as overwhelmed by the public and media. Data of 4 Thai outpatient clinics showed similar results, with mild anxiety in 78% of all patients.³⁶

Three quarters of all patients described symptoms lasting more than 1 month, underlying the elective nature of an outpatient clinic. Nearly half of all postponements were caused by not getting an appointment due to strict legal regulations, as elective cases had to be postponed. A quarter of all patients did not want to put further burden on the medical system. This reluctance was also seen in other medical fields and requires further attention.^{16,20,22,33,34} Media campaigns may be helpful for future crises to ensure timely patient presentation. Our data, however,

Table 1. List of Diagnosis of Diseases, Ranked by Number

| Pathology | Percentage |
|--|------------|
| Degenerative spine and spinal infections | 50.2 |
| Tumor, intrinsic and extrinsic | 21.5 |
| Vascular | 9.7 |
| Other | 7.8 |
| Pain | 7.0 |
| Hydrocephalus | 2.5 |
| Functional | 1.4 |

demonstrate that neurologic symptoms and severe pain appear to be a sufficient trigger for early urgent medical care and fear of COVID-19 seems to be less deterrent as spread by media or authorities.

In 3.2% of all cases (0.9% emergent and 2.3% acute, **Figure 6**) presenting to the outpatient clinic and in 6% of all initial visits, surgical treatment had to be performed within 24 hours. This is lower than other reported data, but comparison is cumbersome as emergencies and urgent cases (subarachnoid hemorrhage, traumatic brain injury) are often managed via an emergency department and are thus not analyzed in our study.²⁴ Yet, these cases are not regularly treated in an outpatient clinic.

Some further limitations need to be acknowledged in our study. First the questionnaire was performed after the peak of COVID-19

cases in Tyrol, potentially underestimating some surveyed data. Second, judgment about postponement and its urgency was at the discretion of the treating neurosurgeon.

CONCLUSIONS

Despite COVID-19, patients in need of neurosurgical service were hardly afraid to visit doctors and/or hospitals. Nonetheless, due to legal requirements, access has been restricted, leading to potential collateral damage in a small subset of neurosurgical patients. These patients at risk need to be identified during a potential second wave in the absence of causative treatment options.

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