









# Changes in patterns of plastic surgery emergencies at a level I trauma center in India during the COVID-19 pandemic

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**Purpose:** The coronavirus disease 2019 (COVID-19) pandemic has had major effects worldwide, including sudden and forceful setbacks to the healthcare system. The COVID-19 pandemic has also led to changes in the plastic and reconstructive management of emergency cases, including those due to road traffic accidents. This study analyzed changes in patterns of plastic surgery emergencies and modifications in consultation policies to minimize the exposure of healthcare workers.

**Methods:** Data on plastic surgery emergency calls received from the trauma and emergency department were collected for a period of 2 months before and during lockdown. The data were then analyzed with respect to the cause, mechanism, and site of the injury, as well as other variables.

**Results:** During lockdown, there was a 40.4% overall decrease in the plastic surgery emergency case volume (168 vs. 100). The average daily number of consultations before lockdown was 2.8 as compared to 1.6 during lockdown. Road traffic accidents remained the most common mechanism of injury in both groups (45.8% vs. 39.0%) but decreased in number during the lockdown (77 vs. 39). Household accidents, including burns, were the second most common cause of injury in both phases (7.7% vs. 20.0%), but their proportion increased significantly from 7.7% to 20.0% in the lockdown phase ( $P=0.003$ ). The percentage of minor procedures done in the emergency department increased from 53.5% to 72.0% during lockdown ( $P=0.002$ ). Procedures in the operating room decreased by 73.1% during lockdown (67 vs. 18,  $P=0.001$ ).

**Conclusions:** The COVID-19 pandemic and lockdown orders in India greatly influenced trends in traumatic emergencies as observed by the plastic surgery team at our tertiary care center. Amidst all the chaos and limitations of the pandemic period, providing safe and prompt care to the patients presenting to the emergency room was our foremost priority.

**Keywords:** Wounds and injuries; Plastic; Surgery; Emergencies

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## INTRODUCTION

The World Health Organization declared coronavirus disease 2019 (COVID-19) to be a pandemic on March 11, 2020. On March 22, 2020, the Government of India under Prime Minister Shri Narendra Modi ordered the “Janta curfew” and later a nationwide lockdown for 21 days, limiting movement of the entire 1.3 billion population of the nation as a preventive measure against the COVID-19 pandemic in India [1]. The first phase of the lockdown order was implemented from March 23 to April 14, and the lockdown was then continued for three more phases till May 31. The aim of the lockdown was to strictly control the movement of people to prevent the spread of infection, while simultaneously preparing the infrastructure, resources, and personnel of the healthcare system to gear up to handle the upcoming disaster. All transport services—road, air, and rail—were suspended, with exceptions for transportation of essential goods, fire, police, and emergency services [2]. Educational institutions, industrial establishments, and hospitality services were also suspended [2]. All public places, including places of worship, parks, malls, and nonessential businesses, were closed. Sports events (national and international), trains, bus locomotion, and flight services were stopped for the first and second phases of the lockdown. There were major changes in people’s lifestyles and attitudes. Staying inside the home and the closure of major markets and transport led to a dramatic decrease in the number of vehicles seen on roads, which in turn led to a major decrease in road traffic accidents as reported by the media. However, every advantage has its own disadvantages as well. Staying indoors during the lockdown period made people susceptible to an increased frequency of household accidents and even domestic violence, especially during third and fourth lockdowns when liquor shops were opened. This aspect of COVID-19 has been well documented by media in periodic reports [3,4].

In the context of changes in the healthcare system and patient management policies, all hospitals—both public and private—changed their priorities. At All India Institute of Medical Sciences, Patna, India, all elective surgical procedures were postponed, and stable patients were immediately discharged to create more space for COVID-19 patients, including both suspected and confirmed cases. Initially, 200 beds were reserved for COVID-19 patients, with 30 beds for intensive care unit services. Later, seeing a sudden surge in cases in Bihar (the state where our institution is located), the government declared our institution as a dedicated COVID-19 hospital. To achieve the goals of a dedicated COVID-19 hospital, the number of COVID-19 beds was in-

creased to 600 along with 80 intensive care unit beds, and two operating rooms were dedicated to COVID-19-related surgery. All non-COVID-19 services were stopped and only patients with positive COVID-19 tests were admitted. These measures were expedited due to the rapid influx of cases after students and migrant laborers were brought back to the state during the relaxation of the first lockdown (lockdown 1.0). Another reason for this step was to utilize the limited resources of the institution, including personal protective equipment (PPE), lab services, and personnel for COVID-19 care and to prevent unnecessary exposure to healthcare workers.

Just after the lockdown orders were issued, Department of Burns and Plastic Surgery became concerned about the impact of COVID-19 on the pattern and density of trauma cases, since plastic surgery is an integral part of trauma centers. The aim of this study was to document changing trends in injuries requiring plastic surgery consultation during lockdown, our departmental policies for managing those cases, and the efforts taken to minimize the risk of exposure to our team members.

## METHODS

The study was approved by the Institutional Review Board of All India Institute of Medical Sciences (No. AIIMS/Pat/IEC/2020/564) and performed in accordance with the principles of the Declaration of Helsinki. Since it was a retrospective study, telephonic informed consent was obtained from the patients. This retrospective study encompassed two periods (2 months each), from January 23 to March 22 (prelockdown) and from March 23 to May 22, 2020 (postlockdown). The hospital information system records and the plastic surgery duty register maintained by residents and signed by faculty on a daily basis were browsed, and data were collected. Details of patients’ demographic and clinical profile including age, sex, time of injury, the time of presentation, and the cause, mechanism, and site of the injury were recorded. Comparisons were then made in relation to the time of presentation, the cause of the injury, the nature of the injury, the location of the injury, the time lag between call and consultation, the number of minor procedures and surgical interventions done (if required), and the length of hospital stay. Data were recorded under three broad headings: the pattern of emergency presentations, the mechanism of the injury, and the procedures performed. The chi-square test was used for statistical analyses, and P-values < 0.05 were considered to indicate statistical significance.

Anticipating a decrease in the number of trauma cases due to

the nationwide lockdown and in light of the prevailing COVID-19 pandemic, the duty roster of the faculty and residents from all specialties was modified in order to prevent exposure to all of them simultaneously. At our institution, teleconsultation services were provided on a regular basis, and this policy was reinforced after issuance of the lockdown order. Following the institutional protocol, the plastic surgery department prepared a three-team roster with each team comprising one faculty member and one resident. The first team was put on emergency duty, the second team was engaged in COVID-19 duties, and the third team was kept in quarantine. Each team worked continuously for 7 days, and the roster was repeated in this sequence on a weekly basis. The quarantine team was also supposed to be used as a backup pool in case a member of the first two teams became infected and a replacement was needed. Digital communications were mostly used whenever necessary. If the resident on duty assessed the injury, then the case was discussed with a faculty member either by telephone or using WhatsApp, rather than having the faculty seeing the case in person for a second time and vice versa. This protocol was followed to minimize unnecessary exposure. If a patient required a minor plastic surgery intervention for his or her injury, it was done in the same setting with the help of other available residents and staff on emergency duty so as to avoid transferring patient and to minimize the use of PPE, which was in limited supply during the lockdown as compared to the current scenario. Standard precautions were followed in the emergency department, as no prior reverse transcriptase-polymerase chain reaction (RT-PCR) testing was done. Only patients with severe injuries were taken directly to the operating room and a sur-

gical intervention was done under general anesthesia with all appropriate precautions, including the strict use of PPE, face shields, and judicious usage of electrocautery in combination with a smoke evacuator. Efforts were made to minimize the usage of power-driven drills and motorized instruments. An operating microscope was preferred for magnification instead of surgical loupes to avoid fogging. In the postoperative period, the patient was shifted to the area for suspected COVID-19 cases and a nasopharyngeal sample was sent as soon as possible. If the surgical intervention was nonurgent, then all efforts were made to have RT-PCR testing done before the patient was taken for surgery. According to the status of the report, the patient was either managed in a non-COVID-19 area or in the COVID-19-positive ward. In the COVID-19-positive area, if a plastic surgery consultation was required for any patient with a bedsore, cellulitis, or ulcer, it was duly attended by the COVID-19 care plastic surgery team. During the lockdown period, the plastic surgery team also managed one of the 30-bed COVID-19 wards.

## RESULTS

A total of 268 calls were received between January 23 and May 22, 2020. The number of cases between January 23 and March 22 (i.e., before lockdown) was 168. From March 23 to May 22, after implementation of the lockdown, the number was 100. The overall decrease in the case volume was 40.4%. The average number of daily consultations before lockdown was 2.8, whereas it was 1.6 during lockdown. The average age of patients before lockdown was  $34.0 \pm 6.2$  years, as compared to  $29.0 \pm 4.6$  years during

**Table 1.** Distribution of emergency consultations before and during lockdown

Variable	Prelockdown <sup>a)</sup> (n=168)	Postlockdown <sup>b)</sup> (n=100)
Age (yr)	34.0±6.2	29.0±4.6
Sex		
Male	136 (80.9)	79 (79.0)
Female	32 (19.1)	21 (21.0)
No. of emergency consultations	168 (62.7)	100 (37.3)
Average daily consultation	2.8	1.6
Time lag between call and consultation (min)	12.3±2.8 (10–15)	38.2±6.7 (30–45)
Total admissions	67 (39.8)	18 (18.0)
Duration of hospital stay (day)	8.4±2.3	14.6±3.4
Injury		
Hand	74 (44.0)	43 (43.0)
Facial	40 (23.8)	25 (25.0)
Other	54 (32.1)	32 (31.0)

Values are presented as mean±standard deviation, number (%), number only, or mean±standard deviation (range).

<sup>a)</sup>23 January–22 March, 2020; <sup>b)</sup>23 March–22 May, 2020.

lockdown. There was no statistical difference in the distribution of patients by sex between the groups ( $P = 0.69$ ). The number of emergency admissions significantly decreased from 67 to 18 ( $P = 0.001$ ) (Table 1). There was no significant change in the proportion of patients who presented with hand injuries (44.0% vs. 43.0%) or facial injuries (23.8% vs. 25.0%) between the two phases ( $P = 0.86$  and  $P = 0.82$ , respectively). The average time from receiving the telephone call on the plastic surgery helpline number and attending the consultation increased during the lockdown period (10–15 minutes prelockdown vs. 30–45 minutes postlockdown). The reasons cited by most residents were the time taken to get the PPE issued and the distance between the PPE donning area and the patient reception area.

The causes and mechanism of injuries during both periods were also analyzed, as shown in Table 2. Road traffic accidents remained the most common mechanism of injury in both groups (45.8% vs. 39.0%) but decreased in number during the lockdown (77 vs. 39). Household accidents, including burns, were the second most common cause of injury in both phases (7.7% vs. 20.0%), and their proportion increased significantly in the lockdown phase ( $P = 0.003$ ). Self-inflicted injuries accounted for more cases as a percentage of all cases during lockdown (6.5% vs. 12.0%). Assault (1.7% vs. 6.0%) and gunshot injuries (2.3% vs.

7.0%) were the other common causes that showed an increasing trend during lockdown ( $P = 0.007$ ). Cases due to falls from height almost doubled in percentage after issuance of the lockdown (4.1% vs. 9.0%). None of the cases reported during lockdown were due to domestic violence. No sports-related injuries were encountered in the lockdown period, and there were no reports of injuries at school. Cases of hand infection like paronychia, cellulitis, and nonhealing ulcers presenting to the emergency department during lockdown decreased significantly ( $P = 0.014$ ). Other causes included dog bites, crush injuries, and lacerations.

Prior to lockdown, our team always tried to attend every case in the emergency department requiring a plastic surgery consultation, but this pattern was modified during lockdown to avoid unnecessary exposure. Thus, the percentage of patients seen physically in the emergency department decreased from 97.6% to 62.0%. Many consultations were done through telephonic conversation with on-duty residents from the trauma team. In order to restrict the movement of patients and minimize the exposure of additional healthcare workers, the majority of minor procedures (e.g., suturing of lacerations, fracture reductions, and incision and drainage) were performed in the emergency procedure room of the trauma center. This led to a

**Table 2.** Mechanism of injuries in 2-month periods before and during lockdown

Variable	Prelockdown <sup>a)</sup> (n=168)	Postlockdown <sup>b)</sup> (n=100)	P-value <sup>c)</sup>
Road traffic accident			
Fall from bike	22 (13.1)	15 (15.0)	0.661
Collision	55 (32.7)	24 (24.0)	0.129
Fall from height	7 (4.1)	9 (9.0)	0.106
Assault	3 (1.7)	6 (6.0)	0.064
Gunshot	4 (2.3)	7 (7.0)	0.130
Self-inflicted injuries	11 (6.5)	12 (12.0)	0.123
Household accidents including burns	13 (7.7)	20 (20.0)	0.003
Cellulitis, ulcer, wound	22 (13.1)	4 (4.0)	0.014
Other (dog bite, crush injuries, lacerations)	31 (18.4)	3 (3.0)	-

Values are presented as number (%).

<sup>a)</sup>23 January–22 March, 2020; <sup>b)</sup>23 March–22 May, 2020; <sup>c)</sup>Significant at  $P < 0.05$ .

**Table 3.** Consultations and procedures performed in the ER and OR

Variable	Prelockdown <sup>a)</sup> (n=168)	Postlockdown <sup>b)</sup> (n=100)	P-value <sup>c)</sup>
No. of cases physically attended in ER	164 (97.6)	62 (62.0)	<0.01
Minor procedures in ER	90 (53.5)	72 (72.0)	<0.01
Procedures in OR	67 (39.8)	18 (18.0)	<0.01
No procedure required	11 (6.5)	10 (10.0)	-

Values are presented as number (%).

ER, emergency room; OR, operating room.

<sup>a)</sup>23 January–22 March, 2020; <sup>b)</sup>23 March–22 May, 2020; <sup>c)</sup>Significant at  $P < 0.05$ .

significant increase in the number of cases done in the procedure room compared to prelockdown, from 53.5% to 72.0% ( $P=0.002$ ). All procedures in the emergency department were performed under local anesthesia. The number of patients requiring major surgical interventions in the operating room decreased significantly, by 73.1%, during lockdown (67 vs. 18,  $P=0.001$ ) and these were the patients who required surgery under general anesthesia (Table 3).

## DISCUSSION

The COVID-19 pandemic had a profound impact on individual lifestyles, which was amplified by the effects of social distancing and intermittent lockdown. The complete restriction of transport was expected to result in a decrease in road traffic and motor vehicle collision accidents. The dip in the absolute number of road crash fatalities during lockdown is mainly attributed to the suspension of public transport and general mobility. This decline in traffic accidents during COVID-19 lockdowns has been noted across the world in academic articles from Spain [5], Brazil [6], India [7], and the United States [3,8], as well as in the media.

In India, the lockdown resulted in a significant reduction in the number of road traffic accidents. Statistics suggest that roughly about 10,000 lives were saved by the lockdown in India in 1 month due to road traffic accidents, relative to a loss of 200 lives due to COVID-19. According to the data provided to the Supreme Court Committee on Road Safety, there was a 68% decrease in deaths due to road traffic accidents during the lockdown between March 24 and May 31 and a 72% decrease in road accident injuries [4]. Bihar (where our institution is located) is the state that observed the fourth-highest declines—with a 58.5% decline in road deaths and 56.6% decline in injuries sustained due to road traffic accidents—during lockdown, after Maharashtra, Rajasthan, and Gujarat [4]. The percentage decrease in Bihar was considerably higher than in metropolitan cities (e.g., central Mumbai), where the number of deaths fell by about 21% in March compared with the same month in 2019 [9]. In our study, the absolute number of emergency cases decreased from 168 in the prelockdown period to 100 in the postlockdown period. Although road traffic accidents remained the most common cause in both periods (45.8% vs. 39.0%), the numbers decreased during the lockdown (77 vs. 39). Studies at various centers from the United States have shown similar patterns, with stay-at-home orders resulting in a decreased volume of plastic surgery consults in the emergency department [10,11].

There was a significant increase in the proportion of assault injuries seen in the postlockdown period, particularly gunshot and stab injuries (4.1% vs. 13%,  $P=0.007$ ). The reason for the increase in gunshot injuries was festive gunfire at marriages taking place in the month of May during the lockdowns 3 and 4 when flight services resumed. The proportion of injuries sustained at home, including burns, increased significantly from 7.7% to 20.0% in the lockdown phase ( $P=0.003$ ). This shows a correlation between staying at home and a propensity for household injuries. The presentation of nontraumatic cases including cellulitis, ulcers, wounds, and other causes (e.g., dog bites, crush injuries, and lacerations) decreased considerably during lockdown (31.5% vs. 7.0%).

Healthcare workers, including doctors and staff, faced a major challenge while managing the emergency patients during the prevailing COVID-19 pandemic. In semiurgent cases, the surgical intervention was done only after the patient's COVID-19 status was confirmed by RT-PCR, but this was not possible in cases requiring immediate surgical management or for patients who underwent minor procedures in the emergency room. The second group included maxillofacial injuries requiring intermaxillary fixation debridement, suturing of lacerated wounds, and dressings. As the COVID-19 status of those patients was unknown, they were considered positive and the utmost precautions were taken by all healthcare workers (including the usage of PPE and face shields), especially when managing complex craniofacial trauma cases where a comprehensive examination relies on close proximity to the patient's nose and mouth [12]. The overall number of personnel involved in the management of any case was kept minimal, both with the goal of avoiding exposure and keeping in mind the shortage of PPE.

Based on the policies followed by our institution and our plastic surgery team, fewer cases were physically seen in the emergency room (97.6% vs. 62.0%). In cases where other associated injuries were present, an attempt was made to coordinate the consultation with other specialty teams, such as neurosurgery, orthopedics, and general surgery. The collected data showed an increase in the number of minor procedures done at the first consultation during the lockdown period (53.5% vs. 72.0%,  $P=0.002$ ). Immediately necessary surgical procedures were done without delay whenever indicated. Once admitted, the patients had somewhat longer stays in the hospital (mean  $\pm$  standard deviation,  $8.4 \pm 2.3$  days vs.  $14.6 \pm 3.4$  days). The reasons for this included the goal of obtaining RT-PCR at least 12 hours before the patient was taken up for surgical procedure, requests from patient family members to postpone discharge due to the unavail-

ability of transport during lockdown, and an inability to come for dressing changes usually done on an outpatient basis before lockdown.

In conclusion, the COVID-19 pandemic and lockdown orders in India greatly influenced trends in traumatic emergencies as observed by the plastic surgery team at our tertiary care center. Amidst all the chaos and limitations of the COVID-19 pandemic, safe and timely care provided by the team for our patients remained our top priority. The overall decrease in the plastic surgery emergency case volume was 40.4%, and the number of daily consultations decreased (2.8 vs. 1.6) during lockdown. Road traffic accidents remained the most common mechanism of injury in both periods (45.8% vs. 39.0%) but decreased in number during the lockdown (77 vs. 39). The proportion of household accidents, including burns, increased significantly from 7.7% to 20.0% in the lockdown phase. The proportion of procedures done in the emergency department increased from 53.5% to 72.0% during lockdown in order to restrict the movement of patients and avoid the exposure of additional healthcare workers. Apart from imparting optimal patient care, the safety of doctors and staff members was also a major concern at our hospital. The lesson learnt from lockdown during this pandemic is that just as the specialty of plastic surgery involves the molding of any structure, our team also molded itself and adapted to the sudden setbacks as expressed by the continuation of safe and timely care provided by our team with thorough communication, vigilance, and guidance on our part.

## NOTES

### Ethical statements

The study was approved by the Institutional Review Board of All India Institute of Medical Sciences (No. AIIMS/Pat/IEC/2020/564) and performed in accordance with the principles of the Declaration of Helsinki. Since it was a retrospective study, telephonic informed consent was obtained from the patients.

### Conflicts of interest

The authors have no conflicts of interest to declare.

### Funding

None.

### Author contributions

Conceptualization: VS; Data curation: AdK, AmK; Formal analy-

sis: VS, AH, SS; Visualization: SK, AnK; Writing—original draft: VS; Writing—review & editing: AH, SS.

All authors read and approved the final manuscript.

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