

To Evaluate the Functional Outcome of Intertrochanteric Fracture Treated by PFNA2 in COVID-19-Positive Patients: A Retrospective Study

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Received: 18-11-2021 / Revised: 05-12-2021 / Accepted: 10-02-2022

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Conflict of interest: Nil

Abstract

Background: Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) - also known as 2019 novel coronavirus or COVID-19 - first emerged on December 31, 2019 in China, and has since rapidly spread to become a world-wide pandemic. Orthopaedic trauma services, have maintained a significant portion of their previous volume throughout the pandemic, specifically, hip fractures in the elderly population. Intertrochanteric fracture is one of the most common injuries among the elderly and is associated with a high mortality rate within 30 days after the injury event. Treatment of Intertrochanteric fractures during the coronavirus disease 2019 (COVID-19) pandemic has posed unique challenges for the management of COVID-19-infected patients and the maintenance of standards of care. PFNA2 provide stability, compression as well as rotational control of the fracture and allows early post operative mobilization, weight bearing and thereby early fracture union. This study aims to assess the functional outcome of intertrochanteric fracture treated by PFNA2 in COVID-19-positive patients.

Objectives: To evaluate the functional outcome of intertrochanteric fracture treated by PFNA2 in COVID-19-positive patients: a retrospective study

Methodology: This was a retrospective study of 30 patients, 18 females and 12 males ≥ 55 years of age with intertrochanteric fracture and COVID-19 who underwent operative management with PFNA2. Clinical characteristics and early postoperative outcomes were reported.

Results: A total of 30 patients, 21 patients (70%) had fever, cough, and fatigue at the time of presentation. 9 patients (30%) had sore throat and dyspnea, headache and dizziness (23%) (7 patients), abdominal pain and vomiting (16%) (5 patient), chest pain and nasal congestion (10%) (3 patient). 18 patients (60%) had comorbidities. Postoperatively all 30 patients (100%) required non-invasive mechanical ventilation. All patients (100%) were given antibiotic therapy, 18 patients underwent anti thromboembolic prophylaxis. 20 patients were treated with

corticosteroids. Blood transfusion was done in 14 patients. Average HARRIS HIP SCORE was 83.6 at the end of six months graded as good outcome. The length of hospital stay in our study was 10 days (7- 14 days). The complications in our study included bed sores, superficial and (which settled subsequently with Intravenous antibiotics and debridement respectively).

Conclusions: Our study shows that intertrochanteric fracture patients who present with a mild to moderate COVID-19 symptoms who underwent Intertrochanteric fracture surgeries with PFNA2 had a good functional outcome with few post op complications.

Keywords: Covid 19, Intertrochanteric fracture, PFNA2, Harris Hip Score.

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Introduction

Coronaviruses are a group of viruses that mainly affect human beings through animal transmission. The novel coronavirus first emerged in Wuhan, China in December 2019 from the wet seafood market [1]. COVID-19 was regarded as a public health emergency of international concern in the world by mid-February 2019 [2].

The number of cases and deaths are increasing day by day and the infection is spreading to almost every corner of this world. India is a developing country with around 1.3 billion population, 2nd largest in the world after China. In India, there is one allopathic doctor per 10,926 population [3], which is below WHO's recommendation of 1:1000 [4], putting tremendous pressure on the health care system in India due to COVID-19.

The first case of COVID-19 was reported on 30th January 2020 and the number has reached 8500 as on 12th April 20, with 289 deaths.

Orthopaedic trauma surgery focused mainly on femoral fragility fractures in the elderly, since the "lockdown" began on March 10, 2020. Proximal femur fractures carry a high mortality rate [5], and the standard of care involves surgery within 48 h from the trauma [6]. These elderly patients are also the most susceptible to the nefarious consequences of COVID-19 [7].

Thus, orthopaedic surgeons face the daily dilemma of performing life-saving surgery on patients who, given their severe respiratory compromise, have a higher risk of peri-operative death. Eligibility for surgery is those with no signs of pneumonia at CT scan or non-severe respiratory symptoms [8].

In the orthopaedic area, the largest number of surgeries concern fractures of the proximal femur, which are the most frequent cause of disability in patients over 65 years old.

Intertrochanteric fracture is one of the most devastating injuries in the elderly. The incidence of these fractures increases with advancing age [9]

50 % of fracture around hip patients in elderly is of trochanteric fracture and these 50 % of fracture are unstable type of trochanteric fractures. Today operative treatment has largely replaced conservative measures and the goal of treatment is to achieve accurate or acceptable reduction. Anatomical and stable reduction with rigid internal fixation in order to achieve early mobilization of patients and prevent complications of prolonged recumbence

Despite marked improvements in implant design, surgical technique and patient care, intertrochanteric fractures continue to consume a substantial proportion of our health care resources and remain a challenge to date [10]

Complications with intertrochanteric fractures arise primarily from fixation rather than union or delayed union. Because the intertrochanteric area is made up of cancellous bones [11].

There is a wide variety of treatment options for these fractures. The sliding hip screw device has been used for more than a decade for the treatment of these fractures which may not be an ideal implant in all cases [12].

Intramedullary load sharing device - PFN helps in early post operative mobilization, weight bearing and ultimately the early fracture union. PFNA-II utilizes a helical blade instead of the conventionally used two screws. The helical blade is believed to provide stability, compression as well as rotational control of the fracture. Theoretically it compacts the bone during insertion into the neck and hence has higher cut out strength as compared to other devices.

The purpose of the present study was to evaluate the functional outcome of intertrochanteric fracture treated by PFNA2 in COVID-19-positive patients.

Materials And Methods:

This research was approved by our Internal Institutional Research Board. A retrospective cohort study was performed in 30 patient's ≥ 55 years of age who had positive COVID-19 diagnostic testing (RT-PCR) assay for the qualitative detection of nucleic acid from SARS-CoV-2 in

nasopharyngeal swabs and underwent PFNA2 surgery for intertrochanteric fracture at our institution during period of March 2020 to August 2021.

Inclusion criteria: a) Patients > 18 years of age presenting to our causality with intertrochanteric femoral fractures with all Boyd and Griffin types (1-4), b) Both displaced and Undisplaced fractures, c) Fractures less than 1 week duration, d) Category A and Category B, Covid patients

Exclusion criteria: a) Age <18 years, b) Open fractures, c) Old malunited intertrochanteric fracture, d) Head injury, Chest injury, Pathological fractures, e) Category C Covid patients.

COVID 19 medications were given based on symptoms, signs, laboratory testing and chest radiograph findings. After getting fitness, surgery was done in all patients, average duration of surgery was 60 mins. Patients were followed up at an interval of 6 weeks, 3 months and 6 months with pelvis x-ray with both hips antero posterior view. Functional outcome of patients was done with Harris hip score and graded accordingly.

Results:

A total of 30 patients, 18 females and 12 males with positive (RT-PCR) nasopharyngeal swabs. Age groups of patients varied from 55 to 80 years. Right side involved in 19 cases and left side in 10 patient, bilateral in 1 patients. Mode of injury was RTA in 12 patients and Self fall in 18 patients. Majority had Type 2 Boyd and Griff fracture. 21 patients had fever, cough, and fatigue at the time of presentation. 9 patients had sore throat and dyspnea, headache and dizziness (7 patients), abdominal pain and vomiting (5 patient), chest pain and nasal congestion (3 patient). 18 patients had comorbidities and 3 patients with severe comorbidities 1 died due to Respiratory failure. Thoracic CT was done in all cases. Postoperatively all 30 patients (100%) required non-invasive mechanical ventilation. All patients (100%) were given antibiotic therapy, 18 patients underwent anti thromboembolic prophylaxis. 20 patients were treated with corticosteroids. Low -mol -weight heparin was given accordingly. D-dimer and CRP values were found high in all patients and LDH values were high in 24 patients (80%). Average duration of surgery was 45 min's to 75 min's and average blood loss was around 150 ml. Blood transfusion was done in 14 patients. In all patients except 1 had

improvement in terms of O₂ saturation and assisted respiration. One patients were put on mechanical ventilation. The length of hospital stay in our study was 11 days (7-18 days). The complications in our study included bed sores, superficial and deep infections (which settled subsequently with Intravenous antibiotics and debridement respectively). Follow up was done during the period of 6 week's, 3 months and 6 months. Patients were evaluated clinically and radiologically, various parameter like pain, limp, use of support, distance walked, sitting, range of motions etc were used. Average HARRIS HIP SCORE was 79.7 at end of 3 months and 83.6 at the end of six months and graded as good outcome. There were no cases of non-union in our study.

Discussion:

COVID-19 symptoms vary substantially among patients, ranging from no symptoms to severe respiratory failure. Patients with covid 19 complain of headache, fatigue, vomiting, diarrhoea and abdominal pain [14,15]. Dysgeusia and anosmia are frequently reported by CoVID-19 patients [16,17]. In our study of 30 patients majority had mild to moderate symptoms. Those with comorbidities especially elderly had more complications. On 30th January 2020, the World Health Organization (WHO) declared CoVID-19 a public health emergency of international concern [18].

The PFN A-II is an effectively designed intramedullary load - sharing device. It incorporates the principles and theretical advantages of the Zicker Nail, Dynamic hip screw locked intramedullary nail, with modifications for Asian population. Various literature has demonstrated the advantages of early hip fracture surgery for elderly patients, which include reducing bed rest, allowing early mobilization, controlling pain, improving function, and thereby reducing morbidity and mortality rates [19,20].

A study by Catellani et al [21] reported on a series of 16 COVID positive patients with proximal femoral fractures in northern Italy, of which 13 underwent surgical treatment. All of the patients in this series reported symptoms of fever and dyspnea prior to admission and had signs of oxygen desaturation on room air upon presentation to the emergency room. The majority of patients in this study demonstrated significant improvements in oxygen saturation and respiratory function following surgery.

Eric Hernandez et al did a retrospective review of surgeries involving proximal femoral fragility fractures from 1 January 2020 to 30 April 2020 within a single institution in Singapore. A total of 153 surgeries were performed on patients with proximal femoral fractures during the period reviewed. In 79 intertrochanteric fractures, 76 underwent intramedullary nailing and 3 were fixed with plates and screws. They adopted a COVID-19 risk category for patients going for surgery. The use of N95 mask, eye protection and PAPR are required for Category 1 patients whereas category 2 patients require only N95 and eye protection. Category 3 patients are done in a regular theatre with use of N95 mask and eye protection. Category 4 patients are done in a regular theatre and use of surgical mask is sufficient. There studies showed early surgery for hip fractures leads to early mobilization, lesser risk of chest infections and shorter hospital stay [22]. This program facilitates holistic care of patients and assists in optimizing patients for surgery.

From January 1, 2020, to February 27, 2020, Bobin Mi et al did a study on 10 patients with a fracture and COVID-19 +ve. All 10 patients presented with limited activity related to the fracture. Three patients underwent surgery, whereas the others were managed non operatively because of their compromised status. Four patients died on day 8 (3 patients) or day 14

(1 patient) after admission. They concluded that the clinical characteristics and early prognosis of COVID-19 in patients with fracture tended to be more severe than those reported for adult patients with COVID-19 without fracture [23]. This finding may be related to the duration between the development of symptoms and presentation.

In Italy Maniscalco et al. [24] In this cohort, 32 COVID-positive hip patients were treated surgically, and there was a 43.8% (14/32) mortality rate within 21 days. These early reports suggested a higher rate of mortality in the early postoperative period for patients with a hip fracture and COVID-19 infection. In a Retrospective cohort analysis from July 1, 2020, to December 31, 2020, by Bastain pass, Tom et al of 123 positive patients with proximal femur fractures showed COVID-19 infection resulted in a 5.95-fold higher mortality risk and long duration of stay by 4.21 days. Awad et al. recommended regional organization by assigning designated hospitals with orthopaedic staff to treat only suspected or confirmed COVID-19 patients and other hospitals in the same regions to treat exclusively non-infected patients[25]

In our study of 30 patients, all were admitted with intertrochanteric fracture and were found to be covid positive by doing RT-PCR nasopharyngeal swabs. COVID-19 patients were isolated in a separate room and kept at least 6 feet distance from other patients and non-treating staff. All had one or other covid 19 symptoms with majority having fever, cough, and fatigue. Separate operating rooms with separate ventilation system with negative pressure [26] were used. All equipment and screens were covered with plastic sheets to facilitate decontamination [27]. Patients face were covered with a surgical mask. All personnel in the operating room were given PPE to wear, which include Association of Advancement of Medical Instrumentation (AAMI) level III surgical gowns, surgical

hood (for head and neck covering), double gloves, N95 masks, googles, fluid-resistant shoes etc [28,29,30]. Surgery was done minimally invasive, use of electrocautery was reduced to minimize the surgical smoke.

Postoperatively all 30 patients (100%) required non-invasive mechanical ventilation and were given antibiotic therapy. All these patients were successfully weaned off except one patient who had severe comorbidities and were put on mechanical ventilation and later died due to Respiratory failure. All the patients were discharged within 14 days of post op period. Average hospital stay period was 10 days. The complications in our study included bed sores, superficial and deep infections which settled subsequently with Intravenous antibiotics and debridement respectively.

Mean Harris Hip Score at 6 months was 83.6 with good functional outcome.

The strength of this study lies in being able to analyse 30 Covid positive cases with intertrochanteric fractures amidst Covid 19 pandemic. The current study is retrospective, it also has some limitations, Firstly, we had small sample size of COVID-19-positive patients who underwent PFNA2 surgery for intertrochanteric fractures, thus it could have affected the significance of the differences reported. Secondly, we included only those with intertrochanteric fractures and excluded patients with other hip fractures and COVID-19 infection. Therefore, our findings should not be extrapolated to other hip fracture patients with severe presentations of COVID-19 infection. Thirdly, the follow-up period of the study was quite short and final outcomes of fracture treatments are yet to be studied.

Conclusion:

Covid -19 has had a devastating effect on our population, particularly on the elderly.

In our study we found out that although majority of patients with intertrochanteric fractures had mild to moderate covid 19 symptoms all required non-invasive mechanical ventilation and were given antibiotic therapy and had good functional outcomes. Corticosteroids and anti-thromboembolic drugs were given based on severity of the disease and investigation reports. Intertrochanteric fracture patients with comorbidities have more deteriorating outcomes compared with patients without. Use of PPE's and early standard surgical care were found to have beneficial effects on these patients.

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