Impact of COVID-19 on Orthopaedic Surgery: Comparison Between Before and During COVID-19 Pandemic

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ABSTRACT

Introduction: Orthopaedic surgical activity has been significantly affected by COVID-19 pandemic. The decision to perform operative interventions is based on balancing risk to benefit to the patient and health care workers. Though different guidelines have been published, there is a lack of reliable data on orthopaedic surgical activities. Our study aimed to evaluate the impact of the COVID-19 pandemic on Orthopaedic surgeries comparing with the previous year.

Methods: This was an epidemiological retrospective comparative study conducted at Shree Birendra Hospital, Nepal after taking ethical approval from the Institutional Review Committee of NAIHS. Data of the first four month of orthopaedic surgeries after National lockdown (from March 24 to July 23, 2020) and the same four month period of the previous year (The year 2019) were retrieved. The demographic profiles and operations categories (trauma, elective and infections) were compared between two periods using SPSS 21.

Result: Out of total of 651 patients enrolled, 169 patients operated during the pandemic compared with 482 patients before the pandemic. There was a 65% reduction in total surgical procedures, 94% reduction in elective cases and trauma cases were reduced by 29% ($P < 0.05$). Implant removal (107, 42.8%) constituted the highest elective cases in the year 2019.

Conclusions: The orthopaedic surgical procedures were decreased in frequency during COVID-19 because of a decrease in elective cases. The total trauma patients remained more equable during pandemic despite strict lock-down. Health care facilities should consider this during post pandemic recovery.

Key words: COVID-19; orthopaedic surgery; pandemic; SARS-COV-2; trauma

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INTRODUCTION

The World Health Organisation on March 11, 2020, has declared the Coronavirus Disease 2019 (COVID-19) outbreak a global pandemic.[1] Nepal has implemented a Nationwide lockdown from 24th March 2020 to mitigate the spread of disease. Surgeons around the world are facing a challenge in delivering optimum care to patients while protecting both patients and healthcare providers from the pandemic.[2] Several adjustments have been made in orthopaedic services to deal with the pandemic, balancing risk to benefit ratio.

Most of the papers published on COVID-19 were aimed to propose different guidelines and recommendations on surgical management.[3] These papers during the initial COVID-19 pandemic were lacking reliable data on surgical activity.

Our study aimed to evaluate the impact of COVID-19 on orthopaedic surgeries at a tertiary level military hospital in Nepal comparing the trends of trauma, elective and infection surgeries before (The year 2019) and during (The year 2020) pandemic.

METHODS

This was an epidemiological retrospective comparative study done at Shree Birendra Hospital (Tertiary level Military Hospital), Kathmandu, Nepal after taking ethical approval from the Institutional Review Committee of NAIHS. Data were extracted from the records section of the Hospital. Patients who had undergone orthopaedic surgical interventions during the first four months of Nationwide lockdown in Nepal (from March 24 to July 23, 2020) were enrolled in the study. Similarly, data of patients who received operations during the same period in previous the year (The year 2019) before the COVID-19 pandemic were collected.

Patients were divided into two groups: during the pandemic (The year 2020) and before the pandemic (The year 2019) group. The four months of each year was further divided into month 1st (March 24 to April 23), month 2nd (April 24 to May 23), month 3rd (May 24 to June 23), and month 4th (June 24 to July 23) of the year 2020 and year 2019 chronologically. The demographic profiles of the patient were recorded. The operations categories were divided into three types as trauma, elective and infections. The elective surgery includes those that can be delayed without significant difference in eventual outcome or harm to the patient.[4] The trauma category was further sub-divided according to anatomic distributions as the upper limb, lower limb, spine, pelvis and acetabulum and soft tissue. The elective category was sub-divided into implant removal, sports and arthroscopy, joint replacement, spine and others. The infection category includes osteomyelitis, septic arthritis and soft tissue infections. This can be after an open fracture or after a surgical procedure like surgical site infection, implant associated infections etc.

During the pandemic, initially a screening questionnaire with relevant signs and symptoms and exposure or recent travel history dictated the need for nasopharyngeal swab RT-PCR testing for operating patients. Later institutional policy changed that indicated nasopharyngeal swab RT-PCR testing for all orthopaedic surgeries. A protocol for universal testing for all orthopaedic surgery admissions is valid as the study from orthopaedic speciality hospital from New York revealed a high percentage of asymptomatic infections with COVID-19 in patients admitted for orthopaedic surgery.[5] No patients reported SARS-COV-2 positive.

We used Statistical Package for Social Sciences (SPSS) software program version 21 for data analysis. Categorical variables were analysed using chi-square test and results were presented as frequencies and percentages. Continuous variables results were presented as mean ± standard deviation (SD). A difference in a P-value < 0.05 was considered statistically significant.

RESULT

A total of 651 patients were analysed. Total 169 patients operated during the pandemic period (The year 2020) were compared with 482 patients in the same months of the previous year in 2019 (Figure 1). This represents a reduction of total orthopaedic operations by 65% during the pandemic period.

There were 463 (71.1%) male patients and 188 (28.9%) female patients with an average age of 37.88 ± 19.368 (range 2 to 88 years). In the pandemic period out of 169 patients, 125 (74%) were males and 44 (26%) were females. The mean

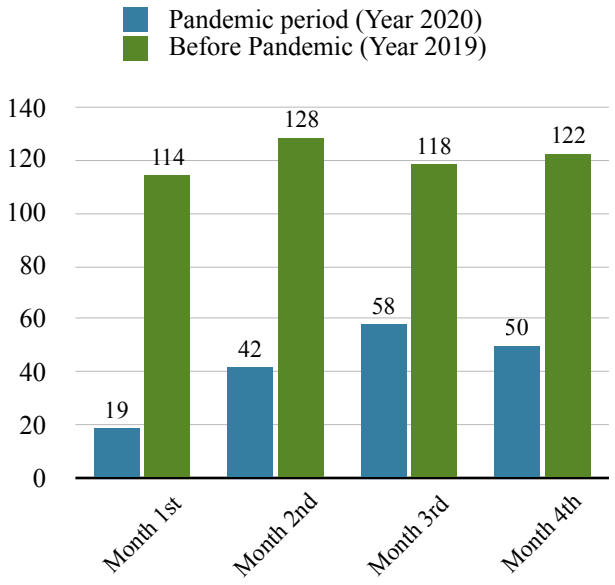

Figure 1. Bar diagram showing monthly comparison of total operated cases during pandemic and before pandemic at same months of period

age was 34.21 ± 19.307 years (range 2 to 87 years). In the year 2019 there were total of 482 patients, 338 (70.1%) male and 144 (29.9%) female. The mean age of patients was 39.17 ± 19.244 ranging from two to 88 years. Out of total patients in each group, children below 14 years were 30 (17.8%) during the pandemic period and 51 (10.6%) in year 2019. Elderly patients above 65 years were 12 (7.1%) during pandemic and 56 (11.6 %) in year 2019.

Of total 651 patients there were 356 (54.7%) trauma cases, 265 (40.7%) elective cases and 30 (4.6%) infections (Table 1). The ratio of trauma to elective operations was increased from 0.832:1 to 9.86:1 during the pandemic. Elective operations were decreased by 94% during the pandemic. There was a significant difference in the trauma, elective and infection cases during the pandemic and

Table 1. Differences in total orthopaedic operations categories during and before pandemic

Groups	Trauma n (%)	Elective n (%)	Infections n (%)	Total n (%)	P-value
Pandemic period (year 2020)	148 (87.6%)	15 (8.9%)	6 (3.6%)	169 (100%)	0.000
Before pandemic (year 2019)	208 (43.2%)	250 (51.9%)	24 (5.0%)	482 (100%)	

previous year ($X^2 = 102.517$, $P < 0.05$). Infections cases were decreased from (24, 5.0%) to (6, 3.6%) during the pandemic period.

Among total of 356 trauma patients, 148 upper limb fractures were accounting 41.6%, followed by lower limb (137, 38.5%), soft tissue injury (53, 14.9%), spine (14, 3.9 %), pelvis and acetabulum (4, 1.1%) (Table 2). The anatomical distribution of trauma cases during the year 2020 and the year 2019 was statistically significant ($X^2 = 12.411$, $P < 0.05$). During the pandemic lower limb trauma was 45.3%. This was followed by upper limb (35.1%) and together they accounted for 80.4% of all trauma cases. Before pandemic upper limb trauma (46.2%) was followed by lower limb (33.7%) with a total of 79.9%. Both upper and lower limb trauma was commonest, accounting for almost 80% of trauma in either period followed by soft tissue trauma operations.

During the study period 265 elective surgeries were performed (Table 3). There was the statistical significance of elective cases between two years ($X^2 = 15.461$, $P < 0.05$). The most common elective procedure was implant removal (107, 42.8%) followed by sports and arthroscopy (58, 23.3%)

Table 2. Differences in orthopaedic trauma operations according to anatomical distribution during and before pandemic

Groups	Upper limb n (%)	Lower limb n (%)	Spine n (%)	Pelvis and acetabulum n (%)	Soft tissue n (%)	Total n (%)	P-value
Pandemic period (year 2020)	52 (35.1%)	67 (45.3%)	10 (6.8%)	1 (7%)	18 (12.2%)	148 (100%)	0.015
Before pandemic (year 2019)	96 (46.2%)	70 (33.7%)	4 (1.9%)	3 (1.4%)	35 (16.8%)	208 (100%)	

Table 3. Differences in orthopaedic elective cases operated during and before pandemic

Groups	Implant removal n (%)	Sports & arthoroscopy n (%)	Joint replacement n (%)	Spine n (%)	Others n (%)	Total n (%)	P-value
Pandemic period (year 2020)	4 (26.7%)	0 (0%)	0 (0%)	4 (26.4%)	7 (46.7%)	15 (100%)	0.002
Before pandemic (year 2019)	107 (42.8%)	58 (23.2%)	13 (5.2%)	18 (7.2%)	54 (21.6%)	250 (100%)	

before the pandemic in the year 2019. Only 15 elective cases were performed during the pandemic. Four implant removals out of which two were planning to go for united mission service, one implant associated infection and one implant failure. Four spine cases, two were cervical myelopathy and two prolapsed inter-vertebral disc disease. Other seven cases were three biopsies, two manipulations under anaesthesia, and two decompressions of neuropathies.

DISCUSSION

The orthopaedic operations were reduced by 65% during the pandemic. These decreases in number were because of the lockdown and greatly reduced elective surgeries. This finding of the current study has been supported by many studies.[6-8]

The male is to female ratio of total operations during and before pandemic was constant showing no significant effect of the pandemic in gender distribution. In contrast to the study from Hong Kong, the mean age of patients during the COVID-19 period was low.[9] Children below 14 years during the pandemic were higher in number than the previous year. It might be because of school closure causing more injuries at home.

There was a monthly progressive rise in the number of operations during the pandemic with a decrease in the last month. Alterations in health care seeking behaviour of patients initially for different reasons like fear of contracting COVID-19 and preferences for private health care facilities could have contributed to changes observed in operations.[10] Increment in the later month was because of gradual reintroduction of surgical activity and alleviation of strict restrictions of activities by the government.

The total number of operations during the pandemic has fallen significantly. A proportion of this is due to the postponement of elective operations. There was an initial expectation of a greater fall in trauma surgery as a result of lockdown.[11,12] However, in our study operated trauma cases during pandemic has not been changed significantly. This might be the result of increased household work-related trauma or paradoxically, fewer vehicles causing more road traffic accidents due to over speeding.

Elective operations were reduced by 94%. Reducing elective surgeries saves resources and reduces unnecessary patient flow that eventually decreases the spread of disease among patients and health care workers.[13] But it showed a huge backlog of elective surgical cases that have great implications and require exceptional attention in post-pandemic recovery.[14,15] This calls for the development of specific protocols to resume previously cancelled and postponed elective surgeries balancing risk to benefit ratio.

Total infections needing operations was decreased during pandemic might be because of significant reduction of open fractures due to decreased road traffic accidents and reduction in referral volume due to unavailability of transportation facility .[16]

In our study, we observed that during pandemic lower limb trauma was higher than upper limb in contrast to the previous year. This might be the result of increasing in low-energy fall in elderly patients causing hip fractures that occur at home, and the incidence may not be impacted by lock-down and decrease road traffic accidents. The elder patients with the trauma of the lower limb and

limited ambulatory status are more susceptible to respiratory infection; the association between COVID-19 and trauma patients is not unlikely.[17,18]

Another point of interest of our study is that despite the reduction of operations during the pandemic, the operated spinal trauma during the pandemic was high. Operated spine trauma cases were (10, 6.8%) similar to a study conducted at Patan Hospital, Nepal (2,5%).[19] Fall from height and tree due to increased agricultural activity during pandemic might have contributed to this result. In contrast to our study, a study from Italy showed a 50% reduction in spine trauma surgery.[20] Spinal trauma patients are at higher risk for respiratory related infections like influenza.[4] They are prone to have fever due to other causes like bedsores and urinary tract infections which are the source of viral and bacterial infections.

Reduction of elective surgical procedures like implant removal, arthroscopy and joint replacement during pandemic had contributed to a decrease in the number of hospital admissions. In the time of pandemic, it is important to identify the elective procedures that could be delayed.[19,21] With no consensus in orthopaedic community the Ohio Hospital Association (OHA) defined elective surgeries as those not meeting the following criteria "threat to the patient's life if surgery or procedure is not performed, the threat of permanent dysfunction of an extremity or an organ system, risk of metastasis or progression of staging, or risk of rapidly worsening to severe symptoms".[22] Although ours is a novel study involving orthopaedic surgeries during the pandemic, it does have certain limitations. Ours is a single-centre study for a short period time which may not be representative of a national profile, and may not be generalised to the entire nation. Since ours is a military hospital catering to army personnels and their dependents, the injuries and surgeries conducted here may not represent the common National injuries as well as orthopaedic surgeries.

CONCLUSIONS

The total proportions of operations that have fallen throughout the course of the pandemic are due to a fall in elective cases. The number of trauma operations remained stable. Dealing with the anticipated backlog of elective orthopaedic surgery in post-pandemic scenarios requires planning. Keeping in mind that the trauma cases do not decrease, despite a nationwide lockdown orthopaedic surgeons and health care facilities should consider this during staffing and resource deployment.

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