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Original Article

The effect of Cinnopar on reducing the complications of femoral neck fracture in people aged 40 to 60 old

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Abstract

Introduction: The femoral neck fracture is a disabling injury that disrupts the patient's health. The fracture healing is long and sometimes unreliable. Therefore, the finding of fracture repair aids that accelerates healing speed and reliability helps in the healing process. The parathyroid hormone is a good option as a systematic mediator in calcium and bone metabolism. The study aimed to use Cinnopar to improve and accelerate rate of the healing process and reduce complications of femoral neck fractures in people aged 40 to 60 years.

Methods: In the study, 34 femoral neck fracture patients were included in two groups as receiving Cinnopar group(N=17) and not receiving Cinnopar group(N=17). The patients were imposed with 20 micrograms of injected Cinnopar subcutaneously once a day, and the other group received only routine postoperative drugs.

Results: The patients with no return to activity was two (33/13%) in the receiving Cinnopar group. There were five patients (33/33%) with no return to the activity for the not-receiving Cinnopar group. The return to activity was compared in both groups three months after the operation, and the two groups were significantly different (p-value = 0.03). The results of the radiographic union showed ten unions (66.66%), three incomplete unions (20%), and two non-unions (13.33%) in the receiving Cinnopar group at three months after the operation. There were eight unions (53.33%), four incomplete unions (26.66%), and three non-union (20%) in the not receiving Cinnopar group, and the two groups were similar.

Conclusion: Receiving Cinnopar immediately after femoral neck fracture surgery can reduce pain. It can also prevent non-return to activity during the first three months after surgery and improve femoral neck union.

Keywords: Femoral neck fracture, Cinnopar, nonunion, pain, fixation failure.

Introduction

The Femoral neck fracture is a disabling injury that disrupts the patient's health and imposes high costs on the public health system [1]. It is estimated there will be approximately 300,000 cases of hip fractures annually in the United States by the year 2030 [2]. These fractures affect young people with high energy trauma and in the elderly by low energy trauma [3] according to the Garden classification, Type I: Incomplete fracture - valgus impacted-non displaced, Type II: Complete fracture – no displaced, Type III: Complete fracture – partial displaced, Type IV: Complete fracture entirely displaced [4].

Treatment of non-displacement fractures in all ages is to fix the fracture with a screw or DHS [5]. Non-union and

osteonecrosis are the main complications of femoral neck fractures and must be resolved [6, 7]. Human parathyroid hormone PTHh 1-34 or Triparathyroid is a bone anabolic agent. The excessive production of PTH in people with hyperparathyroidism causes catabolic effects on bone. Although, the intermittent subcutaneous injection of PTH leads to anabolic effects on bone [8]. Subcutaneous injection of PTH h within 15 to 45 minutes leads to increased PTH levels Up to 10 times and then returns to baseline within 10 to 12 hours. Decreased apoptosis of osteoblasts is observed [8]. In addition, the production of the bone matrix is increased and causes to an increase in volume and width of trabecular bone. Despite that, there is incomplete secondary mineralization of the matrix [9,10]. The results of previous studies showed that teriparatide can significantly improve function in patients with fractures [11, 12]. In addition, studies have shown that PTH could improve fracture healing in different skeletal sites of patients [12-14]. Because fracture healing is long and is sometimes unreliable, finding for fracture repair aids that accelerates healing speed and reliability helps in healing. Parathyroid hormone is a good option as a systematic mediator in calcium and bone metabolism. Cinnopar is an analog of human parathyroid hormone, which is produced by recombinant protein [13-15]. This drug is similar to the body's natural parathyroid hormone secreted by the parathyroid glands. This drug is composed of the first 34 amino acids, which are the active part of the drug [16-18].

Due to the high complications rate of femoral neck fracture fixation in the age group of 40 to 60 years, the study aimed to evaluate Cinnopar to reduce the complications of femoral neck fracture and improve patient's function.

Methods

Total, 34 femoral neck fractures cases referred to Imam Khomeini and Golestan hospitals, Ahvaz, Iran, were included in the study. The total patients were randomly divided into two groups as one group was treated with standard drugs after surgery (N=17 Patients). The second group was imposed with Cinnopar extra than the routine drugs after surgery (N=17 Patients). The protocol of Cinnopar treatment was used once the daily and subcutaneously injection of 20 micrograms of Cinnopar drug.

Demographic characteristics and medical history of the patients were collected. The bone mineral density, and the levels of serum vitamin D and serum calcium were measured. The recording and matching data were performed in both groups. Then the patients were visited on first day, 3rd week, 3ed months after the operation. At each visit, the site of the surgery, radiographic union, and fixation failure were evaluated. The radiological union criteria were fusion of 3 out of 4 cortices, and the clinical union criteria was painless weight bearing. X-ray was confirmed for union or non-union or fixation failure by an orthopedic and radiologist physician. Information about the patient's pain and activity level was collected and recorded. Finally, the information was analyzed by a statistical consultant. To perform statistical analysis, SPSS software version 22 and ANOVA and T-TEST were used. The significance level in tests was considered as 0.05.

Inclusion criteria:

Patients with femoral neck fractures in the ages of 40-60 years who consent to participate in the study.

Exclusion criteria

Patients who use smoke, alcohol, corticosteroids and PPI. Patients with a history of diabetes, chronic hypertension, rheumatoid arthritis, disorders of calcium metabolism, cancer, Paget's disease and chronic renal failure. Patients with very high or low weight.

Results

Two patients from the receiving Cinnopar group were excluded from the study (one person died and one person due to non-referral). Two patients from the not receiving Cinnopar group due to death were excluded from the study. Age, sex, BMI, serum calcium levels, vitamin D levels, hospitalization period, BMD, fracture typing, and type of procedure (CRIF or ORIF) were similar in the two groups.No significant statistical difference was observed between the two groups.(Table 1).

Table1- Demographic characteristics and descriptive statistics of study variables

Variable		Receiving cinnopar	Not receiving cinnopar	p-value
Age		49.3 ± 5.3	52.2 ± 5.2	0.75
BMI		24 ± 2.2	24.7 ± 2.1	0.59
Serum calcium		9.2 ± 0.48	9.1 ± 0.47	0.94
Serum vitamin D		24.6 ± 1.4	22.2 ± 1.5	0.88
Hospitalisation period		3 ± 0.75	3 ± 0.75	1
BMD		-2.34 ± 0.52	-2.07 ± 0.46	0.6
type of procedure	CRIF	7 (46.66%)	9 (60%)	0.58
	ORIF	8 (53.34%)	6 (40%)	0.58
fracture typing	Garden 1	2 (13.33%)	3 (20%)	0.78
	Garden 2	3 (20%)	5 (33.33%)	0.43
	Garden 3	8 (53.33%)	6 (40%)	0.43
	Garden 4	2 (13.33%)	1 (6.66%)	0.78
sex	Male	6 (40%)	5 (33.33%)	0.49
	Female	9 (60%)	10 (66.66%)	0.42

The mean length of the return to activity was 2.66 ± 0.24 months in the receiving Cinnopar group and 2.81 ± 0.25 months in the not-receiving cinnabar group. Thus, there was no significant statistical difference between the two groups about the length of the return to activity (P- value = 0.74). There are two patients with no return to activity in the Cinnopar receiving group (13.33%) and five cases in the not receiving Cinnopar group (33.33%). And, there was a significant statistical difference between the two groups about no return to activity (P = 0.03) (Figure 1).

The pain score was measured three months after surgery in the receiving cinnopar group. Five patients had pain-free (33.33%), three patients with very little pain (20%), two patients with Low pain (13.33%), three patients had moderate pain (20%), one patient had severe pain (6.66%), and one patient had very severe pain (6.66%). In the not receiving Cinnopar group, two patients were pain-free (13.33%), four patients had very little pain, two patients with low pain (13.33%), two patients had moderate pain (13.33%), one person had severe pain (6.66%) and four patients had very severe pain (66 26.0%). There was a significant difference between the two groups in pain-free patients (P = 0.04). Also, there was a significant difference between the two groups in patients with severe pain (P = 0.02). There was no significant difference between the two groups in patients with very little pain, low pain, moderate pain, and severe pain (P= 0.79, P=1, P=0.84, p=1). (Figure 2).

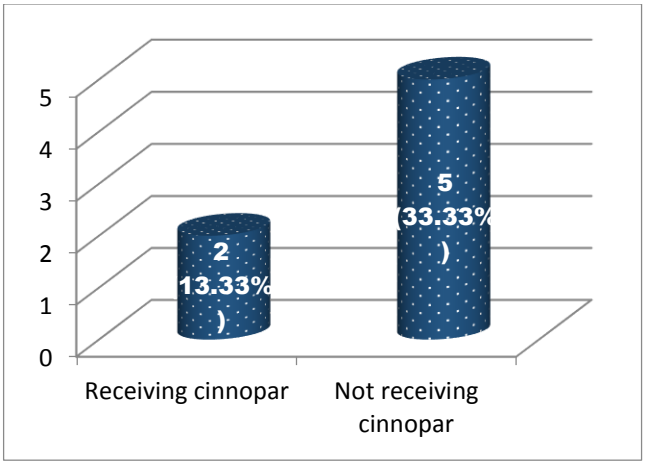

Figure 1: Comparison of return to activity by group.

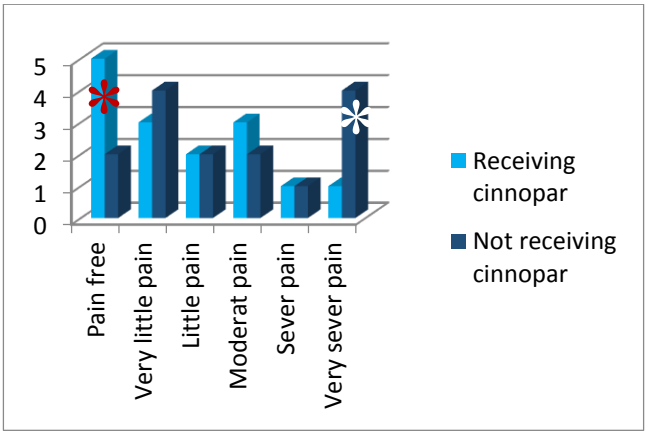

Figure 2: Evaluation of pain 3 months after surgery

The radiographic union showed that there were ten patients with the complete union (66.66%) in the receiving Cinnopar group, three patients in with the complete union (20%), and two patients with non-union (13.33%) at three months after surgery. There were eight patients with the complete union (53.33%), four patients with the incomplete union (26.66%) and three people with non-union (20%) in the not receiving Cinnopar group, the comparison of radiographic x-ray results showed a significant statistical difference between the two groups with the complete union (P = 0.04). Also, there were no significant statistical differences between the two groups in patients with incomplete and non-union at radiographic x-ray (P = 0.82, P= 0.94). Radiography results were showed 13 patients with retained fixation (86.66%), two patients with loss of fixation (13.33%) in the receiving Cinnopar group, and 12 patients with retained fixation (80%), and three patients with loss of fixation (20%) at three months after surgery. There was no significant statistical difference between the two groups (P = 0.92).

Discussion

Various factors associated with functional outcome or walking ability after treatment for hip fracture have been proposed by various researchers. Age and pre-injury walking were reported by Cheng et al [19]. The present study showed no significant statistical difference between the two groups in duration of return to activity (defined as the ability to walk without a cane and aids) during three months. However, the number of patients who can return to activity in the first three months after surgery was significantly higher in the receiving Cinnopar than the not receiving Cinnopar group. This study showed that more patients were pain-free in the receiving Cinnopar group. Also, fewer patients suffered from very severe pain in the receiving Cinnopar group. The previous studies confirm these results [20, 21]. This study showed that the number of patients with the complete radiographic union was significantly higher in the receiving Cinnopar group. This study showed that the number of patients with the complete radiographic union was significantly higher in the receiving Cinnopar group. Zandi et al. showed that the mandibular bone union after treatment with teriparatide at one month was higher than the control group [22]. Also, Shayesteh Azar et al. showed that Cinnopar was effective for therapy of long bone nonunion [15]. In contrast, Zhongju Shi et al. showed that teriparatide did not help repair fractures in patients [23]. Our study showed that fixation failure was higher in the not receiving Cinnopar than the receiving Cinnopar group, and there was no statistically significant difference.

Conclusion

Taking Cinnopar drug immediately after femoral neck fixation surgery can reduce pain. It can also prevent non-return to activity during the first three months after treatment and improve femoral neck union. But this drug does not reduce fixation failure and reduces the length of the return to activity. Therefore, it can be used as a safe and suitable drug after femoral neck fixation surgery.

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Conflict of Interest Disclosures

The authors declared no potential conflict of interests with respect to the research, authorship, and/or publication of this article.

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Authors' Contributions

All authors pass the four criteria for authorship contribution based on the international committee of Medical Journal Editors(ICMJE) recommendations.

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