Original Article

Conservative Management of Stable, Minimally Displaced Pertrochanteric Fractures: A Case Series

Abstract

Background: Hip fractures are common, and account for significant morbidity and mortality. While surgical intervention remains the gold standard, nonoperative treatment protocols are seldom analysed and may be of value in select settings. **Objectives:** We sought to review our conservatively treated pertrochanteric fractures and present a case series that outlined indications, treatment protocol and early outcomes. **Materials and Methods:** A retrospective review of medical records and radiographic imaging of all patients who presented with stable pertrochanteric fractures and were treated nonoperatively, from September 2017 to February 2021, at a Level 2 District Hospital in South Africa. **Results:** Of the 242 patients who were admitted with pertrochanteric fractures, 12 (4.9%) fractures were radiographically classified as AO 31A1.2 (stable, minimally displaced) and eligible for active nonoperative management. Within 6 weeks of injury, 10 (84%) of the patients who received active nonoperative treatment achieved union. Two patients (16%) failed the treatment protocol and required surgery, with one failing during the hospital phase of the treatment protocol and the other on follow up. In the group of united fractures, the neck shaft angle was on average within 3 degrees of the contralateral hip with a range of 0 to 5 degrees. At follow-up, two (16%) patients had a measurable shortening of 5 mm at union. There was no medical morbidity associated with this protocol. **Conclusions:** In our case series, the active nonoperative management protocol, involving early mobilisation and serial radiographs, in select cases of stable pertrochanteric fractures yielded acceptable outcomes. This is of relevance in low-middle income countries with limited surgical capacity.

Keywords: *Conservative management, hip fractures, non operative treatment protocol, nonoperative management, pertrochanteric fractures*

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Introduction

Hip fractures are common, and account for significant morbidity and mortality amongst elderly patients. One-year mortality rate often exceeds 30% despite advances in care,[1-8] while more than 30% are unable to live independently one year after the injury.[9,10] As global populations experience a demographic shift, with rising life expectancies throughout the globe, conservative estimates have suggested that hip fracture incidence amongst elderly will increase threefold, exceeding 6.3 million cases by 2050.[11-13] Furthermore, a historical lack of data from African countries suggests the future incidence of hip fractures on the continent may be grossly underestimated.[14] The large corpus of literature speaking to the morbidity and mortality associated with hip fractures, underscored by changing disease burdens, suggests that hip fractures pose an emergent public health issue.

Since its introduction, surgical intervention has emerged as the standard of care in hip fractures. Advances in operative techniques and perioperative care have lowered surgical risk and improved outcomes, providing pain relief and improved mobility. Operative management for most hip fractures is recommended, with guidelines advocating for timeous surgery within 48 hours of the event.[15,16] This recommendation is informed by observational studies that suggest a shorter time to surgery is associated with reduced mortality and decreased postoperative complications.[15,16] Numerous studies have reported the improved outcomes associated with operative management,[17-20] which has seen the proportion of those receiving nonoperative management decrease.[21] The anatomical classification of the fracture, coupled with patient-specific

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considerations, typically inform the nature of treatment protocol and surgical procedure.

The ability to provide surgical intervention is determined by a healthcare system's surgical capacity, a neglected concept that has garnered growing interest in global surgery. Dell and Kahn[22] found that South Africa had a functional theater density of 3.59 per 100 000 total population, which decreased to 1.95 operating theaters per 100 000 population when selecting for the public sector. When compared to the global average of 6.2 operating theaters per 100,000 population,[22] it becomes evident that Sub-Saharan Africa has limited surgical capacity. Similarly, trauma-related injuries place a disproportionate burden on an already strained healthcare system and demand most of the surgical resources available.[23] In resource-limited centers, patients with hip fractures, especially pertrochanteric fractures, may wait longer than the recommended time for surgery due to limited access to theater. In such circumstances it becomes important to explore alternative treatment options for certain pertrochanteric fractures, especially if these options would provide similar outcomes. The limited number of hospital beds, restricted theater access and the heavy load of trauma cases in our setting led us to develop a nonoperative treatment protocol for the stable and undisplaced pertrochanteric fractures.

Nonoperative management is typically reserved for patient's whose health status precludes operative intervention. It consists of a prolonged period of skin traction and bed rest, resulting in high morbidity and mortality rate. Although data is limited, current estimates suggest that up to 33% of hip fractures are being managed nonoperatively.[24-31] Furthermore, a Scottish hip fracture audit suggests the absolute number of patients being managed nonoperatively is increasing, as we are faced with a greater burden of older, medically unfit patients.[32] Despite this, there are few recent studies in the English literature that describe nonoperative treatment protocols and analyse their outcomes. Where described, these studies comprise heterogenous cohorts both in terms of fracture type and patient characteristics.[33-35]

We sought to present a case series of our conservatively treated consequetive pertrochanteric fractures and report on our indications, treatment protocol and early outcomes.

Subjects and Methods

A retrospective review of a prospectively collected database was performed. We reviewed medical records and radiographic imaging of all patients who presented with stable pertrochanteric fractures and were treated nonoperatively, from September 2017 to February 2021, at a Level 2 District Hospital.

All patients who sustained a stable pertrochanteric fractures (AO/OTA classification 31A1.2)[36] were offered an active nonoperative treatment protocol with the intention to offer surgical treatment in the event of treatment protocol failure. Treatment failure was defined as fracture displacement at any point during treatment.

Active nonoperative treatment protocol

Day 0

Admission day, diagnosis and classification of the fracture as AO 31A1.2 (stable, minimally displaced); clinical assessment to determine if the patient can follow instructions and will be able to mobilize safely with crutches. If the patient satisfies these criteria, they are offered active nonoperative management as an alternative option to surgical management.

Day 1

Mobilization with toe-touch weight bearing on crutches, under supervision of a physiotherapist.

Ability to perform above allows patients to progress to day 2 protocol.

Day 2

Mobilization on stairs, under supervision of a physiotherapist.

Day 3

Repeat pelvis and affected hip orthogonal radiographs. If the fracture remains undisplaced on day 3 radiographs, the patient is discharged to mobilize with crutches.

Day 7

Patient follows up for repeat radiographs at 7 days post protocol initiation. If at 7 days the fracture remains undisplaced on radiographs, the patient is reviewed again at 14 days post protocol initiation.

Day 14

Patient follows up for repeat radiographs at 14 days post protocol initiation. If at 14 days, the fracture remains undisplaced on radiographs, the patient is only reviewed again at 6 weeks.

Week 6

Patient follows up for repeat radiographs at 6 weeks post protocol initiation.

Data for all eligible patients were entered in a Google Sheets database. All patients were anonymized using a numerical identifier. Each folder was examined for patient characteristics, which included age, sex, presenting symptoms and mechanism of injury, fracture classification, treatment complications and outcome. Outcomes measured included length of hospital stay, 90-day medical and Orthopaedic morbidity rate and profile and mortality rate, fracture union rate, malunion rate and severity thereof.

Each patient's radiographs were reviewed and summarized. Continuous variables were summarized using mean and standard deviation if normally distributed whilst median and interquartile range was computed for skewed data.

Results

A total of 242 pertrochanteric fractures were admitted for management at our Level 2 institution between 1 September 2017 and 28 February 2021. Of the 242 patients who sustained pertrochanteric fractures, 12 (4,9%) fractures were radiographically classified as AO 31A1.2 (stable, minimally displaced) and eligible for the active nonoperative management [Figure 1]. This cohort comprised two females and ten males, with a median age of [51] years at diagnosis.

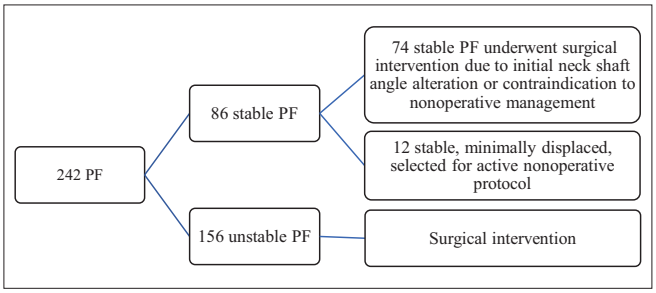

Figure 1: Total numbers of pertrochanteric fractures admitted during the study period and selection pattern for the active nonoperative treatment protocol versus surgical intervention. PF: pertrochanteric fractures

The average length of hospitalization was 4 days (range: 3 to 6 days). The average length of follow up was 11 weeks (range: 8 to 12 weeks).

Within 6 weeks of injury, 10 (84%) of the patients who received active nonoperative treatment achieved union. Two patients (16%) failed the treatment protocol and required surgery, with one failing during the hospital phase of the treatment protocol and the other on follow up. In the group of united fractures, the neck shaft angle was on average within 3 degrees of the contralateral hip with a range of 0 to 5 degrees [Table 1; Figure 2].

At follow-up, two (16%) patients had a measurable shortening of 5 mm at union. There was no medical morbidity associated with this treatment protocol. All patients had a mild painless limp on the affected side at 6 weeks.

Discussion

This is the first reported study evaluating the outcomes of a nonoperative treatment protocol for patients with stable pertrochanteric fractures in a low-middle income country (LMIC). The case series shows that conservative

Table 1: Neck shaft angle of the affected hip

Neck shaft angle on the fracture side measured in degrees with electronic goniometer on the electronic images on day 0, day 3, day 7, day 14 and at 6 weeks post protocol initiation.

Patient Identifier	D0	D3	D7	D14	6 weeks
1	138	138	138	138	138
2	135	135	135	132	132
3	127	127	125	122	122
4	130	105			
5	128	128	128	128	128
6	135	135	135	135	135
7	136	136	136	136	136
8	128	128	98		
9	132	129	129	129	129
10	127	127	127	127	127
11	130	130	130	130	130
12	135	135	135	135	135

Patients 4 and 8 failed conservative management and required surgical intervention.
Average change in neck shaft angle in conservatively treated patients was within 3 degrees of the contralateral hip (range of 0 to 5 degrees).

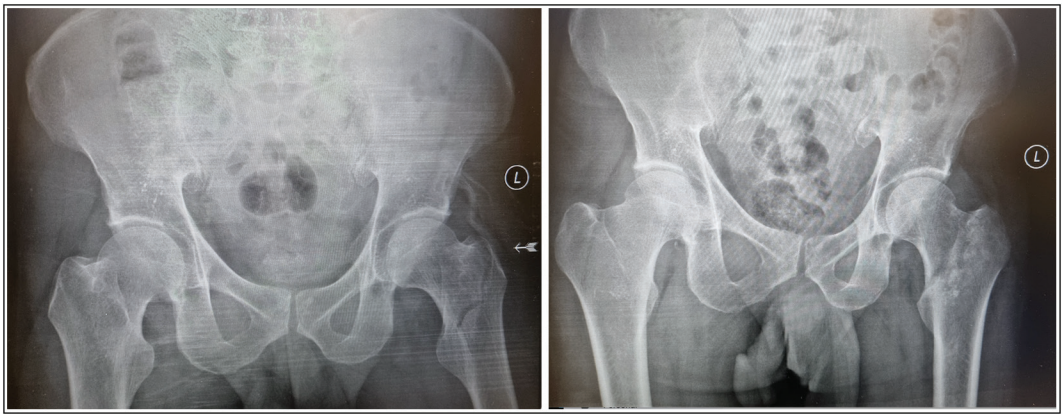

Figure 2: Pre (A) and post (B) treatment radiographs of a left stable and minimally displaced pertrochanteric fractures

management of select stable, minimally displaced pertrochanteric hip fractures, in our experience, is safe and results in a high union rate. Only 4% of all pertrochanteric fractures admitted into our hospital during the study period were eligible for the nonoperative treatment protocol. Although this is a smaller proportion, it is still significant in the setting where access to surgical care is limited.

Ten (84%) patients from this cohort achieved union with a neck shaft angle within 3 degrees (on average) of the contralateral normal hip with no morbidity or mortality encountered in the first 90 days following the injury. These findings are consistent with findings in several more recent studies, which have described comparable outcomes in operative and nonoperatively managed patients with hip fractures when early mobilization was employed in the latter.[33-35] There are several earlier case series that document comparable outcomes between operative and nonoperative management of hip fractures. In a study of 106 patients with extracapsular hip fractures, Hornby *et al.*[37] found no statistically significant difference in mortality, pain, or complications when comparing internal fixation with nonoperative treatment using traction. It is important to note however that our active nonoperative treatment does not involve prolonged hospitalisation and the use of skin traction.

Similarly, a prospective study found conservative management with early mobilisation yielded 86% union rates with a one year mortality rate of 16% in 170 patients with impacted femoral neck fractures.[38] More recently, Hossain *et al.*[33] concluded that nonoperative management with early rehabilitation does not result in a statistically significant difference in functional outcome or mortality when compared to patients treated surgically in a study of 41 patients. There are several other studies that reported acceptable results with nonoperative treatment of intertrochanteric femur fractures in elderly patients.[34,39-41] While these studies comprise heterogenous cohorts, both in terms of fracture type and patient characteristics, current evidence doesn't differentiate in outcomes of different types of hip fractures. This supports the notion, that while operative fixation is still the standard of care, nonoperative management with early mobilisation may provide an alternative, efficacious treatment choice to a select patient cohort.

Our cohort differs from many of those described in these studies conducted in the developed world, in that our mean patient age is considerably lower and only stable and minimally displaced pertrochanteric fractures were eligible for the nonoperative treatment.

Owing to the importance of early mobilisation, it may be self-evident that those offered nonoperative treatment must be able to mobilise safely and are able to follow instructions. This excludes from this treatment protocol those with poor cognitive ability, such as those with dementia or intellectual disability, as well as those with an increased fall risk, such as those with residual neurological impairment following a stroke.

In our cohort, two patients failed the non-operative treatment. The first patient was a known epileptic, on treatment, who experienced a breakthrough seizure episode while still in hospital. Pelvis radiographs obtained after the seizure revealed fracture displacement. He was successfully treated with a dynamic hip screw. The second patient presented with secondary displacement of his hip fracture at the day 7 follow up. He described a low-energy minor fall at home, but this did not cause enough pain for him to seek immediate medical attention. Pelvis radiographs revealed fracture displacement and the patient was subsequently treated with closed reduction and a dynamic hip screw.

The success of nonoperative management in our case series, it seems, rests on the proviso that the fracture pattern was stable and minimally displaced, early mobilization was the treatment protocol of choice and patients were able to follow instructions. Our efforts represent the only study that presents a nonoperative management protocol in hip fractures in a low-middle income setting.

The limitations of our study included its retrospective nature, small sample size and lack of standardized hip scores for measurement of clinical outcomes. We were however able to show a high 6-week union rate with no morbidity associated with this treatment protocol. A prospective descriptive cohort of nonoperatively treated stable pertrochanteric fractures preferably across multiple centers is desirable for a validation of this treatment protocol.

Conclusion

In our case series, the active nonoperative management protocol, involving early mobilisation and serial radiographs, in select cases of stable pertrochanteric fractures yielded acceptable outcomes. Good clinical decision-making is of tantamount importance in the selection of candidates eligible for active nonoperative management. Patients with uncontrolled epilepsy and those unable to follow instructions should not be offered this treatment protocol. Our report also provides impetus for similar studies in resource-limited centers as a means of contributing to a greater body of literature.

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Conflicts of interest

There are no conflicts of interest.

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