



ROLE OF TERIPARATIDE IN FRACTURE HEALING AND FUNCTIONAL RECOVERY IN INTERTROCHANTRIC FRACTURES TREATED WITH PFN

Orthopaedics

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ABSTRACT

Osteoporotic Intertrochantric fractures are a serious health concern and a notable burden on healthcare systems. Faster time to union results in decreased complications and less morbidity. Teriparatide has been shown to expedite fracture union but there is sparse literature on this. All the patients who had suffered intertrochantric fractures and were treated with PFN between February 2019 to January 2020 were included in this prospective study to evaluate the effects of teriparatide on time to union and functional recovery. Patients were divided in two groups. Group 1 did not receive teriparatide postoperatively while the Group 2 received teriparatide. Patients were then followed up and evaluated on the basis of radiological union, functional outcome, pain score and the need for revision surgery. A total of 98 patients met our inclusion criterion. 8 patients were lost to follow up. Of these 42 patients received teriparatide and 48 patients did not receive teriparatide. A total of 90 patients were available for analysis. Time to union in Group 1 was longer (14.6 weeks) compared to the Group 2 (11.1 weeks). Patients in Group 2 also showed better results in terms of hip pain. Mean hip pain scores in Group 1 and 2 at 3 months were (2.6 and 1.4), and at 6 months were (2.4 and 1.2) respectively. Functional recovery in terms of ability to move inside and outside the house was also significantly better in Group 2 patients. These patients also showed less radiologic complications in terms of varus collapse and less implant cut out rate. We concluded that teriparatide was an effective adjunct therapy in osteoporotic fractures treated with PFN.

KEYWORDS

Teriparatide, Fracture healing, Intertrochanteric fractures

INTRODUCTION

Intertrochanteric fractures lead to serious morbidity and decrease the quality of life. (1-3). The absolute number of such fractures is bound to increase as the geriatric population increases in our society. Need for medical therapies that expedite the process of fracture healing has long been felt. Teriparatide, recombinant human parathyroid hormone is a human anabolic drug that has been approved for treatment of osteoporosis. Preclinical and initial data clinical data does suggest that teriparatide may enhance fracture healing, but there are few clinical studies detailing its role in fracture healing. Hence this study was undertaken to determine if treatment with teriparatide enhance the process of fracture healing and improves functional recovery in intertrochanteric fractures treated with fixation.

Materials and Methods

This prospective study was carried out at KD Medical College, Mathura. All the patients who had suffered intertrochanteric fractures and were treated with PFN between February 2019 to January 2020 were included in this study. The study was approved by the Ethics Committee and all the patients provided informed consent.

To minimize the compounding factors, all the patients treated with implants other than PFN like DHS were not included in this study. Other exclusion criterion were patients with impaired cognitive function, minimum follow up of less than 12 months, pathologic fractures, multiple fractures, patients with previous surgery on same hip and patients who were not ambulatory prior to the fracture and those who were receiving anti osteoporotic treatment prior to the surgery. Within one week post surgery, patients were offered osteoporotic treatment according to WHO guidelines. (4). There was no randomization or blinding because of financial constraints. The choice of accepting teriparatide was left to the patients. Thereafter patient were divided in two groups. Patients in Group 1 did not receive teriparatide and Group 2 received 20 microgram teriparatide (Terifrac, Intas) per day for 6 months.

All the patients had BMD examination before the surgery and clinical and radiological follow up at 1 day, 2 weeks, 4 weeks and then monthly interval till the fracture united. Patients were evaluated on the basis of radiological union, functional outcome, pain score and the need for revision surgery. This data was compared between the two groups at 3 months, 6 months 9 months and 12 months interval.

Radiological union was defined as recanalization of the trabeculae or visible bridging call us on both radiograph views. The hip pain was

graded on a 4-point scale: (1) no pain; (2) mild pain, not affecting walking or requiring regular analgesic medication; (3) moderate pain, affecting walking and/or requiring regular medication; and (4) severe pain (5) Post-operative functional scores were calculated using the mobility score of Parker and Palmer (6)

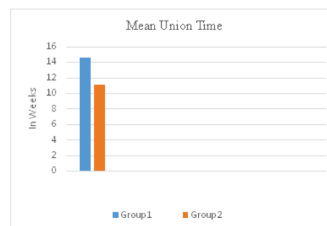
Table 1: Assessment of mobility

	No difficulty	With an aid	With the help of another person	Not at all
Ability to move inside the house	3	2	1	0
Ability to move outside the house	3	2	1	0
Ability to go shopping	3	2	1	0

The magnitude of bone shortening was measured using the method established by Leungetal (7). Failure of treatment was recognized if any of the following events occurred: penetration of the spiral blade into the hip joint or breakage of the implant.

Results

A total of 98 patients met our inclusion criterion. 8 patients were lost to follow up and hence excluded from the study. Of these 42 patients received teriparatide and 48 patients did not receive teriparatide. A total of 90 patients were available for analysis. The mean duration of analgesic use after surgery in Group 1 and 2 were 23.4 and 16.1 weeks respectively. The mean union time in Group 1 and 2 was 14.6 and 11.1 weeks respectively.



Group 1 showed significantly more varus collapse (6+-2) than Group 2 (2+-1) at the time of final radiological analysis at 12 months. There was no significant difference in sliding of the spiral blade and femoral shortening between the two groups. Implant cut out rate was significantly higher in Group 1 (6 out of 48) as compared to Group 2 (1 out of 42). There was no case of implant breakage in either group. Mean

hip pain scores in Group 1 and 2 at 3 months were (mean 2.6 and 1.4),at 6 months were (mean 2.4 and 1.2) respectively.

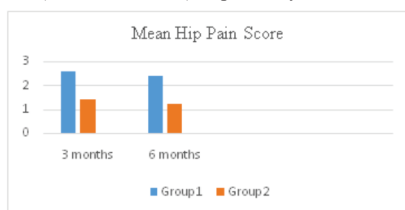


Figure 1 Mean Hip Pain Score at 3 and 6 months

Ability to get around the house at 3 months was (mean 1.1 and 1.8) respectively, and at 6 months was (mean 1.8 and 2.7) respectively.

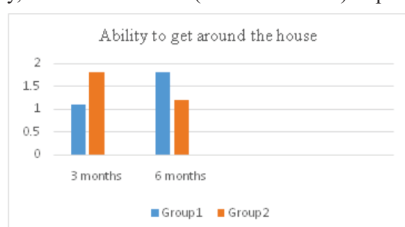


Figure 2 Ability to get around the house at 3 months 6 months

Ability to get out of the house at 3 months was (mean 0.4 and 0.7) respectively and at 6 months was (mean 0.8 and 1.5 respectively)

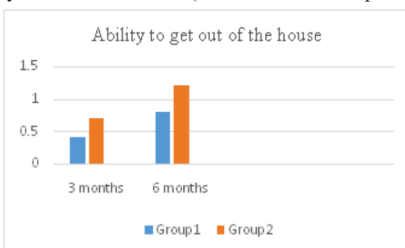


Figure 3 Ability to get out of the house at 3 months and 6 months respectively

Ability to go shopping at 3 months was (mean 0.2 and 0.7) respectively, and at 6 months was (mean .3 and 1.0) respectively.



Figure 4 Ability to go shopping at 3 and 6 months respectively.

Table 2: Assessment of mobility at the end of 3 and 6 months

	3 months (Group 1)	3 months (Group 2)	6 months (Group 1)	6 months (Group 2)
Ability to move inside the house	1.1	1.8	1.8	2.7
Ability to move outside the house	0.4	0.7	0.8	1.5
Ability to go shopping	0.2	0.7	0.3	1.0

The overall mobility score as calculated by Parker and Palmer mobility score at the end of 3 months in Group 1 and 2 was 1.7 and 3.2 at the end of 3 months and 2.9 and 4.2 respectively at the end of 6 months. At the end of 9 and 12 months after the surgery, the difference in the score did not achieve statistical significance.

DISCUSSION

Teriparatide has been shown to reduce the rate of osteoporotic fractures (8). However there has been interest in its role in facilitating fracture healing (9). It has been shown to be effective in

enhancing the mechanical properties of callus and decreasing the time for fracture union.(10-13). This has also been documented in clinical trials and case reports.(14-17). Its role in shortening the time for fracture union in distal radius has been reported by Aspenberg et al(18).

In this study we had tried to minimize the confounding factors by excluding the patients who have been taking any kind of anti osteoporotic medication prior to the surgery and also the patients who have been treated by implants other than PFN in addition to the other exclusion criterion mentioned previously. Also the implant used in all the cases was from the same company. With this strict inclusion criterion we had analysed and demonstrated decreased time to union in patients who received teriparatide in the post operative period as compared to those who did not receive the same. Patients who received teriparatide post operatively also showed significantly less varus collapse and implant cutout rate. However, due to high cost of the medication and financial constraints, we could not blind or randomize our study and the decision to receive teriparatide was the choice of the patient. Larger, randomized, multicentric studies are needed to further establish the role of teriparatide in fracture healing

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