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Fragility hip fractures in the COVID-19 pandemic: A local experience in the United Kingdom

Jawaad Sheikh Saleem a,*, Muhammad Ali Fazal b

a Imperial College NHS Foundation Trust, Charing Cross Hospital, Fulham Palace Rd, Hammersmith, London, W6 8RF, UK
b Royal Free NHS Foundation Trust, Trauma and Orthopaedics, Barnet Hospital, Wellhouse Ln, Barnet, EN5 3DJ, UK

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ABSTRACT

Background: Fragility hip fractures are a major cause of morbidity and mortality in the UK. The 2019 novel coronavirus disease (COVID-19) pandemic led to restrictions on trauma services in several hospitals with potential operating delays and unintended negative outcomes. This local study describes the impact of operative pathway changes on clinical outcomes of patients undergoing fragility hip fracture surgery during the COVID-19 pandemic.

Methods: A single centre, retrospective analysis was performed for all patients who presented with fragility hip fractures for operative management between the 23rd March and 29th April 2020.

Results: Thirty four patients met the inclusion criteria for analysis. The median patient age was 88 years old, with a median inpatient stay of 8 days. Three patients died prior to being operated on. Forty eight percent of patients were operated on within the national 36 hour target. The 30 day all-cause mortality from the date of presentation of injury was 20%.

Discussion: Our study demonstrates that the pandemic and changes to operating pathways has had a sizeable impact on the hip fracture service with delays in surgery and an increase in the 30 day mortality. These disruptions to surgical operating systems are likely to continue, with potential ongoing unintended negative consequences as demonstrated in this study. We believe that a focus on solving logistical issues including availability of sufficient operating theatre capacity, redeployment of staff, early multidisciplinary input and counselling patients on the increased outcome risks will help to mitigate risks posed to this vulnerable patient population during these periods.

Introduction

An outbreak of the novel coronavirus disease, COVID-19, started in Wuhan, China in December 2019 (Zhu, 2020). Due to its global spread, the World Health Organisation classified COVID-19 as a pandemic on March 11th 2020 (World Health Organisation, 2020). This led to the implementation of a ‘lockdown’ strategy in many countries to control the impact of the virus, with the United Kingdom (UK) entering its own lockdown on the 23rd March (Koh, 2020). Despite these efforts, at the time of writing, in the UK alone nearly 300,000 people have been infected with over 40,000 deaths (Public Health England, 2020). The global picture presents an unprecedented burden on the capacity of many healthcare systems to deal with the outbreak.

The UKs National Health Service (NHS) has been overhauled to help dedicate adequate resources and staff to the care of patients with COVID-19. This included the cancellation of elective operations, the redeployment of staff from surgical to medical specialities and a focus on providing ventilators and personal protective equipment (Stevens, 2020). The changes aimed to reduce the nosocomial spread of the virus or aid management of those infected with the virus and, therefore, reduce its associated morbidity and mortality (Royal College of Surgeons, 2020). These adjustments have, consequently, had a demonstrable effect on patients waiting for potentially life changing operations, the management of acute surgical presentations, and added significant costs to the NHS (American college of Surgeons, 2020), (Nepogodiev and Bhangu, 2020). At our hospital, a similar redistribution process occurred in which trauma patients with hip fragility fractures were transferred to a local ‘COVID free’ hospital. The rationale for this operative pathway change was to enable the provision of ‘COVID free’ operating sites to reduce the risk of coronavirus spread in trauma patients.
operating theatres and increase the bed capacity for COVID-19 patients in non-operating hospitals. The aim was that patients would initially be admitted at the presenting hospital and either transferred directly from the emergency department or admitted briefly for pain control and stabilisation before transfer. This would occur during daytime working hours. Post-operatively, patients would be discharged to their residence or back to the initial admitting hospital for ongoing management on a ‘COVID-free’ ward. This arrangement would enable the operating hospital to stay ‘COVID-19-free’ without inhibiting its operating capacity. This operative pathway change was challenging as patient transfers are complex undertakings, with a referral needing to take place between orthopaedic teams conditional on acceptable imaging and investigations. This is in addition to bed manager liaison and ensuring adequate transport being available. These factors have the potential to increase times to surgical fixation as well as increase the overall admission time period for these patients. Fragility fractures are a significant injury and delays to surgery may adversely affect morbidity and mortality outcomes.

More than 60,000 patients with fragility hip fractures present to UK hospitals every year, with an estimated cost to the NHS of over 2 billion pounds annually for patients who require very intensive nursing care input (NHFD, 2019). Such fractures are a significant cause of morbidity and mortality, with estimates of between 10 per cent and 30 percent mortality at 30 days and 1 year post injury respectively. With an ageing population this issue is likely to become more commonplace (White and Griffiths, 2011) (Roberts and Goldacre, 2003) (Roche et al., 2005). In the UK, the significance of fragility hip fracture has led to a target of emergency fracture fixation within 36 h of admission to reduce the complications associated with delays (National Institute for Health and Care Excellence, 2017). The improvements in managing the injury led by the National Institute for Health and Clinical Excellence (NICE) targets has improved the 30-day mortality to between 6 and 7% in recent years (NHFD, 2019), (Royal College of Physicians, 2015).

The need to transfer care to another site with associated potential delays in surgical fixation has the potential to adversely affect adherence to NICE targets and post-operative outcomes. Locally, the redeployment of critical medical and nursing care from fragility hip fracture management to roles in intensive care and medical specialties led to the disruption of trauma operating pathways. Furthermore, the need for cross-site management disrupted the ability of multidisciplinary teams (including physiotherapist, occupational therapists and orthopaedic nursing staff) to risk assess and manage patients. This study analyses how changes in local management necessitated by the COVID-19 pandemic have affected the outcomes of patients undergoing fragility hip fracture surgery. This has the overall aim of informing future policy and management decisions should the current or further pandemics cause further disruption in the management of these injuries.

Methods

Data collection and analysis

A single centre, retrospective analysis was performed for all patients who presented with fragility hip fractures for operative management between the 23rd March and 29th April 2020. Departmental trauma lists were used to identify fragility hip fracture presentations within the specified period. Software called Electronic Patient Record or ‘EPR’ was used to gather basic patient identification, operation data and post admission outcomes including whether patients were repatriated (see Fig. 1). All patients included in this study who were operated on at a local tertiary referral centre had their corresponding inpatient data transferred to our records for review. Records were analysed for post-operative complications including mortality.

Patient outcomes with continuous variables were presented as a median with an interquartile range (IQR). Other outcomes were summarised and reported alongside the overall percentage (%). All-cause 30-day mortality was calculated from the day of presentation to hospital to the date of death.

A regression analysis was performed to ascertain if there was any significant relationship between the time to operation and length of stay and mortality outcomes. This analysis was conducted using the software STAT/IC 15.1.

Results

Thirty five patients presented with a fragility hip fracture for operative management between 23rd March and 29th April. One patient was excluded as no documentation of their admission details could be found, potentially due to administrative error. Therefore, 34 patients met the inclusion criteria for analysis. The median patient age was 88 years old, with 10 (29%) patients being male. All patients included had at least one comorbidity, with the most common being hypertension (53%), long term cognitive impairment (32%) and cardiovascular disease (29%). Right sided fractures comprised 50% of fractures and 65% of fractures were intracapsular. Table 1 contains the characteristics of patients included in the study.

| Table 1: Patient demographics. |
|-----------------------------|
| Patient demographics       |
| Total patients, (n)         | 34 |
| Males, n (%)                | 10 (29) |
| Age, median (IQR)           | 88 (84–92) |
| Comorbidities               |   |
|  - None, n (%)              | 0 (0) |
|  - Hypertension, n (%)      | 18 (53) |
|  - Diabetes Mellitus, n (%) | 4 (12) |
|  - Cardiovascular disease, n (%) | 10 (29) |
|  - Chronic Kidney disease, n (%) | 9 (26) |
|  - Dementia/alzheimers, n (%) | 5 (15) |
| Other, n (%)                | 25 (74) |
| Right sided fracture, n (%) | 17 (50) |
| Intracapsular fracture, n (%) | 22 (65) |
| Extracapsular fracture, n (%) | 14 (35) |
Of the 34 patients due for operative management, 31 underwent operations whilst 3 died prior to being operated on. The median inpatient stay was 8 days, and 48% of patients were operated on within 36 h. The median duration in days from presentation to operation was two days. The most common operation type was a hip hemiarthroplasty (39%). Six (21%) patients were repatriated back for ongoing rehabilitation or medical management. Three patients died post operation, giving an overall 30-day all-cause mortality from the date of injury presentation of 20%. Table 2 shows the patient outcomes results. Regression analysis showed no significant relationship between either operating within 36 h or the number of days to operation and length of stay or mortality rates ($p > 0.05$). Regarding the cause of the deaths, two patients had COVID as a possible contributing factor, one was confirmed COVID positive. One patient died of acute coronary syndrome, whilst two patients had no specific cause but a general decline in health.

### Discussion

COVID-19 necessitated a significant change in fragility hip fracture management at our local district general hospital. Only 48% of the patients were operated within 36 h of presentation. The 30-day mortality rate was 20%, nearly three times recent UK National Hip Fracture Database reports (NICE, 2013) (NICE, 2019). Three of these patients died pre-operatively, whilst the three patients who died post-operatively were operated on after 36 h of presentation. Whilst not achieving statistical significance in regression analysis this higher than expected mortality can partly be attributed to the COVID-19 pandemic as the virus was given as a documented cause of death in three of the deaths seen in this study, two of whom died before being operated on. The COVID 19 pandemic continues to disrupt health systems and it is likely new methods will be needed to ensure safe surgery (Mouton et al., 2020) (Stahel, 2020).

With the ongoing disturbance to patient pathways, we would advise being aware of logistical issues which delay the management of these patients and determining appropriate measures to rectify this. The need for cross-site management, repatriation and delays to surgery present difficulties for multi-disciplinary teams to assess patients. We would also advise allocating specific discharge planning teams to focus on streamlining the admission pathways for hip fragility fractures.

Also noted is the redeployment of trauma and orthopaedic nurses to other specialities. Fragility hip fracture patients require intensive nursing and the increased risks highlighted by this study emphasise the need for management by dedicated nursing staff. Additionally, robust early orthogeriatric input in the perioperative period is vital in improving the management of a multi comorbid population; this has proved to be of significant benefit in improving patient outcomes (Middleton et al., 2016). Moreover, our data shows that in this particularly ‘high risk’ period it may be wise to counsel and consent patients and families with emphasis on the increased risks of morbidity and mortality related to both the pandemic and these operative delays.

Our study has several limitations. These include our small sample size which may have contributed to our outcome data not achieving statistical significance. We envision more data from other hospital trusts would help to expand on our findings. Another limitation included the lack of documentation found in the repatriated data, we were only able to ascertain discharge summaries and operation notes. Therefore, accurately identifying the events leading up to and the cause of death was difficult. A further study considering the long-term mortality of those operated on during the COVID 19 pandemic as well as reviewing longer term postoperative complications would prove useful in discerning its impacts.

Our study demonstrates that the pandemic and changes to pathways locally have had a sizeable impact on meeting operating targets as well as the 30-day mortality of hip fragility fracture patients. Whilst based on a small sample size, this is likely to be analogous with the experiences of other local hospitals; more studies are likely to be needed in this respect.

### Table 2

**Patient outcomes.**

| Patient outcomes | n (%)       |
|------------------|------------|
| Total number of patients operated on | 31 (91)    |
| Patient mortality prior to operation | 3 (9)      |
| Duration inpatient stay, median days (IQR) | 8 (5–17)  |
| Patients operated on within 36 h, n (%) | 15 (48)    |
| Duration from admission to operation, median days (IQR) | 2 (1–2)    |
| Operation type |                  |
| - Hemiarthroplasty, n (%) | 12 (39)    |
| - Total hip replacement, n (%) | 4 (13)     |
| - Intramedullary nailing, n (%) | 5 (16)     |
| - Dynamic hip screw, n (%) | 10 (32)    |
| Patients repatriated back n (%) | 6 (21)     |
| Patient mortality post operation n (%) | 3 (10)     |
| 30-day mortality from date of presentation, n (%) | 6 (20)     |
| Duration from admission to mortality, median days (IQR) | 4 (3–14)   |

The disruptions, restructuring of services and staff deployment as well as the risk posed by the virus itself are likely to continue for considerable time, leading to the unintended negative consequences demonstrated in this study. The changes seen locally to operating pathways are not dissimilar to those outlined in other studies which focus on elective surgery rather than issues surrounding trauma operating as discussed in this paper (Mouton et al., 2020) (Brindle and Gawande, 2020) (Stahel, 2020).

Provision of personal protective equipment for nursing, operating and anaesthetic teams, COVID-19 testing for patients prior to surgery and a post-operative rehabilitation team are few of the challenges faced in this period. To prevent management delays, a focus on solving the logistical issues relating to multi centre management pathways is crucial. Staff deployment must also be a priority for the hip fracture service along with provision of hip fracture operating lists in accordance with relative hip fracture workload. In addition, we believe that senior anaesthetic and surgeon led operating lists, rapid COVID-19 swab testing for patients, appropriate trauma theatre staffing, ward care led by specialist hip fracture nurses, early ortho-geriatrician input in the perioperative setting, and a dedicated rehabilitation team to enable early discharge from hospital would be essential in improving outcomes and deliver a safe service. We also advise to inform patients and relatives about the increased mortality risks during the COVID-19 pandemic as part of informed consent to help increase awareness of the hazards of operating in this period. We believe that the multidisciplinary input as outlined above will ensure safe and effective care for this vulnerable group of patients.

### Declaration of competing interest

No known conflicts of interest.

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