Orthoss® Case Report

Orthoss® is a commonly known complication in non-surgical and even operative fracture treatment. A pseudarthrosis is a false joint and occurs when a bone fracture fails to unite and remains mobile at the fracture site. Pseudarthrosis is still one of the most difficult conditions to assess as a source of symptoms, and not surprisingly the outcome from repair of pseudarthrosis is the most difficult to predict.

Patient History, Clinical Diagnosis
An open wedge valgisation osteotomy was performed at the left tibia of a 66 year old patient with a medial gonarthrosis. The osteotomy was filled with autologous bone from the iliac crest. 5 months later the patient had pain depending on the weight load of the leg.

The radiological assessment revealed an incomplete bone formation in the osteotomy with pseudoarthrotic symptoms (Figure 1).

Treatment
The osteotomy was debrided and the defect was completely filled with a mixture of autologous bone from the iliac crest and Orthoss® granules 2-4 mm. 3 months postoperatively, new bone formation is clearly visible (Figure 2).

Discussion and Outcome
The postoperative course was uneventful and no complications were reported. No signs of thrombosis or inflammations were visible. Despite the progressing medial gonarthrosis the patient is pain free and shows a range of motion form 0-120 degrees.

Recommendations
The Orthoss® bone mineral matrix is an ideal volume expander in pseudoarthrosis surgery creating an ideal scaffold for new bone formation.

Bone Grafting in Pseudoarthrosis Surgery
Clinical Case by Prof. Dr. med. Ruhnau
Sankt Marienhospital Buer, Germany

Figure 1: Incomplete bone formation after open wedge osteotomy with pseudoarthrotic symptoms.

Figure 2: Defect completely filled with autologous bone and Orthoss® after 3 months.
Bone Grafting in Hip Revision Surgery

Clinical Case by Prof. Dr. med. Michael Wagner
Chemnitz, Germany

Total hip replacements in patients with acetabular bone deficiency remain a challenge for orthopaedic surgeons. In most revision procedures a reconstruction of bone defects is mandatory to obtain a stable fixation. Morsellised allogeneic femoral heads harvested from sound donors during total joint replacement have been used worldwide for acetabular reinforcements for decades. Since this well-established procedure may be no longer applicable in the future, other proven materials are necessary to fill bone defects.

Bone grafting in acetabular revisions with major bone defects is conducted using Orthoss®, an inorganic bone mineral matrix of bovine origin. This mineralised bone matrix is chemically comparable with mineralised human bone and has an excellent and proven osteoconductivity.

The defects in the presented case were filled with Orthoss®. Antiprotrusio cages and acetabular reconstruction rings were used as acetabular prosthetic components.

**Patient History, Clinical Diagnosis**

Female Patient, 83 years old, 18 years after implantation of a cemented hip system. Cup loosening and breakage of the cup on the left side.

The patient showed significant osteolysis on the acetabulum with a Paprosky IIIa defect.

**Treatment**

A hip revision surgery was performed. The cup was reconstructed using a Burch-Schneider Ring Implant (Zimmer).

Approximately 60cc of Orthoss® was used to help restore deficient host bone.

**Discussion and Outcome**

The postoperative course was uneventful in this case. No revision was necessary and no infection occurred. In the short-term follow-up, the clinical and radiological examinations showed no changes. There was no resorption of the commercially available bone graft. No implant migration could be detected.

**Recommendations**

The inorganic bone mineral matrix Orthoss® seems to be a good substitute for human bone in total hip revision surgery. It is suitable to fill even major defects and is also well suited as a volume expander for autologous bone. The short-term results, in mainly cavitary defects, are promising.

Orthoss® is easy to prepare as it can be stored at room temperature and is ready for use.
Bone Grafting in Traumatology

Clinical Case by Prof. Dr. med. Schlickewei
Freiburg, Germany

Orthoss® is well suited for use in both osteotomies and fracture repair, including complex fracture patterns and various forms of non-union. Additionally, Orthoss® has an excellent record when used in combination with metal implants to provide both a bone void filler function and a biological trigger and support for new bone formation.

Patient History, Clinical Diagnosis

Figure 1:
A 6 year old child with a calcaneus fracture.

Figure 2:
The fracture was repositioned and fixed with an external fixator.

Discussion and outcome

Figure 3:
3 Months postoperatively the metal was removed. The Orthoss®-Bone Substitute is still visible.

Figure 4:
21 Month postoperatively the bone transformation is complete and no residuals of Orthoss® are visible. New bone has been successfully formed and is nicely consolidated.
Bone Grafting in Spinal Fusion Surgery

Clinical Results provided by Dr. med. Karsten Ritter-Lang
Potsdam, Germany

The incidence of degenerative diseases of the vertebral column is constantly increasing. Treatment options for this indication may involve discectomy or fusion of the affected vertebral bodies if the spine is unstable. Fusion procedures are designed to eliminate motion between the affected vertebrae, thus providing pain relief at the site of spinal instability. The vertebrae are fused using bone grafts, with or without pedicle screws, plates, or cages.

In such cases, the bone graft material Orthoss® from Geistlich provides an osteoconductive scaffold for local natural bone growth and rapid fusion. Orthoss® may be placed directly into the inter vertebral gap, formerly occupied by the degenerated disc, or into the centre of a fusion cage or any other implant used to fill the disc space to restore the original anatomical height.

Fusion procedures have lead to good clinical results, even though the rate of non-unions ranges from 1-25% according to the literature. The rehabilitation process after spinal fusion lasts for several months.

Dr. med. Karsten Ritter-Lang from Potsdam, Germany has treated 22 patients using Orthoss® for spinal fusion.

<table>
<thead>
<tr>
<th>Anterior Fusion</th>
<th>Posterior Fusion</th>
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<tbody>
<tr>
<td>Number of Patients</td>
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<td>Age</td>
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<td>Indications</td>
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<td>M. Scheuermann: 1</td>
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<tr>
<td>Number of Segments</td>
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<td>5 Segments: 1</td>
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<td>Results</td>
<td>Consolidation: 7 Pat. after 6 months</td>
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<td></td>
<td>3 Pat. after 12 months</td>
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</tbody>
</table>

Table 1: Results of 22 patients who underwent spinal fusion procedures using Orthoss®

Radiographs show a 59 year old female patient treated with an anteroposterior spondylodesis L4/5 with PEEK-Cage filled with Orthoss®, pedicle screws and an artificial disc L5/S1.

The use of Orthoss® in combination with autologous bone with interbody fusion cages leads to good clinical results in spinal fusion procedures.
Orthoss® Case Report

In most benign giant cell tumors a complete excision is mandatory during treatment. As these tumors are osteolytic, fractures are common in load bearing bones. In the majority of all cases the tumors occur in the region of a joint. Complete excision of the tumor with reconstruction of the bone defect results in an increased recovery without disability or deformity. The strength and function can be restored more rapidly when using a bone graft as the ossification of the blood-filled cavity is slow and convalescence prolonged when these are not used.

Autologous bone remains the ideal material for bone grafting as it has both osteoinductive and osteogenic properties. Because of donor site morbidity, variations in quality and the limited availability for the filling of large defects, bone graft substitutes are a viable alternative.

In the presented case, the resultant cavity was filled using Orthoss®, an inorganic bone mineral matrix of bovine origin in combination with autologous bone. This mineralised bone matrix is chemically comparable with mineralised human bone and offers an ideal scaffold into which new bone can grow. The defects were filled with bone matrix and were supported with metal implant components in order to stabilise the defect and to compensate the mechanical forces. This stimulated rapid formation of new bone and lessened the danger of a collapse through fracture and preventing disability and deformity.

**Patient History, Clinical Diagnosis**

A 21 year old female patient with a giant cell tumor in the lateral femoral condyle.

After excision of the tumour, the defect cavity was reconstructed with a mixture of Orthoss® and autologous bone.

On the lateral side an angular stable femoral condylar plate was implanted to stabilise the defect.

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**Figure 1:**
Giant cell tumor in the lateral femoral condyle.

**Figure 2:**
Reconstruction of the bony defect using autologous bone and Orthoss as volume expander. Defect stabilisation through osteosynthesis.
Discussion and Outcome

The plate was removed 8 months postoperatively and the revascularisation and remodelling of Orthoss®, which is still visible, could be observed.

The Goldner-stained histological sections 8 months postoperatively revealed new bone formation. Due to the slow resorption rate of Orthoss®, some intact Orthoss® particles could still be seen.

Orthoss® acts as a scaffold for new bone formation. As a result of its high porosity a rapid revascularisation occurs and new bone formation takes place.

Recommendations

The inorganic bone mineral matrix Orthoss® seems to be an ideal volume expander for autologous bone. It is suitable for use in large defects showing a high degree of osteointegration and osteoconductivity.

As a result of the high porosity an instantaneous and complete wetting, Orthoss® is immediately applicable and has excellent handling properties.