

Number & Title: 10879

Surgical Treatment Of Pathological Fractures Of The Proximal Femur Through Benign Bone Lesions In Children Based On A Prospective Treatment Protocol

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ABSTRACT

Purpose: We aimed to evaluate a prospective treatment protocol and develop a treatment strategy for pathological fractures of the proximal femur through benign bone lesions in children.

Methods: Fifty-four children with pathological fractures of the proximal femur secondary to benign bone lesions were surgically treated between 2005 and 2013. The median age of patients (34M/20F) at surgery was 9 years (range, 5-17 years). Histopathological diagnoses were simple bone cysts (27), aneurysmal bone cysts (24), and non-ossifying fibromas (3). All lesions were symptomatic and associated with actual micro (64.8%) or displaced (35.2%) fractures. Surgical treatment was determined due to patient's skeletal maturity, localization and preliminary diagnosis of lesion, and the amount of bone loss in the femoral neck and lateral proximal femur. Surgical procedure consisted of biopsy, curettage, bone grafting and internal fixation. The median follow-up was 45 months (range, 25-89 months) and performed functionally and radiologically.

Results: Complete clinical recovery was achieved in 92.6% of patients between 4 to 6 months postoperatively; full weight-bearing and mobilization, without pain and limping, was possible. The median preoperative and postoperative last follow-up MSTS scores were 13.3% (range, 10-23.3%) and 96.6% (range, 90-100%), respectively. The pathological fractures were healed in 10 weeks on average (range, 8-12 weeks). All lesions radiographically responded well to treatment, and 94.4% demonstrated complete or significant partial healing between 5 to 7 months that maintained throughout follow-up. There were 4 (7.4%) early or late complications, including superficial wound infection (1), mild varus malunion of the proximal femur (1), shortening of the femoral neck (1), and re-fracture (1). Re-operation rate was 1.85%.

Conclusions: This protocol provides a treatment strategy which can be applied in the management of pathological fractures of the proximal femur secondary to benign bone lesions with good local tumor control, fracture healing, permanent structural integrity, and excellent functional and radiological outcomes.

Table 1. The authors' surgical approach to benign lesions of the proximal femur.

- Eradication of the lesions

- Frozen section
- Curettage

For ABCs

- High-speed burring
- Cauterization

For SBCs

- Continuous intramedullary decompression by TENs

- Stabilization of the lesions

- Bone grafting (cancellous allograft, autograft, or combination of the two)
- Open reduction (if required) and internal fixation

i) *TENs*

- all SBCs regardless of location and extension
- extensive ABCs in pertrochanteric/proximal metadiaphyseal region

ii) *K-wires, cannulated screws, sliding hip screw and a side plate*

- ABCs, NOFs

Figure 1. The authors' classification system for benign bone lesions of the proximal femur with corresponding treatment implications.

