ChronOS™Inject in Children with Bone Cysts Resistant to Conventional Treatment

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INTRODUCTION: Although a majority of benign bone cysts can be cured by the nowadays established treatments (curettage, corticosteroids, autogenous or allogenic bone grafting, intramedullary nailing) there are a number of cysts, which remain difficult to treat mainly due to the localisation or the patient's age with closed growing plates. Recently a new injectable hydraulic calcium phosphate cement (chronOS™Inject) was introduced, which shows the induction of bone formation and resorption [1,2]. We therefore hypothesized, that chronOS™Inject might be a reliable alternative in patients with complicated bone cysts.

METHODS: Since 2004 in 7 patients with benign bone cysts, which could not be cured by the established treatments or could not be treated with the established treatments because of the lesion's localisation, the indication for chronOS™Inject was made. 4 of them were already treated, in 3 the day of surgery is fixed. Follow up was done at our outpatients' clinic. Follow up ranged between 9 and 16 month so far.

RESULTS: Among the 4 already treated children the age ranged between 3 and 17 years at the day of treatment. Two times a juvenile bone cyst was diagnosed (tibial head, humeral shaft), once an aneurysmatic bone cyst (proximal humerus) and once a Langerhans-cell-histiozytosis (femoral neck). All 4 children underwent at least one other treatment because of a pathological fracture in prior, either by cast or intramedullary nailing, without healing of the cyst. The indication of chronOS™Inject was in two cases the cyst's localisation with instability and a high risk of refracture. In two cases a healing of the bone cysts could not be expected anymore due to the patients age. In all cases a stabilisation by intramedullary nailing was done together with the injection of chronOS™Inject. 15-20 ml of chronOS™Inject was injected in each bone cyst. The injection together with the intramedullary nailing was done by day surgery, so the children could leave the hospital the same day. A complete healing and consolidation were achieved in all 4 cases. Except of one patient a resorption of chronOS™Inject could be observed. Beside a reddish skin and subfebrile temperatures short after operation no adverse effects were seen.

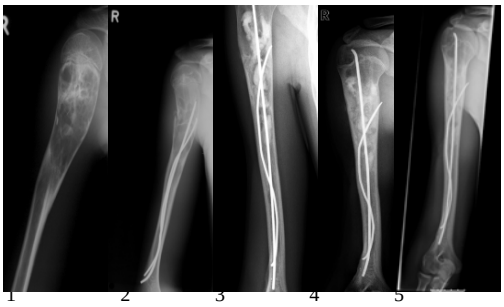

Fig. 1: 17 year old boy with an aneurysmatic bone cyst. First diagnosis because of a pathological fracture (1), another pathological fracture with TENs in situ (2), 2 month, 5 month and 16 month after injection of chronOS™Inject (3,4,5). A complete healing with a resorption of chronOS™Inject, new bone formation and even an unexpected bone remodelling could be observed.

DISCUSSION & CONCLUSIONS: Despite all established treatments large bone cysts in children with closed growing plates or cyst's localisation with a high risk of instability remain an unsolved problem. With the injection of chronOS™Inject we could achieve a complete healing in 4 patients with complicated bone cysts. No adverse effects were seen. Using chronOS™Inject a more invasive surgery for autogenous bone grafting and the risk of infection (e.g. hepatitis, HIV) by allogenic bone grafting can be avoided. We believe, that chronOS™Inject is a promising alternative treatment in children with complicated large long bone cysts, in which the established treatments are unsuccessful. These promising results encourage us for further use of chronOS™Inject, but larger prospective clinical studies are needed to verify our observations.

REFERENCES: [1] D. Apelt, F Theiss, A.O. El-Warrak et al (2004) *In vivo behaviour of three different injectable hydraulic calcium phosphate cements*, Biomaterials **25**:1439-51.[2] *Compositional changes of a dicalcium phosphate dehydrate cement after implantation in sheep*, Biomaterials **24**:3463-74