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Review Article

The Prevalence and Mortality in COVID-19 Positive Patients with Hip Fracture: A Case-Series and Literature Review

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ABSTRACT

Background: The novel coronavirus has spread rapidly worldwide, with exceptionally high mortality in the elderly. Patients with hip fracture have an average age of 80 years, with an estimated 2.8 comorbidities per patient. This study aims to assess the impact of the COVID-19 pandemic on hip fracture care services and the associated mortality rate.

Methods: PubMed, Medline, and Google Scholar databases were searched for relevant studies linked to mortality in COVID-19 patients who have undergone hip surgeries using the keywords "COVID-19" OR "SARS-cov-2" OR "Coronavirus Infections"; AND "Surgery" OR "Hip" OR "Fracture" OR "Orthopedics." We included all patients with hip fractures but excluded pathological fractures and other non-traumatic hip pathologies 30 studies for the final review were selected according to the inclusion and exclusion criteria.

Results: 30 studies were included in the review. The overall mortality was 10.52%. There was a significant difference in the mortality rate between patients with positive and negative tests and between the operative patients who tested positive and the operative patients who tested negative.

Conclusions: COVID-19-infected elderly patients with hip fractures have a higher mortality rate than non-COVID-19 infected cases. Further studies are warranted to examine the morbidity and mortality rates in COVID-19-positive patients with hip fractures and investigate how these outcomes can be improved.

COVID-19 is a pandemic respiratory disease caused by the virus extreme acute respiratory syndrome. SARS-CoV-2 was first discovered in Wuhan, China, in December 2019. SARS-CoV-2 is thought to infect others through droplet and touch transmission. Fever, cough, and ground-glass opacification on chest computed tomography are typical symptoms (CT) [1]. It has been recorded that up to 6.1 percent of Fragility fractures are serious injuries, so surgery delays could negatively impact morbidity and mortality. Patients with a mortality rate of 1.4 percent need intensive care or mechanical ventilation. Per year, over 60000 patients with hip fractures present to hospitals, costing the NHS more than 2 billion pounds annually due to patients who need very intensive nursing care. These fractures are a leading cause of morbidity and mortality, with mortality rates ranging from 10% to 30% at 30 days and one year after injury. With an aging population, these fractures are becoming more common. Because of the severity of this injury, a target of fracture fixation within 36 hours has been set to minimize the complications associated with it. In recent years, an

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emphasis on the National Institute for Health and Clinical Excellence (NICE) goal has led to progress in managing this injury, with 30-day mortality dropping to between 6 and 7%. Hip fracture patients are among the most vulnerable. Patients with underlying comorbidities, such as hypertension, diabetes, chronic lung disease, and cardiovascular and cerebrovascular disorders, are particularly vulnerable to COVID-19 infection-related complications, including death. Furthermore, healthcare professionals, such as surgeons and operating room nurses, are at a significantly higher risk of contracting SARS-Coronavirus. This review aimed to evaluate the prevalence of COVID-19 and its impact on mortality in patients with hip fractures.

Methods

Search Strategy

The study question and inclusion criteria for individual studies were created before searching databases. Online databases (PubMed, Medline, and Google Scholar) were used to find literature on mortality in COVID-19 patients who have undergone hip surgeries. Key words included were “COVID-19” OR “SARS-cov-2” OR “Coronavirus Infections”; AND “Surgery”OR “Hip”OR “Fracture”OR “Orthopedics.” The following criteria were used to determine inclusion: (1) all levels of evidence, regardless of study type, (2) male and female patients of any age, and (3) all COVID-19 patients with hip fractures. Patients with (1) pathological fractures, (2) non-hip fractures, and (3) non-traumatic hip pathologies were removed from the study.

Study Selection

All of the searches yielded a total of 138 pages. After screening titles and abstracts, we found 68 studies that met our inclusion and exclusion requirements. The 30 studies and case series that were qualified for review were all subjected to a full-text review by all of the reviewers (Figure 1).

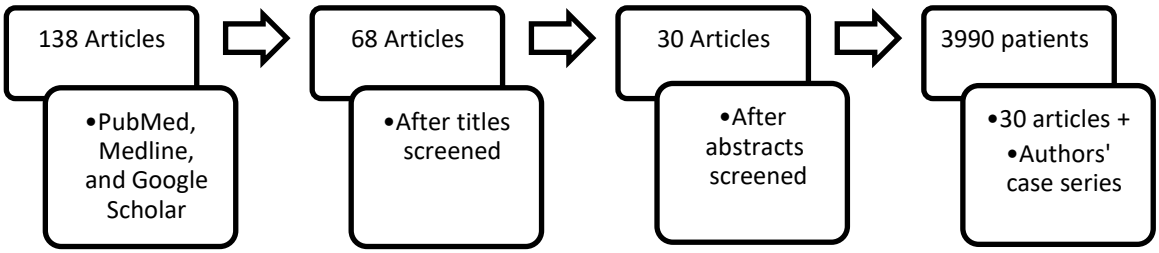

Figure1- Flow chart illustrating the article screening process

Data Abstraction

One reviewer extracted relevant research data from the final study pool and entered it into a spreadsheet. These included study and publication information (author, study design, and sample size) and patients’ data (age, sex, and outcomes). An unpublished case series of 361 patients during COVID-19 outbreaks who attended an orthopedic clinic at the Milad hospital revealed 47 patients were COVID-19 infected with hip fracture who satisfy our inclusion criteria, and therefore, were added to the total number of patients included.

Literature Review

Many types of research on outpatient surgeries were conducted in the last decade, from several aspects Research by Milroy (2000) For outpatient knees arthroscopic, researchers evaluated epidural, general, and spinal anaesthesia. At the outpatients facility, he discovered that both epidural chloroprocaine and general anaesthesia with propofol-nitrous oxide were equally successful. Patients who received 75 mg fentanyl and procaine for spinal anaesthetic had to remain in the hospital for 42–54 extra minutes and had an undesirable impact [11]. Another study by the same author (Molroy 2003) found regional anesthesia, even though it often takes more time at the start, has consistently been shown to be cheaper and faster than general anesthesia at getting people out of the hospital. They should have a big role in outpatient surgery [12]. Shnaider2006 found Quality management must be defined and enhanced for quality-related issues. Anesthesia and surgery will continue to evolve [13]. As a field of perioperative care, ambulatory surgery is continuing to grow in popularity. The recent COVID-19 pandemic has placed additional strain on inpatient bed resources, and it is anticipated that both clinicians and patients will be even more eager to avoid inpatient stays as a result of the recent pandemic [14].

Results

A total of 3990 patients were included in the final results. The patients' ages range from 50 to 100 years, with an average age of 81.6. Female patients were 1603 (40.1 %), 598(37.3%) patients who had Covid positive test and were discharged, including 424(26.45%) patients managed non-operatively. COVID positive and negative postoperative mortality were 198 (4.96%), 222 (5.56%) respectively, for a 30.47 days follow-up on average (Table 1).

Table 1- Studies Included for Review

study	Study Design	Sample size(number of hip fracture patient)	Mean Age	Overall Female (%)	Covid -19 positive	Number of No operative COVID -19 + Patients	Follow-up	Outcome/ COVID-19 - Postoperative mortality	Outcome/ COVID-19 + Postoperative mortality
Dupley et al.[2]	Case series	64	83	35 (54.7%)	64	6	30 days	Not reported	17/58 (29.3%)
Narang et al. [3]	Prospective cohort	682	84	477(70.4 %)	86	0	30 days	36(6%)	30/86 (34.9%)
Rabie et al. [4]	Case series	4	81	3 (75%)	4	3	Not reported	Not reported	0/1
Malik-Tabassum et al. [5]	Retrospective cohort	68	84.3	43 (63.2%)	1	1	30 days	5(7.5%)	0/0
Sobti et al. [6]	Retrospective cohort	94	83.5	Not reported	6	0	Not reported	6(6.82%)	3/6(50.0%)
Segarra et al.[7]	Prospective cohort	68	82.4	47 (69.1%)	2	0	69.7 days	7(10.6%)	1/2 (50.0%)
Thakrar et al. [8]	Prospective cohort	43	81.6	20 (46.5%)	12	0	30 days	3(6.9%)	4/12 (33.3%)
Kayani et al. [9]	Retrospective cohort	422	72.5	255 (60.4%)	82	0	30 days	35(10.3%)	25/82 (30.5%)
Hall AJ et al.[10]	Retrospective cohort	317	80.7	211 (66.6%)	27	2	30-day minimum	24(8.3%)	7/25 (28%)
Mi et al. [11]	Case series	6	75.6	4 (66.6%)	6	3	Inpatien	Not reported	1/3 (33.3%)
Mamarelis et al. [12]	Retrospective	41	83.63	21(51.2%)	11	6	30 days	1 (7.69%)	3/11 (54.5%)
Catellani et al. [13]	Case series	16	85	6 (37.5%)	16	3	Inpatien	Not reported	4/13 (30.8%)
Egol et al. [14]	Retrospective cohort	138	83	88 (63.8%)	17	4	Inpatien & 30 days	6(5.6%)	7/13 (53.8%)
Maniscalco et al. [15]	Retrospective cohort	121	81.6	89 (73.6%)	32	0	21 days	3(3.4%)	14/32 (43.8)
Cheung et al. [16]	Case series	10	79.7	8 (80%)	10	0	Inpatient	Not reported	1/10 (10.0%)
Vives et al. [17]	Retrospective cohort	136	85.3	102 (75%)	23	8	14 days	6(5.3%)	2/15 (13.3%)
LeBrun et al. [18]	Retrospective cohort	59	85	44 (74.6%)	9	2	Inpatient	2(4%)	3/7 (42.9%)
Arafa et al. [19]	Retrospective	97	86.2	10	19	Not reported	30 days	7(9%)	7/19 (36.8%)
Chui et al. [20]	Retrospective	47	Not reported	Not reported	8	Not reported	Not reported	1(2.6%)	4/8 (50%)
Clement et al. [21]	Retrospective	354	Not reported	Not reported	Not reported	47	30 days	50/307(16.3 %)	17/47 (36.2%)
Clough et al. [22]	Retrospective	84	85.1	3	7	0	Not reported	13(16.9%)	5/7 (71.4%)

De et al. [23]	Retrospective	276	85.9	22	34	Not reported	30 days	Not reported	14/34 (41.2%)
Fadulelmola et al. [24]	Retrospective	75	83.7	13	20	6	30 days	4(7.3%)	10/20 (50.0%)
Karayiannis et al. [25]	Retrospective	203	Not reported	Not reported	24	Not reported	30 days	3(1.6%)	4/24 (19.0%)
Lazizi et al.[26]	Retrospective	31	88	1	3	0	11.5 days	0	2/3 (66.7%)
Macey et al.[27]	Retrospective	76	Not reported	Not reported	10	1	30 days	9(13.6%)	2/10 (20.0%)
Morelli et al.[28]	Retrospective	10	83.9	8	10	10	14 to 39 days	Not reported	2/10 (20.0%)
Muse et al. [29]	Retrospective	5	79	4	5	5	8 to 15 days	Not reported	0/5 (0.0%)
Stoneham et al. [30]	Retrospective	48	Not reported	Not reported	1	0	Not reported	0	0/1 (0.0%)
Saleem et al. [31]	Retrospective	34	88	24(69%)	2	3	30 days	Not reported	6/34(20%)
Authors' case series	Case series	361	50.1	217(60%)	47	314	60 days	1/314 (0.3%)	3/47(6.3%)

Discussion

The most common trauma-related fracture is a hip fracture, also known as a proximal femur fracture. This is one of the most common fractures seen in COVID-19 cases. Hip fractures are categorized as intracapsular (femoral neck and head) or extra capsular (femoral neck and head) based on their anatomic position (intertrochanteric and sub trochanteric fractures). Addressing underlying medical problems, ensuring adequate surgical fixation, and encouraging early mobilization and rehabilitation to ensure a return to basic functional mobility, restoration of activities of daily living (ADLs), and independence are normally part of the treatment plan. Hip fractures in the elderly significantly raise the risk of death and serious morbidity.

Before COVID-19, several national guidelines recommended that patients with hip fractures have surgery within 48 hours of admission. During the COVID-19 pandemic, various recommendations classified patients with hip fractures as needing immediate surgical intervention. Before COVID-19, research revealed a 30-day mortality rate of 7-10% and postoperative pneumonopathy. Pre-COVID-19 studies have reported a 30-day mortality rate of 7-10% and postoperative pulmonary complications rate of 4.9%. The present review of 3990 patients from 30 studies and case series shows that the overall death rate is 10.52% in COVID-19-positive patients. The highest mortality rate was seen in elderly patients in their seventh and eighth decades. This finding is consistent with the trend of hip fracture in non-COVID-19 elderly patients.

The mortality rate in these populations is significantly higher than in non-COVID-19 patients with hip fractures. The virus's preference for the lungs, combined with the extreme pain caused by hip fractures, which results in decreased respiratory effort, appears to be a possible explanation for these patients' poor health upon admission to the hospital and high preoperative mortality rate. The lower postoperative mortality rate may be due to the beneficial pain-relieving effect of surgical fracture treatment, which allows for early regeneration and pulmonary drainage. Why so many patients are admitted in such poor health and have such a high preoperative mortality rate is unknown.

When these patients were critically ill, their Do Not Resuscitate (DNR) status was not reported, and they were refused ICU care, ventilator assistance, and cardiopulmonary resuscitation (CPR). Patients with hip fractures that are symptomatic with COVID-19, as well as asymptomatic positive testing and merely come from a high COVID-19 setting (such as a nursing home), seem to have a higher mortality rate. One possibility is that these patients received a false-negative test result. According to our findings, the pandemic and improvements in operating pathways have had a significant effect on the hip fracture operation, with delays in surgery and a rise in mortality.

Conclusions

In conclusion, the analysis found that the combination of COVID-19 positivity and hip fracture is associated with a significantly higher mortality rate than in non-COVID-19 patients. For this vulnerable category of

patients, more preventive measures against COVID-19 exposure and hip fractures are clearly needed. Given the evolving nature of the COVID-19 pandemic and its widespread and rapid spread across populations, especially nursing homes, it is critical to report all data together to gain a better understanding of the disease in this population. More research is needed to look at morbidity and mortality rates in COVID-19-positive patients with hip fractures and how these results can be improved.

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References

[1] Ahmadinejad B, Shabani A, Jalali A. Implementation of Clean Hospital Strategy and Prioritizing Covid-19 Prevention Factors Using Best-Worst Method. HOSP TOP. 2021:1-11.

[2] Dupley L, Oputa TJ, Bourne JT. 30-day mortality for fractured neck of femur patients with concurrent COVID-19 infection. Eur J Orthop Surg Traumatol. 2021; 31(2):341-7.

[3] Narang A, Chan G, Aframian A, Ali Z, Carr A, Goodier H, et al. Thirty-day mortality following surgical management of hip fractures during the COVID-19 pandemic: findings from a prospective multi-centre UK study. Int Orthop. 2021;45(1):23-31.

[4] Rabie H, Sharafi MH, Zanjani LO, Nabian MH. Novel coronavirus infection in orthopedic patients; report of seven cases. Arch Bone Jt Surg. 2020; 8(Suppl 1):302.

[5] Malik-Tabassum K, Crooks M, Robertson A, To C, Maling L, Selmon G. Management of hip fractures during the COVID-19 pandemic at a high-volume hip fracture unit in the United Kingdom. Int J Orthop. 2020; 20:332-7.

[6] Sobti A, Memon K, Bhaskar RRP, Unnithan A, Khaleel A. Outcome of trauma and orthopaedic surgery at a UK District General Hospital during the Covid-19 pandemic. J Clin Orthop Trauma. 2020; 11:S442-S5.

[7] Segarra B, Heras NB, Ortiz MV, Ribes-Iborra J, Martinez-Macias O, Cuesta-Peredo D. Are hospitals safe? A prospective study on SARS-CoV-2 prevalence and outcome on surgical fracture patients: a closer look at hip fracture patients. J Orthop Trauma. 2020;34(10):371-6.

[8] Thakrar A, Chui K, Kapoor A, Hambidge J. Thirty-day mortality rate of patients with hip fractures during the COVID-19 pandemic: a single centre prospective study in the United Kingdom. J Orthop Trauma. 2020;34(9):325-9.

[9] Kayani B, Onochie E, Patil V, Begum F, Cuthbert R, Ferguson D, et al. The effects of COVID-19 on perioperative morbidity and mortality in patients with hip fractures: a multicentre cohort study. Bone Joint J. 2020;102(9):1136-45.

[10] Hall AJ, Clement ND, Farrow L, Group I-SS, MacLullich AM, Dall GF, et al. IMPACT-Scot report on COVID-19 and hip fractures: a multicentre study assessing mortality, predictors of early SARS-CoV-2 infection, and the effects of social lockdown on epidemiology. Bone Joint J. 2020;102(9):1219-28.

[11] Mi B, Chen L, Tong D, Panayi AC, Ji F, Guo J, et al. Delayed surgery versus nonoperative treatment for hip fractures in post-COVID-19 arena: a retrospective study of 145 patients. Acta Orthop. 2020;91(6):639-43.

[12] Mamarelis G, Oduoza U, Chekuri R, Estfan R, Greer T. Mortality in patients with proximal femoral fracture during the COVID-19 pandemic: A UK hospital's experience. JBJS Open Access. 2020;5(4):20.

[13] Catellani F, Coscione A, D'Ambrosi R, Usai L, Roscitano C, Fiorentino G. Treatment of proximal femoral fragility fractures in patients with COVID-19 during the SARS-CoV-2 outbreak in Northern Italy. J Bone Joint Surg Am. 2020;102(12):58.

[14] Egol KA, Konda SR, Bird ML, Dedhia N, Landes EK, Ranson RA, et al. Increased mortality and major complications in hip fracture care during the COVID-19 pandemic: a New York City perspective. Orthop Trauma. 2020;34(8):395-402.

[15] Maniscalco P, Poggiali E, Quattrini F, Ciatti C, Magnacavallo A, Vercelli A, et al. Proximal femur fractures in COVID-19 emergency: the experience of two Orthopedics and Traumatology Departments in the first eight weeks of the Italian epidemic. Acta Biomed. 2020;91(2):89.

[16] Cheung ZB, Forsh DA. Early outcomes after hip fracture surgery in COVID-19 patients in New York City. J Orthop. 2020; 21:291-6.

[17] Vives JMM, Jornet-Gibert M, Cámara-Cabrera J, Esteban PL, Brunet L, Delgado-Flores L, et al. Mortality rates of patients with proximal femoral fracture in a worldwide pandemic: preliminary results of the Spanish HIP-COVID observational study. J Bone Joint Surg Am. 2020.

[18] LeBrun DG, Konnaris MA, Ghahramani GC, Premkumar A, DeFrancesco CJ, Gruskay JA, et al. Hip fracture outcomes during the COVID-19 pandemic: early results from New York. Orthop Trauma. 2020;34(8):403-10.

[19] Arafa M, Nesar S, Abu-Jabeh H, Jayme MOR, Kalairajah Y. COVID-19 pandemic and hip fractures: impact and lessons learned. Bone Jt Open. 2020;1(9):530-40.

[20] Chui K, Thakrar A, Shankar S. Evaluating the efficacy of a two-site ('COVID-19'and 'COVID-19-free') trauma and orthopaedic service for the management of hip fractures during the COVID-19

pandemic in the UK. Bone Jt Open. 2020;1(6):190-7.
[21] Clement ND, Hall AJ, Makaram NS, Robinson PG, Patton RF, Moran M, et al. IMPACT-Restart: the influence of COVID-19 on postoperative mortality and risk factors associated with SARS-CoV-2 infection after orthopaedic and trauma surgery. Bone Joint J. 2020;102(12):1774-81.
[22] Clough TM, Shah N, Divecha H, Talwalkar S. COVID-19 consent and return to elective orthopaedic surgery: allowing a true patient choice? Bone Jt Open. 2020;1(9):556-61.
[23] De C, Wignall A, Giannoudis V, Jimenez A, Sturdee S, Aderinto J, et al. Peri-operative outcomes and predictors of mortality in COVID-19 positive patients with hip fractures: a multicentre study in the UK. Indian J Orthop. 2020;54(2):386-96.
[24] Fadulelmola A, Gregory R, Gordon G, Smith F, Jennings A. The impact of COVID-19 infection on hip fractures 30-day mortality. Trauma. 2021;23(4):295-300.
[25] Karayiannis PN, Roberts V, Cassidy R, Mayne AI, McAuley D, Milligan DJ, et al. 30-day mortality following trauma and orthopaedic surgery during the peak of the COVID-19 pandemic: a multicentre regional analysis of 484 patients. Bone Jt Open. 2020;1(7):392-7.
[26] Lazizi M, Marusza CJ, Sexton SA, Middleton RG. Orthopaedic surgery in a time of COVID-19: using a low prevalence COVID-19 trauma surgery model to guide a safe return to elective surgery. Bone Jt Open. 2020;1(6):229-35.
[27] Macey AR, Butler J, Martin SC, Tan TY, Leach WJ, Jamal B. 30-day outcomes in hip fracture patients during the COVID-19 pandemic compared to the preceding year. Bone Jt Open. 2020;1(7):415-9.
[28] Morelli I, Luceri F, Giorgino R, Accetta R, Perazzo P, Mangiavini L, et al. COVID-19: not a contraindication for surgery in patients with proximal femur fragility fractures. BioMed Central; 2020. p. 1-5.
[29] Muse IO, Montilla E, Gruson KI, Berger J. Perioperative management of patients with hip fractures and COVID-19: A single institution's early experiences. J Clin Anesth. 2020; 67:110017.
[30] Stoneham AC, Apostolides M, Bennett PM, Hillier-Smith R, Witek AJ, Goodier H, et al. Early outcomes of patients undergoing total hip arthroplasty for trauma during COVID-19. Bone Jt Open. 2020;1(7):438-42.
[31] Saleem JS, Fazal MA. Fragility hip fractures in the COVID-19 pandemic: a local experience in the United Kingdom. Int J Orthop Trauma Nurs. 2021; 41:100817.