Risk factors in allogenous strut graft surgery in fibrous dysplasia of the proximal femur.

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Background

Fibrous dysplasia (FD) is a rare benign genetic disorder of bone, characterized by localized abnormal production of fibrous tissue by poorly differentiated osteoblasts and osteocytes. Fibrous dysplasia may be monstotic or polyostotic, and the proximal femur is a common localisation for a lesion. ASCG surgery represents an attractive option for the treatment of FD lesions of the proximal femur as this procedure when successful is often associated with a decrease in pain symptoms due to stabilization of the FD lesion. The main problem with ASCG is the development of a difficult to predict graft resorption, with a number of factors potentially influencing graft survival. The main objective of treatment of patients with FD with bisphosphonates is to normalize bone turnover, which is associated with a decrease in pain symptoms and in prevention of progression of the lesions in the majority of patients. .

Objectives

To evaluate the clinical outcome of ACSG surgery in FD of the proximal femur and to assess factors associated with graft survival in a series of patients who underwent the procedure in our institution

Patients & Methods

In a retrospective study design, we studied the outcome of ACSG without osteotomy and/or osteosynthesis in 29 patients (15 male, 14 female) with FD of the proximal femur, as only localisation of FD (n=17) or as part of polyostotic disease, who were followed for at least two years after surgery. Mean age a time of surgery was 22,9 years (5-50 years) and mean follow up after surgery was 12,7 years (4-37 years). Fourteen patients (48%) were additionally treated with dimethyl-APD (maximum dose 200 mg/d po or iv 4-8 mg for 3-5 days 3 monthly) started prior to surgery in 3 patients and between 1 and 24 years after surgery in 26 patients. The primary outcome of this study was the success rate of ACSG-surgery, as measured by the need for revision surgery for fracture, and absence of progressive deformity or resorption of the graft. The role of possible contributing factors such as gender, age at time of surgery, preoperative fractures, bridging properties of the graft (ratio of the portion of the graft placed in solid bone to total graft length) and potential beneficial effect of treatment with bisphosphonates were further assessed. Statistical analysis was performed using the Kaplan-Meier method, the log-rank test and the independent T-test.

Results

ACSG surgery was performed using fibular strut grafts In 28 patients and a tibial strut graft in one patient. All patients but for one reported significant pain relief at one year after surgery. Overall graft survival was 55% after a mean period of 18,1 years (11.7-24,5). Revision surgery was required in 13 patients (figure 1.). Patients with a preoperative fracture had a higher incidence of graft failure (figure 2.), which was observed in 7 of 10 patients (70%) with fractures prior to surgery. Docking of the graft in healthy bone appeared to be an important factor for graft survival, with failure of 7 out of eleven grafts (64%) with less than 15% docking in healthy bone. Patients who required reoperation because of graft failure were significantly younger at the time of the procedure than patients in whom the graft survived, with a significant mean age difference of 9,4 years between groups ($p< 0.05$). Analysis of bisphosphonate treatment failed to significantly point out an benefit on clinical outcome. However, survival curves did show a trend towards a beneficial effect of bisphosphonates (figure 3.).

Conclusion

Data from our study suggest that pre-operative fractures, young age at the time of the procedure and failure of docking the allograft between two areas of healthy bone may be significant contributing factors to graft failure. The variable timing of starting therapy and duration of treatment with bisphosphonates precluded any conclusion as to the beneficial effect of these agents in preventing graft resorption.

Long-term placebo-controlled studies are required to explore the potential beneficial effect of bisphosphonates in preventing graft failure in FD of the proximal femur.

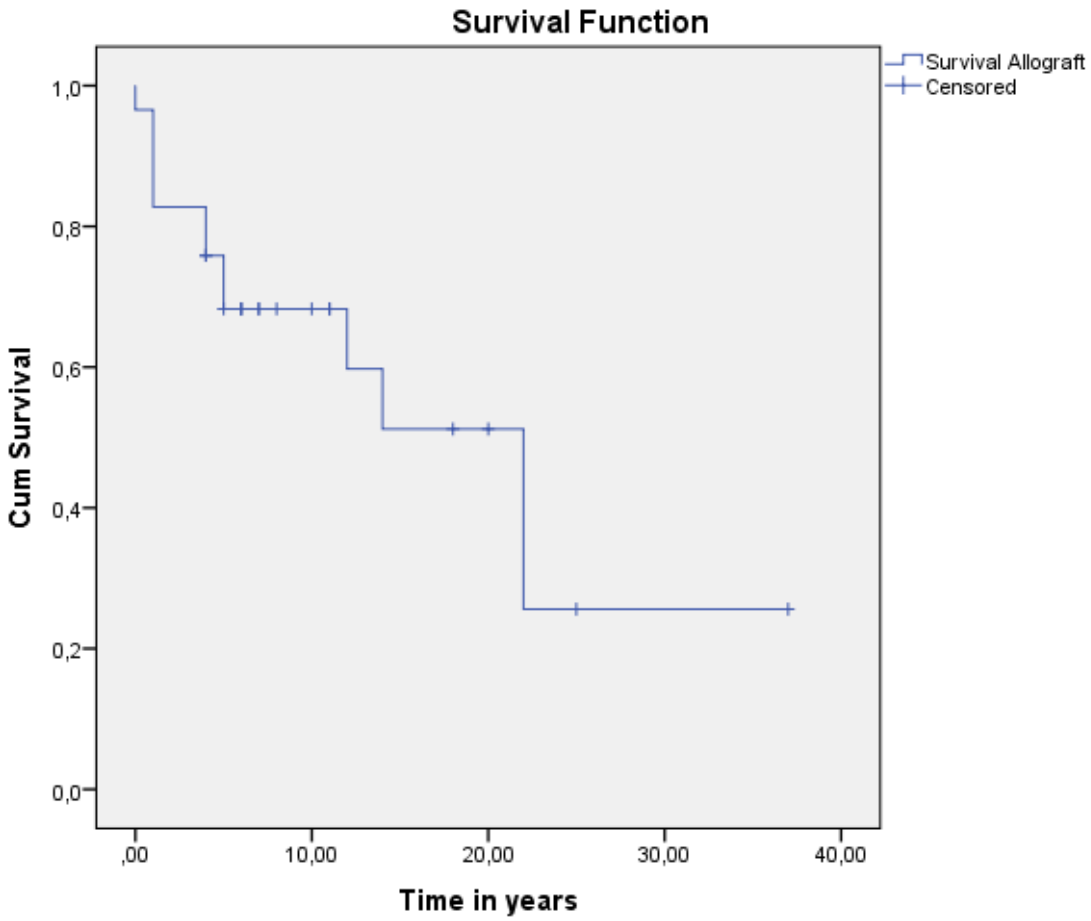

Figure 1. Kaplan-Meier curve demonstrating overall graft survival with ACSG surgery in fibrous dysplasia of the proximal femur in 29 patients.

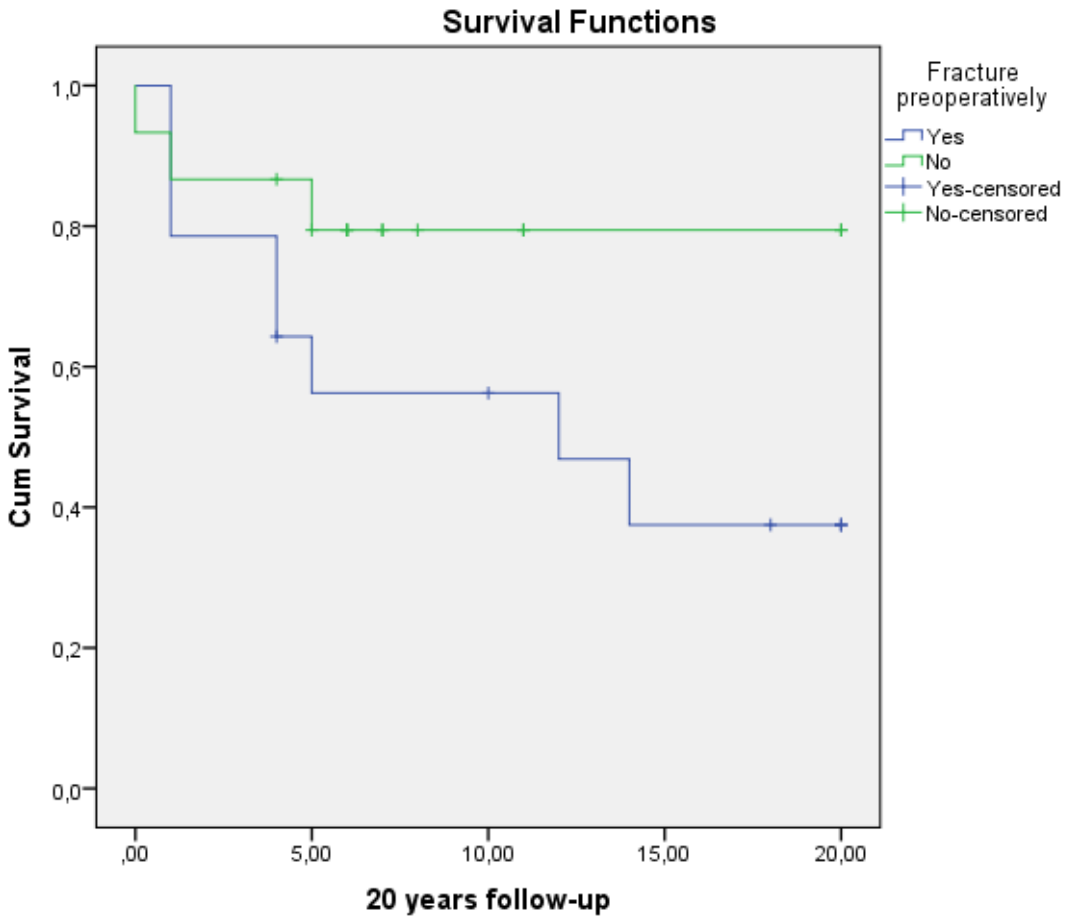

Figure 2. Kaplan-Meier curve demonstrating better long-term results of ACSG surgery in 19 patients with no fracture compared with 10 patients with a fracture preoperatively (sig. 0.058).

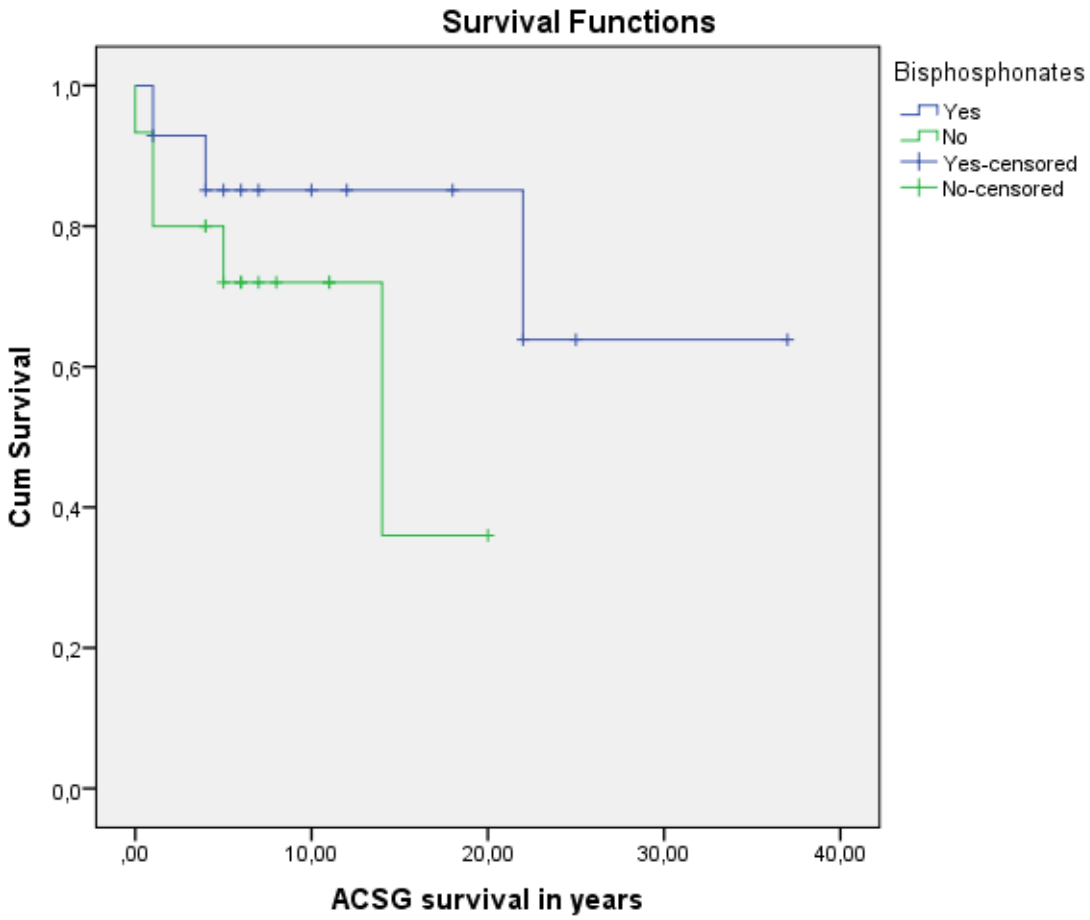

Figure 3. Kaplan-Meier curve demonstrating a trend towards better ACSG survival in 14 patients with bisphosphonate treatment compared to 15 patients without bisphosphonates (Sig. 0.19).