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Original research article

Study Of Outcome Of Intracapsular Fracture Of Neck Of Femur In Elderly Patient Treated By Hemiarthroplasty

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Abstract

Background: clinical study fifty cases of intracapsular fracture neck of femur in elderly patients above the age of 50 years irrespective of sex treated by hemiarthroplasty using unipolar (Austin moore's / Thompson's) or bipolar endoprosthesis, in the Department of Orthopedics, were followed up and functional results were analysed with the objectives, to study the age and sex incidence of fracture neck of femur, quality of life after hemiarthroplasty, morbidity and mortality associated with the procedure.

Methods: Fifty cases of fracture neck of femur in elderly patients above the age of 50 years treated by hemiarthroplasty using either unipolar or bipolar prosthesis in the Department of Orthopaedics at All india institute of medical sciences, Patna. Study duration period of two years, were selelected on the basis of purposive sampling or judgement sampling method.

Conclusion: The success of hemiarthroplasty no doubt depends on preoperative planning and proper attention to surgical details to achieve the optimum biomechanical stability. The poor results (11.1%) were due to moderate to marked pain in the hip or thigh after hemiarthroplasty. We conclude that hemiarthroplasty for fracture neck of femur is a good option in elderly patients.

Keywords: Unipolar, Bipolar, Hemiarthroplasty , Femoral neck fracture.

Introduction

Hip fractures are devastating injuries that most commonly affect the elderly and have a tremendous impact on both the health care system and society in general. Despite of marked improvements in implant design, surgical technique and patients care, hip fractures consume a potential proportion of our health care resources.[1]Fracture neck of femur has been recognized since the time of Hippocrates and is a common orthopaedic problem in elderly. Various methods of treatment have been employed since ages. But the problem remains an enigma unsolved till today.[1] The prolonged immobilization in elderly will jeopardize the life span of patient and furthercomplicates the problem. This forces one to totally abandon the complete immobilization to achieve a bony union, or to resort early ambulatory procedures by surgery. It is a known fact that the hip is a weight bearing joint and has to performmany functions. A successful operation at the hip joint should provide painless,stable hip with wide range of movements. But none of the accepted procedures have been able to achieve this goal fully. The blood supply to the neck and head of the femur is extensive, intricate and complicated.[2] Healing process mainly depends on the good blood supply. This furtherhandicaps the treatment

of these fractures and the healing process is always in doubt. Under such circumstances one has to decide whether the prolonged immobilizationhas to be employed to achieve the bony union or quick ambulation by hemireplacement anrthroplasty, Earlier hemireplacement arthroplasty by using vitallium or stainless steel was popularly practiced by Austin Moore's produced fairly good results. But it had its limitations in loosening and reactions at acetabulum etc. Many of the shortcomings ofthis procedure were overcome by a new type of prosthesis, which had the great advantage of second joint, below the acetabulum. It was named as bipolar prosthesis, since it had an outer head of metal which articulates with the acetabulum and a secondinner small metallic head which articulates with the high density polyethylene (HDPE), lining the inner surface of the outer head. This prosthesis is very useful and results are encouraging. his clinical study presents the short term results of prospective randomised trial of hemiarthroplasty for the treatment of displaced femoral neck fractures in the elderly.

Objectives

To study the age and sex incidence of fracture neck of femur, To study the quality of life after hemiarthroplasty, To study the morbidity and mortality rate associated with the procedure.

Review of Literature

In 1822, in his book titled "A treatise on dislocations and fractures of joints"he has clearly delineated the differences between intracapsular and extracapsularfarctures. He believed that non-union of intracapsular fractures was due to loss of blood supply to the proximal fragment and most femoral neck fractures wouldeventually heal with a fibrous union and that such patients would suffer "permanent lameness". He also noted that incomplete fractures would unite by ossification. Astley cooper advocated a regimen of bed rest with affected limb extended and supported by pillows until pain subsided, followed by mobilization with crutches and gradual weight bearing. He did post-mortem examination of patients who died after femoral neck fractures and none of the fractures were united by bone (ossific union). In 1866, Hamilton and Stimson explained the preferential treatment of internalfixation for fracture neck of femur, quoting surgeries performed by John Ray Burtonin Philadelphia in 1834. In 1867, Philips introduced a technique for longitudinal and lateral traction to be used in the treatment of femoral neck fractures to eliminate "shortening or other deformity". In 1838, internal trabecular pattern of femoral head and neck was described byWard. Vascular anatomy of head was described by Crock. Mechanism ofinjury was suggested by Kocher.[1] He also advocated excision of head as intracapsular fracture would fail to unite. Whitman and lead better methods of closed reduction were important contributions to the conservative management. In 1902, Whitman advocated careful closed reduction under X-ray control followed by hip spica application. This produced a few satisfactory unions, but extremely high morbidity and mortality. In 1908, Davis reported use of ordinary wood screws for the fixation offemoral neck fractures. Similar screws were used by Dacosta in 1907, Delbet in 1919 and Martin and Knight in 1920. Hey Groves in 1916 designed a quadriflanged nail to obtain better fixation but it failed because of unsatisfactory material. The first effective method of internalfixation was introduced in 1931 by Smith Peterson and associates. The triflanged nail now bears his name as S.P. Nail. When properly used succeeds in preventing the rotation and with improved alloy constituted in the nail does not produce any tissue reaction. Moore (1934) enlarged upon the multiple pin principle of Martin and starting with three pins gradually increased to five. He continued to emphasize the need for impaction and devised a punch to accomplish this. Knowels (1936) advocated threaded pins placed as far apart as possible in the head in an effort to obtain "absolute fixation" It is dissatisfaction of many surgeons with the above methods of treatment particularly in older people that lead to trail of hip prosthesis as a final procedure in reestablishing a painless, functional and stable hip, thereby escaping the

uncertaintyof bony union and late onset of osteoarthritis. Innumerable reports similar to upper femoral prosthesis have appeared since then including those of McKeever (1961) who used stainless steel, Movin (1957) whose prosthesis has a long stem, Kevethe (1957) who used titanium stem, Fitzgerald (1952) used all purpose stainless steel head and neck prosthesis and Lippmani's Cranetype (1957). Christiansen described trunnion type of bipolar prosthesis which allowed axial movements between head and neck of prosthesis (flexion and extension) and other movements between prosthesis and acetabulum. The erosion of bone on the pelvic side (acetabulum) brought attention toresurface the acetabulum. Metal-on-metal total hip arthroplasty described by McKee- Farrar (1966) did not prove satisfactory because of friction and metal wear. The credit of modern total hip replacement should go to Sir John Charnley (1967). He believed that the various types of femoral neck fractures represent differentstages of the same displacing movement. In his classification, the direction of medial or compression trabeculae rising superiorly into the weight bearing dome of thefemoral head is used to indicate the degree of rotation of the fracture in the anteroposterior radiograph. Aseptic necrosis is one of the two important complications of femoral neck fracture. Aseptic necrosis is the actual death of bone secondary to ischemia, an early phenomenon after fracture neck femur and is a microscopic event. Late segmental collapse is the collapse of the subchondral bone and articular cartilage that overliesthe infracted bone. This collapse results in articular incongruity, pain and degenerative joint disease. The tender vascular buds during revascularisation of fracture can be repeatedlytorn if there is persistent motion at the fracture site owing to poor stabilisation. Moore demonstrated that in a poor reduction the surface area for blood vessels to grow up theremaining neck is decreased so that the incidence of aseptic necrosis and late segmental collapse is increased when the fracture is poorly reduced. Smith demostrated that excessive rotation about the longitudinal axis or excessive valgus at the time of reduction may obstruct the remaining blood supply in the ligamentum teres. Fielding and Lowell mention that insertion of a screw for fixation may rotate the femoral head fragment, thereby obstructing the remaining blood supply in the capsule and ligamentum teres. A nail placed superiorly and laterally in the femoral head may disrupt the lateral epiphyseal vessels and therefore increase the risk of AVN.

Material and methods

The present study includes 50 cases of intracapsular fracture neck of femur in elderly patients above the age of 50 years irrespective of sex treated by hemiarthroplasty using unipolar or bipolarendoprosthesis, in the Department of Orthopaedics at, All India institute of medical sciences, Patna Bihar. Study duration of two years. The study was carried out to evaluate the immediate and early results of hemiarthroplasty for intracapsular fracture of neck of femur in elderly.

Exclusion criteria Patients with dementia 2. patients who were nonambulatory 3 Patients with pathologic femoral neck fracture and 4 Patients with additional acute lower extremity fractures in addition to the femoral neck fracture. Fifty cases treated by hemiarthroplasty were followed up for 6 months. At the end of 6 months following surgery 2 patients died and 3 patients lost for follow up. The functional results after hemiarthroplasty are therefore analysed for the remaining 45 patients. Once the patient was admitted to the hospital, all the essential information wasrecorded in the proforma prepared for this study. They were observed regularly during their hospital stay till they get discharged. Patients were admitted to the ward. Detailed history was taken with particular emphasize on mode of injury and associated medical illness. In depth, clinical assessment was carried out in each case. In all patients preoperatively Buck's traction with appropriate weight wasapplied, to the fractured lower limb, with the aim of relieving pain preventing shortening and to reduce unnecessary movements of the injured limb.

Oral or parental NSAIDs were given to relieve the pain. Anteroposterior radiographs of the affected hip joint of pelvis with bone hips were taken for all the patients, keeping the fractured limb in 15^0 internal rotation to bring the neck parallel to X-ray film.

Results

In our series the maximum age was 90 years in case of males and 82 years in case of females. Most of the patients were in the age group of 50 - 70 years with the mean age of 65.33 years for males and 64.73years for females. In our series there were 26 female patients and 24 male patients this shows preponderance of females over males.

Table 1: Distribution of sample by age and sex

Age groups(in years)		SEX		Total
		Male	Female	
50-59	Frequency	6	7	13
	%	25.0%	26.9%	26.0%
60-69	Frequency	10	9	19
	%	41.7%	34.6%	38.0%
70-79	Frequency	5	9	14
	%	20.8%	34.6%	28.0%
80-89	Frequency	2	1	3
	%	8.3%	3.8%	6.0%
90-99	Frequency	1	-	1
	%	4.2%	-	2.0%
Total	Frequency	24	26	50
	%	100.0%	100.0%	100.0%

CC=0.219; P<.639 (NS) :: X^2 for age alone=23.6; P<.000 (HS)

Left hip was more often fractured than the right hip. There were 27 patientswith fracture on left side compared to 23 patients with fracture on right side.

Table 2: Descriptive statistics for the side of fracture of the sample selected

Side	Frequency	Percent
Right	23	46.0
Left	27	54.0
Total	50	100.0

X^2 =0.320; P<.572 (NS)

Majority(74%) of fractures were subcapital type on radiographic examination .There were 37 patients with subcapital type of fracture and 13 patients with transcervical type of fracture.

Table 3: Descriptive statistics for the type of fracture of the sample selected

Type of fracture	Frequency	Percent
Sub capital	37	74.0
Trans cervical	13	26.0
Total	50	100.0

X^2 =11.52; P<.001 (HS)

Majority(84%) of the patients had minimal trauma most of them slipped and fell down on flat ground or in bathroom and were not able to walk or stand. Five patients were involved in road traffic accidents. Three of them were hit by vehicles, 2fell down while riding the bicycle. One patient in our study was treated earlier for femoral shaft fracture. On radiographic examination

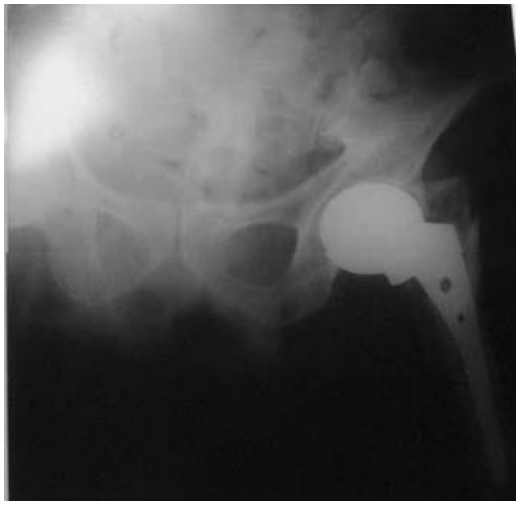
of the affected femur on the same side of fracture neck of femur, the fracture was well consolidated with Kuntscher nail insitu. In this case K-nail was removed before doing hemiarthroplasty using Austin Moores prosthesis. One patient had hemiarthroplasty with Austin Moores prosthesis done four years back for the fracture neck of femur on opposite hip. He had slight pain in thathip and on radiograph there was loss of joint space reflecting acetabular erosion.There was no evidence of dislocation or sinking of prosthesis but there were radiolucent zones around of the prosthesis. Twenty patients in our series had various medical and surgical problems. Hypertension, anaemia and diabetes mellitus were the most common problems. One patient had Parkinson's disease. They were seen by physician in the early period of hospitalization and were given necessary treatment. One patient had indirect inguinal hernia for which surgical opinion was obtained before doinghemiarthroplasty. The functional outcome after hemiarthroplasty for intracapsular fracture neck of femur was graded as excellent, good and fair after adding the scores given for eachcriteria for assessment of hip. In our series total Harris hip score at the end of six months ranged form 24 to 100. Fifteen (33.3%) hemiarthroplasties had hip scoresform 91 to 100 (excellent). Fifteen(33.3%) had hip scores 81 to 90 (good). Nine hips(20%) were rated 71 to 80 (satisfactory) and six (13.3%)were rated 24 to 69 (poor). Thus 86.7% of the hips were classified as having a satisfactory to excellent result and 13.3% of the patients had a poor result.

Discussion

Management of fracture of femoral neck still remains major and difficultundertaking for an orthopaedic surgeon. The pendulum is swinging between reductionand internal fixation with various supplementary methods as osteosynthesis to totalhip replacement. It is now the general feeling that reduction and internal fixation should be reserved for the younger patients in whom if needed revision surgery maybe done at a later date. Primary prosthetic replacement in older patients who are activeand need early mobilization should be considered. The average age of our patients was 65.33 years in case of males and 64.73 years in case of females. Majority of the patients were between 51-70 years. Thephysiological age of our patients is more than the chronological age and hence these patients are considered old for all practical purposes. In our series the intracapsular fracture of femoral neck were foundto be more common in females. The elderly females are more prone to fracture neck of femur due to osteoporosis (Choudhari & Mohite 1987). Female preponderance has been reported in several series. Depending on the anteroposterior radiographic view available they were grouped into subcapital and transcervical type. In our series 74% patients had subcapital fracture and 26% had transcervical type of fracture. Klenerman and Marcuson (1970) defined subcapital fracture asthe one that occurs immediately beneath the articular surface of the femoral head along the old epiphyseal plate and a transcervical fracture was referred to the fracture passing across the femoral neck between the femoral head and greater trochanter. Klenerman and Marcuson (1970) and Garden (1974) suggested that this differentiation cannot be made distinctly in radiographs. All the fractures in our series belonged to displaced fractures of Garden Type III and IV. Depending on the anteroposterior radiographs available, we could group 32 patients (64%) into type III and 18 patients (36%) into Garden type IV. G.S. Kulkarni (1987) had grouped type III and type IV into one groupof 'displaced fractures' and reported it in 82.5% of his patients. Sanchetti et al. (1987) reported 30% Garden type III and 22.5% Garden type IV in a series distributed between 20 to 80 years of age. Mukherjee &. Puri (1986)had 85% patients of Garden type III and IV fractures. Sikroski and Barrington (1981), G.S. Kulkarni (1987)] are taken into consideration while selecting hemiarthroplasty for the management of fracture neck of femur. Bavadekar and Manelkar (1987), emphasised not to choose hemiarthroplasty in Garden type I and II fractures even in old individuals. We have

followed the same philosophy while selecting the patients for hemiarthroplasty. Colonel M.K. Seth (1987) and several other authorities believe that the intracapsular fracture are stress fractures through pathological bone secondary to osteoporosis or osteomalacia. One of our patient who had broken his hip due to vehicle accident had associated Colles' fracture, a well known injury among the elderly. He was treated by closed manipulation and plaster of paris cast. patient had hemiarthroplasty done on opposite hip using Austin Moore prosthesis four years earlier. There was no evidence of subluxation or dislocation of the prosthesis in radiograph.

Old fracture neck of femur treated byhemiarthroplasty on right side



Hemiarthroplasty of left hipwith AMP insitu

The common problem in our series were gross anaemia, hypertension, diabetes mellitus, chronic bronchitis and bronchial asthma. Forty percent of our patients had one or more of the problem. Hinchey and Day (1964) reported similar problems in 84.6% of their patients, whereas rest also had slight anaemia and mild hypertension with good health. Anaemia was a major problem which is not commonly found in western literature. Ischaemic heart diseases are common in western series, which are not foundso common in our series. The patients with ischaemic heart disorder most of the time do not agree for anaesthetic risk. The mild ischaemia in hypertensive old patients was not grouped separately. Hypertension, diabetes mellitus were commonly detectedafter the patient got admitted with fracture neck of femur. There is another importantdifference, the patients with nervous system disorder and mental problems are not found in our series whereas they were common in western series. This is probably because the already handicapped patients are either not brought to the hospital when they fracture their femoral neck or are restricted from activities hence incidences of fracture are less. This is also true for blind patients. One patient in our series had hypertension with parkinsonism. Another patient had indirect inguinal hernia which was reduced manually before doing hemiarthroplasty.

Conclusion

A review of literature on intracapsular fracture neck of femur has been presented. Its pertinent anatomy, traumatic and biomechanical principles has been reviewed. Fifty cases of fracture neck of femur who were treated by hemiarthroplasty using either unipolar (Austin Moore/ Thompson prosthesis) or bipolar prosthesishave been presented. The follow up results are analyzed and discussed.

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