ORIGINAL ARTICLE

The effect of lockdown during SARS-CoV-2 pandemic on maxillofacial injuries in a level I trauma centre: a comparative study

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Abstract

Introduction The SARS-CoV-2 pandemic forced many governments to impose nation-wide lockdowns. Government legislation forced limited travel on the population with restrictions on the normal way of life to limit spread of the SARS-CoV-2 virus. The aim of this study is to explore the effects of lockdown on the presentation of maxillofacial trauma in a level I trauma centre.

Methods Comparative analysis was carried out using prospective and retrospective review of all consecutive patients admitted with any maxillofacial fracture in the lockdown period between 15th March and 15th June 2020 with the same period in 2019 to a Regional Trauma Maxillofacial Surgery Unit. Data included basic demographics and mechanism of injury including alcohol/drug influence, polytrauma, site of injury and treatment modality including escalation of care.

Results Across both periods, there were a total of one hundred and five ($n = 105$) recorded episodes of traumatic fractures with fifty-three ($n = 53$) in the pre-lockdown cohort and fifty-two ($n = 52$) in the lockdown. Included patients were significantly ($p = 0.024$) older during lockdown (mean age 41.44 years SD 20.70, range 5–96) with no differences in gender distribution between cohorts ($p = 0.270$). Patients in lockdown were more likely to be involved in polytrauma ($p < 0.05$) and have sustained their injury by cycling/running or any outdoor related activity ($p = 0.013$). Lockdown saw a significant reduction in alcohol and drug related violence ($p < 0.05$). Significantly more patients required operative management ($p = 0.038$).

Conclusion Local lockdowns form part of the governments public health strategy for managing future outbreaks of SARS-CoV-2. Our study showed no significant reduction in volume of trauma during lockdown. It is vital that hospitals maintain trauma capacity to ensure that patients are treated in a timely manner.

Keywords Maxillofacial trauma · Lockdown · SARS-CoV-2 · Trauma

Introduction

On the 31st of December 2019, a case of pneumonia of unknown cause was reported to the World Health Organisation (WHO) in China [1]. Early published research on the

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clinical features of these patients from Wuhan in China was alarming. The first case series of 41 hospitalised patients demonstrated that 32% had no underlying co-morbidity, 32% required intensive care admission and 15% went on to die [2]. Other early studies showed that this was not a disease exclusive to the elderly population, with a larger retrospective cohort study of 1099 reporting a median age of 47 years [3]. The novel virus was named SARS-CoV-2, and on 11th March 2020, the WHO announced that the disease had become a pandemic [4].

The United Kingdom (UK) developed a rapidly increasing caseload and death rate which prompted a state of 'lockdown' on the 26th March 2020 [5]. This move was unprecedented by the UK government with questions arising over the capability of the National Health Service (NHS) to cope. Primary care facilities were rapidly scaled back which limited ease of access

for patients to essential general medical and dental services [6]. The public were instructed to only leave the house for essential travel but individual outdoor exercise was permitted.

Surgery is considered high risk as it is an 'aerosol generation procedure (AGP)'. Surgical drilling and the intubation procedure is deemed to generate an aerosol. Aerosolization procedures and the presence of blood particles in these droplets can increase risk transmission [7, 8]. The exact effects of social distancing and lockdown on trauma and patient behaviour are unknown. No studies to date have explored the effects of lockdown on a population in comparison to those pre-lockdown and the potential influence on the presentation and nature of maxillofacial trauma. The aim of this study is to explore differences in how patients present with hard tissue trauma of the maxillofacial region in a level I trauma centre, during a lockdown period.

Material and methods

Prospective data were collected on all consecutive patients admitted with any traumatic fracture of the maxillofacial region between the dates of 15th March and 15th June 2020. Pre-lockdown retrospective data was collected using electronic hospital records via Physician Practice Management Plus (PPM +) and saved handover data. Comparative analysis between the same dates in 2019 was performed to avoid any seasonal variation. Data was recorded and stored on a secure hospital server in NHS hospital server on a Microsoft Excel spreadsheet.

Data collected included basic demographic data (age, gender), mechanism of injury, anatomical region of fracture(s), whether the injury was as part of polytrauma, timing from injury to presentation, any associated neurological injury, alcohol or drug influence when injury sustained, treatment modality, time to theatre, length of stay, whether any escalation of care (high-dependency/intensive care units), post-operative infection, readmission and return to theatre.

Analysis was carried out using SPSS (SPSS version 26, IBM). The analytic method used for differences between the two groups was dependent upon on the variable and skew of the data. Significance level was set at $p = 0.05$ and confidence intervals at 95%. Non-parametric data was analysed using Mann–Whitney U test, binomial data using χ^2 and normally distributed non-categorical data using the Student's t-test.

Results

Across both periods, there were a total of one hundred and five (105) recorded episodes of traumatic fractures with fifty-three (53) in the pre-lockdown cohort and fifty-two (52)

in the lockdown cohort representing no significant reduction in volume of trauma during lockdown ($p > 0.05$) with a total one hundred and eighty fractures (180). Distribution of trauma throughout both cohorts are detailed in Table 1 with orbital fractures (20%) presenting most commonly followed by angle fractures (18.8%) of the mandible.

Basic demographic data (Table 2) showed that the lockdown cohort (mean age 41.44 years SD 20.70, range 5–96) were significantly older ($p = 0.024$) than pre-lockdown (mean 33.21 years, SD 15.9, range 1–89). There were no differences in gender distribution between both cohorts ($p = 0.574$) with males forming 84.9% and 80.8% in the pre-lockdown and lockdown cohorts, respectively. Within the lockdown cohort, 1.9% ($n = 1$) tested positive for SARS-CoV-2, 55.8% ($n = 29$) tested negative and 42.3% (22) had no recorded result.

Although patients were operated on later during lockdown (Table 2) (mean 4.00 days, SD 5.34, range 0–18) than outside of lockdown (mean 2.57 days, SD 5.46, range 0–29), this did not represent a statistically significant difference ($p = 0.137$). Patients also presented later in lockdown (mean 0.75 days, SD 1.91, range 0–9) than in pre-lockdown (mean 0.45 days, SD 0.67, range 0–3); however, this did not demonstrate statistical significance ($p = 0.313$). Furthermore, there were no significant differences between the cohorts in re-admission ($p = 0.176$), post-operative infection ($p = 0.414$) or return to theatre ($p = 0.310$).

Figure 1 shows a stacked bar chart displaying the differences between mechanism of trauma before and during lockdown. Analysis of data (Table 3) on circumstances and mechanism of injury demonstrated a significant difference in patients presenting under the influence of alcohol or drugs outside of lockdown (60.4%) than during lockdown (21.1%) ($p < 0.05$). Patients were more likely to be involved in polytrauma whilst in lockdown ($p < 0.05$) and significantly more patients sustained a fracture secondary to cycling/running or other outdoor related activities during lockdown ($p = 0.013$). There were no differences observed in concurrent neurological injuries sustained ($p = 0.559$) or requirement for escalation of care to high dependency, intensive care or neurosurgical critical care ($p = 0.586$). Interestingly patients sustained

Table 1 Total number of fractures ($n = 180$)

Angle (%)	34 (18.8)
Symphysis (%)	2 (1.1)
Body (%)	16 (8.8)
Parasymphysis (%)	25 (13.8)
Condyle (%)	19 (10.5)
Dento-alveolar (%)	9 (5)
Orbital (%)	36 (20)
Zygoma (%)	26 (14.4)
Nasal bone (%)	13 (7.2)

Table 2 Comparative analysis of basic demographics, admissions and timing of injury in trauma pre- and post-lockdown

	Pre-lockdown ($n=53$)	Lockdown ($n=52$)	P value
Age (years)	Mean 33.21, SD 15.9, range 1–89	Mean 41.44 SD 20.70, range 5–96	0.024*
Gender n (%)	Male = 45 (84.9) Female = 8 (15.1)	Male = 42 (80.8) Female = 10 (9.5)	0.574**
Length of admission (days)	Mean 5.74, SD 11.82, range 0–56	Mean 5.02, SD 11.00, range 0–65	0.615***
Time from presentation to theatre (days)	Mean 2.57, SD 5.46, range 0–29	Mean 4.00, SD 5.34, range 0–18	0.137**
Time from injury to presentation (days)	Mean 0.45, SD 0.67, range 0–3	Mean 0.75, SD 1.91, range 0–9	0.313***

*Student's T-test

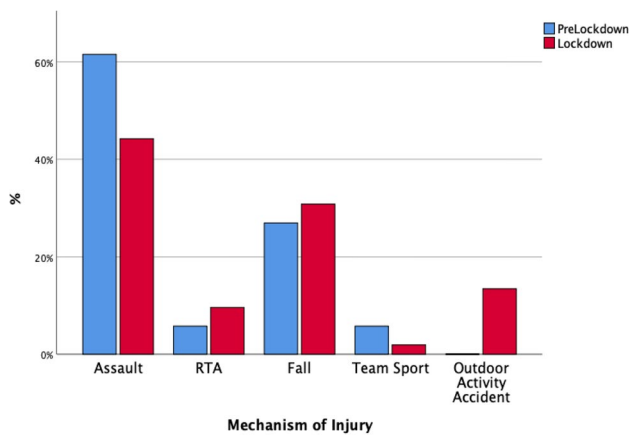**χ^2

***Mann–Whitney U

Fig. 1 Stacked chart for mechanism of injury prior to and during lockdown

injuries were more likely to need operative management during lockdown than outside of lockdown ($p=0.031$).

Table 4 shows a sub-group analysis on gender in the study. Females represented a smaller study sample size ($n=18$) than males ($n=87$) with no significant differences in age distribution between the groups ($p=0.915$). Males were significantly more likely to be involved in interpersonal violence as their mechanism of trauma than women ($p<0.05$). Furthermore, males were significantly more likely to be involved in trauma associated with alcohol or drug influence ($p=0.021$) and more were involved in road traffic accidents ($p=0.010$). Although not statistically significant, proportionally more women were involved as victims of domestic violence than men ($p=0.075$).

Discussion

The overall aim of this study was to understand whether the SARS-CoV-2 pandemic lockdown had any differences in presentation, pattern and severity of injury along with management strategies of oral and maxillofacial trauma. Lockdown has shown to change the presentation, mechanism and nature of trauma [9, 10]. Attendances to the emergency department in the UK had reportedly decreased by 25% during lockdown [11]. It is unclear whether this was due to less disease or patient anxiety over the risk of transmission of SARS-CoV-2. Furthermore, calls to the National Domestic

Table 3 Comparative analysis of differences in presentation and management of trauma pre- and post-lockdown

	Pre-lockdown ($n=53$)	Lockdown ($n=52$)	P value
Alcohol/drug influence n (%)	32 (60.4)	11 (21.1)	**< 0.005**
Polytrauma n (%)	6 (11.3)	20 (38.5)	**< 0.005**
Cycling/running/other outdoor activity n (%)	2 (3.8)	10 (19.2)	**0.013**
HDU/ITU or neurosurgical HDU/ITU admission n (%)	9 (17)	11 (21.2)	0.586**
Associated neurological injury n (%)	7 (13.2)	9 (17.3)	0.559**
Operative management n (%)	12 (22.6)	22 (42.3)	**0.031**
Conservative management n (%)	41 (77.4)	30 (57.7)	**0.038**

P value < 0.05 is considered significant at 95% confidence level

*Student's T-test

**χ^2

Table 4 Comparative analysis between key gender-specific outcomes

	Female ($n=18$)	Male ($n=87$)	P value
Age (years)	Mean 37.72, SD 24.5, range 1–96	Mean 37.20, SD 17.5, range 5–89	0.915*
Interpersonal (%)	2 (11.1)	50 (57.5)	**< 0.005****
Alcohol/drug influence n (%)	3 (16.7)	40 (46.0)	**0.021****
Domestic violence n (%)	2 (11.1)	2 (2.3)	0.075**
Road traffic accident n (%)	4 (4.6)	4 (22.2)	**0.010****

P value < 0.05 is considered significant at 95% confidence level

*Student's T-test

**χ^2

Abuse Helpline had increased a reported 25% following implementation of lockdown measures [11].

Our study demonstrated no significant reduction in the volume of trauma during lockdown; however, the nature and type of trauma was different. There was a significant reduction in alcohol or drug-related trauma presenting to the emergency department in lockdown which likely reflects the closure of social venues; however, alcohol sales were in-fact up 67% in the early stages of lockdown [12]. Although not statistically significant ($p = 0.075$), our research demonstrated a difference in the number of women presenting with a trauma secondary to domestic violence. Research has shown that there may be a causal relationship between alcohol use and domestic violence with 25–50% of perpetrators of domestic abuse drinking at the time of assault [13–16].

Lockdown lead to significant increase ($p < 0.05$) in the volume of polytrauma (38.5%) than outside of lockdown (11.3%). This is likely related to the mechanism of injury which showed a significant increase ($p = 0.013$) in cycling, running or any other outdoor-related activity. Although not seen in our cohort, other studies have demonstrated an increase in road traffic accidents [10]. Polytrauma reflects the mechanism of injury with studies showing that these types of injuries are more likely to occur on roads with vehicle-related incidents most common cause [17, 18]. Our study did not show any significant differences between the cohorts in requirement for escalation of care or admission to a neurosurgical critical care unit ($p = 0.586$). This is in keeping with no significant differences in associated neurological injuries between cohorts ($p = 0.559$).

Although not statistically significant, our study demonstrated that patients were operated on average 1.5 days later than when compared to pre-lockdown cohort which may represent clinical significance. These delays were likely due to the change in clinical pathways prior to surgery during the pandemic. In accordance with new hospital policies, all patients who are admitted and required surgery must undergo a SARS-CoV-2 swab prior to their operation. During the lockdown period in which this study was carried out, delays in transporting samples to the lab along with shortages of essential reagent meant that the turnaround time often exceeded 48 h [19], which was likely a contributor to longer admission periods and delays in time to theatre. Studies are inconclusive as to optimal timing for surgical fixation following trauma; however, common practice is to undertake ORIF as soon as feasibly possible following injury within normal working hours to minimise risk of complications from surgery [20, 21].

Subgroup analysis on gender differences (Table 4) revealed that males were more likely to be involved in alcohol or drug-related injuries than women ($p = 0.021$). Other studies have shown that males are far more likely than females to have used drugs or be under the influence of alcohol on presentation to an emergency department [22]; in addition to this, alcohol use and male sex are significant risk factors for trauma sustained secondary to interpersonal violence [23, 24]. Further analysis shows that over half of men (57.5%) across both cohorts are far more likely than women ($p = < 0.005$) to have a history of interpersonal violence.

Although not recorded in our study, other research has shown an increase in 'do-it-yourself' (DiY)/garden-related injuries [9, 10]. Our research focuses on patients with hard tissue trauma only and soft tissue trauma is more likely in DiY and garden-related mechanisms. Further research may wish to highlight the effects of lockdown on soft tissue injuries and this mechanism of injury is more relevant to those types of injuries sustained.

Patients were significantly more likely to have operative management of their injury during lockdown than outside of lockdown ($p = 0.031$), and conversely, patients were more likely to receive conservative management outside of lockdown than during ($p = 0.038$). Our research shows that operative surgery increased during the lockdown (Table 3), compared to the same period last year. This could be reflective of the nature of trauma with significantly more polytrauma and activity-based outdoor injuries leading to higher energy injuries contraindicating conservative management. The distribution of mandibular trauma (Table 1) was in keeping with other studies [17] with the angle being the most commonly involved site.

Although our study demonstrated significant findings with respect to the impact of the SARS-CoV-2 pandemic and lockdown on oral and maxillofacial trauma, we acknowledge that the limited study periods may not reflect the pattern of trauma throughout the year. In addition to this, comparing one retrospective cohort and another prospective may skew the findings as the biases involved in particular with retrospective studies cannot be eliminated. Our single centre study may not reflect the experience of trauma elsewhere; however, given that the unit is within a regional trauma centre will allow for a wider representation of trauma patterns across the entire region.

The national or regional lockdown strategy is designed with the interest of public health to limit the spread of SARS-CoV-2. The measures implemented by government had a secondary impact on maxillofacial trauma. Key differences include a significantly higher incidence of polytrauma and other outdoor activity or cycling-related fractures during lockdown. In addition, patients were far less likely to be under the influence of drugs or alcohol upon sustaining the injury and presentation to the emergency department. Despite lockdown measures, operative management of trauma continued throughout the pandemic; therefore, ensuring adequate provision for trauma in theatres and outpatient clinics is essential in case of future local lockdowns.

Declarations

Ethics approval Not applicable.

Conflict of interest The authors declare no competing interests.

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