

Pathological fractures of femur: A study of surgical management and monitoring using Lower Limb Functional Score and VAS Score

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Abstract

Purpose: To analyze the results of surgical intervention for pathological fractures of femur.

Materials and Methods: All patients (n = 30) that underwent osteosynthesis or arthroplasty for pathological fractures of the femur between period extending from June 2015 to November 2016 were included. Data were recorded from the patients' medical record and the outpatients' clinics files. Primary and secondary tumors, metastases and types of pathological fractures, surgical procedures, and postoperative complications were recorded. Lower limb functional scale was used for functional evaluation at 1 year.

Results: There were 16 males and 14 females. Following pathologies were detected - 10 cases of Unicameral Bone Cyst (UBC); 5 cases of Aneurysmal Bone cyst (ABC); 2 cases of eosinophilic granuloma; 3 cases of fibrous dysplasia; 3 cases of osteosarcoma; 4 cases of multiple myeloma; 2 cases of metastases and 1 case of osteoid osteoma. Patients were treated with following surgical interventions - Application of compression plates - 9; Recon Nail - 8; Dynamic Hip Screw - 5; Hip arthroplasty - 6; Combination of nailing and plating - 2. In our study of 30 patients the mean VAS which was pre operatively - 9; was reduced to 4 at the end of 6 months and to 1 at end of 1 year. Thus showing satisfactory reduction in the pain intensity. The mean LLFS which was pre operatively 10.88 was improved to 45.55 at the end of 6 months and to 71.91 at end of 1 year. Thus showing satisfactory improvement in the lower limb function. Three postoperative complications occurred. 2 cases of superficial surgical site infection, and 1 case of death.

Conclusion: Surgical treatment of pathological fractures at the femur excellent pain relief and good functional outcome. Surgery is necessary for improving the functional outcome of such patients; however, more cases of pathological fractures should be studied for assessing the functional outcome.

KeyWords: Proximal femur, Pathological fracture, Intramedullary nailing, Arthroplasty.

Introduction

Pathological long bones fractures in patients with primary and metastatic bone tumours are endowed with many difficulties even to the most experienced surgeons. Their management alters the prognosis, which affects both- the quality of life and the survival of the patients [1]. Mechanical weakness of bone which is caused by biopsy, and post-chemotherapy tumour necrosis lead to the occurrence of pathological fractures [2, 3, 4]. Most common site for long bone pathological fractures are femur, followed by the humerus and then the tibia. Aggressive benign bone tumours with tumour like conditions including fibrous dysplasia, simple bone cysts, aneurysmal bone cyst and giant cell tumour have a huge risk of pathological fracture, more prominently in the proximal femur [5, 6, 7, 8, 9]. In the past, the patients with pathological fracture through bone sarcomas or skeletal metastasis were an absolute contra-

indication for limb salvage; Treatment primarily consisted of amputation proximal to the most superior aspect of the fracture haematoma [15, 25, 26]. Multi-agent chemotherapy, advanced surgical approaches and radiation therapy have enhanced and improved local control and survival in patients with bone tumours complicated by pathological fractures [1, 27, 28, 18, 29, 30, 20, 31].

Methodology

Type of Study- Prospective Study.

Duration of Study- June 2015 to November 2016

Case Selection And Criteria- During the period extending From June 2015 to November 2016, a prospective study of all patients undergoing surgical intervention for pathological fractures of Femur was done using inclusion and exclusion criteria. Patients sustaining fractures (i.e. non traumatic) were investigated with radiographs and suspected of pathological fractures. Hence further investigations were done such as

1. CT Scan
2. MRI
3. Bone scan
4. Biopsy.

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Depending on the pathology; treatment was given to the patients on its merits.

Ethical approval of the Institutional Review Board and Ethics Committee was obtained prior to the commencement of the study. Written informed consent was taken for all the patients who fit in the inclusion criteria.

All patients who fall into the eligibility criteria were included in the study and were called for follow up at 1.5 month, 3 months, 6 months and 1 year after treatment. They were assessed clinically, radiographically and functionally using radiological measurements.

Inclusion criteria:

- 1) All cases of pathologic fractures of Femur
- 2) Pathological fractures of bone tumours benign, malignant and metastatic.
- 3) Patients willing to participate

Exclusion criteria:

- 1) Age less than 15 and more than 70 years.
- 2) Cases of fractures due to osteoporosis and chronic osteomyelitis.

Surgical procedure

Preoperatively anaesthetist's and physician's fitness for surgery were obtained after the required preoperative work up. Spinal anaesthesia was used, the standard lateral approach to the hip was taken. Axial traction is applied to regain length, correct the varus deformity, and disengage the fracture fragments. Internal rotation and slight abduction is given to reduce the fracture. The dynamic hip screw guide wire was inserted centred on the AP and lateral views in the femoral neck. The wire is advanced to within 5 to 10 mm of subchondral bone to meet the requirements of the tip-apex distance (TAD) of less than 25 mm.

The angle is measured over the angle guide and lag screw length is measured over a same length guide wire. Second guide wire is inserted just above the first to maintain the provisional fixation preventing rotation of head and neck fragment. Reaming of head and neck fragment is done with a triple reamer for lag screw. Reaming is done upto the selected depth. Tapping is done. PMMA

cement is inserted after thorough debridement. The selected lag screw is inserted with the cannulated attachment over the guide wire and seated within 5 to 10 mm of subchondral bone. Four-hole plate is selected and inserted. Plate is aligned to the shaft of femur and secured with 4.5 mm cortical screws with bicortical fixation. Top nut is applied to the plate. Derotation screw is inserted over the second guide wire. Intraoperative confirmation of reduction on the AP and lateral views is done. The decision on type of additional fixation method to be done is taken on the morphology of the fracture.

Post-operatively, foot end elevation was given for one day. DVT prophylaxis was given in high risk patients. Post-operative antero-posterior x-rays were done. Haemogram and Serum electrolytes were done in the immediate post-operative period and 24 hours post-operative. Drain removal was done after 48 hours. Postoperative dressings were done 2nd, 5th and 8th day. Suture removal done after 14 days. Postoperatively patients underwent neo-adjuvant chemotherapy.

Observations & Results

30 patients with pathological fractures of femur were evaluated. Average age of the patients evaluated was 39.94. The minimum age was 15 years and maximum age was 70 years. The standard deviation was 17.35 and median was 38.

There were 16 males and 14 females, age wise we had 17 patients who were less than 40 years of age and 13 patients were of more than 40 years of age.

Following pathologies were detected:

1. Unicameral Bone Cyst (UBC) - 10
2. Aneurysmal Bone Cyst (ABC) - 5
3. Eosinophilic Granuloma - 2
4. Fibrous Dysplasia - 3
5. Osteosarcoma - 3
6. Multiple Myeloma - 4
7. Metastases - 2
8. Osteoid Osteoma - 1

Patients were treated with different surgical interventions.

Interventions are as follows:

1. Application of compression plates - 9
2. Recon Nail - 8
3. Dynamic Hip Screw - 5
4. Hip arthroplasty - 6

	Number of patients	Lower limb functional score (LLFS)		p-value
		Mean	SD	
Baseline	30	10.88	5.93	
3 month	30	25.88	3.4	< 0.001
6 month	30	45.55	4.27	< 0.001
9 month	30	59.18	5.75	< 0.001
1 year	30	71.91	5.1	< 0.001

	Number of patients	VAS			p-value
		Min	Max	Median	
Baseline	30	8	10	9	
3 month	30	5	9	7	< 0.001
6 month	30	4	7	5	< 0.001
9 month	30	1	5	3	< 0.001
1 year	30	1	4	2	< 0.001

SF-36	≤ 40 yrs (n=17)		> 40 yrs (n=13)		p-value
	Mean	SD	Mean	SD	
PF	63.06	26.13	65	27.06	0.836
RP	96.33	8.44	98.53	5.68	0.38
BP	63.33	11.01	66.93	10.95	0.356
GH	55	14.55	60	0	0.163
VT	38.89	8.14	44.67	7.19	0.038*
SF	61.61	10.5	66.33	12.02	0.244
RE	96.3	10.78	100	0	0.163
MH	67.94	17.04	76.33	6.8	0.068

*Significant (unpaired t-test used)



5. Combination of nailing and plating- 2

The fracture healing, the post-operative pain and clinical function was assessed with radiographs, Visual Analogue Scale (VAS) and the Lower Limb Functional Score (LLFS) and SF-36.

Pre- operative pain and post- operative pain is noted by asking the patients to grade their pain according to Visual Analogue Scale. We have graded this VAS score as poor pain (Score 7> more); Fair Pain (Score 4-6) and mild pain or good pain relief (Score 3 or less). Pre operatively all the patient were having poor pain.

The pre-operative and post-operative clinical outcome of the patients was analysed with the Lower limb functional scale (LLFS). Patients were classified as with good clinical outcome (Score 60 >more); Fair clinical outcome (Score 45- 60); Poor clinical outcome (Score less than 45).

Among all 33 patients who sustained pathological fractures as a result of neo-plastic bone lesion –none of them had any local recurrence of lesion and neither during the follow up there was any sign of accelerated neoplastic activity and systemic dysfunction. Thus in our study rate of local recurrence and distant metastases wasn't altered by the pathological fractures.

Monitoring of lower limb functional score (LLFS): In our study of 30 patients the mean LLFS which was pre operatively 10.88 was improved to 45.55 at the end of 6 months and to 71.91 at end of 1 year. Thus showing satisfactory improvement in the lower limb function.

Conclusion: By using paired t-test p-value < 0.05 therefore there is significant difference between mean Lower limb functional score (LLFS) at Baseline and at 3 month, 6 month, 9 month and 1 year.

Monitoring of VAS score: In our study of 33 patients the mean VAS which was pre operatively- 9; was reduced to 4 at the end of 6 months and to 1 at end of 1 year. Thus showing satisfactory reduction in the pain intensity.

Conclusion: By using Wilcoxon sign rank p-value < 0.05 therefore there is Significant difference between mean visual analogue score (VAS) at Baseline and at 3 month, 6 month, 9 month and 1 year.

SF-36 score: In our study of 30 patients the mean SF-36 score which was compared at the end of 1 year and was 48 in age less than 40 years and 49 in age more than 40 years. Thus showing no significant difference and was comparable.

Discussion

In our study of 30 patients we had 16 patients who were males and 14 patients were females. We had 17 patients who were less than 40 years of age and 13 patients that of more than 40 years of age. Patients with pathological fractures were treated surgically in the form of internal fixation or prosthetic replacement. Monitoring done by LLFS and VAS score and SF-36 score.

In our study, the mean LLFS which was pre operatively 10.88 was improved to 45.55 at the end of 6 months and to 71.91 at end of 1 year. Thus showing satisfactory improvement in the lower limb function.

The mean VAS which was pre operatively- 9; was reduced to 4 at the end of 6 months and to 1 at end of 1 year. Thus showing satisfactory reduction in the pain intensity.

1 death occurred in the patient with lung carcinoma which was

treated with surgical intervention .Death was due to internal haemorrhage while undergoing biopsy.

Thus from monitoring of LLFS and VAS SCORE over a period of 1 year patient had improvement in lower limb function and there was significant pain relief.

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