DONOR SITE PAIN FROM THE ILIUM
A complication of Lumbar Spine Fusion

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Design
Retrospective observation

Objective
Evaluation of the frequency, origin and contributing factors for pain at the site of harvest

Abstract
- 25% of 290 patients complain of unacceptable pain at the site of harvest following an anterior lumbar spine fusion
- Postsurgical pain occurs more frequently at the site of harvest than at the actual surgical site
- Pain frequently subsides after several weeks but is also persistent

Method
- 428 patients aged 17-62 years; treated with anterior spine fusion
- 290 subjects via questionnaire, 81 of whom were clinically examined; 235 had images available
- Pain scale: unacceptable pain / acceptable pain / no pain at the site of harvest

Results
- Patients with unacceptable pain at the site of harvest: 25%
- Patients with acceptable pain at the site of harvest: 24%
- Patients without pain at the site of harvest: 51%
- Patients with tricortical bone harvest (taken using a separate approach) and patients with an unsatisfactory surgical result (back pain as previously) more frequently have pain at the site of harvest
  - 30% of patients with a tricortical harvest and an abdominal approach complain of pain
  - 23% of patients with a bicortical harvest and a separate approach complain of pain
  - 88% of patients with a tricortical harvest and a separate approach complain of pain
- In 11 out of 290 patients, the site of harvest was filled with bone cement; 10 of these patients complain of pain at the site of harvest
- In 5 out of 290 patients, the site of harvest became infected; 4 of these patients received bone cement to fill in the site of harvest
- 69% of patients complain of pain at the site of harvest immediately after surgery
- 15% of patients developed pain at the site of harvest 1-3 months after surgery
- 15% of patients developed pain at the site of harvest 4-12 months after surgery

Conclusion
- In almost all cases, the use of bone cement was associated with pain at the site of harvest as well as a higher incidence of local infections
- The idea of "prophylaxis" not successful
- A clear reason for the pain remains unanswered
- None of the traditional therapies for pain was successful, rarely any spontaneous recovery
- The risk of significant pain must be taken into account in the decision (consideration of advantages vs. disadvantages of autologous bone).
A SYNTHETIC POROUS CERAMIC AS A BONE GRAFT SUBSTITUTE IN THE SURGICAL MANAGEMENT OF SCOLIOSIS
A Prospective, Randomized Study

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Design
Prospective, randomized study

Objective
Assessment of the clinical and radiological performance of synthetic bone graft materials in scoliosis

Method
- 58 subjects with idiopathic scoliosis between the ages of 13 and 25 years who were treated posteriorly (arthrodesis) by the same physician
- Group A: 30 patients received treatment with spine bone material mixed with iliac crest bone material
- Group B: 28 patients received treatment with spine bone material mixed with a hydroxyapatite/tricalcium phosphate mixture

Result
- Less blood loss in patients who received ceramic bone graft material than in patients who received iliac crest bone graft material
- Significantly high number of patients with pain at the site of harvest in group A
- Bone successfully absorbed within 12 months on the ceramic bone graft material
- Correction of the spinal deformities in both groups was satisfactory
- The following patients in group A complained of pain at the site of harvest:
  - 67% 3 months after the surgery
  - 52% 6 months after the surgery
  - 37% 12 months after the surgery
  - 22% 24 months after the surgery
- Fusion results are comparable in group A and B

Conclusion
The use of ceramic bone graft materials instead of iliac crest bone material is preferred in teenagers and young adults for a posterior spine fusion.
MORBIDITY AT BONE GRAFT DONOR SITES

Edward M. Younger, Michael W. Chapman

Design
Retrospective study

Objective
Documentation of morbidity in the case of bone harvest from the iliac crest

Method
- 239 subjects with bone graft harvest (153 male, 86 female, average age of 33 years (1-83 years))
- Bone harvest in 176 patients (72.4%) via a separate approach and in 76 patients (27.6%) via the same approach
- Method: Complications classified according to
  - Severe (repeat surgery necessary, increase in days of hospitalization) / mild (treated locally)
  - Early (occurred while still in hospital) / late (occurred after discharge)

Result
- Overall rate of complications: 8.6% serious, 20.6% mild
- Rate of complications in patients with a separate approach: 5.1% serious, 19.3% mild
- Rate of complications in patients with the same approach: 17.9% serious, 23.9% mild

Conclusion
- Complications documented in the case of bone harvest
- Some complications can be avoided by the surgical technique
- However, many complications cannot be avoided
- It is worthwhile to review and consider the use of other materials (synthetic)
OVERVIEW OF THE BIOLOGY OF LUMBAR SPINE FUSION AND PRINCIPLES FOR SELECTING A BONE GRAFT SUBSTITUTE

Scott D. Boden, MD

Design

Literature analysis

Objective

Analysis of spinal fusion to define criteria for the selection of the bone graft material

Result

- Bone healing is dependent on the quality of the bone, the amount of bone and tissue vascularization
- Bone graft strengthener = increases the rate of recovery of the body’s own bone
- Ceramic bone graft material = can be used as a bone graft supplement when mixed with autologous bone; it does not appear suitable for stand-alone use
- Recovery results for bone graft materials for one region of the spine are not transferable to other regions of the spine
  - Surgeons should use only those materials for their particular indication which have also been tested precisely at this anatomical site
- Animal testing with bone materials is not transferable to humans
  - Therefore, when selecting the bone graft material, the material which is closest to humans in the biological hierarchy should be used (to the extent that no studies have been performed on humans)

Conclusion

- Osteoconductive bone graft materials are less effective as a “stand-alone” treatment in posterolateral spinal fusion in adults but may be suitable for rigid treatment of the anterior spine
- Osteoinductive bone graft materials are suitable for use as filling materials, strengtheners or a graft for posterolateral spinal fusion
TRI-CALCIUM PHOSPHATE CERAMICS AND ALLOGRAFTS AS BONE SUBSTITUTES FOR SPINAL FUSION IN IDIOPATHIC SCOLIOSIS: COMPARATIVE CLINICAL RESULTS AT FOUR YEARS

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Design
- Comparative study, posterolateral arthrodesis in scoliosis
- Follow-up in 3 / 6 / 12 months; thereafter annually with up to 4 years of follow-ups

Objective
- Assessment of the quality of the bone fusion achieved with the use of TCP bone graft
- Comparison of TCP to allogenic bone graft

Method
- 54 scoliosis patients underwent surgery (with the same technique, by the same surgeon)
- Group A: 30 patients with a mixture of autologous and allogenic bone graft material
- Group B: 24 patients with a mixture of autologous bone and tricalcium phosphate bone

Result
- After 2 years, resorption was complete in group B, however this was not the case in group A
- 8% of patients from group B had loss of spinal correction up to 6 months post-op, thereafter the spine stabilized
- 33% of patients from group A had loss of spinal correction up to 2 years post-op, thereafter the spine stabilized
- However: The loss of spinal correction within 6 months post-op was comparable in both groups!
- The loss of spinal correction is not dependent on the type of the bone graft material used
- TCP
  - No increased evidence of intolerance or sepsis
  - No triggers for complications in the 4-year follow-up
  - Complete remodeling in the body’s own bone
  - 2 years post-op
  - No loss of correction after 6 months
  - Results comparable with freeze-dried allograft

Conclusion
A mixture of autologous bone and tricalcium phosphate as bone graft material appears to be a valuable alternative to allografts for posterolateral spine arthodesis in scoliosis.