The Effect of a Pain Management Program on the Rehabilitation of Elderly Patients following Hip Fracture Surgery

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ABSTRACT: **Background:** Pain following hip fracture and internal fixation is a major factor during the treatment of elderly patients on rehabilitation programs. A proactive pain management program was instituted in our geriatric rehabilitation ward in 2005.

Objectives: To compare retrospectively two groups of patients, one before and one after implementation of the proactive pain management program.

Methods: The study group comprised 67 patients and the control group 77 patients. Pain in the study group was evaluated daily by the visual analogue scale (VAS) and the outcome of the rehabilitation process by the Functional Independence Measure (FIM). During the study period (2003–2006) no changes were made in the rehabilitation team, methods or facilities other than introduction of the pain control program. We compared the FIM scores between admission and discharge in both groups.

Results: Improvement in FIM scores between admission and discharge was significantly higher in the study group than in the control group (11.07 ± 7.9 vs. 8.4 ± 7.3, $P < 0.03$). There was no significant difference between the average lengths of stay.

Conclusions: These data support the view that the proactive monitoring of pain in surgical hip fracture patients is associated with a better outcome of the rehabilitation process.

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KEY WORDS: pain management, rehabilitation, post-surgery, hip fracture, elderly

Hip fracture is a common cause of acute hospitalization of older people and is associated with disability, prolonged hospitalization and diminished quality of life [1-3]. The 1 year mortality rate among the elderly after hip fracture is 20%; a significant proportion of survivors are admitted to nursing homes, and approximately 50% have permanent limited functioning [4]. A significant functional decline has been documented even among individuals who were functioning at a high level before the event [5,6].

Hip pain has been reported to be one of the factors that may affect functional outcomes after hip fracture, but limited information is available [7]. Pain during the first 3 postoperative days has been associated with longer hospital stay, more postoperative complications, missed or shortened physical therapy sessions, and delayed ambulation [8]. Studies suggest that pain in the immediate postoperative period has a significant effect on short-and long-term functional outcomes after hip fracture [5-11]. Presumably, pain-control interventions could benefit the rehabilitation process either by shortening it or by improving the functional outcome.

The purpose of this study was to compare two cohorts of patients who received rehabilitation therapy after internal fixation for hip fracture – one (the control group) before the initiation of a pain control program, and the other (the interventional, study group) after its implementation.

PATIENTS AND METHODS

In the past, the usual practice had been to treat pain as any other clinical problem, addressing it whenever patients complained about it during the periodic medical rounds. The proactive pain management approach was introduced in 2005 and was based on daily pain evaluation followed by immediate titration of the pain using a flow chart of pain scores. The pain was evaluated by means of the Visual Analogue Scale [12] and was performed by a trained nurse. The daily pain ratings (on a scale of 1 to 10) were recorded in the patient's file together with other measurements.

On admission to the rehabilitation department the patients were questioned about the presence and intensity of pain and were placed on a standard analgesic protocol that included one of the following drugs: acetaminophen, dipyrone, tramadol, or oxycodone. Analgesic drugs were added according to patients' self-reported pain levels. The medication was changed if the VAS pain score was ≥ 5 or whenever it was 2 points higher than that of the previous day. The first-choice analgesic treatment consisted of acetaminophen, followed when necessary by dipyrone or tramadol. The pain evaluation and titration process

VAS = Visual Analogue Scale

were performed as a usual procedure together with the daily measurement of other vital signs such as body temperature, blood pressure and pulse.

The Functional Independence Measurement was used to assess function and rehabilitation [13]. The FIM scale assesses physical disability, focusing on the burden of care – i.e., the level of disability indicating the burden of caring for these patients. Items are scored according to the level of assistance required for an individual to perform activities of daily living. The scale includes 18 items, grouped in 5 domains: self-care, transfer, communication, social cognition, locomotion. Each item is scored from 1 to 7 based on the level of independence, where 1 represents total dependence and 7 complete independence. Possible scores range from 18 to 126, with higher scores indicating more independence.

Delta FIM (ΔFIM) was calculated as the difference between FIM at admission and at discharge. It was evaluated by a nurse experienced in this procedure and not directly involved in the rehabilitation process.

This was a retrospective double-cohort comparative study. Demographic and medical data were retrieved from each patient's records. Included in the study were patients over 65 years with operated hip fractures admitted for treatment to the geriatric rehabilitation department of our 400-bed geriatric medical center. Excluded were demented patients and patients with medical complications that interrupted the rehabilitation process for more than 48 hours, such as infections, acute coronary events, and deep vein thrombosis.

The interventional group consisted of patients admitted consecutively in 2006 and who met the inclusion criteria (n=67). The control group consisted of patients consecutively admitted in 2003 who met the inclusion criteria (n=77). During the study period, 2003–2006, no changes were made in the rehabilitation team or in the rehabilitation methods and facilities other than implementation of the pain control program.

FIM = Functional Independence Measurement

Data collection began after Helsinki Committee approval was granted.

STATISTICAL ANALYSIS

Data analyses were performed using the SPSS, version 17. Differences between groups were analyzed using chi-square and Student *t*-tests. *P* value < 0.005 was considered statistically significant

RESULTS

Demographic and medical characteristics of both groups of patients are presented in Table 1. No significant differences were found with regard to the average age, male/female ratio and length of stay.

FIM evaluation was performed weekly. Table 2 presents the average results of the FIM domains for each group at admission and at discharge with the respective ΔFIM. Both groups improved significantly as a result of the rehabilita-

Table 1. Demographic and medical characteristics of both groups

	Study group (n=67) N (%)	Control group (n=77) N (%)
Age (yrs)	76.9 ± 6.8	77.6 ± 6.8
Female	50 (75)	63 (82)
Male	17 (25)	14 (18)
Length of stay (days)	29.8 ± 16.5	26.58 ± 10.8
Diseases		
Hypertension*	53 (79)	49 (64)
NIDDM	19 (28)	14 (18)
IHD*	18 (27)	11 (14)
Drugs		
Optalgin	40 (60)	44 (57)
Laxatives	44 (66)	42 (54)
Anticoagulants	41 (61)	43 (56)
ACE-inhibitors	35 (52)	30 (39)

*$P < 0.05$ significant

NIDDM = non-insulin-dependent diabetes mellitus, IHD = ischemic heart disease, ACE = angiotensin-converting enzyme

Table 2. FIM score results of both groups

		Study group (n=67) Average ± SD			Control group (n=77) Average ± SD			
FIM domains	**Range**	**Admission**	**Discharge**	**ΔFIM**	**Admission**	**Discharge**	**ΔFIM****	***P****
Self-care	8–56	30.00 ± 6.14	34.99 ± 6.09	4.99 ± 4.24	33.26 ± 7.36	37.64 ± 6.31	4.27 ± 4.62	0.3
Transfer	3–21	9.03 ± 1.99	11.82 ± 2.49	2.79 ± 2.63	10.39 ± 2.97	12.96 ± 2.76	2.57 ± 2.60	0.6
Locomotion	2–14	3.66 ± 1.11	4.99 ± 1.57	1.33 ± 1.54	4.27 ± 1.67	5.48 ± 2.07	1.21 ± 1.85	0.7
Communication	2–14	10.48 ± 1.40	11.03 ± 1.23	0.55 ± 1.05	11.18 ± 2.02	11.22 ± 1.64	0.04 ± 1.04	0.004*
Social cognition	3–21	15.88 ± 2.74	16.79 ± 2.18	0.9 ± 1.5	16.22 ± 2.77	16.36 ± 2.65	0.1 ± 1.4	0.002*
Total FIM	18–126	67.99 ± 12.30	79.81 ± 11.42	11.07 ± 7.9	74.75 ± 13.55	83.14 ± 12.79	8.4 ± 7.4	0.03*

*$P < 0.05$ significant

**ΔFIM = FIM discharge score – FIM admission score

tion process. However, the total ΔFIM of the study group was significantly higher (11.07 ± 7.9 vs. 8.4 ± 7.3, $P < 0.03$) than that of the control group, indicating that a higher state of independence was achieved over a similar period of rehabilitation.

Examination of the different domains of the FIM shows that the main contribution comes from an impressive higher improvement in the subscales of communication ability (ΔFIM 0.55 ± 1.05 in the study group vs. ΔFIM 0.04 ± 1.04 in the control group, $P = 0.004$) and social cognition (ΔFIM 0.9 ± 1.5 in study group vs. ΔFIM 0.1 ± 1.4 in control group, $P = 0.002$) in the interventional cohort.

DISCUSSION

The main finding of this study was a significantly greater improvement in the FIM score among elderly post-surgical hip fracture patients after the implementation of a pain management intervention. This was obtained over a similar time period, suggesting that the proactive pain intervention favorably affected the subjects in the interventional cohort. Previous studies of pain in post-surgical hip fracture patients focused on the management of postoperative pain symptoms or the relationship between acute postoperative pain and functional status [7,10]. One study using a convenience sample of 85 hip fracture patients found that pain severity with movement during hospitalization for the hip fracture was a significant predictor of functional outcomes 2 months after surgery [14]. Prior studies observed that postoperative pain in older adults undergoing hip fracture surgery is associated with an increased risk of longer hospital and rehabilitation length of stay, missed or shortened physical therapy sessions, and delayed ambulation [8].

The results of this study are compatible with our early presumption that proactive pain control could improve the outcome of the rehabilitation process. Our results are also consistent with those of a recently published study that showed that a similar proactive intervention improved function and also reduced chronic pain thereafter [15]. Implementation of the program did not necessitate the use of additional personnel or other resources. It was easily adopted by the staff and highly valued in the rehabilitation process.

The fact that the main improvement in the FIM score comes mainly from the communication and social cognition domains is interesting and deserves further attention. Likewise, it will be interesting to evaluate this approach in similar patients in home rehabilitation programs.

Our study has several limitations. It was retrospective and did not include data following discharge from the rehabilitation hospital period.

As a recent publication emphasized, active pain management is an essential element of the orthogeriatric approach [16]. We suggest that it be considered as the standard in the rehabilitation of elderly patients following surgery for hip fracture.

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"Guard well within yourself that treasure, kindness. Know how to give without hesitation, how to lose without regret, how to acquire without meanness"

George Sand [pen name of Amantine Aurore Lucile Dupin] (1804-1876), French novelist