

Original Article
Orthopaedics

**PATHOLOGICAL
FRACTURES IN
NON-NEOPLASTIC
DISORDERS: A STUDY
OF ETIOLOGY,
CLINICAL PROFILE
AND MANAGEMENT IN
A TEACHING HOSPITAL
IN UTTARAKHAND**

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Abstract:

Background - Pathological fractures represent a sinister underlying cause and require its identification and management along with that of fracture for appropriate treatment and also to check complications including recurrence. Many a times, pathological fracture is the first presentation of an underlying systemic or generalized disorder. The treatment of fracture requires special attention to the abnormal physiology of native bone with subnormal structure and strength. An understanding of common pattern of these fracture subtypes and underlying causes are critical for decision making in a particular geographical area. The present study is a record of pathological fracture pattern and etiologies in Kumaon region of Uttarakhand.

Methods – A retrospective evaluation of pathological fractures in cases with diagnosed pre-existing disorders other than neoplastic etiology was done during the period of July 2011 to Jan 2016. The relevant demographic details, site, affected bone and pattern of fractures along with management and outcome were key points noted. A detailed notification of already diagnosed disorder was done along with other significant clinical features. In cases of congenital or genetic condition, detailed history regarding birth and milestones, consanguinity, other sibling and investigative data was noted. Pathological fractures associated with oncological nature including both benign and malignant ones were excluded from the study.

Result – A total of 34 cases were included in the study with males constituting majority 25(73.52%) of cases. The lower extremity was involved in 26 cases (76.47%) including 4 bilateral cases and femur was most common bone involved (15 cases, 44.11%). The proximal femur was most commonly involved region of femur bone (10 cases, 66.66%). Top two associated disorders were polio (8 cases, 23.52%) and osteomyelitis (7 cases, 20.58%. 5 cases of bacterial and 2 cases of tubercular osteomyelitis). The osteogenesis imperfecta, stress fracture and HIV were noted in 2 cases each. Other notable causes were thalassemia, congenital pseudoarthrosis tibia and inclusion cyst among others.

Conclusion – The study was comprehensive one and evaluates fractures with associated non-neoplastic disorders. The study is important for documentation of such entity in Uttarakhand region for further research and is part of an ongoing and robust data collection preferably with multicentre collaboration.

Key words: *Pathological Fractures, Orthopaedic, Injury, Bone, Osteopenia, Osteoporosis, Treatment, Diagnosis*

Introduction

Pathological fractures result from local or generalized bone disorder leading to qualitative reduction in bone strength and the term is widely used in the setting of neoplastic conditions. Disorders of production, resorption, remodelling and local bone destruction are chief causes of pathological fractures.¹ Besides osteoporotic fractures, the reported frequency is about 5% of all treated fractures.² There, however, are other pathologic conditions with abnormal skeleton and presenting with fracture in the clinical practice. Disorders causing pathological fracture may be grouped broadly under intrinsic and extrinsic categories. Intrinsic causes like neoplasm or neoplasm-like conditions can cause localized intrinsic bone weakness. Metastatic lesions are leading cause of pathological fractures in clinical setting.³ Osteopenic or osteoporotic conditions of various etiologies may be extrinsic cause for a localized weak segment of bone. A thorough evaluation of such disorders is required for a comprehensive knowledge of their pattern in a geographic region that aids in anticipation leading to prompt diagnosis and preparedness for their management. Apart from it, the etiological profile highlights strengthening of other supportive measures for holistic treatment of the patient along with that of fracture.

Material and Methods

A retrospective assessment of data of cases presenting with pathological fractures, that were worked-up to reach an etiological diagnosis, were included during the period of July 2011 to Mar 2015 in the department of Orthopaedics. The patients mostly included in-patient and out patients

in certain cases. Disorders of varying etiologies presenting with pathological fractures excluding benign neoplastic or tumor like conditions were part of the study except mono-ostotic Paget's disease in one case. The fractures related to primary malignant condition or metastatic ones were also excluded as were the cases with pathological lesions with impending fracture. Detailed demographic data including name, age, sex, locality, presenting complaint, family history, co-morbidities were recorded along with relevant clinical history. The fracture details like pattern, number, side, site and mechanism of injury were noted with detailed treatment history including type of management, outcome and complications. The findings were arranged in relevant tables using Microsoft word excel spreadsheet for ease of presentation and results were summarized to highlight important clinical details. The nature of treatment in both conservative and surgery group were studied and type of surgery was noted. Any peri or post-operative complications were also studied and appropriately noted.

Result

A total of 39 cases of fractures with underlying pathological condition were identified in patients during the specified period. Five cases were associated with benign conditions of bone like unicameral bone cyst in two, enchondroma in one and non ossifying fibroma in one case which were excluded as they were considered as benign neoplastic lesions by authors. Final 34 cases were included which were related to generalized or systemic disorders affecting bone quality. One Case had more than one fractures in metachronous manner over the follow up. Appendicular skeleton

was commonly involved in all except phalanx in two cases along with metatarsal and spine in one case each. Cases with appendicular involvement were thus 30 and 4 cases had bilateral involvement and all of them were of lower extremities (2 neck femur and 2 shaft femur). Out of remaining 26 cases, 4 cases of upper and 22 cases of lower extremity were present. Males dominated the case pool with 25 cases (73.52%) as compared to females (09 cases, 26.47%). The smallest age was of two month old female and the oldest case was 65 year old female. The most cases fell in the age group of 11 to 20 years range (8 cases, 23.52%). The femur was common involved bone overall (15 cases, 44.11%) with 4 cases each for neck, shaft and sub-trochanteric region and 2 cases for inter-trochanteric and 1 remaining case of distal femur region. Most of the cases were managed conservatively (24 cases, 70.58%) including those who refused operation or referred. The overall outcome of conservative care was good with united bone as end result.



Figure 1. The radiograph of case of distal phalanx fracture through inclusion cyst (a) which was treated by arthrodesis with K wire fixation (b).

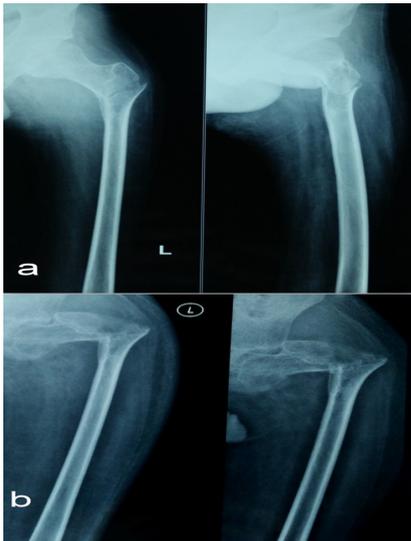


Figure 2. The radiograph of a subtrochanteric fracture in polio limb (a) managed conservatively to union in varus (b).

Discussion

Various causes lead to abnormal bone quality leading to pathological fracture and primary factors of causation are the load pattern and altered strength of the bone.⁴ There is scarcity of literature regarding pathological fractures other than malignant or metastatic association. The pattern, clinical profile and management data is essential to know the burden of the problem. The fractures may initially begin as micro-fracture that can easily be missed or neglected thus making a strong suspicion and judicious use of investigative battery an important step for prompt detection.⁵ A thorough history, clinical examination and attention to details of radiological reports, therefore, remains cornerstone of effective management of pathological fractures. Most studies about prevalence and management are related to metastatic pathological fractures. Their importance is relevant as early detection of pathological lesion may mitigate impending fracture and cases might benefit with prophylactic fixation that has

proven better outcome.⁶ Regarding an already fractured bone, surgical fixation has been linked to better function and improved quality of life.⁷ A multidisciplinary approach is advocated for the management of these fractures resulting in good functional outcome.⁸ Males and femur involvement as reported by us is commoner pattern and is reflected in other studies as well.

The shortcomings of the study are low number of cases as most of these are referred to other department and referred from there to higher centre as per the case. Besides it, collaboration with other departments like pediatrics, surgery etc. would have made study more comprehensive as these department also witness such cases with or without other associated conditions and most of them might not be seen by us. The cases of axial skeleton involvement are less probably because major involvement of spine here is consulted by neurosurgery department and very few cases with orthopaedic component present at that time are referred to us. The outcome parameter of the study is not good as

most of the cases like those involving polio limb were reluctant to surgical treatment despite strong indication. Many of such cases also were lost to follow up after few months. The outcome also could not be properly ascertained as afflicted limbs with pathology were already less functional than healthy counterpart more notably the poliotic limbs. The cases with chronic osteomyelitis also present with localized or systemic morbidity thus have sub-optimal outcome. The associated osteopenia contributes to loosening of implants thus affecting the results. The study however is an honest attempt to tabulate experiences of a single centre in dealing with such cases and the more data in the future might yield beneficial information in various aspects of managing such cases with bigger subject pool and robust methodology.

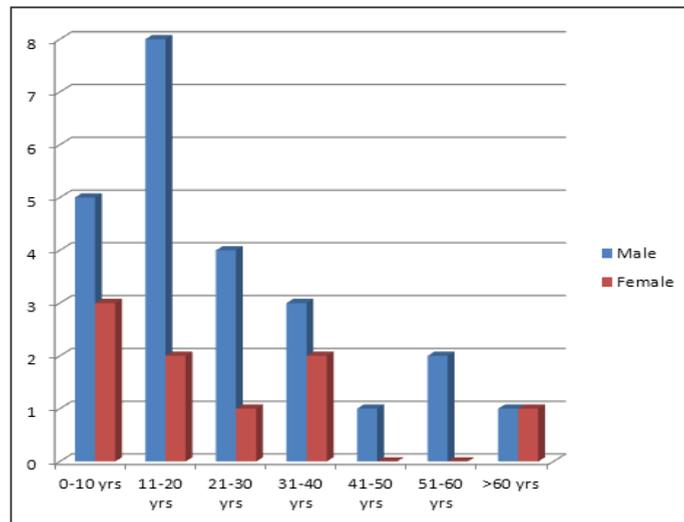


Figure 3. Graphic representation showing age and sex distribution of the cases

Table 1. Salient features of the pathological fractures and associated pathologyReferences

S.N.	Pathological Fracture Location	A/S	Side R/L	Underlying Pathology	Management	Special points/ Associated co-morbidity
1.	Proximal Tibia	15/M	R	Myelomeningocele	Braces	Insensate lower limbs
2,	Olecranon metaphysis	10/M	L	Osteogenesis imperfecta	POP	Type 4 OI
3.	Femur	2 months/F	B/L	Arthrogryposis multiplex congenita	Brace	B/L clubfeet, contractures
4.	Distal tibia	09/M	L	Osteogenesis imperfecta	POP	Type 3 OI
5.	Femur	07/M	R	Thalessemia	Hip Spica	
6.	Index finger distal phalynx	17/M	L	Inclusion cyst	Arthrodesis of DIP joint index	
7.	Distal fibula	62/M	R	OM	Debridement	Associated occipital OM and brain abscess, Death
8.	Femur	20/M	L	Achondroplasia	Operative plate fixation	C/L femur stress fracture
9.	Neck femur	09/M	R	Osteopetrosis	Conservative	Deafness, low vision, ipsilateral SCFE
10.	Femur shaft	55/M	R	Osteomyelitis	Operative staged management	
11.	Neck femur	38/M	B/L	AIDS on ART, AVN	Conservative	
12.	Distal radius	29/F	R	Neurofibromatosis	Conservative	Neurofibromatosis type 1.
13.	Humerus	15.M	R	Tubercular	Fixation with nailing under ATT	Union
14.	Spine compression	32/M	L 1	ITP on steroids	Conservative	Recurrent GCT proximal tibia
15.	Prox. femur	32/F	L	Polio with Ankylosed hip due to old pyogenic infection	Operative fixation with Proximal femur locking plates	Union
16.	Neck femur	53/M	B/L	AIDS on ART	Conservative	Refused operation
17.	Femur	16/M	L	Tuberculosis	Operation with ATT.	
18.	Intertrochanteric	50/M	L	Polio	Refused operation	Malunion

19.	Subtrochanteric	28/M	R	Polio	Fixation with Nail	
20.	Proximal tibia metaphysis	30/M	L	Stress fracture	Conservative	Millitary recruit
21.	Femur, Synchronous	12/F	B/L	GTCS on antiepileptics, osteomalacia	Fixation with TENS, calcium, Vitamin D	Multiple Stress fractures
22.	Both bones forearm	11/M	L	Thalessemia	Conservative, Reduction and POP	Previous femur fracture
23.	Metatarsal	40/F	R	Stress fracture third metatarsal	Conservative	
24.	Proximal fibula	25/M	L	Polio	POP	
25.	Neck femur	09/F	R	Osteomyelitis	Traction and infection control, operation awaited	Pyomyositis complication to femur osteomyelitis
26.	Tibia shaft	65/F	L	Mono-ostotic Paget's	POP, Bisphosphonates	tibia bowing
27.	Both bone leg	15/F	L	CPT with chest TB	Referred	
28.	Intertrochanteric fracture	19/M	L	Polio	Fixation with DHS	Implant Cut through, removed
29.	Proximal femur	14/M	L	Polio	Neglected mal-union managed by plate and plate failed.	Osteoclasia and re-fixation with LCP
30.	Subtrochanteric fracture	7/M	L	OI	POP	
31.	Neck femur	8/M	L	Osteomyelitis	Conservative, POP spica	Lost to follow up
32.	Subtrochanteric	32/M	L	Polio	Conservative	Dislocated hip
33.	Proximal phalanx middle finger	4/F	R	OM	Debridement	Metal foreign body splinter removed
34.	Distal Femur condyle (Hoffa's fracture)	28/M	L	Polio	Planned for operation	Refused operation, Conservative

Abbreviations used : L =Left, R =right, POP=plaster of paris brace, PFN=Proximal femoral nail, UBC= unicameral(simple) bone cyst, B/L=Bilateral, M=male, F= female, GTCS=generalized tonic clonic seizures, TENS=titanium elastic nails, GCT=Giant cell tumor, ITP= Idiopathic thrombocytopenic purpura, AIDS=Acquired immunodeficiency syndrome, ART= Anti-retroviral therapy, AVN=Avascular necrosis, C/L=Contralateral, SCFE=Slipped capital femoral epiphysis, DIP=ditalintephalangeal joint, OI=Osteogenesis imperfect, CPT=Congenital pseudoarthrosis tibia, DHS= Dynamic Hip Screw.

Conclusion –

The study enlists the cases of non-neoplastic pathological fractures with pre-established diagnosis presented in this region and is helpful in highlighting the burden and pattern. Despite the fallacies, the study is crucial for understanding the type of cases prevalent in this region and may act as draft for future studies with robust data and clinical impact.

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