Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Letter to the Editor

Letter to the editor on the outcomes in fracture patients infected with COVID-19.

Dear editor,

In January 2020, China's center of disease control identified a novel coronavirus(COVID-19) as responsible of a cluster of respiratory infections [1,2]. This virus rapidly spread through the world, and the World Health Organization (WHO) declared the outbreak a Pandemic [3–5]. In France, the situation became worrisome and evolved quickly despite lockdown [6,7]. Local health authorities urged hospitals to cancel scheduled surgeries and to deal only with emergent cases. In orthopedics, this meant dealing mainly with surgical trauma patients. Being conscious that patients with fracture are very susceptible to pneumonia, strict preventive and protective measures were offered to all patients [8,9]. Some trauma patients presented with covid-19 infection and we wondered if these patients with emergent fractures (spine, hip, ankle..) should be operated. Available literature shows only one report from Wuhan reporting their experience with fracture patients infected with Covid-19, and one paper from Italy showing their experience on 13 Covid-19 operated trauma patients [10,11]. Through this letter, we share with you our in-crisis experience as an orthopedic surgery department from France, so we can draw conclusions, lessons, and be ready for a possible second epidemic surge.

Our experience

Through the pandemic, we dealt with twelve patients having a surgical fracture and a concomitant Covid-19 infection. Covid-19 infection was confirmed through RT-PCR and/or chest CT-scan performed in patients showing evocative symptoms. There were 4 women and 8 men. Mean age was 78.1 years [46-97]. Mean ASA scale was 2.56. There were 4 proximal femoral fractures, 3 traumatic hip arthroplasty dislocation, two ankle fractures, two unstable thoracolumbar spine fractures, and one displaced proximal humerus fracture-dislocation. Eight patients were diagnosed for their Covid-19 infection pre-operatively and 2 patients were diagnosed on day one postoperatively, after they developed hypoxia. All operated patients were evaluated pre-operatively. A multidisciplinary team decision was taken to operate ten patients, for whom benefits of early surgery outweighed the risks of delayed surgery. Two patients with confirmed Covid-19 diagnosis were not operated as they were judged at high risk of intraoperative mortality by the multidisciplinary team (one hip fracture and one thoracolumbar spine fracture). Of these twelve patients, 5 patients (41.67%) died during their in-hospital stay (4 proximal femoral fractures, 1 hip prosthesis traumatic dislocation). Patients died on average, 8.2 days [4-14] after hospitalization. The remaining seven patients were discharged after a prolonged hospital stay. Table 1 shows the details of the patients.

Is increased mortality attributable to concomitant covid-19 infection?

This high mortality rate is comparable to the reported mortality rate in trauma patients infected with Covid-19 from Wuhan(40%) [10] and Italy(31%) [11]. However both reports were descriptive and increased mortality couldn't be directly imputable to the concomitant infection. We matched each of these twelve patients to two patients from our hospitalized fracture patient database. We created therefore a control group with 24 patients Covid-negative patients matched for sex, age, diagnosis and ASA score. In this group, no intra-hospital death was recorded. The results of the matched case-controls comparing patients differing only by their covid-19 infection showed the extent of the increased mortality associated to this infection.

Is this observed increased mortality attributable to Covid-19 infection independently of the concomitant fracture?

To answer this question, the database of the hospital's "crisis unit" was analyzed. From March 1st till April 15th 2020, there were 864 Covid-19 positive non-fracture patients hospitalized in other departments. In this cohort, 72(8.33%) intra-hospital deaths were reported. This was significantly lower than mortality in fracture patients with concomitant Covid-19 infection($p=0.0022$). Therefore, the fracture and concomitant Covid-19 infection led to worse prognosis in included patients

Is the observed increased mortality due to anesthesia/surgery effect?

Between March 1st and April 15th, 16 Covid-19 positive patients were operated for emergencies in other specialties (ENT, urology, vascular surgery). Two (12,5%) died during their hospital stay(vs. 41.5% in trauma patients). This is a trend towards higher mortality in patients with fractures compared to those with other diseases($p=0.1$). Of note, both mortalities in non-fracture patients occurred in patients with severe Covid-19 infection from the intensive care unit that needed lifesaving surgeries (percutaneous angioplasty; ureteral tract clearing). These patients are not comparable to the twelve covid-19 positive fracture patients who were medically stable and did not need intensive care.

Differences in mortality were tested using Fisher's exact test. All analyses were performed using the R software v3.6.1(R Foundation for Statistical Computing).

Discussion

Through this letter, we share the first report that compares the mortality of Covid-19 patients with concomitant fracture or dislocation requiring surgery or hospitalization, to that of Covid-19 patients without a fracture, or patients operated on for a fracture without Covid-19 infection.

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Table 1
Table showing data of all 12 patients of the principal cohort of the study, including diagnosis, age, sex, ASA score, date of hospitalization, date of surgery (if performed), and date of death (if patient died).

Patient	Diagnosis	Age	Sex	ASA	Date of hospitalization	Date of Surgery	Date of death
1	Proximal femur fracture	82.52	F	3	24/3/2020	-	3/28/2020
2	Proximal femur fracture	89.04	M	3	15/3/2020	18/3/2020	3/28/2020
3	Proximal femur fracture	85.25	M	3	12/3/2020	19/3/2020	3/26/2020
4	Proximal femur fracture	93.21	M	3	6/4/2020	30/3/2020	4/10/2020
5	Hip prosthesis dislocation	78.78	M	3	30/3/2020	30/3/2020	4/5/2020
6	Hip prosthesis dislocation	69.45	F	2	1/4/2020	12/4/2020	-
7	Hip prosthesis dislocation	86.96	M	3	5/4/2020	6/4/2020	-
8	Ankle fracture	72.32	M	3	10/4/2020	12/4/2020	-
9	Ankle fracture	57.01	F	2	23/3/2020	23/3/2020	-
10	Proximal Humerus fracture	46.71	M	1	12/3/2020	13/3/2020	-
11	Thoracolumbar spine fracture	86.06	M	2	9/4/2020	14/4/2020	-
12	Thoracolumbar spine fracture	97.09	F	3	4/4/2020	-	-

Governments around the world have recommended to cancel all non-emergent surgeries [12,13]. Orthopedic surgeons still had to operate on trauma, septic, and tumor patients. Some fractures, such as proximal femoral fracture, open fractures, and unstable spine fractures are considered emergencies and should be operated as soon as the patient is medically stable, as delaying surgery leads to a poor outcome. Despite the fact that all three patients with proximal femoral fractures were stable on the day of surgery, all three died postoperatively. More, the only patient with a proximal femoral fracture who was not deemed medically fit to undergo surgery eventually died. Therefore, we cannot recommend against surgery at this level but we believe that that a decision by a multidisciplinary team is necessary to evaluate the risk, taking into consideration the notable increase in mortality caused by the novel coronavirus. This should also be discussed with the patient, especially in cases when trauma surgery aims to improve a functional outcome.

Two patients in this cohort were diagnosed with Covid-19 infection postoperatively when they started to show clinical symptoms, so the virus was probably in its incubation period when they were operated. We believe that as more tests become available, all trauma patients who require surgery should undergo screening for Covid-19, to avoid unnecessary risk to the patient if the surgery can be delayed by a couple of weeks with minimal impact on outcome.

We know that this report has several limitations as during lockdown, most fractures are low energy fractures in the frail elderly, who are at higher risk of perioperative death, but we tried to control this bias by having a matched control group. The sample is small, but fractures in Covid-19 patients are rare, and our sample is nonetheless the largest ever published. Despite this fact, the increase in mortality is so important that we were able to demonstrate a statistically significant difference and to draw lessons and conculsions.

IRB approval

Study title: Outcomes in fracture patients infected with the COVID-19: An In crisis analysis from France.

The study sponsor is the “Groupe Hospitalier Paris Saint-Joseph; Paris, France, 75014”.

The cohort protocol has been approved by the institutional ethics committee (IRB number IRB00012157).

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Declaration of Competing Interest

Maroun Rizkallah, Elias Melhem, Jean Meyblum, Mansour Sadeqi, Pomme Jouffroy and Guillaume Riouallon declare that they have no conflicts of interest.

References

[1] Lu H, Stratton CW, Tang Y-W. Outbreak of pneumonia of unknown etiology in Wuhan, China: the mystery and the miracle. J Med Virol 2020;92:401–2. doi:10.1002/jmv.25678.
[2] Zhou P, Yang X-L, Wang X-G, Hu B, Zhang L, Zhang W, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. Nature 2020;579:270–3. doi:10.1038/s41586-020-2012-7.
[3] Kakodkar P, Kaka N, Baig MN. A comprehensive literature review on the clinical presentation, and management of the pandemic coronavirus disease 2019 (COVID-19). Cureus 2020;12:e7560. doi:10.7759/cureus.7560.
[4] Hussain K, Dewan V, Ali T, Al Shakarchi J. The impact of the COVID-19 pandemic on the provision of surgical care. J Surg Case Rep 2020 2020:rjaa087. doi:10.1093/jscr/rjaa087.
[5] Bernard Stoecklin S, Rolland P, Silue Y, Mailles A, Campese C, Simondon A, et al. First cases of coronavirus disease 2019 (COVID-19) in France: surveillance, investigations and control measures, January 2020. Eurosurveillance 2020:25. doi:10.2807/1560-7917.ES.2020.25.6.2000094.
[6] ECDC. Situation update for the EU/EEA and the UK, as of 14 April 2020 2020. https://www.ecdc.europa.eu/en/cases-2019-ncov-eueea.
[7] ministere des solidarites et de la sante. Carte du nombre de cas en France 2020. https://dashboard.covid19.data.gouv.fr/.
[8] Chen Y-C, Lin W-C. Risk of long-term infection-related death in clinical osteoporotic vertebral fractures: a hospital-based analysis. PLoS One 2017;12:e0182614. doi:10.1371/journal.pone.0182614.
[9] Halvachizadeh S, Teuber H, Pape H-C, Allemann F. Principles and current concepts in the surgical treatment of fragility fractures in the elderly. Best Pract Res Clin Rheumatol 2019;33:264–77. doi:10.1016/j.berh.2019.03.018.
[10] Mi B, Chen L, Xiong Y, Xue H, Zhou W, Liu G. Characteristics and early prognosis of COVID-19 infection in fracture patients. J Bone Jt Surg 2020:1. 10.2106/JBJS.20.00390.
[11] Saglietto A, D'Ascenzo F, Zoccai GB, De Ferrari GM. COVID-19 in Europe: the Italian lesson. Lancet 2020;395:1110–11 10.1016/S0140-6736(20)30690-5.
[12] Chang Liang Z, Wang W, Murphy D, Po Hui JH. Novel coronavirus and orthopaedic surgery. J Bone Jt Surg 2020:1. 10.2106/JBJS.20.00236.
[13] Sarac NJ, Sarac BA, Schoenbrunner AR, Janis JE, Harrison RK, Phieffer LS, et al. A review of state guidelines for elective orthopaedic procedures during the COVID-19 outbreak. J Bone Jt Surg 2020:1. 10.2106/JBJS.20.00510.

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