talenta PUBLISHER
AANHS Journal
Journal of Medical Science
AANHS Asian Australasian Neuro & Health Science Journal
Universitas Sumatera Utara - Indonesia

Traumatic Brain Injury Cases Through Emergency Department During Covid-19 Pandemic Era 2020 In Adam Malik General Hospital Medan

Mahyudanil[1], Patrice LWY Sinaga[1], M Ari Irsyad[1], Tommy Rizky Hutagalung[1], Faisal[1]
Department of Neurosurgery, Faculty of Medicine, Universitas Sumatera Utara

Abstract

Introduction: Coronavirus disease 2019 (COVID-19) has been infecting nearly 800.000 individuals of all ages in 31 March 2020. Based on Harvard Medical school experience, almost over 80% of patients have switched to telemedicine services. In Indonesia, there are almost 1,22 million cases with recovery of 1 million case and the death of 33.183 cases. In North Sumatera, the COVID-19 cases occurred in 22.999 cases and the recovery of 19.758 cases with death of 786 cases. Here, we report the trend of traumatic brain injury (TBI) cases in pandemic era 2020 in our institution in Adam Malik General Hospital, Medan, North Sumatera.

Method: This retrospective observational study reported 343 TBI cases from January 2020 to December 2020. January 2020 to March 2020 regarded as pre pandemic and April 2020 to December 2020 as the pandemic era.

Results: There is significant decrease of traumatic brain injury patients from March 2020 to April 2020. It was 61% decrease in patients admission to our Emergency Department (ED). Demographically, male patients in productive age group and mild TBI has the most common presentation to our ED.

Discussion: There is significant decrease of patients with TBI in our institution. The number of cases was declining from 55 patients on January to 21 patients on April. This also occurred concurrently with the start of social distancing in Indonesia on April 2020 and the civilian suggested to stay at home during this period. This decline was also found in other countries, like Massachusetts, USA and India.

Conclusion: We reported significant decrease in traumatic brain injury cases in Adam Malik General Hospital during COVID-19 pandemic era in 2020. Neurosurgeons and Residents of Neurosurgery have to be cautious in assessing the TBI patients to limit the spread of COVID-19 in ED.

Keywords: Traumatic brain injury, COVID-19, Pandemic, Emergency Department

Introduction

Coronavirus disease 2019 (COVID-19), per 2020, has been spreading to almost 192 countries throughout the world, infecting nearly 800.000 individuals of all ages in 31 March 2020, and these cases exhibiting symptoms such as fever, upper respiratory tract symptoms, shortness of breath and diarrhea [1]. Four human coronavirus, 229E, HKU1, NL63 and OC43 are a known causes of common cold in humans, and recently detected SARS CoV in 2002 and MERS CoV in 2012 causing outbreaks and in 2019 SARS-CoV2 emerges and causing pandemic outbreak [2].

The Coronavirus has incubation period of 5,2 days, and some research shown that the incubation period ranged from 1 to 19 days, with duration similar to the MERS and

Corresponding author at: Department of Neurosurgery, Faculty of Medicine, Universitas Sumatera Utara, Medan, Indonesia

longer than influenza [3]. The patient has wide range variety of symptoms, from asymptomatic to severe form. Based on meta-analysis, the range of age in patients of COVID-19 start from 30-79 years in mainland China but it occurs almost in all group of ages nowadays [4]. COVID-19 has wide comorbidities factor and the most common is hypertension and this thought to occur from binding of the ACE2 to infiltrate the cells [5]. Symptoms vary from fever to cough and other such as myalgia, sore throat, nausea, vomiting, and diarrhea.

The spread of this virus is rapid and through the droplet, suggesting airborne transfer. Patient with no symptoms can also infecting others. COVID-19 has many complications such as acute respiratory distress syndrome, myocardial injury, acute kidney injury, higher rate of co-infection [6].

With the pandemic era of COVID-19 nowadays, posing the new challenge in neurosurgical services and the admission of patients through emergency department. Based on Harvard Medical school experience, almost over 80% of patients have switched to telemedicine services, and actual visits reserved for selected patients [7]. In New York City, US, the cases of traumatic brain injury (TBI) significantly increase in males with mechanical fall accounted with the majority of cases, and TBI related to violence interestingly increased in pandemic era, and with the emerging of social distancing, the cases were decreased significantly. In Italy, one of the most impacted countries, public lockdown during pandemic diminishing the TBI cases, and also the surgical cases [8].

In Indonesia, until the completion of this study, there are almost 1,22 million cases with recovery of 1 million cases and the death of 33.183 cases. In North Sumatera, the COVID-19 cases occurred in 22.999 cases and the recovery of 19.758 cases with death of 786 cases. Here, we report the trend of TBI cases in pandemic era in our institution in Adam Malik General Hospital, Medan, North Sumatera. In Indonesia, started from 1st June 2020, the new normal has been implemented by the government of Indonesia and the trend has once again shifted. Based on data taken from WHO, from the 1st June to 31st December 2020, the cases were up from 26.473 cases into 727.122 suggesting that there is a significant increase in COVID-19 patients in Indonesia, and we would also like to describe the effect of new normal in our institution regarding the TBI case admission from emergency department.

In the pandemic era, there is significant decrease of TBI patients, and this may be suggested by the fact that people in Indonesia have been working from home and thus may limit some of traffic in roadway. After the government of Indonesia suggested the term of new normal, which is return of normal activity in assimilation of COVID-19 era

has increased once again traffic in Indonesia and thus TBI patients have emerged as a problem once again in neurosurgery field [9].

Method

We reported 343 TBI cases from January 2020 to December 2020 with retrospective observational study, with the January 2020 to March 2020 regarded as pre pandemic and April 2020 to December 2020 as the pandemic era. All data were taken from bank data of medical record of Adam Malik General Hospital. The variables listed such as gender, age and Glasgow Coma Scale (GCS) in TBI patients. The GCS classifies traumatic brain injury as mild TBI with GCS on admission 13-15, moderate TBI with GCS on admission 9-12 and severe TBI with GCS on admission 3-8. The age group were divided into three, such as paediatric patients with age up to 18 years old, productive age with range of 19-60 years old and elder group with age over 61 years old. Data were processed into descriptive measure and provided into this study. In our institution, the confirmation of COVID-19 firstly using the suspicion of higher level of neutrophil lymphocyte ratio (NLR) as screening factor and that patients with higher NLR have to be checked on antigen screening test, and with advancement of screening test, the use of swab antigen on patients widely used in our department.

Results

Table 1. Demographic of TBI patients in Adam Malik Hospital from January 2020 to December 2020

Months	Gender	N	Age	N	GCS	N
January	Male	35	Pediatric	18	Mid TBI	40
	Female	20	Productive	34	Moderate TBI	7
			Elder	3	Severe TBI	8
February	Male	50	Pediatric	22	Mild TBI	41
	Female	10	Productive	34	Moderate TBI	12
			Elder	4	Severe TBI	4

March	Male	35	Pediatric	18	Mild TBI	40
	Female	20	Productive	34	Moderate TBI	7
			Elder	3	Severe TBI	8
April	Male	17	Pediatric	2	Mild TBI	14
	Female	4	Productive	19	Moderate TBI	3
			Elder	0	Severe TBI	4
May	Male	23	Pediatric	10	Mild TBI	9
	Female	7	Productive	15	Moderate TBI	11
			Elder	5	Severe TBI	5
June	Male	18	Pediatric	7	Mild TBI	13
	Female	4	Productive	14	Moderate TBI	5
			Elder	1	Severe TBI	4
July	Male	18	Pediatric	4	Mild TBI	18
	Female	6	Productive	16	Moderate TBI	3
			Elder	4	Severe TBI	3
August	Male	12	Pediatric	6	Mild TBI	11
	Female	5	Productive	10	Moderate TBI	4
			Elder	1	Severe TBI	2
September	Male	9	Pediatric	2	Mild TBI	8

	Female	3	Productive	10	Moderate TBI	1
			Elder	0	Severe TBI	3
October	Male	12	Pediatric	6	Mild TBI	12
	Female	7	Productive	12	Moderate TBI	4
			Elder	1	Severe TBBI	3
November	Male	14	Pediatric	6	Mild TBI	9
	Female	5	Productive	12	Moderate TBI	3
			Elder	1	Severe TBI	7
December	Male	16	Pediatric	8	Mild TBI	17
	Female	3	Productive	11	Moderate TBI	1
			Elder	0	Severe TBI	1

Based on table 1, on January there are total of 55 patients with TBI with dominance of the male with 35 cases and female with 20 cases, and the dominance of productive age of group with 34 cases, whilst the most common GCS is in the range of mild TBI. On February, there are total cases of 60 TBI patients with dominance on male patients with 50 cases, dominant age on productive group, and dominant GCS on mild TBI. In March, there are 55 TBI patients, with dominant genre is male with 35 cases, dominant age is productive group with 34 cases, and dominant GCS is mild TB with 40 cases.

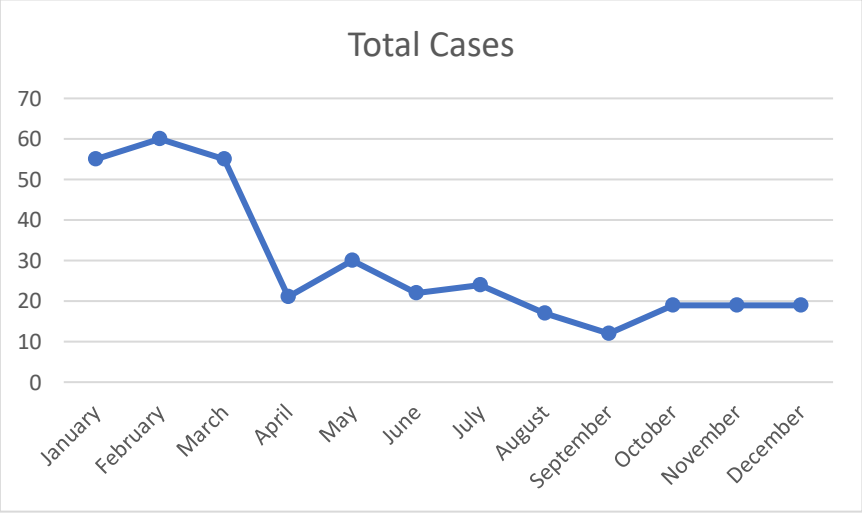
After entering the COVID-19 era in Indonesia, started from April 2020, there is a significant decrease of TBI case into 21 patients, with dominant genre on male with 17

patients, dominant age on productive group with 19 cases, and dominant GCS on mild TBI with 14 cases. In May, there is an increasing TBI cases into 30 patients, with dominant genre on male with 23 cases, dominant age on productive group with 15 cases, and dominant GCS on mild TBI with 14 patients.

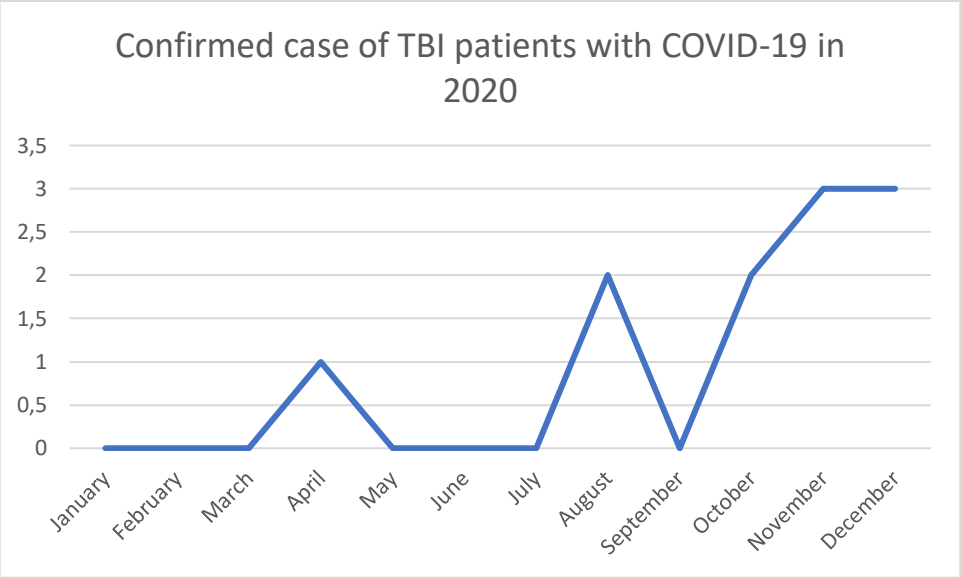
With the beginning of new normal, in June, there are 22 cases of TBI, with dominant genre on male with 18 patients, dominant age on productive group with 14 cases, and dominant GCS on mild TBI 13 cases. In July, there are 24 cases of TBI with dominant genre on male with 18 cases, dominant age on productive group with 16 cases, and dominant GCS on mild TBI with 18 cases. In August, there are 17 patients with dominant genre on male with 12 cases, dominant age on productive age group with 10 cases, and dominant GCS on mild TBI as the most common presentation with 11 cases.

In October, there are 19 cases of TBI, with dominant genre of 12 male, dominant productive age group with 12 cases, and dominant GCS on mild TBI with 12 cases as the most common one. In the last two months, in November, there are also 19 cases of TBI with male dominance in14 cases, and productive age group dominance in 12 cases, and mild TBI also as the most common presentation with 9 cases. Lastly, in December there are 19 TBI cases, with male dominance in 16 cases, productive age group dominance in 11 cases, and mild TBI as the most common presentation with 17 cases.

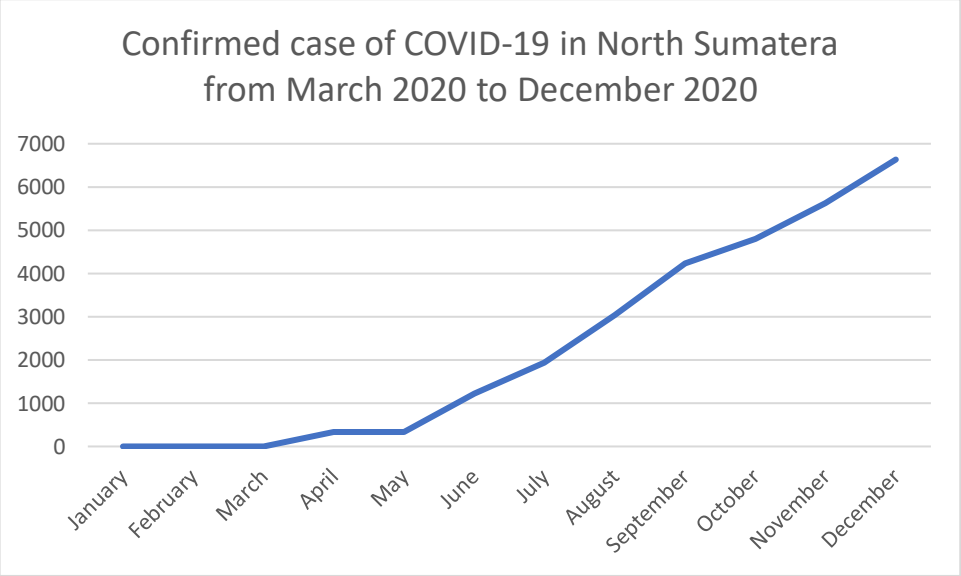
Trend of TBI total cases in each month is shown in graphic 1. The TBI cases decrease from March to April 2020, with not significantly different cases in the following next months.



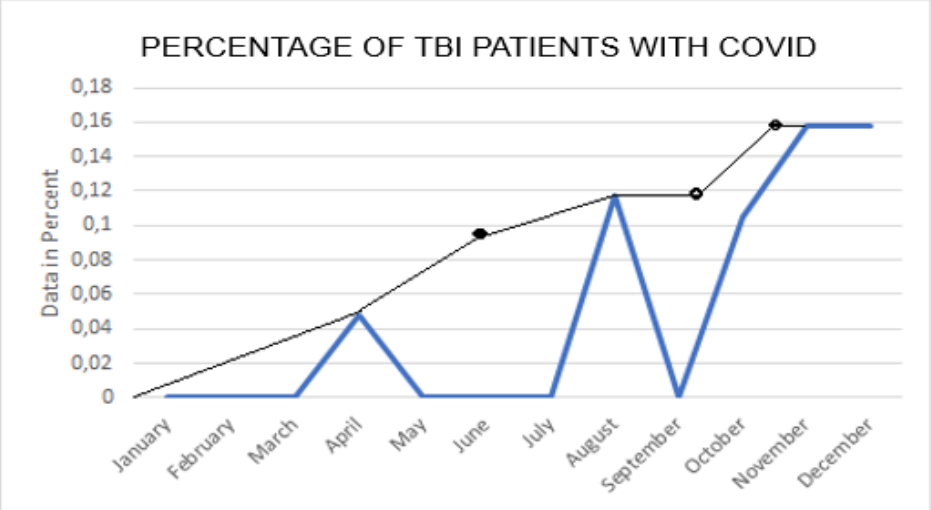
Graphic 1. Trend of TBI patients in Adam Malik General Hospital, Medan



Graphic 2. Confirmed case of TBI patients with COVID-19 in Adam Malik General Hospital Medan



Graphic 3. Confirmed case of COVID-19 in North Sumatera from April 2020 to December 2020



Graphic 4. Percentage of TBI Patients with COVID-19

Based on comparison between the graphic 2 and graphic 3, in April 2020 there is only one case of TBI patients with COVID-19 meanwhile in the April 2020 in North Sumatera, there are 333 confirmed cases in North Sumatera. In August 2020, there are 2 TBI cases with COVID-19, whilst in North Sumatera in that period of time has 3.037 confirmed cases of COVID-19. In October 2020, there are 2 TBI cases with COVID-19 and in North Sumatera there are 4.803 confirmed cases of COVID-19. In the last two months, in November and December 2020, we admitted 3 patients TBI confirming COVID-19 respectively, meanwhile in North Sumatera there are 5.623 confirmed cases and 6.635 confirmed cases of COVID-19 respectively.

On graphic 4, the percentage of TBI patients on April is 4,76%, while on August the percentage is 11,76%, on October the percentage is 10.52% and lastly in the last two months, the percentage are in the value of 15,78%. this graphic shows that the trend is increasing and linearly with the curve in the graphic 3 with the total patients of COVID-19 in North Sumatera.

Discussion

In graphic 1, there is significant decrease of patients with TBI cases in our institution admitted into ED, with 55 TBI cases in March and 21 TBI cases in April. This also occurred concurrently with the start of social distancing in Indonesia on April 2020 and the civilian suggested to stay at home during this period. In pre pandemic era from January 2020 to March 2020, 170 cases were collected meanwhile in pandemic era from April 2020 to December 2020 in our institution 173 cases were collected. From March to

April as the start of social distancing protocol in Indonesia there is a significant decrease to 61% cases.

Between the graphic 2 and graphic 3, although we admitted few cases of COVID-19 in TBI patients, the peak incidence occurred in November and December 2020 with total of 3 patients respectively, and the lowest incidence is on April 2020. It may be due to lack of screening test in the start of pandemic in our institution. Although the incidence tends to be higher in every month in North Sumatera, the number of TBI patients do not follow the trend in North Sumatera. In our institution, residents who directly involved in assessing the patients with TBI in COVID-19 era, although with the low amount of confirmed cases, have to feel cautious of the emerging of COVID-19 in assessing TBI patients in ED.

The relation between graphic 3 and 4 suggesting that the graphic also increasing in both total COVID-19 patients in North Sumatera and the TBI patients in Adam Malik Hospital. This may be caused by the increasing in mobility of civilian and the higher traffic rate in Medan, and also residents need to stay aware on the increasing rate of COVID-19 after new normal phase in Medan.

Whilst other studies only conclude the data taken from 2019, our study was taken from January 2020 to December 2020, this occurred because in Indonesia the suggestion of lockdown started from April 2020 and caused the significant decrease in TBI patients.

Our finding is also similar to the finding of Nourazari., et al in 2020 that they concluded the significant decrease of TBI patients admitted to the ED in Massachusetts, US, because the patients with respiratory conditions were the first priority admitted into the ED, and also the emerging of telemedicine in pandemic era prompting patients to seek physician via telemedicine [10].

In India, Sahoo., et al in 2020 also concluded that there is also change in trend of neurosurgical practice, in a way that some of the facilities used have been shifted into the centre for COVID-19 treatment. In nowadays, all of TBI patients have to be taken into COVID-19 suspect into consideration, prompting a thorough examination and the need of separation between the COVID-19 and non-COVID-19 patients. We have some major changes in the way of admitting our patients, in terms of separation of the patients and the need to acquire serology testing of all our neurotrauma patients [11].

Based on study done by Pelargos PE., et al in 2020, they also noted significant decrease in a region with high number of COVID-19 patients, and also this pandemic affected not only the neurosurgeons, but affected the fellow residents, in terms of

operation [12]. We may note this significant decrease will also affect our residents in Adam Malik General Hospital.

The study of Goyal N., et al in 2020 analyzed the pattern of increasing number after the unlock phase of activity and this may be caused by immobilisation of civilian, and also advise of patients to stay at home, social distancing, higher rate of work from home trend and avoiding public transport [13]. In our institution, there is also lower case of TBI during lockdown and may be caused by the same exact reason as stated, but interestingly, during our new normal era, the graphic tends to be in plateau as in graphic 1, concluding no significant increase in TBI although higher mobility rate in Medan after new normal.

Conclusion

We reported significant decrease in traumatic brain injury cases in Adam Malik General Hospital during COVID-19 era suggested by plateau activity of patients admission to Emergency Department (ED), by rate of 61% in March 2020 to April 2020 and plateau phase until December 2020. The number of COVID-19 is still increasing, with the increase of TBI patients confirmed COVID-19 too. Neurosurgeons and Residents of Neurosurgery have to be cautious in assessing the TBI patients to limit the spread of COVID-19 in ED.

References

[1]. Park M, Cook AR, Lim JT, Sun Y, Dickens BL. A systematic review of COVID-19 epidemiology based on current evidence. Journal of clinical medicine. 2020 Apr;9(4):967.
[2]. Bulut C, Kato Y. Epidemiology of COVID-19. Turkish journal of medical sciences. 2020 Apr 21;50(SI-1):563-70.
[3]. Jiang X, Rayner S, Luo MH. Does SARS-CoV-2 has a longer incubation period than SARS and MERS?. Journal of medical virology. 2020 May;92(5):476-8.
[4]. Yang J, Zheng Y, Gou X, Pu K, Chen Z, Guo Q, Ji R, Wang H, Wang Y, Zhou Y. Prevalence of comorbidities in the novel Wuhan coronavirus (COVID-19) infection: a systematic review and meta-analysis. Int J Infect Dis. 2020 Mar 12;10.
[5]. Zhou P, Liu Z, Chen Y, Xiao Y, Huang X, Fan XG. Bacterial and fungal infections in COVID-19 patients: A matter of concern. Infection Control & Hospital Epidemiology. 2020 Sep;41(9):1124-5.
[6]. Siordia Jr JA. Epidemiology and clinical features of COVID-19: A review of current literature. Journal of Clinical Virology. 2020 Apr 10:104357.
[7]. Ozoner B, Gungor A, Hasanov T, Toktas ZO, Kilic T. Neurosurgery practice during coronavirus disease 2019 (COVID-19) Pandemic. World neurosurgery. 2020 May 28.
[8]. Lara-Reyna J, Yaeger KA, Rossitto CP, Camara D, Wedderburn R, Ghatan S, Bederson JB, Margetis K. “Staying home”—early changes in patterns of

neurotrauma in New York City during the COVID-19 pandemic. World neurosurgery. 2020 Nov 1;143:344-50.

[9]. Rosyidi RM, Wardhana DP, Apriawan T, Al Fauzi A, Priyanto B, Gunawan K, Nugroho SW, Prihastomo KT, Nasution MD, Ihwan A. Algorithm of traumatic brain injury management at Indonesia in the COVID 19 pandemic ERA. Retrospective cohort study. Annals of Medicine and Surgery. 2021 Jan 16.

[10]. Nourazari S, Davis SR, Granovsky R, Austin R, Straff DJ, Joseph JW, Sanchez LD. Decreased hospital admissions through emergency departments during the COVID-19 pandemic. The American Journal of Emergency Medicine. 2020 Nov 19.

[11]. Sahoo SK, Dhandapani S, Singh A, Gendle C, Karthigeyan M, Salunke P, Aggarwal A, Singla N, Singla R, Tripathi M, Chhabra R. COVID-19: changing patterns among neurosurgical patients from North India, efficacy of repeat testing, and inpatient prevalence. Neurosurgical focus. 2020 Dec 1;49(6):E7.

[12]. Pelargos PE, Chakraborty A, Zhao YD, Smith ZA, Dunn IF, Bauer AM. An evaluation of neurosurgical resident education and sentiment during the coronavirus disease 2019 pandemic: a North American survey. World neurosurgery. 2020 Aug 1;140:381-6.

[13]. Goyal N, Swain SK, Gupta K, Chaturvedi J, Arora RK, Sharma SK. “Locked up inside home”–Head injury patterns during coronavirus disease of 2019 pandemic. Surgical neurology international. 2020;11.