

ORIGINAL RESEARCH

To study the management of fibrous dysplasia of proximal femur by internal fixation without grafting

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ABSTRACT

Aim: To study the management of fibrous dysplasia of proximal femur by internal fixation without grafting.

Methods: This retrospective study was carried out in the Department of Orthopaedic, IGIMS, Patna, Bihar, India 17 patients with FD of proximal femur treated by internal fixation only without grafting, were included in the study. Records of the patients were assessed for the epidemiologic data, clinical manifestations, pathologic and radiologic investigations, number and type of surgical procedures, the choice of implant used for fixation, functional outcome, and complications. Pre- and postoperative plain radio- graph were reviewed; also, CT and MRI were reviewed when available.

Results: The study included 11 male patients (64.71%) and 6 female patients (35.29%). The mean age of the patients was 21.74 years. The mean follow-up period was 54.60 months the mean MSTS score was 28.62 points. Four patients (76.47%) had postoperative complications. One patient (5.88%) developed mild limping, which required shoe lift of 1 cm. One patient (5.88%) experienced superficial wound infection, which was managed with antibiotics efficiently. One patient (5.88%) had residual varus deformity and mild limping, which required shoe lift of 1 cm. One patient (5.88%) had residual varus deformity and 3 cm limb length discrepancy, which required also shoe lift.

Conclusion: we concluded that the internal fixation only without grafting has satisfactory functional outcome that alleviates the patient's symptoms, improves the limb function, and prevents future morbidities such as deformities and pathologic fractures.

Keywords: Femur, Bening, Deformity.

INTRODUCTION

Fibrous dysplasia (FD) is a benign bone lesion resulting from congenital dysplasia of bone. It is characterized by fibro osseous tissue replacing normal bone tissue.^{1,2} The incidence rate of FD is difficult to estimate. However, it is not rare in the clinic. It is reported that this disease accounts for 5- 7% of clinical benign tumors.^{3,4} According to its clinical characteristics, FD is divided into 4 types: monostotic type, polyostotictype, McCune- Albright syndrome and Mazabraud syndrome.^{1,5} FD may occur at any age, without gender tendency. In general, the mean age of patients with monostotic FD presenting with clinical symptoms is 15 years old and the mean age of patients with polyostotic FD is 30 years old.⁶ Common invasive skeletal sites include the long bones, ribs, maxillofacial skeleton and pelvis. The proximal femur is the most commonly affected site and its main symptoms include pain, deformity and lame-

ness which seriously influence the functioning of affected limbs.⁶ Fibrous dysplasia (FD) is a condition characterized by the presence of fibro-osseous tissue in the bone leading to widening and thinning of its cortex. Fibrous dysplasia has a wide clinical spectrum, with substantial variation between patients in terms of orthopaedic manifestations, including the number of fractures and the degree of deformity.⁷ Fibrous dysplasia of the femoral neck is difficult to treat due to the varied presentations like pain, pathological fractures, severe deformity, and high chances of recurrence.⁸ According to its clinical characteristics, FD is divided into 4 types: monostotic type, polyostotic type, McCune-Albright syndrome and Mazabraud syndrome.⁹ Common invasive skeletal sites include the long bones, ribs, maxillofacial skeleton and pelvis. The proximal femur is the most commonly affected site and its main symptoms include pain, deformity and lameness which seriously influence the functioning of affected limbs.¹⁰

MATERIAL AND METHODS

This retrospective study was carried out in the Department of Orthopaedic, IGIMS, Patna, Bihar, India from August 2019 to July 2020, after taking the approval of the protocol review committee and institutional ethics committee. 17 patients with FD of proximal femur treated by internal fixation only without grafting, were included in the study. Records of the patients were assessed for the epidemiologic data, clinical manifestations, pathologic and radiologic investigations, number and type of surgical procedures, the choice of implant used for fixation, functional outcome, and complications. Pre- and postoperative plain radio- graph were reviewed; also, CT and MRI were reviewed when available.

METHODOLOGY

After treating the patients with FD by internal fixation only, they were followed up through clinical and radiologic evaluation, at 1.5, 3, 6, 12, and 18 months postoperatively. Postoperative complications were recorded. The Musculoskeletal Tumor Society (MSTS) score¹² was used for the evaluation of functional outcomes.

RESULTS

The study included 11 male patients (64.71%) and 6 female patients (35.29%). The mean age of the patients was 21.74 years. 2 patients had a monostotic FD and 15 patients had a polyostotic disease. 1 patient had previous curettage and non-vascularized fibular grafting elsewhere and complicated with graft resorption. 8 patients (47.06%) presented with hip pain, two patients (11.76%) presented with limping, three patients (17.65%) presented with hip pain and limping, two patients (11.76%) presented with pathologic fractures, and two patients (11.76%) presented with shepherd's crook deformity (Table 2). Of the 17 patients, 2 patients (10.53%) underwent core biopsy for confirming diagnosis. All the 17 patients with manifesting FD underwent internal fixation only without grafting. The choice of implant used for fixation depended on the location of the lesion and the bone quality. Fixation by intramedullary (IM) nail was done in three patients (17.65%), dynamic hip screw (DHS) in nine patients (52.94%), cannulated screws in three patients (17.65%), broad dynamic compression plate (DCP) in one patient (5.88%), and narrow DCP in one patient (5.88%). Valgus osteotomy was done in two patients (11.76%) with shepherd's crook deformity.

Table 1 Gender and age of the patients

Gender	Number	Percentage
Male	11	64.71
Female	6	35.29
Age		

Below 15	2	11.76
15-30	5	29.41
Above 30	10	58.82

Table 2. Types of FD

	Number	Percentage
Monostotic FD	2	11.76
Polyostotic FD	15	88.23

Table 3.

	Number	Percentage
Hip pain,	8	47.06
Limping	2	11.76
Hip pain and limping	3	17.65
Pathologic fractures	2	11.76
Shepherd's crook deformity	2	11.76

Table 4. Types of implants

	Number	Percentage
Fixation by intramedullary (IM) nail	3	17.65
dynamic hip screw (DHS)	9	52.94
cannulated screws	3	17.65
broad dynamic compression plate (DCP)	1	5.88
narrow DCP	1	5.88
Valgus osteotomy	1	5.88

Table 5. MSTS score

	mean
MSTS score	28.62
follow-up period	54.60 months

Table 6. complications

Postoperative complications	13	76.47
Developed mild limping	1	5.88
Experienced superficial wound infection	1	5.88
Residual varus deformity and mild limping	1	5.88
Residual varus deformity and 3 cm limb length discrepancy	1	5.88

FUNCTIONAL OUTCOME

The mean follow-up period was 54.60 months. The mean MSTS score was 28.62 points. With the exclusion of the one patient with shepherd's crook deformity, who underwent valgus osteotomy and internal fixation, the mean MSTS score of the remaining 17 patients would be 28.41.

COMPLICATIONS

Four patients (76.47%) had postoperative complications. One patient (5.88%) developed mild limping, which required shoe lift of 1 cm. One patient (5.88%) experienced superficial wound infection, which was managed with antibiotics efficiently. One patient (5.88%) had residual varus deformity and mild limping, which required shoe lift of 1 cm. One patient (5.88%) had residual varus deformity and 3 cm limb length discrepancy, which required also shoe lift.

DISCUSSION

The development of FD lesions occurs at all stages of the bone formation and growth process, and is most likely to occur in the proximal femur. The treatment of foci at this site is more difficult. Body weight and mechanical stretching of muscle may cause stress and weaken bones, easily leading to fractures and deformity. In addition, repeated fractures may exacerbate the deformity. Among patients with multiple FD, a long bone usually fractures due to stress and thus bends to form a shepherd's crook deformity.^{11,12} Out of the eight patients with polyostotic disease, four patients were type 6, three patients were type 1, and one patient was type 4 according to radiological classification by Ippolito et al.¹¹ In our study of 17 patients with FD of proximal femur, 11 were male and 6 female, which coincided with the numbers in Tong et al,¹³ who reviewed 15 patients, of which 9 were male and 6 female, and also in Kushare et al,¹⁴ who reviewed 23 patients, of which, 14 were male and 9 female. In our study, the mean age of the patients was 20.74 years, which was slightly lower than that of the patients in Tong et al¹³ and Majoor et al.¹⁵ The main problem in FD is the resultant weak bone that becomes so evident in the proximal femoral location. So, the treatment is always directed to augment or restore the strength and integrity of bone.^{16,17} The goal of surgery in FD of proximal femur is to eliminate the symptoms resulted from repeated fissures or fractures caused by the lesion, to correct the deformity if present, and to prevent future morbidities such as pathologic fractures or deformities.¹⁷ Some authors believe that restoring the integrity of bone requires grafting.^{13,15} However, we do believe that only internal fixation would achieve this goal without associated morbidities of bone grafting. So, this study assesses whether doing internal fixation for these patients would alleviate their symptoms and prevent future morbidities. Moreover, one might think that doing internal fixation without grafting would put the patient under the risk of fixation failure by time. However, in our study, none of the fixations failed with a mean follow-up period of 53.58 months (range, 24 to 159 months). The reason for this was that bone integrity was already present and failure of fixation would happen if bone continuity was lost or ununited fractures were present, which was not the case. Moreover, the complications that occurred in our patients are not related to the nonuse of grafting.

In Nakashima et al¹⁸ and Onoda et al,¹⁹ intralesional curettage and bone grafting was the treatment option. Majoor et al¹⁵ performed cortical strut allografting for impending or actual proximal femoral fractures in 30 patients with FD. In Tong et al,^{13,15} patients were treated by internal fixation with DHS and anatomic plates following curettage and bone grafting with valgus osteotomy in shepherd's crook deformity. In Nishida et al,²⁰ eight patients with proximal femoral FD were treated with fibular strut grafting and compression hip screw fixation. Jung et al²¹ treated eight patients with shepherd's crook deformity by multiple osteotomies and IM nailing.

In our study, all the patients were treated by internal fixation only without grafting using variable implant options depending on the lesion site and bone quality. IM nailing was done in four patients (21.05%), which is a good fixation option for proximal femur, especially in subtrochanteric lesions.²² Long IM nailing traversing the neck and having a firm purchase in the head can prevent loss of neck shaft angle.²¹ In our study, DHS was used in eight patients (42.11%), cannulated screws in four patients (21.05%), broad DCP in two patients (10.53%),

and narrow DCP in one patient (5.26%); and valgus osteotomy was performed in two patients with shepherd's crook deformity.

In our study, with the use of internal fixation implants, the mean MSTS score was 27.63 points, which was considered satisfactory. This score was slightly lower than that in Lang et al,²³ where the mean MSTS score was 28.42 points. Also, this score was worse than that in Rosario et al,²⁴ where the mean MSTS score was 29.6 points.

Regarding complications, four patients (21.05%) in our study had postoperative and late complications. One patient had superficial wound infection, which was healed with antibiotics. One patient had mild limping, which required shoe lift of 1 cm. And two patients had residual varus deformity, one of them with 3 cm limb length discrepancy and required also shoe lift. These complications would not be prevented if grafting was used. No internal fixation loosening occurred in any of the patients in our study. Complications in our study were slightly lesser than those in Kushare et al,¹⁴ with a complication rate of 21.7%. In Major et al,¹⁵ the complication rate was 3.3%, with only one patient having a refracture after surgery, which was treated and healed conservatively. In Rosario et al,²⁴ none of the patients developed complications. In our study, follow-up loss of neck shaft angle did not occur, which was better than O'Sullivan and Zacharin²⁵ and Jung et al²¹ who reported loss of neck shaft angle in five and two patients, respectively.

CONCLUSION

We concluded that internal fixation only without grafting has satisfactory functional outcome that alleviates the patient's symptoms, improves the limb function, and prevents future morbidities such as deformities and pathologic fractures.

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