


Palliative Management of Nonoperative Femoral Neck Fractures With Continuous Peripheral Pain Catheters: 20 Patient Case Series

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Abstract

Introduction: To identify the success of pain catheters in the management of pain in nonoperatively treated femoral neck fractures (FNFs) in supplement to current multimodal protocols for end-of-life pain management. **Methods:** Twenty patients aged older than 50 years with FNFs were selected in a retrospective fashion at a level I trauma center. These patients were treated nonoperatively with indwelling continuous peripheral pain catheters to palliate pain. Adjunctive pain control for patients undergoing nonoperative management of FNFs was provided with an indwelling continuous intra-articular/peripheral nerve ropivacaine pain catheters. Pain scores 24 hours before/after continuous pain catheter placement, ambulation status before/after continuous pain catheter placement, mortality at 30 days/1 year, and length of hospital stay were measured. **Results:** Twenty patients were identified with an average age of 84.55 years. The average length of stay was 4.85 days with a decrease of 4.45 points on the visual analog scale and an improvement of 90% in ambulation status. Thirty-day and one-year mortality were 65% and 95%, respectively. **Conclusion:** This case series provides orthopedic surgeons with an option for and data on the success of this adjunct to palliate patients who elect to undergo nonoperative management of FNFs. This study also helps define which patients may be candidates for nonoperative management of geriatric hip fractures.

Keywords

femoral neck fractures, osteoporosis, palliative management, pain catheter

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Introduction

Intracapsular femoral neck fractures (FNFs) account for 50% of all hip fractures and 20% of the workload for orthopedic surgeons. As life expectancy in the worldwide population has increased, there has been an increase in the number of hip fractures with a projection of 6.26 million in 2050.¹ The majority of these fractures occur in elderly patients with osteoporosis secondary to low energy falls. This patient population requires a multidisciplinary approach, as they may have complicated preexisting medical comorbidities and cognitive impairments.

The surgical management of FNFs is dependent on multiple factors including fracture displacement, patient age, and activity level. Surgical options range from percutaneous screw fixation to total hip arthroplasty. Postoperatively, patients who undergo surgical management have a 46% probability of regaining their previous level of mobility, and 15% to 20% of the patients do not return to their previous residence.²⁻⁵

Although surgical management of FNFs is the current standard of care, select patients/families may elect to proceed with non-operative management due to their significant preexisting medical conditions, minimal baseline ambulatory level, and/or goals of care. Previously, these patients would require oral opiate pain medication to palliate their pain until a functional girdle stone forms, which may take several weeks. In addition, mobilization is crucial for these patients as it is directly tied to survival.^{6,7}

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Ideal pain management of elderly patients with FNFs includes a multimodal approach.⁸ Opioid usage in this patient population has been shown to exacerbate cognitive impairments, worsen acute delirium, and potentially increase the probability of additional falls. Thus, a clinical need exists for adjunct medications to be utilized with this subset of patients undergoing nonoperative management. The advent of continuous indwelling analgesic catheters provides a feasible adjuvant to pain management in this patient cohort.

Pain management utilizing an indwelling peripheral nerve sheath catheter that dispenses local anesthetic medication has been described with successful upper extremity surgery, joint arthroplasty, and in nonorthopedic surgical procedures.⁹⁻¹⁶ However, the use of peripheral or intracapsular catheters for pain management in patients with FNFs treated nonoperatively, to our knowledge, has yet to be described in published literature.

This study intends to identify the efficacy of indwelling catheters to palliate patients with FNFs treated nonoperatively. These catheters are intended to supplement our current multimodal protocol with the objectives of comparing pre- and post-catheter pain scores and ambulatory level. In addition, we compared 30-day mortality, 1-year mortality, and length of stay to previously reported percentages.

Methods

Patients were identified from a level 1 trauma center hospital electronic medical record from January 2009 to May 2015. All patients with an FNF, utilizing *International Classification of Diseases, Ninth Revision* codes in combination with a common procedural terminology (CPT) code for placement of intracapsular continuous ropivacaine analgesic catheters were included. Patients with a CPT code for surgical intervention were excluded. A retrospective chart review was conducted to include the following data: basic patient demographics, past medical history, visual analog pain scores 24 hours before/after continuous pain catheter placement, ambulation status before and after continuous pain catheter placement, mortality at 30 days and 1 year, and length of hospital stay. Chronic disease was defined as cardiac disease, peripheral vascular disease, diabetes mellitus, hypertension, hyperlipidemia, chronic kidney disease, chronic obstructive pulmonary disease, or atrial fibrillation.

Inclusion criteria:

- Patients aged 50 and older with an FNF, Orthopaedic Trauma Association 31-B1, 31-B2, 31-B3, who were treated nonoperatively.
- Intracapsular or peripheral nerve continuous analgesic catheters placed by the Department of Anesthesia.
- Inpatient or observational admission status with documented visual analog scale (VAS) charting by floor nursing.
- Intracapsular/peripheral nerve continuous analgesic catheter placement CPT code.

Table 1. Patient Demographics.

Patient	Gender	Age, Years	Ambulation Status Prior to Fracture	Number of Comorbidities	Cognitive Disorder
1	Female	79	Community ambulator	2	Yes
2	Male	83	Transfers	1	Yes
3	Female	85	Transfers	3	Yes
4	Female	79	Household ambulator	3	Yes
5	Female	98	Transfers	1	Yes
6	Female	94	Community ambulator	1	Yes
7	Female	89	Nonambulator	2	Yes
8	Female	87	Transfers	4	Yes
9	Male	80	Community ambulator	3	Yes
10	Male	66	Transfers	4	No
11	Female	88	Household ambulator	3	Yes
12	Male	71	Household ambulator	4	No
13	Female	101	Transfers	3	No
14	Male	72	Community ambulator	3	No
15	Female	80	Community ambulator	3	No
16	Female	74	Community ambulator	3	Yes
17	Female	89	Transfers	4	No
18	Female	101	Transfers	3	Yes
19	Female	86	Transfers	3	Yes
20	Female	89	Household ambulator	2	No

Exclusion criteria:

- Patients who self-discontinue analgesic pain catheter placement within 24 hours of placement.
- Patients with advanced dementia or cognitive impairments that make them incapable to subjectively rate pain.

Results

Twenty patients were identified from a retrospective chart review with all patients having 30-day and 1-year mortality data. The average age of the included patients was 84.55 with a 75% female predominance. Forty-five percent of patients in this cohort had 3 major chronic diseases and 65% of patients had a cognitive disorder. Ambulation level prior to FNFs was 5% nonambulatory, 45% transfers only, 30% minimal community ambulator, and 20% household ambulatory. After sustaining the FNF, all patients were limited to bed rest secondary to pain. Fifty-five percent of the patients had a palliative care consult during their hospital stay (Table 1). The average length of stay was 4.85 days with 1 outlier that required a 17-day

Table 2. Results.

Patient	Length of Stay, days	30-Day Mortality	1-Year Mortality	Ambulation Status After Catheter Placement	24-Hour VAS Score Average Prior to Catheter Placement	24-Hour VAS Score Average After Catheter Placement
1	4	Deceased	Deceased	Transfers	9	0
2	4	Living	Deceased	Transfers	7	0
3	2	Deceased	Deceased	Bed rest	5	1
4	3	Deceased	Deceased	Transfers	6	0
5	3	Deceased	Deceased	Transfers	9	0
6	5	Living	Deceased	Transfers	7	3
7	4	Deceased	Deceased	Bed rest	7	3
8	3	Deceased	Deceased	Household with walker	7	4
9	6	Living	Deceased	Household with walker	8	3
10	1	Living	Living	Transfers	5	2
11	9	Deceased	Deceased	Transfers	8	5
12	4	Deceased	Deceased	Household with walker	8	5
13	7	Deceased	Deceased	Transfers	6	0
14	17	Living	Deceased	Transfers	6	3
15	4	Deceased	Deceased	Transfers	7	3
16	5	Living	Deceased	Transfers	9	4
17	5	Living	Deceased	Transfers	4	4
18	5	Deceased	Deceased	Transfers	5	0
19	3	Deceased	Deceased	Transfers	6	4
20	3	Deceased	Deceased	Transfers	7	3

hospital stay. When the outlier was removed, the average length of stay was reduced to 4 days.

During the hospital stay, pain scores were measured utilizing the VAS charted by the floor nursing staff. The VAS were averaged for 24 hours before and after placement of continuous analgesic catheter placement. On average, after placement of a continuous analgesic catheter placement, there was a decrease of 4.45 points in VAS scores. After catheter placement, 90% of the patients improved ambulation level when participating with physical therapy, which was defined as being able to transfer to chair or ambulate with a walker. Fifteen of the patients were able to transfer to a chair, 3 were able to ambulate with a walker, and 2 remained on bed rest. The 30-day and 1-year mortalities in the patient group were 65% and 95%, respectively (Table 2).

Discussion

The current standard of care for elderly patients sustaining FNFs is operative management; however, there is a subset of patients who may be at too high risk for surgery and/or wish to not undergo surgical management secondary to their significant medical comorbidities, minimal baseline ambulation level, and/or comfort care goals. This small patient population still requires palliation of pain and early mobilization.¹⁻⁷ With the increasing number of elderly patients sustaining a FNF, orthopedic surgeons can expect to manage patients who may wish to not have surgical management for numerous reasons. This case series gives surgeons results of an additional modality to improve pain control and mobilization in this patient subset. To our knowledge, this is the only case series that

describes pain management of nonoperatively treated FNFs with continuous analgesic pain catheters as an augment to traditional pain management techniques.

Pain secondary to hip fractures can be debilitating; all 20 patients in this study were initially placed on bed rest activity level secondary to pain. Pain control with opiate and nonopiate pain medication can be a limiting factor in the geriatric population. Opiate pain medications have been shown to further exacerbate baseline cognitive disorders. This is certainly a concern as 65% of our studied patient population presented with baseline cognitive disorders. Recent initiatives have been created to reduce the incidence of delirium in geriatric patients and delineates modifiable and nonmodifiable risks to reduce acute delirium. Many of the modifiable risks were demonstrated in our patient cohort: opiate pain medications, pain, emotional distress, and sleep deprivation secondary to pain. In addition, acute delirium has been attributed to poor hospital outcomes. With the application of continuous pain catheters as an adjunct to pain control in our cohort, we demonstrated the reduction in opiate medication consumption and hopefully the incidence of acute delirium.⁷

This study attempts to evaluate the efficacy of intracapsular/peripheral continuous analgesic pain catheters in hopes of improving pain management regimens used to treat geriatric patients with FNFs who are being treated nonoperatively. In this series, VAS were reduced by 4.45 points in a 24-hour period when these catheters were placed by our anesthesiology staff. This modality allowed 90% of patients to improve their ambulatory status to a minimum of transfer to chair. Patients who remain in a bedridden state are more likely to have negative outcomes secondary to pressure ulcer, aspirations, and

pulmonary decline.⁶ The improvement of ambulatory status seen in our cohort has the potential to decrease these negative outcomes attributed to a prolonged bed rest status. In addition, this series of patients demonstrated a shorter hospital length of stay at 4 days when compared to the 2010 national average of 5.8 days published by the Centers of Disease Control (CDC).¹⁷

Although this series of patients demonstrated improved pain scores and decreased hospital length of stay, 30-day mortality was 65% and 1-year mortality was 95%. This significant mortality rate could be due to 1 of 2 reasons. First, this may be due to the significant comorbidities that burden these patients leading to a high likelihood of fatality whether treated with or without surgery. This could be supported by the work of Ooi et al, who in their study of nonagenarians showed similar mortality of those treated both operatively and nonoperatively for proximal femur fractures.¹⁸ Conversely, one could argue that mortality rate was so strikingly high due to the fact that these patients were treated nonoperatively. This could be disputed by the fact that, despite not undergoing operative treatment, 90% of patients were at minimum able to ambulate to a chair and 16.7% were able to ambulate a distance. This is supported by the work of Parker et al who conducted a Cochrane review showing no difference in mortality of hip fractures treated with or without surgery.¹⁹ Additionally, Raaymakers and Marti reported only a 16% mortality rate at 1 year for patients with impacted FNFs treated with nonoperative management and early mobilization.⁸ We cannot conclude that either of these theories are true or false due to lack of a comparative group and with our small subset of patients.

The limitations of this study remain with the small patient subset, which can be attributed to the recent attainment of disposable continuous analgesic catheter systems at our hospital and that the majority of FNFs that were treated operatively. Additionally, this data set would likely be more powerful if there was a control group that did not receive continuous analgesic catheters, which is currently being collected and reviewed. With that addition of a control group, our hopes are to be able to show statistical significance in decreased length of stay and visual analog pain scores. Other limitations consist of variability in catheter placements including intracapsular blocks, peripheral nerve blocks, or a combination of both.

This case series provides orthopedic surgeons with an option for and data on the efficacy of this adjunct to palliate patients who are not candidates for surgical management of their FNFs. In addition, it helps define which patients may be candidates for nonoperative management of geriatric hip fractures and further discusses the mortality that is attributed to patients who are not able to be managed operatively.

Declaration of Conflicting Interests

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