



Dung Tran Trung^{1*}, Hieu Pham Trung¹, Sang Nguyen Tran Quang², Thai Nguyen Hoang³ and Kien Tran Van⁴

¹Hanoi Medical University, Hanoi, Vietnam

²Hanoi hospital of ministry of construction, Vietnam

³Hai Duong hospital, Vietnam

⁴Hung Vuong Hospital, Vietnam

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***Corresponding author:** Dung Tran Trung, Hanoi Medical University, No.1, Ton That Tung Street, Hanoi, Vietnam, Tel: +84-24-238523798; Fax: +86-24-38523798; E-mail: dungbacsy@dungbacsy.com

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Research Article

Evaluation of the result of total hip arthroplasty with minimally invasive surgery for fracture of femoral neck caused by trauma in Vietnamese adult

Abstract

Objectives: evaluate the result of cementless total hip replacement with minimally invasive surgery for femoral neck fracture

Subjects and methods: A prospective study of 30 patients with femoral neck underwent cementless total hip replacement with minimally invasive surgery in Viet Duc University Hospital from June 2012 to June 2013.

Results: Average age is 65.7 ± 8.3 . Male/female ratio is 0.5:1. 86.7% patients with osteoporosis situation from -2.5 to -1.5 T-score. Excellent and good result are 93.3% and no poor result. No complication intra and post-operative.

Conclusion: Cementless total hip replacement with minimally invasive surgery for femoral neck fracture have good and excellent results.

Background

Femoral neck is the weakest zone of proximal femur. Fracture of femoral neck is a type of fracture between femoral head and trochanteric, almost intracapsular and is quite common in elderly people, closely related to bone quality. In developed countries such as the United States, Europe, and the incidence of femoral neck fracture is rising, which is estimated to reach 500,000 by 2040, with treatment costs up to \$ 9.8 billion each year [1].

Femoral neck fracture can be treated by preserved treatment, osteosynthesis or hip replacement surgery. However, the risk of bone loss and the need for patient care make the methods of preservation or osteosynthesis less commonly used in reality. Total hip arthroplasty surgery can help patients move early, avoid long-term complications and be able to resume movement ability quickly, so, it is considered an ideal method to treat femoral neck fracture. However, the majority of patients with femoral neck fracture are elderly. Besides, health status and pain tolerance of patients is the problem that limited surgical indication. In recent years, with the advancement of anesthesia, the ability to intervene in the

elderly is no longer a problem. In addition, surgical advances with minimally invasive surgery reduce the discomfort and pain of surgical wounds, so the rehabilitation of patients after surgery is earlier and better [2,3,4].

There are many different methods of hip replacements for femoral neck fractures such as total hip arthroplasty, hip hemiarthroplasty, cemented or cementless joint replacement. Each type has different advantage and disadvantage and indications for different cases depends on age and bone quality of patients [5]. Through this study, we want to evaluate the result of cementless total hip replacement with minimally invasive surgery for femoral neck fracture with the following goal: Evaluate the result of cementless total hip arthroplasty with minimally invasive surgery for femoral neck fracture caused by trauma.

Subjects and Methods

Subjects: 30 patients who were diagnosed with unilateral femoral neck fractures, with no other proximal femur fractures on the same side; treated by cementless total hip arthroplasty with minimally invasive surgery at Viet Duc University Hospital, Ha Noi, Viet Nam from 6/2012 to 6/2013.

Study design: A descriptive – prospective study.

Surgical indications: Patients who have femoral neck fractures caused by trauma, grade 3 or 4 follow the classification of Garden. Aged over 60 y.o. T-score > -2.5 with measured zone in the femoral neck of contralateral hip, use Discovery dual energy X-ray absorptionmetry system, Hologic Inc. USA.

Surgical technique: The patient is set in lateral decubitus position and anaesthetized with epidural lumbar block. Used the posterior- lateral incision parallel to the femur axis, with top of the greater trochanter is midpoint, extending to neither side 4.5cm (incision <9cm: standard of minimal invasive in hip replacement). Open gluteus maximus muscle along the bundles to reveal the external rotation muscles and gluteus medius muscle. Use gosset to push the gluteus maximus muscle. Lower abduction of the pelvic muscles, from the upper edge of the quadratus femoris muscle to the upper edge of the piriformis muscle, open the joint capsule along the attachment and incision parallel to the upper edge of the piriformis muscle, to the cartilage of the acetabulum (L-shape). Use 2 Steinman nails to fixed: on the right pelvis at 12h position and 3h position on the left (9h on the right). Removal of cartilage to reveal the border of acetabulum. Perform routine hip reconstruction and cementless total hip arthroplasty with metal on polyethylene component from OmniFit system, Stryker Inc. USA. Close the hip joint capsule, restore the attachment of hip external rotation muscles group, put drainage, and restore the soft tissue.

After the surgery, patients are allowed to sit-up. The first day after surgery, patients can move slightly on bed. On the second day, take out the drainage, patients can do exercises with supporting tools.

Recorded informations: General information: Age, gender. Informations related to the surgery. Post-surgery evaluation: after 1 month, 3 months and 6 months according to Charnley score for THA postoperation patients with 4 grades [6].

Processed results using SPSS 16.0 software. Research ethics: All patients agree to participate in the research, allowing the use of medical information for scientific research and confidentiality of personal information. The research has been conducted by the Research Council of the Viet Duc University Hospital.

Results

In 30 patients of this study, the average follow-up time is 6.8 month (Table 1). The mean age when surgery is 65.7 years old (the range from 58 to 80 year old). (Table 2) illustrates the age of subjects according to 3 groups. The number of male patients in this study is 10 and 20 in female patients.

(Table 3) illustrates the bone quality of subjects measuring by T-score. Almost subjects have the bone density in the range from -2.5 to -1.5 T-score. There are only 13.3% patients in the range from -1.5 to -0.5 T-score and no patients has bone density bellow level of -0.5.

All of the patients have the early stage incision healing and none of them have a periprosthetic infection.

In (Table 4), we evaluate the postoperative results according to Charnley hip score. The percentage of the excellent and good result is 93.3%. There is not the poor result. The average time when patients can walk with walker cane is 4.3 ± 2.5 days, with the range from 2 to 7 days.

Discussion

Fracture of the femoral neck is a common injury in elderly people. Due to the anatomy structural characteristics of the femoral neck, the quality of bone in this area usually decreases with age. As a result, the risk of bone fracture increases and the heal of bone decreases. Even in young people, the rate of bone healing is only about 70% with early osteosynthesis. For the elderly patients, if the operation is late, the unhealing of femoral neck is close to 100%. Thus, the current main treatment for fracture of the femoral neck of the elderly is hip arthroplasty [1].

The mean age of subjects in our study is 65.7 ± 8.3 y.o, with the age group under 75 accounting for 90% and 40% of the patients under 65 years (Table 2). For elderly people, the higher the age, the lower the bone quality. We only selected patients with relatively high bone quality at T score > -2.5, so our study age group was also lower than those who used cemented total hip arthroplasty or hemiarthroplasty [1]. When evaluate bone quality in patients, the rate of osteoporosis at T-score group from -2.5 to -1.5 is 86.7% and only 13.3% of subjects

Table 1: Post-surgery evaluation according to Charnley scale.

Criteria	Pain	Amplitude of movement	Movement	Supporting tool
Excellent	No pain	Normal	Normal	No
Good	No pain	50% of normal	Moderate limping	1 crutch
Medium	Moderate	Inadequate	Moderate limping	2 crutches
Poor	Severe	Limited	Severe limping	2 crutches

Table 2: The age of subjects.

Age	Age group			Total
	<65	65-75	>75	
Value	12	15	3	30
Percentage	40%	50%	10%	100%

Table 3: The bone quality of subjects (with T-score).

Bone quality	T source			Total
	-2.5 to -1.5	-1.5 to -0.5	>-0.5	
Value	26	4	0	30
Percentage	86.70%	13.30%	0%	100%

Table 4: Evaluation of postoperative results according to Charnley hip score

Result	Excellent	Good	Fair	Poor	Total
Value	18	10	2	0	30
Percentage	60%	33.30%	6.70%	0%	100%

with osteoporosis are at T-score from -1,5 to -0.5 (Table 3). The group of patients with osteoporosis ranged from -1.5 to -0.5, mainly in group under 65 years of age and male patients group. The majority of authors agree with our indication to use cementless total hip arthroplasty for moderate grade of osteoporosis [7,8] because of the principle of the strengthening of the cementless prosthetic based on mechanical compression of the skeleton on the joint and the development of the bone tissue into the prosthetic joint surface. If the quality of bone is too low (T-score < -2.5), the risk of the post-operative bone fractures and prosthetic loosening will be very high.

The surgery results in our study are quite fine with excellent and good result are 93.3% and there is no poor result (Table 4). When compared with other authors used THA surgery for femoral neck fracture treatment, there is no difference [2,3,5,8]. Ability to rehabilitation very soon with 4.3 ± 2.5 days (2-7 days). Good results are due to the minimally invasive incision, less tissue damage should reduce the pain after surgery for the patient, the restoration of the joint capsule and the attachment of the muscle also is ensured so that the joint mobility and the gait of the patient will return to normal soon. In addition, beside the sterile conditions of the operating room, with minor incision, the risk of peri-prosthetic infection should be reduced. In our study, the incidence of peri-prosthetic infection is 0% (Table 5). Studies of other authors suggest that total hip arthroplasty with minimally invasive incision gives good results both in the early and late stages [2,3,8]. However, this technique requires the surgeon must have experience in surgery and be trained basically.

Table 5: Early postoperative results.

	Results	N	%
Incision healing	Good	60	90.91
	Superficial infection	6	9.09
	Good	59	89.39
Postoperative X-rays	Minimal displacement	7	10.61
	Significant displacement	0	0

Conclusion

According to our study, measured in 30 femoral neck fractures patients undergoing MIS total hip arthroplasty surgery with the average age of 65.7 ± 8.3 , there are 86.7% of patients have osteoporosis level from -2.5 to -1.5 T-score. The results are good and excellent at 93.3% and there is no poor result. There is no complications during and post operation. Thus, THA surgery with minimally invasive incision was a good treatment for the femoral neck patients with moderate osteoporosis level.

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