



## Original article

## Is it safe to restart elective day-case surgery? Lessons learned from upper limb ambulatory trauma during the COVID-19 pandemic



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## ABSTRACT

**Background:** The COVID-19 pandemic has impacted on the provision of elective and trauma orthopaedic surgery worldwide with millions of operations cancelled. The risk of patients developing COVID-19 after undergoing ambulatory procedures in hospitals is unknown. This paper aims to investigate the risk of developing COVID-19 from day-case and overnight stay upper limb procedures during the peak of the pandemic in London, and to discuss the implications for the safe management of elective hand and upper limb patients in the coming months.

**Methods:** 56 patients underwent emergency trauma upper limb procedures as a day case or with a single overnight stay from 1st March to May 31, 2020 at two central London hospitals that were also key players in the pan-London COVID response. Data was collected retrospectively from clinical and theatre records. Patients were contacted post-operatively and answered a structured questionnaire, including whether patients had experienced any of the symptoms suggestive of COVID-19 in the 14 days prior or 30 days following surgery.

**Results:** Of 56 patients, one patient reported COVID-19 symptoms, which were minor and did not require hospitalisation. Five patients experienced minor post-operative complications such as stiffness and scar hypersensitivity; one patient had a superficial wound infection. The mean age was 46 years (20–90) with 68% patients ASA I, 25% ASA II and 4% ASA III. 9% had LA, 30% a regional block and 61% had a GA. The most common operation was a distal radius open reduction and internal fixation. The average time spent in hospital was 11 h (3–34 h) and 12 patients required an overnight stay. The median length of face-to-face follow up was 38.5 days.

**Conclusion:** Our study suggests that, with appropriate precautions, elective upper limb ambulatory surgery can be safely restarted with a low risk of contracting COVID-19 or its complications.

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## 1. Introduction

The first cases of the novel Sars-CoV-2, coronavirus disease (COVID-19) occurred in Wuhan, China in December 2019.<sup>1</sup> The World Health Organisation (WHO) have since declared the disease a global pandemic, with spread to almost every country and more than 10 million confirmed cases.<sup>2</sup> In response to the pandemic, elective orthopaedic surgery in the UK was suspended in order to avoid unknown risks associated with the disease and also to

allocate hospital resources appropriately to respond to a perceived peak in patients admitted with COVID-19 requiring a higher level of care.<sup>3</sup>

It has been estimated that worldwide, over 28 million operations have been suspended during the peak 12 weeks of the pandemic.<sup>4</sup> Due to COVID-specific theatre protocols, anaesthetic guidelines and requirement for additional personal protective equipment, procedures are also taking longer and theatre capacity effectively reduced, with one study demonstrating that trauma procedures were taking 65–80% longer than prior to COVID-19.<sup>5</sup> Furthermore, the delay to obtaining face-to-face outpatient clinics in this time, is likely to result in an increased surgical burden in the long term.

As healthcare systems adjust to COVID-19 restrictions the

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reinstatement of elective orthopaedic surgery presents a number of challenges. The relationship between surgery, anaesthesia and COVID-19 is still poorly understood. Theoretically, procedures that can occur under regional and local anaesthetic may reduce risk to staff and patients and minimise the length of hospital stay.<sup>6</sup> However, at present, the risk of patients developing COVID-19 following travel to, admission and treatment in hospital for ambulatory or short stay elective procedures is unknown.

During the pandemic urgent and emergency surgery has continued, including those ambulatory patients with orthopaedic injuries requiring intervention. This study aims to investigate the risk of developing COVID-19 from day-case and overnight stay upper limb procedures that have occurred during the pandemic at two central London teaching hospitals that have both acted as COVID-19 specialist treatment units, and discuss the implications this may have on the current safe management of pathways for day-case and short stay elective orthopaedic surgery.

## 2. Methods

Patients who underwent emergency trauma upper limb procedures as a day case or with a single overnight stay from March 1 to May 31 2020 were identified at both units following local ethical approval. Data was collected retrospectively from both clinical and theatre records including patient demographics, co-morbidities, operation details, time frames around the procedure and admission, mode of anaesthesia and results of any peri-operative viral swabs. Follow up letters were also reviewed for any wound or other post-operative complications.

Patients were then contacted and, following verbal consent, symptomatic screening was conducted using a structured questionnaire. This included determining whether patients had experienced any symptoms suggestive of COVID-19 in the 14 days prior to surgery or 30 days following surgery; details regarding confirmation of diagnosis and treatment of COVID-19 if they had been symptomatic; any isolation precautions the patient had taken before and after surgery; and what method of transport patients had taken to and from hospital. Symptoms considered suggestive of COVID-19 included fever, cough, myalgia, fatigue, altered sense of taste or smell and diarrhoea based on previous reports in the literature.<sup>7,8</sup>

All patients were treated in the trauma departments of our central London hospitals. Theatres were located in the same hospital buildings as wards and intensive care units that were being used to treat patients with COVID-19. Early in the pandemic, patients were screened for COVID symptomatically, and swabs only taken if a patient was symptomatic. As time progressed, it became routine to take COVID-19 screening swabs in all patients who would be attending hospital for a procedure. Patients were admitted and discharged from the day surgery unit or a ward considered to be free of COVID patients.

Operations were conducted using full personal protective equipment (PPE), including visors and FFP3 masks, as well as surgical gown, gloves and hat. Theatre traffic was kept to a minimum and work flows through theatre were optimised with separate 'donning' and post-operative 'doffing' areas. Face-to-face interactions before and after surgery were also conducted using basic PPE (visor, mask, apron and gloves) based on public health guidelines, and follow up was kept to a minimum.

## 3. Results

Across both sites a total of 56 patients were identified with a mean age 46 years (range, 20–90) and a male to female ratio of 31:25. As would be expected from ambulatory trauma patients, the

vast majority were ASA grade I or II (93%, grade I: 38, grade II: 14). Demographics, co-morbidities and procedures are summarised in Tables 1 and 2.

The mean time spent in theatre, including anaesthetic, procedure and recovery time was  $150 \pm 65$  min (range, 50–381). The average time spent in hospital was just over 11 h (range, 3–34 h), with 12 of the 56 patients requiring a single night stay in hospital post-operatively. For day-case patients, the length of stay was lower in patients receiving a regional block or local anaesthetic rather than general anaesthetic (GA), at 6 h 34 min compared to 8 h 28 min. The average time from diagnosis to surgery was  $2.6 \pm 2.5$  days (range 0–12). The most common methods of transport to and from hospital was private car or walking (34.9% and 32.6%), with a lower proportion using a taxi (18.6%) or public transport (13.9%).

The median length of in-clinic follow up was 38.5 days. Post-operative wound infection was noted in only one patient, who had undergone a tendon repair. This was successfully treated with a course of oral antibiotics. Four patients had been referred to hand therapy specifically for post-operative stiffness (3 distal radius fractures, 1 K-wire fixation of a finger), one patient had scar hypersensitivity following a laceration repair, and another patient had superficial radial nerve paraesthesia, which had resolved at latest follow up.

48 of the 56 patients were contactable for telephone follow up at a minimum of 30 days post-operatively. The eight patients who were not contactable via telephone had all been seen in follow up clinics and no symptoms of COVID had been noted. Two patients reported pre-operative symptoms of COVID-19, but both of these were at least two months prior to surgery. Both had negative COVID-19 polymerase chain reaction (PCR) samples and were symptom-free at the time of surgery. At the beginning of the study sample period, patients were screened for COVID based on symptoms and only tested if symptomatic. However, towards the end of the sample period pre-operative PCR screening became routine for asymptomatic patients. In total, 12 patients had pre-operative COVID-19 PCR screening, all of which were negative.

Post-operatively, only one of 56 patients (1.8%) reported post-operative COVID symptoms. This was a 72 year-old lady with a medical history of sleep apnoea, who underwent a distal radius open reduction and internal fixation under GA and required an

**Table 1**  
Patient demographics and co-morbidities.

Patient characteristics	n (%)
Age, mean (range)	46 (20–90)
<b>Sex</b>	
Male	31 (55)
Female	25 (45)
<b>ASA grade</b>	
I	38 (68)
II	14 (25)
III	4 (7)
<b>Co-morbidities</b>	
Hypertension	5 (8.9)
COPD	2 (3.6)
Cardiac disease	2 (3.6)
Hypothyroidism	2 (3.6)
Diabetes	1 (1.8)
Asthma	1 (1.8)
Sleep apnoea	1 (1.8)
Hiatus hernia	1 (1.8)
<b>Anaesthetic</b>	
Local	5 (9)
Block	17 (30)
General	34 (61)

**Table 2**  
List of operations performed.

Surgical procedure	n
Distal radius open reduction and internal fixation	24
Wound management of forearm or hand	9
Finger or metacarpal K-wire fixation	7
Olecranon open reduction and internal fixation	4
Thumb ulna collateral ligament repair	3
Ulna open reduction and internal fixation	2
Radial head open reduction and internal fixation	2
Tendon repair	2
Scaphoid open reduction and internal fixation	1
Capitellum open reduction and internal fixation	1
Removal of metalwork	1

overnight stay in hospital. The patient developed symptoms of anosmia and breathlessness, and was subsequently reviewed by paramedics at home, but did not require admission to hospital. No laboratory diagnosis was made to confirm the diagnosis, and the patient was well and symptom-free at the time of telephone consultation. However, these symptoms occurred three weeks following surgery. Based on the current estimates of COVID-19 incubation period, these symptoms are unlikely to be associated with the hospital admission.

#### 4. Discussion

Restarting elective surgery in the wake of the COVID-19 pandemic is a major challenge faced by health care systems. There is growing discussion regarding the risk of hospital-acquired COVID-19 infection but reliable data is still lacking.<sup>9</sup> Guidelines aimed at the restarting of elective services have called for safety risks to be explained to patients during their consent process, although the risk profile is still not fully understood.<sup>10</sup> To our knowledge, no study has reported on the risk of developing COVID-19 in day-case or overnight stay upper limb surgery. In our study at two central London teaching hospitals during the height of the pandemic, only one of the 56 upper limb trauma patients became symptomatic post-operatively, with all others reporting no COVID symptoms for 30 days following surgery.

With reports of high mortality in COVID-positive surgical patients, it is understandable that patients and healthcare professionals alike are cautious when considering pathways for managing the COVID-19 related risk in elective surgery. Early reports estimated a mortality rate of 20.5% in 34 patients who unintentionally underwent elective surgery during the incubation period of COVID-19<sup>8</sup>, whilst initial reports from the COVIDSurg collaborative have estimated a similar rate of 23.8%.<sup>11</sup> Gruskay et al. found a mortality rate of 17% in urgent orthopaedic surgical patients who tested positive for COVID-19 (two of 13 patients, one patient died pre-operatively).<sup>12</sup> The potential for significant morbidity and mortality associated with surgery in the context of COVID-19 is evident and pre-operative screening is therefore an essential tool in the restarting of elective services.

There have been many potential strategies and methods for risk management in elective surgery pathways suggested in the literature, generally based on risk stratification of the patient, underlying diagnosis and intended surgical procedure.<sup>6,13,14</sup> In a large meta-analysis including over 50,000 patients, it was shown that age over 50 years, any co-morbidity and smoking were associated with severe COVID-19 infection.<sup>15</sup> The COVIDSurg collaborative also reported mortality due to COVID-19 to be associated with advanced age and ASA grade.<sup>11</sup> Therefore, a pragmatic approach to selecting patients for upper limb day-case or overnight stay elective surgery might focus treatment on younger patients, non-smokers and those

with few or no co-morbidities.<sup>10</sup> In our study the majority of patients eligible for ambulatory day-case trauma surgery were young (mean age 46 ± 16) with few co-morbidities (ASA grade 1-2 (93%, 38 ASA 1, 14 ASA 2)).

General anaesthesia is an aerosol generating procedure and there is concern about putting theatre staff and patients at risk.<sup>16,17</sup> Regional and local anaesthesia therefore offers the theoretical benefit of minimising potential transmission by maintaining a patient's own respiratory effort, avoiding airway manipulation and allowing patients to wear a mask during the procedure. The majority of cases in our series underwent surgery under GA and there appears to be no increased risk of acquiring COVID-19 in patients who received a GA compared to regional or local anaesthesia. However, length of stay in day surgery patients who had a block may lead to a lower risk of exposure to COVID-19 in the peri-operative period.

Elective surgical guidelines have recommended a two week self-isolation period prior to surgery to avoid the risk of concurrent COVID-19 infection, consistent with the observed 14 days maximum incubation period.<sup>6,18</sup> Due to the urgent requirement for treatment for the upper limb trauma patients in our study, this period of self-isolation was not possible. Our study would suggest, in the context of upper limb conditions suitable for a procedure as a day-case or overnight stay, if symptom free in the 14 days prior to surgery, there is a low risk of patients developing symptoms of COVID-19 or becoming unwell in the postoperative period.

Our study has a number of limitations related to its retrospective nature and reliance on patient reported symptoms to screen for COVID-19. However, the negative predictive value of symptom-based screening has been found to be 91.4%, making it relatively reliable for ruling out infection.<sup>11</sup> The implications of this study should be interpreted with caution in other regions, as there may be geographical variables in the ongoing COVID-19 pandemic that are yet to become apparent.

#### 5. Conclusions

Minimising the risk from COVID-19 in elective surgical pathways is complex, with little data pertaining to specific patient populations. We describe an upper limb trauma cohort where the operation was conducted as day-case or overnight stay in COVID specialist units, without the possibility of pre-operative isolation of the patients. The findings suggest that, particularly with extra precautions in place, upper limb and other elective ambulatory surgery pathways could be managed effectively, with low risk of significant COVID infection.

#### Author contribution

Samuel Trowbridge: Data curation, Formal analysis, Writing - original draft. Warran Wignadasan: Data curation, Formal analysis. Dominic Davenport: Data curation, Formal analysis, Writing - review & editing. Shahrier Sarker: Data curation, Formal analysis, Writing - original draft. Alistair Hunter: Writing - review & editing. Sam Gidwani: Conceptualization, Writing - review & editing.

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#### Declaration of competing interest

None.

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