INTRODUCTION

Corona virus disease (COVID-19) caused by novel coronavirus (SARS-COV2) has created a worldwide health crisis. Started in the city of Wuhan, China in December 2019, it was declared a global pandemic on 11 March 2020 by World Health Organization. The first case of COVID-19 in Nepal was confirmed on 23 Jan 2020. Government of Nepal announced a country-wide lockdown on 24 March 2020, which lasted till 21 July 2020.

Ministry of Health and Population has timely implemented different health policies to readjust the functioning of health institutions. We adopted guidelines to manage the orthopedic trauma during this pandemic crisis prioritizing urgent and semi-urgent cases. Safety measures were strictly followed during patient examination and orthopedic procedures or surgery. Such recommendations have been put forward by various affected countries.

In such an adverse situation, lockdown has restricted the movement of people, and also people are less likely to visit hospitals for minor ailments. Despite this, patients continue to come to seek orthopaedic services and there may be a need to categorize the treatment provided so that maximum hospital resources are directed towards the needful patients.

The aim of this study was to evaluate the impact of national lockdown in orthopedic services in Chitwan Medical College and to analyse the patients admitted and operated in the orthopaedics department during the lockdown period. This will help us to be prepared for similar disaster in future.

METHODS

This was a cross-sectional study of all patients operated or admitted for conservative management to the Department of Orthopedics, Chitwan Medical College during the lockdown period from 24 March to 21 July 2020. This was compared with the same four-month interval from 24 March to 21 July of the previous year 2019. A predetermined format was used to collect data from hospital records obtained from medical record section, indoor ward records and operation theater records. Demographic data including age, sex, diagnosis, mechanism of injury, anatomical location, number of days of admission before surgery and total days of hospital stay were recorded. Approval for the study was taken from Institutional Review Committee of Chitwan Medical College.
All patients admitted to orthopedic department during the study period were included irrespective of the method of treatment given. Patients who left against medical advice (LAMA), who deceeded during the hospital stay, or those with an incomplete medical record, were excluded from the study.

Data entry and statistical data analysis was done using Statistical Package for Social Sciences (SPSS) version 16.0. Analysis was done using frequencies, descriptive option for mean and standard deviation and median. Mean age between the two groups was compared using Independent samples t test. Categorical data were compared using Pearson’s Chi-Square test or Fisher’s exact test, and data not normally distributed compared using Mann-Whitney U test. A value of p < 0.05 was considered significant with confidence interval of 95%.

RESULTS

A total of 452 patients were treated in 2019, which dropped down to 247 patients in the lockdown, resulting in 45.4% reduction (Table 1). Similar reduction was seen in total trauma cases (39.1% reduction; p = 0.009) and total cases operated (35.7% reduction; p = 0.000) from 2019 to the lockdown period (Table 2 and 3).

Table 1: Comparison of total number of cases in 2019 and during lockdown

| Variable      | 2019 (n=452) | Lockdown (n=247) | % decrease 2019 vs lockdown |
|---------------|--------------|------------------|-----------------------------|
| Total cases   | 452          | 247              | 45.4%                       |
| Trauma cases  | 340          | 207              | 39.1%                       |
| Operated cases| 347          | 223              | 35.7%                       |

There were 304 male (67.3%) and 148 female patients (32.7%) in 2019. Similar gender distribution was seen during lockdown- 165 (66.8%) and 82 (33.2%) males and females respectively. The mean age was 33.3 ± 21.6 years (range six month to 97 years) in 2019 and 35.5 ± 20.7 years (range three to 97 years) during lockdown (Table 2). Majority of patients were adults in both periods, however there was a decrease in patients of pediatric age group, 15.8% in lockdown versus 23.5% in 2019 and increase in adults, 72.9% in lockdown versus 66.2% in 2019 (p ≤ 0.05).

The median waiting time before surgery was zero day during lockdown and one day in 2019 (p = 0.000, Table 2). After operation patients were discharged earlier (median hospital stay three days during lockdown and six days in 2019, (p ≤ 0.001). Similarly patients managed conservatively had a shorter hospital stay during lockdown, median stay two days versus four days in 2019 (p = 0.018). The delay before surgery ranged from 0-14 days during lockdown and 0-20 days in 2019. Hospital stay of operated patients ranged 0-65 days during lockdown and 0-108 days in 2019; and 0-9 days and 0-17 days in non-operated patients in lockdown and 2019 respectively.

Table 2: Demographic data of patients admitted and treated in orthopedic ward

| Variable                | 2019 (n=452) | Lockdown (n=247) | p value |
|-------------------------|--------------|------------------|---------|
| Male                    | 304 (67.3%)  | 165 (66.8%)      | 0.903†  |
| Female                  | 148 (32.7%)  | 82 (33.2%)       |         |
| Age, mean (years)       | 33.3         | 35.5             | 0.199†  |
| Age group*              |              |                  |         |
| 0-14 years              | 106 (23.5%)  | 39 (15.8%)       | 0.044†  |
| 15-64 years             | 299 (66.2%)  | 180 (72.9%)      |         |
| ≥65 years               | 47 (10.4%)   | 28 (11.3%)       |         |
| Management*             |              |                  |         |
| Operative               | 347 (76.8%)  | 223 (90.3%)      | 0.000‡  |
| Conservative            | 105 (23.2%)  | 24 (9.7%)        |         |
| Wait before surgery, median (days)* | 1 | 0 | 0.000§ |
| Hospital stay, median (days)* | | | |
| Operative               | 6            | 3                | 0.000§  |
| Conservative            | 4            | 2                | 0.018§  |

*p<0.05
†Independent-Samples T-test
‡Pearson’s Chi-Square test
§Mann-Whitney U test

Though there was a decrease in total number of trauma cases from 2019 to lockdown period, the number of patients with pathological fracture (two (0.6%) 2019; one (0.5%) lockdown; p = 1.000) and with associated neurovascular injury (three (0.9%) 2019; three (1.5%) lockdown; p = 0.678) remained constant. The incidence of open fracture was reduced during lockdown, 16 cases (7.7%), when compared to 2019, 38 cases (11.2%); but this difference was not statistically significant (p = 0.237) (Table 3).

During lockdown there was decrease in proportion of fractures, 76.3% (n = 158) versus 90% (n = 306) in 2019 (p = 0.000). Cases of amputation and soft tissue injury increased (p < 0.05) whereas cases of dislocation were similar between the two-time period (p = 0.557) (Table 3).

There was difference in the mechanism of injury of trauma cases between the two groups (Table 3). During lockdown only 27.1% (n = 56) sustained road traffic accident (RTA) compared to 45% (n = 153) in 2019 (p = 0.000). There was an increased proportion of direct impact injury during lockdown 10.6% (n = 22) when compared to 2.9% (n = 10) in 2019 (p = 0.000), however there was no significant difference in other mechanism of injuries including fall (p > 0.05 for all).

Regional distribution showed that cases of upper limb, hip and pelvis remained constant (p > 0.05 for all) (Table 4). Though the number of cases of lower limb decreased from 2019 to lockdown period, the proportion increased during lockdown (37.7% (n = 93) versus 29.9% (n = 135) in 2019, p = 0.043). There was a decrease in patients with spine pathology during lockdown (p = 0.028).
Table 3: Characteristics of trauma admissions by type and mechanism of injury

| Variable                      | 2019          | Lockdown       | p value |
|-------------------------------|---------------|----------------|---------|
| Total trauma cases            | 340 (75.2%)   | 207 (83.8%)    | 0.009*  |
| Open fractures                | 38 (11.2%)    | 16 (7.7%)      | 0.237   |
| Associated neurovascular injury| 3 (0.9%)      | 3 (1.5%)       | 0.678   |
| Pathological fracture         | 2 (0.6%)      | 1 (0.5%)       | 1.000   |
| Injury type                   |               |                |         |
| Fracture                      | 306 (90.0%)   | 158 (76.3%)    | 0.000*  |
| Dislocation                   | 16 (4.7%)     | 12 (5.8%)      | 0.557   |
| Amputation†                   | 1 (0.3%)      | 10 (4.8%)      | 0.000*  |
| Soft tissue injury            | 17 (5.0%)     | 27 (13.0%)     | 0.001*  |
| Mechanism of injury           |               |                |         |
| Fall                          | 155 (45.6%)   | 108 (52.2%)    | 0.158   |
| RTA‡                          | 153 (45.0%)   | 56 (27.1%)     | 0.000*  |
| Sports                        | 9 (2.36%)     | 4 (1.9%)       | 0.775   |
| Machine                       | 4 (1.2%)      | 7 (3.4%)       | 0.113   |
| Crush                         | 5 (1.5%)      | 5 (2.4%)       | 0.515   |
| Direct impact                 | 10 (2.9%)     | 22 (10.6%)     | 0.000*  |
| Physical assault              | 3 (0.9%)      | 2 (1.0%)       | 1.000   |
| Animal attack                 | 1 (0.3%)      | 1 (0.5%)       | 1.000   |
| Electric shock                | 0             | 1 (0.5%)       | 0.378   |
| Gunshot                       | 0             | 1 (0.5%)       | 0.378   |

*Fisher’s exact test p < 0.05, †Includes cases of amputation and near total amputation, ‡Road Traffic Accident

Surgery was required in higher percentage of patients admitted during lockdown 90.3% (n = 223) as compared to 76.8% (n = 347) in 2019 (p = 0.000, Table 2). Out of the total patients operated, there was less proportion of implant removed during lockdown (4.9% (n = 11) versus 14.1% (n = 49) in 2019, p = 0.000); however, cases of trauma, infection and soft tissue procedures remained constant (p > 0.05, Table 4). Among the cases managed conservatively, there was no significant difference between the two groups.

Table 4: Characteristics of orthopedic cases managed

| Variable                      | 2019 (n=452) | Lockdown (n=247) | p-value |
|-------------------------------|--------------|------------------|---------|
| Region                        |              |                  |         |
| Upper limb                    | 229 (50.7%)  | 117 (47.4%)      | 0.429   |
| Lower limb                    | 135 (29.9%)  | 93 (37.7%)       | 0.043*  |
| Hip                           | 35 (7.7%)    | 20 (8.1%)        | 0.884   |
| Pelvis                        | 10 (2.2%)    | 5 (2.0%)         | 1.000   |
| Spine                         | 43 (9.5%)    | 12 (4.9%)        | 0.028*  |
| Operative                     |              |                  |         |
| Trauma                        | 276 (79.5%)  | 191 (85.7%)      | 0.074   |
| Infection                     | 13 (3.7%)    | 10 (4.5%)        | 0.668   |
| Implant removal               | 49 (14.1%)   | 11 (4.9%)        | 0.000*  |
| PIVD†                         | 0            | 5 (2.2%)         | 0.009*  |
| Soft tissue procedures        | 9 (2.6%)     | 6 (2.7%)         | 1.000   |
| Conservative                  |              |                  |         |
| Trauma                        | 64 (61.0%)   | 16 (66.7%)       | 0.649   |
| Infection                     | 18 (17.1%)   | 6 (25.0%)        | 0.389   |
| Back pain                     | 18 (17.1%)   | 1 (4.2%)         | 0.197   |
| Arthritis                     | 4 (3.8%)     | 1 (4.2%)         | 1.000   |
| Knee contracture              | 1 (1.0%)     | 0                | 1.000   |

*Fisher’s exact test p<0.05, †Prolapsed intervertebral disc

DISCUSSION

COVID-19 pandemic has affected all sectors of Nepal including health. National and institutional guidelines have been followed in managing the patients presenting to orthopedic facility.
decreased considerably during lockdown. There was 45.4% reduction in cases admitted and treated when compared to 2019. This was because of lockdown affecting transport and public movement, reduction in injuries sustained as people were confined indoors, and also patients being reluctant to visit hospital for fear of COVID infection. A similar 53.7% reduction in orthopedic trauma admissions was seen in UK lockdown, and Park et al found 46.3% reduction in acute trauma referrals in London. During initial five weeks of national lockdown orthopedic admissions reduced to one third in Patan hospital.

Generation of aerosol during reaming and use of drill, hammer and electrocautery increases the chance of infection among healthcare workers. Different studies have recommended minimizing hospital admission and non-urgent surgery to reduce the disease impact. Similar strategy was adopted by our hospital and we found that there was 77.1% reduction in patients admitted for conservative management and 35.7% reduction in cases operated during lockdown. Hampton et al also found a reduction in patients requiring no intervention (4% in lockdown versus 17% in 2019), and the number of operated cases reduced by a third following COVID as studied by Park et al.

Majority patients fell in the adult age group (15-64 years) which is the main working and economically active age group. The proportion of elderly patients remained constant and this may be because most injuries in the elderly are the result of trivial falls within their homes. Schools remained closed during lockdown restricting outdoor activities of children and so the pediatric patients were less when compared to previous year. Hampton et al found a decrease of around 50% in both adult and pediatric services during lockdown as compared to previous year, but we found 40% reduction in adult and 63% reduction in pediatric cases. Park et al had 44.4% and 55.6% reduction in adult and pediatric trauma referrals respectively during lockdown though not statistically significant.

Trauma remained the most common surgery performed during both periods. During lockdown period there were 85.7% cases with trauma surgery, which was comparable to 84.1% in the study of Pradhan et al. Emphasis was given for non-operative management and routine implant removal surgery was postponed whenever possible. Only 11 cases (4.9%) of implant removal were done during the lockdown as compared to 49 (14.1%) in 2019.

Fall was the most common mechanism of injury in both the study periods. RTAs reduced significantly during lockdown and open fractures also decreased though not significant. This was probably because motor vehicle accidents are the most common cause of open fractures, and transportation was restricted in the lockdown period. Park et al found 26.1% reduction in open injuries during lockdown as compared to 2019, whereas we found a greater reduction of 57.9%. Direct impact injuries and finger/toe amputations increased during lockdown as compared to last year. Other studies also found a similar increase in proportion of low energy falls and a decrease in road traffic collisions during lockdown.

CONCLUSION

National lockdown implemented to limit the COVID 19 outbreak has caused reduction in total number of orthopedic cases managed in our institution. RTAs, though decreased during lockdown, are the cause of polytrauma with associated head/abdomen injuries and open fractures that require staged multidisciplinary approach, leading to prolonged hospital stay. Total trauma cases operated have also decreased, with a priority to shorten the waiting time before surgery as well as the hospital stay.
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