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**Letter to the Editor: COVID-19 and the Neurosurgical Treatment of Idiopathic Normal Pressure Hydrocephalus: Shall We Continue to Postpone “Non-emergent” Surgical Procedures?**



**LETTER:**

We read with great interest the editorial published by Bernucci et al<sup>1</sup> “Effects of the COVID-19 Outbreak in Northern Italy: Perspectives from the Bergamo Neurosurgery Department” about reallocation of Italian neurosurgical activity because of the COVID-19 pandemic, caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

Emilia-Romagna represents the third most affected Italian region with 27,946 confirmed COVID-19 cases.<sup>2</sup> Bologna, the capital of the Emilia-Romagna region, represents the highest province with 5054 COVID-19 confirmed patients (Figure 1).<sup>2</sup> Our Unit of Neurosurgery at the Bellaria Hospital and IRCCS Istituto delle Scienze Neurologiche di Bologna harbors a multidisciplinary hydrocephalus clinic, namely the BOLOGNA PRO-HYDRO Study Group. The Bellaria Hospital was reallocated, in a first emergent phase, as a COVID hospital, and our unit moved to another city hospital to provide emergent neurologic surgical procedures (such as traumatic and neurooncologic cases), with a significant reduction of hospital beds (from 50 to 10).

Idiopathic normal pressure hydrocephalus (INPH) represents a chronic and communicating hydrocephalus that mainly affects the elderly population, which also represents the frailest population at risk for developing complications and aggressive disease of COVID-19. The main surgical treatment consists of positioning a ventriculoperitoneal shunt (VPS) with a usually rapid procedure and brief hospitalization (2–3 days). INPH patients usually do not need any post-operative intensive care unit assistance.<sup>3</sup> According to the international and local guidelines, INPH patients do not represent emergent neurosurgical procedures and our hydrocephalus clinic stopped all surgical and clinical activities during the lock-down phase. The European Association of Neurosurgical Societies advises triages of neurosurgical procedures based on an emergency tier classification based on the American College of Surgeons and Elective Surgery Acuity Scale from St. Louis University, but we could not find any recommendation regarding INPH patients.<sup>4</sup> The German Society of Neurosurgery presented a position statement defining the neurosurgical nonelective interventions to be performed during the COVID-19 pandemic. In their paper, “hydrocephalus” represents one of the mentioned categories of patients, with a progressive increase of intracranial pressure with signs and symptoms suggestive of elevated intracranial pressure or infection of implanted shunt material/shunt dysfunction, that should undergo surgery, but INPH patients under normal circumstances do not fall in this category.<sup>5</sup>

Retrospectively reviewing the amount of the neurosurgical activity performed at our hydrocephalus clinic, 8 VPS procedures and 51 outpatients clinical visits were performed from March 9th to June 9th, 2019. During the corresponding period in 2020, only 1 VPS procedure and 2 outpatients clinical visits were performed.

Therefore there was a significant reduction of 88% and 96% of surgeries and outpatients visits, respectively. Besides, there was an increase of 60% of visit appointments requests (9 in 2019 vs. 22 in 2020) due to progressive neurologic symptoms, such as Hakim triad, worsening. Furthermore, we still cannot precisely estimate the amount of neurologic deterioration in INPH patients selected for surgery that has occurred during this period in which operative treatment has been suspended. Which is the point of non-return for our INPH patients? At which point of deterioration shall we declare this operation urgent?

Long-term clinical outcomes in shunted INPH patients are improving over the years due to the refinement of diagnostic, surgical, and anesthetic techniques, with a pooled improvement rate after 3 years of 73%.<sup>6</sup> Recent studies showed that early diagnosis and treatment can predict INPH patients' outcomes in terms of symptom improvement and reduction of mortality, with a gain in quality-adjusted life years as well.<sup>7-10</sup> It is certainly true that INPH patients' surgery cannot be considered as an urgent surgery, but it is also evident that postponing surgical treatment, like during the present COVID-19 lock-down period, will probably lead to poorer neurologic preoperative status, less efficacious treatment response and worse outcomes. This condition may also augment mortality risk in such a frail population in the short and long terms. In addition to postponing shunt nonemergent procedures in already clinically assessed patients, the reduction of new visits in the outpatient clinics and lack of resource facilities, such as magnetic resonance imaging scans, may enormously delay the diagnosis in INPH patients. These factors should be analyzed in future studies to assess COVID-19 pandemics in outcomes assessment.

INPH patients represent a low acuity neurosurgical condition with the employment of few resources. In presence of any humanitarian crisis, such as natural disasters, wars, and epidemics, there is an exhaustion and reallocation of resources that limits the offering of adequate treatments to patients who may have a good long-term prognosis in normal circumstances. Because of the local government and regulatory offices' request to reduce neurosurgical beds and the so-called “elective” surgeries, we, as physicians, are facing challenging practical and ethical dilemmas while triaging non-emergent neurosurgical procedures. We should bear in mind that a planned neurosurgery case does not mean it is not urgent. Postponing surgery in INPH patients indefinitely could provide serious consequences in the long-term period.

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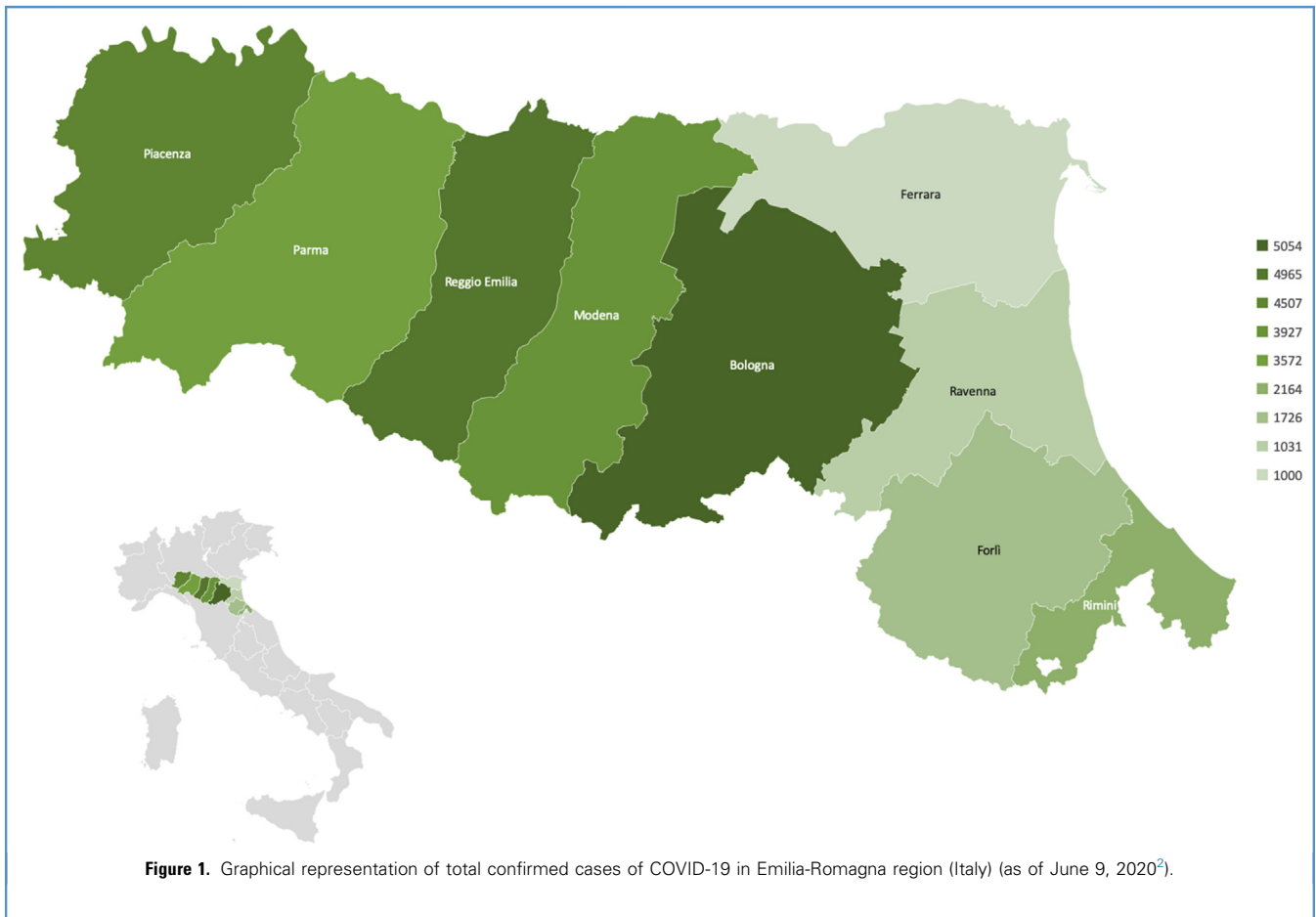
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