OSTEOAMP Case Report

POSTERIOR CERVICAL FUSION

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Patient

Presented with cervical myelopathy and neck pain

Procedure

C3-6 laminectomy and posterolateral arthrodesis

Outcome

12-month post-operative x-ray confirms fusion

OSTEOAMP IS A UNIQUELY PROCESSED ALLOGRAFT THAT MAINTAINS AND PRESERVES HIGH LEVELS OF A WIDE ARRAY OF NATURAL GROWTH FACTORS FOUND IN BONE AND BONE MARROW.[1-3]

Patient

A 77-year-old female presented to the clinic with cervical myelopathy and neck pain. The patient was diagnosed with cervical scoliosis, cervical stenosis and cervical myelopathy **(Figures 1 and 2)**. The patient was obese, had osteopenia, severe osteoarthritis, and chronic obstructive pulmonary disease. She had previously undergone physical therapy for 12 weeks and multiple medication regimens. Her symptoms had not improved with conservative management and surgical intervention was indicated.

Procedure

The objective of the surgery was to perform a C3-6 laminectomy and posterolateral arthrodesis with instrumentation (lateral mass screws and rods). The procedure was augmented with OSTEOAMP strips and local morselized autograft from the C3-6 lamina bilaterally. No complications of surgery were reported.

Outcome

Following surgery, the patient had improved cervical myelopathy, although she still had mild neck pain. The 12-month post-operative dynamic, standing x-rays showed solid fusion **(Figures 3 and 4)** with no movement of the vertebral bodies upon flexion or extension **(Figures 5 and 6)**.

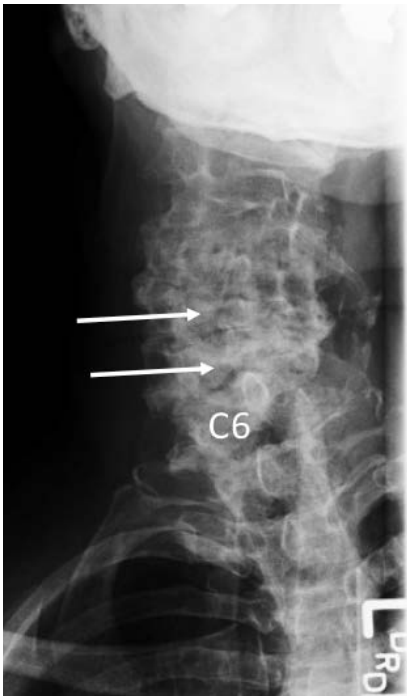
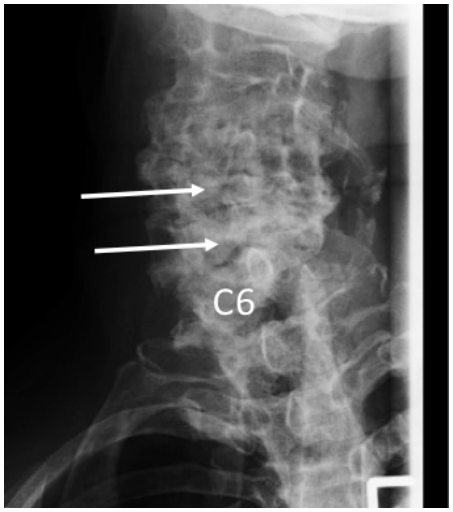


Figure 1: Pre-operative anteroposterior cervical spine x-ray showing cervical scoliosis, extensive cervical stenosis at C3-6, and loss of intervertebral disc space (arrows).

Pre-operative



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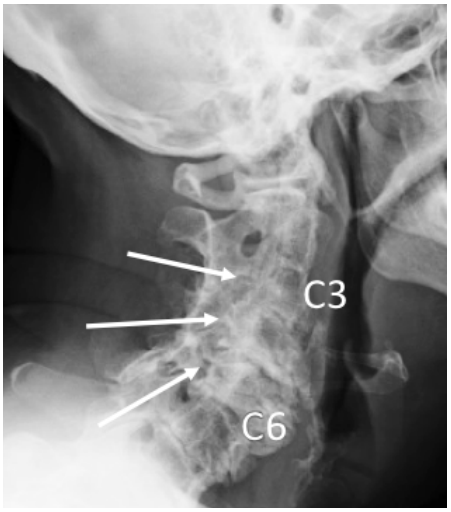

Figure 2: Pre-operative lateral cervical x-ray showing cervical stenosis at C3-6 (arrows) and loss of intervertebral disc space.

12 months post-operation

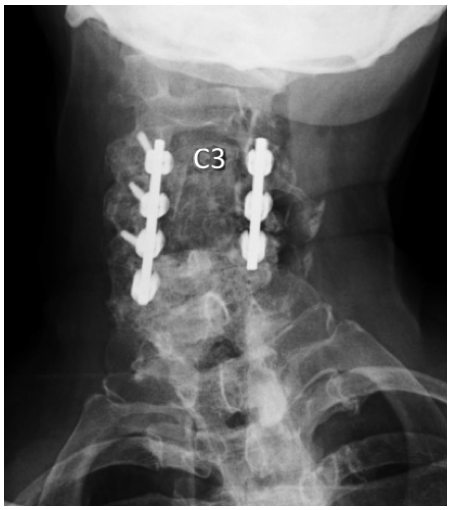

Figure 3: 12-month post-operative dynamic, standing, anteroposterior cervical spine x-ray. The cervical fixation (lateral mass screws and rods) at C3-C6 remain intact with no loosening of the screws observed.

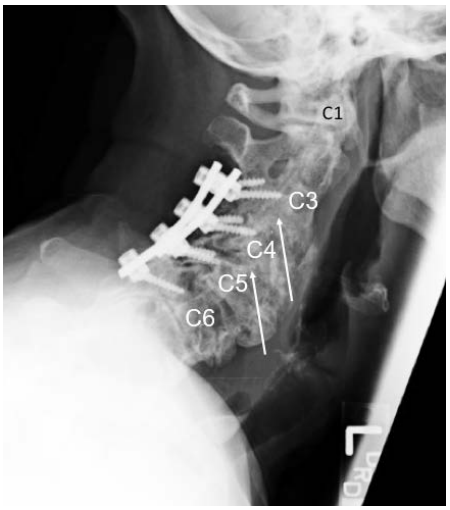

Figure 4: 12-month post-operative dynamic, standing, lateral cervical spine x-ray. Complete bone fusion at C3-6 has taken place: the vertebral bodies are no longer clearly defined. New bone growth is indicated by the white arrows.

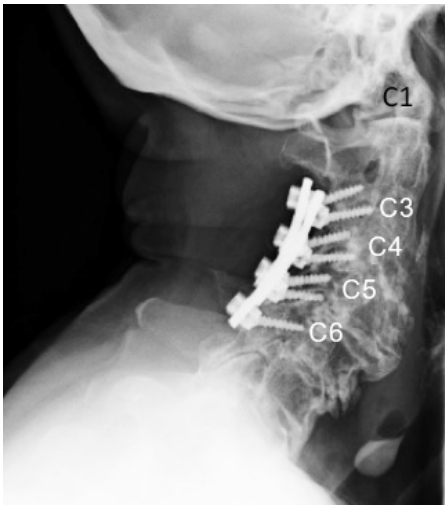

Figure 5: 12-month post-operative dynamic, standing, lateral cervical spine x-ray in extension.

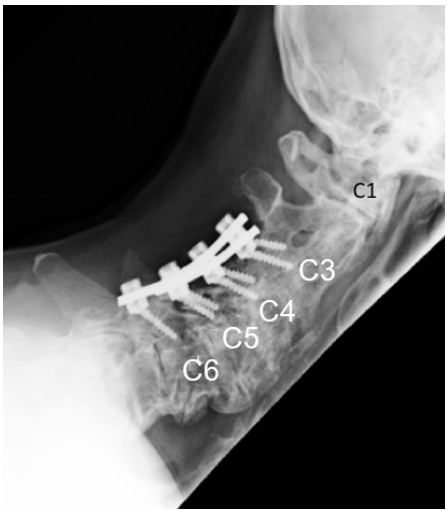

Figure 6: 12-month post-operative dynamic, standing, lateral cervical spine x-ray in flexion. No movement of the vertebral bodies between the extension and flexion views is observed.

About OSTEOAMP

OSTEOAMP, an allogeneic bone graft, was developed to provide an alternative to autograft harvested from the iliac crest - the "gold standard" bone graft. However, autograft harvesting is associated with donor site morbidity and is limited in its use by tissue availability.[4] Furthermore, harvesting from the iliac crest increases the overall operating time. Therefore, using an alternative allogeneic bone graft for bone fusion may be preferable.

OSTEOAMP is unique as the method of processing the bone graft allows for retention of high levels of naturally occurring growth factors.[1-3] Unlike traditional allografts that are typically processed by washing away the bone marrow, and with that the milieu of growth factors that support bone healing, the OSTEOAMP process uses the bone, including bone marrow, from a single donor. OSTEOAMP contains bone morphogenetic proteins (BMP-2 and BMP-7), transforming growth factor β1 (TGF-β1) and acidic fibroblast growth factor (aFGF), amongst others.[2] These critical growth factors are known to influence bone formation: BMPs are involved in the regulation of bone formation and induce the differentiation of mesenchymal stem cells into osteoblasts; TGF-β1 enhances proliferation of mesenchymal stem cells and induces the production of extracellular proteins such as collagen, proteoglycans, osteopontin, osteonectin, and alkaline phosphatase; and aFGF helps to increase cell proliferation and enhances cartilage formation.[5] OSTEOAMP is available in three different formats: granules, putty, and compressible sponges, thus enabling augmented bone grafting at various locations.

Several clinical studies with large numbers of patients have reported that OSTEOAMP is a safe and clinically effective bone graft substitute for spine fusion.[6-8] Yeung et al. (2014), a retrospective study, reported a total of 488 different OSTEOAMP allografts from 114 donors that were used in 119 cervical and 166 lumbar procedures without complications.[6] Donor age, gender or tissue intervariability were not clinically relevant to time to fusion. Cervical fusion rates were reported as 83.2% at 6 months, 98.3% at 12 months and 100% at 18 months. Lumbar fusion rates were reported as 68.1% at 6 months, 98.2% at 12 months and 99.4% at 18 months. Another study with 321 patients undergoing lumbar interbody fusion reported that OSTEOAMP led to solid bone fusion in a shorter period of time (~40% less time) with fewer complications and a lower cost per level than rhBMP-2.[8] Thus, the clinical evidence supports the use of OSTEOAMP, both clinically and economically.

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References

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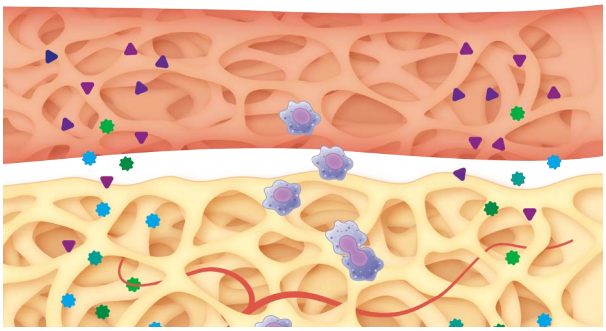
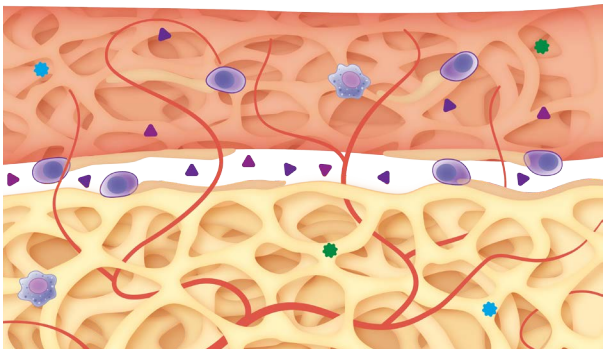


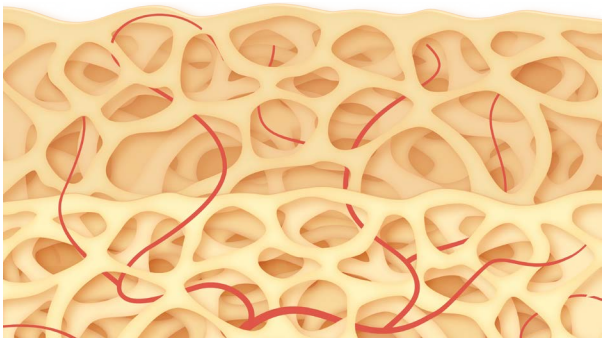
Step1

OSTEOAMP, an osteoconductive, osteoinductive, and angiogenic bone graft substitute, is placed at the fusion site.[9] Cells are attracted to the site of injury in response to cytokines and endogenous growth factors in the bone healing environment.



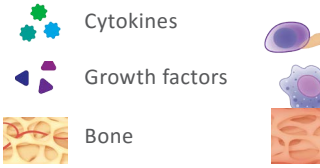
Step 2

The endogenous osteoinductive and angiogenic growth factors in OSTEOAMP contribute to the bone healing process. Osteoinductive growth factors, such as BMPs, are known to promote cellular recruitment, proliferation and differentiation of bone cells, which promotes bone formation.[5] Angiogenic growth factors initiate development of new vessels. Osteoblasts lay down new osteoid matrix.



Step 3

OSTEOAMP is incorporated into the site of bone healing. Mineralization of the osteoid matrix occurs, creating solid fusion. This is followed by bone re-modelling where OSTEOAMP is replaced by host bone.



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