

Long Term Results of Valgus Intertrochanteric Osteotomy in Old Fracture Neck of Femur – A Prospective Analysis

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Abstract

A prospective study (data collected retrospectively from January 2011 to December 2018) was conducted in the department of orthopaedics in SCB Medical College and Hospital from December 2018 to December 2020 on patients with old fracture neck of femur. A total of 42 cases were included for the study who had undergone this surgery before December 2019. Valgus Intertrochanteric Osteotomies included McMurray's Osteotomy, Modified Pauwel's Osteotomy and Transfracture Abduction Osteotomy. Thirty six patients were followed up only as Six patients could not be contacted. Valgus Intertrochanteric Osteotomy of proximal femur was found to be the mainstay of the treatment in young patients. Initially Mc Murrays Osteotomy was preferred but in recent times modified Pauwel's Intertrochanteric Valgus Osteotomy and Trans Fracture Abduction Osteotomy was considered as an augmentation to the healing of a fracture neck of femur which presented late.

Keywords: Valgus intertrochanteric osteotomy, Old neck of femur fracture, Fixation

Introduction

Fracture neck of femur is aptly called as “the unsolved fracture” [1]. This is because even with so much of advances in orthopedic field, there is no simple method of treatment which can give consistently successful results for this fracture. Management of this fracture especially in younger patients is a really demanding and challenging task for any orthopaedic surgeon [2].

Fracture neck of femur is common in old people as many of them are osteoporotic [3]. With improvement in quality of life leading to increased life expectancy, the incidence is even more common nowadays. Due to the congested vehicular traffic, it is also commonly seen in young patients after road traffic accidents. Because of its peculiar blood supply, a fracture neck of femur may cause circulatory disturbance leading to avascular necrosis and non-union [4]. So every fracture neck of femur should be treated as an emergency. It should be reduced accurately anatomically and fixed stably by one of the many implants available now. Usually undisplaced stable fractures have a good prognosis and displaced unstable fractures a poor prognosis [5].

In our part of the country, because many patients go to native bone setters for treatment of fractures, these patients present quite late and with non-union of fracture neck of femur. Another factor leading to non-union is the angle of inclination of fracture [6]. Usually horizontal fractures with less than 30 degrees of powels angle unite

well and those with more than 30 degrees may result in non-union even when treated expertly [7]. This is because in fractures with more than 30 degrees of inclination, the resulting forces will act as shearing forces leading to displacement of fragments and non-union. McMurray's Osteotomy though initially designed to treat osteoarthritis of Hip by changing the weight bearing area of the femoral head, its use was extended for treating old fracture of neck of femur [8]. Surgeons in developing countries preferred this because the distal fragment shifting medially acted as a load bearing mechanism like a “Chair effect”, while the abduction helped in reducing the Powels angle [9]. Before advent of several varieties of fixation for the osteotomy, even the patients were immobilized in hip spica plaster. While using a Hook plate to fix the osteotomy, the fracture of femoral neck could be fixed with cannulated cancellous screws [10].

The Pauwels principle which was described in 1927 is used even today successfully. Pseudoarthrosis of femoral neck may unite if inclination of Pseudoarthrosis is changed in such a way that the shearing forces are converted into compression forces and converting unstable fracture into stable one [11]. This leads to endochondral ossification of the fibrocartilage at pseudoarthrosis making the fracture unite [12]. Since our patients require squatting for their routine daily activities, it is important to preserve the natural femoral head by making the fracture unite. One should not think of prosthetic replacement for every patient with fracture neck of femur.

The best end result after fracture neck of femur treatment is the patient's own healed femoral head and neck and every attempt must be made to achieve that goal. In the passage of time varieties of osteotomies were used to augment healing in old fracture neck of femur. McMurrays osteotomy was mostly being done, after which Powels proximal femoral valgus osteotomy became popular by using different types of fixations like DHS, Double angled DHS. Dr. Magu's



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Figure 1: 43-year-old lower middle class male who presented with 6 months old fracture neck of Left femur in 2011 was treated with McMurray's Osteotomy and internally fixed with Wainright's plate was treated with implant removal in Jan 2018 and Total Hip Replacement in Dec 2018. Patient was followed up in July 2019.



Figure 3: 35-year-old male with 2 months old fracture neck of Left femur was treated with Modified Pauwel's Osteotomy and fixed with single angled blade plate and one CC Screw. Patient was followed up with no shortening but restriction of terminal 20 degrees of flexion and extremes of rotation.



Figure 2: 52-year-old male with 4 months old fracture neck of Left femur was treated with McMurray's Osteotomy and fixed with hook plate through which 2 CC Screws were passed into the neck. Patient had nearly full range of motion and Trendelenburg negative but required removal of the plate for trochanteric bursitis. Patient was followed up in 2018.



Figure 4: 20 years old male with 2 months old fracture neck of Left femur was treated with Transfracture Abduction Osteotomy and fixed with modified trochanteric plate in Oct 2019. Patient was followed up in November 2020. He had no limb shortening with full range of motion of left hip and could walk around comfortably.



VITO (Valgus Inter Trochanteric Osteotomy) using Angled Blade plate is quite popular method now [13]. Recently Pingley shared his experience of treating old fracture neck femur cases by Transfracture Abduction Osteotomy [14]. Postoperatively he immobilised the patients with Hip Spica Plaster.

It was worthwhile to prospectively study the long term results of various methods of osteotomy for treatment of old neglected fractures of femoral neck.

Materials & Methods

This was a prospective study (data collected retrospectively from January 2011 to December 2018) conducted in the department of orthopaedics in SCB Medical College and Hospital from December 2018 to December 2020 on patients with old fracture neck of femur. Ethical approval was obtained from the institutional ethical committee. Patients fulfilling inclusion/exclusion criteria were included in the study after obtaining informed written consent.

Patients with intracapsular fracture neck of femur more than 3 weeks old who were operated at our institution were included in the study. Patients who were lost to follow up were excluded from the study. Cases were selected from bed head tickets in the record room of SCB

MCH. The Main OT register of the department of orthopaedics, SCBMCH was also evaluated.

After getting the contact number and address details, the operated patients were contacted over cell phone or by sending request letters for availing information/for follow-up in OPD or they were met in person. Thus, the functional status of the patients were evaluated and observations made. The selected cases have been thoroughly evaluated and investigated as per a specified proforma designed for the study.

Observations

About 882 cases of fracture neck of femur (of different age groups) were encountered from October 2010 to December 2019. The cases who were admitted later and were not followed up for at least one year were not included.

As a routine procedure 11 cases of pediatric age group were treated by Moore's pinning and the cases which were treated by osteosynthesis were mostly managed by multiple cancellous cannulated hip screws (209 cases) whereas 60 cases were treated by DHS. Patients at a higher age group were treated by THR/Hemiarthroplasty considering the clinical presentation and co-morbidities present.

From the bed head tickets of patients who were exposed to head salvaging surgery, it was seen that the cases presented quite late (after 3 weeks) or sometimes even after two and a half years. Some cases who had previous osteosynthesis but failed finally required osteotomy. In some selected cases fibula was used along with the implant used for osteosynthesis.

A total of 42 cases were included for the study who had undergone this surgery before December 2019. We had few cases which had been operated after December 2019 and thus were not included in this study as the follow up period was very short.

These 42 patients were contacted by sending letters or over phone wherever the contact number was available. Only 28 patients of the total 42 patients responded. We tried to contact the rest of the patients by sending information through someone who resides near their village or by even going there personally to meet the patients and know their present condition. The whereabouts of 6 patients could not be ascertained by any of these means. 17 of the 28 patients who responded came and attended the OPD for clinical and radiological examination. We tried to record the present clinical condition of the rest 19 patients who could not come for follow up along with the details of the radiographs done during their follow ups before.

Out of these 19 patients, one was operated in 2011 with McMurray's osteotomy. He was admitted with 5 weeks old fracture neck of femur at the age of 38 years. He suffered from chronic renal failure later though he was walking around and doing his profession of cultivation after 7 months of surgery. He expired in January 2018.

In total we followed up 36 cases who had undergone osteotomy for old fracture neck of femur. The initial presentation of the case pertaining to time since injury, limb shortening and co-morbidities etc. were recorded from the bed head tickets. One of the patients treated with McMurray's Osteotomy in 2011 was later admitted for secondary osteoarthritic changes and was treated with Total Hip Replacement in December 2018.

It was observed that McMurray's osteotomy with pelvic support was preferred in earlier times and was virtually abandoned after 2013. Pauwel's IT Valgus osteotomy has been the preferred method after that where the implants differ from DHS to angled blade plate. This fixation was augmented by a cannulated cancellous screw with a washer. Fibula was used to augment in 2 McMurray's and 3 Pauwel's osteotomy cases. It was seen that the McMurray's Osteotomy cases which was fixed by Wain right plate mostly required a boot and bar plaster to immobilize post operatively. But a modified hook plate when used did not require immobilization.

The patients treated with McMurray's osteotomy mostly could ambulate and go back to their work by 6-7 months from the date of surgery. The common complication encountered was backing out of cannulated screws or irritation at the tip of trochanter when the implants were removed. Out of the 14 cases of McMurray's osteotomy, four were lost to follow up. From the rest 10 cases, it was found that 3 patients had nearly full range of motion of the hip joint with very minimal limping and Trendelenburg test was negative. From the rest 7 patients which have been followed up for more than 9 years, 6 patients were found to be limping and have occasional pain and may require THR in near future.

Since February 2018, 3 cases of old fracture neck of femur were treated by trans fracture abduction osteotomy (popularised by Dr.

	Post Op Shortening in this Study (McMurray's Osteotomy with Internal Fixation)	Post Op Shortening in Dr Naveen Nair's Study (Mc Murray's Osteotomy without Internal Fixation)
MEAN	0.9	1.875
SD	0.5	0.75
N	10	12
Range	0-2	1-4

Table 1: Post-op shortening in McMurray's osteotomy

	Post Op Shortening in this Study (Pauwel's Osteotomy)	Post Op Shortening in Magu et al Study (Pauwel's Osteotomy)
Mean	1.5	1.9
SD	0.625	0.4
N	24	8
Range	0-2.5	1.5-2.5

Table 2: Post-op shortening in Powell's osteotomy

Pingle in India). These patients were not required to be immobilized after fixation by a modified plate for fixation of the fracture neck along with the osteotomy. Out of these 3 cases, 2 cases were included in the study as they have completed more than one year of follow up and both of them had good range of movements at the hips with minimal limping.

Comparison

P-Value = 0.0022 which is statistically significant 95% CI = -1.55 to -0.39

t = 3.50

Degree of Freedom = 20

Standard Error of Difference = 0.278

P-Value = 0.1017 which is not statistically significant 95% CI = -0.88 to 0.08

t = 1.68

Degree of Freedom = 30

Standard Error of Difference = 0.237

Postoperative shortening in Trans Fracture Abduction Osteotomy (2 cases followed up in this study) could not be compared with any other article as because the sample size is very low (n = 2) and the comparison would not be statistically significant.

Discussion

We have taken Valgus Intertrochanteric Osteotomy into account which includes-

1. McMurray's Osteotomy
2. Modified Pauwel's Osteotomy
3. Transfracture Abduction Osteotomy

In this study, McMurray's Osteotomy was fixed either with a Wainright Plate or a Trochanteric Hook Plate. Modified Pauwel's Osteotomy was fixed either with a Double Angled DHS or an Angled Blade Plate. Transfracture Abduction Osteotomy was fixed with a Modified Trochanteric Plate.

The notable complications were Limping, Occasional Pain, Infection, CC Screw backout, Trochanteric Bursitis, Secondary Osteoarthritis of Hip, Avascular Necrosis of Femoral Head. The pre-op and post-op shortening (limb length discrepancy) as well as type

of ambulation (assisted/unassisted) was recorded and compared with a few study articles.

The post-op shortening (limb length discrepancy) in this study in the cases treated with McMurray's Osteotomy and internal fixation was statistically compared with that of Nair et al [15] study article who did not use any type of internal fixation after doing McMurray's Osteotomy but used hip spica immobilization instead. Nair et al [15] found a mean post-op limb length discrepancy of 1.875 cm in a sample size of 12 cases (n=12). The maximum shortening observed was 4 cm while the minimum was 1 cm. The standard deviation was 0.75 [16]. In our study, we found a mean limb length discrepancy of 0.9 cm in a sample size of 10 cases (n=10). We found a maximum shortening of 2 cm and a minimum of 0 cm (no shortening). Standard deviation in our study was 0.5. When statistically compared by Student's t test, we found:

P value = 0.0022 that's statistically significant 95% CI = -1.55 to -0.39
t = 3.50

Degree of Freedom = 20

Standard Error of Difference = 0.278 (Table 1)

This could be due to the internal fixation used in our study compared to the post-op hip spica immobilization used by Nair et al [15]. Thus, McMurray's Osteotomy along with Internal Fixation (Wainright plate [17] or Trochanteric hook plate [18]) is superior to McMurray's Osteotomy alone (with post-op hip spica immobilization [19]).

The post-op shortening in this study in the cases treated with Modified Pauwel's Osteotomy with internal fixation was statistically compared with Magu et al [20] study article Magu et al found a mean limb length discrepancy of 1.9 cm in a sample size of 8 cases (n = 8). The maximum shortening observed was 2.5 cm while the minimum was 1.5 cm. The Standard Deviation was 0.4. In our study, we found a mean limb length discrepancy of 1.5 cm in a sample size of 24 cases (n=24). The maximum shortening observed was 2.5 cm while the minimum was 0 cm (no shortening). The Standard Deviation in our study was 0.625. When statistically compared by Student's t test, we found:

P value = 0.1017 that's not statistically significant 95% CI = -0.88 to 0.08

t = 1.68

Degree of Freedom = 30

Standard error of Difference = 0.237 (Table 2)

Thus, in our study we found similar results as Magu et al with respect to post-op shortening and that too in a higher sample size (n =24) compared to Magu et al (n=8).

Valgus Intertrochanteric Osteotomy has been considered the mainstay of the treatment of old fracture neck of femur mostly in young adults as it involves preservation of biological femoral head. Modified Pauwel's valgus intertrochanteric osteotomy and Transfracture Abduction Osteotomy have been considered in recent times to augment the healing of a fracture neck of femur which presented late. McMurray's Osteotomy is still being used as an option for the treatment of old fracture neck of femur.

Limitations

1. Sample Size is small.
2. Six cases were lost to follow up.
3. The number of cases of transfracture abduction osteotomy followed up are very small (2 cases).
4. The follow up parameters considered are only the pre-op and post-op Limb Length Discrepancy and the type of ambulation.

The ignorance about the need for surgical intervention in fracture neck of femur, faith in native treatment and unwillingness or lack of desire to receive institutional treatment are the key factors that lead to rise in the number of cases of neglected fracture neck of femur which eventually need Valgus Intertrochanteric Osteotomy.

Conclusion

Preservation of biological femoral head in cases of patients presenting with fracture neck of femur presenting late is the aim of the treating surgeon. Valgus Intertrochanteric Osteotomy of proximal femur is considered to be the mainstay of the treatment. Modified Pauwel's Intertrochanteric Valgus Osteotomy and Trans Fracture Abduction Osteotomy may be considered as an augmentation to the healing of a fracture neck of femur which presented late.

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Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his/her consent for his/her images and other clinical information to be reported in the Journal. The patient understands that his/her name and initials will not be published, and due efforts will be made to conceal his/her identity, but anonymity cannot be guaranteed.

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