Ankle and Hindfoot Arthrodesis Using ViviGen® Cellular Bone Matrix

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CASE STUDY 3

Arthrodesis is used to treat arthritis, deformity, instability, or pain in the ankle and hindfoot. Although this procedure is the most commonly used technique to treat end-stage ankle arthritis, reported success rates vary widely.[1] One bone grafting option for arthrodesis is autograft. Autograft bone can provide the osteoconductive, osteoinductive and osteogenic properties needed for successful bone fusion; however, the retrieval of the autograft can cause pain and site-morbidity to patients.[2] ViviGen provides all three of these properties using viable lineage-committed bone cells. ViviGen contains viable cortico-cancellous bone matrix, cortico-cancellous chips, and demineralized bone and preclinical studies have suggested bone cells might improve fusion over mesenchymal stem cells by providing better bone deposition[3] while remaining in the defect site longer.[4]

The following describes the use of ViviGen to treat a challenging ankle deformity case.

Patient

- A 59 year old former smoker, male patient with human leukocyte antigen (HLA) B27
- Complained of pain, progressive deformity, instability, degenerative joint disorder, and ambulatory changes in left ankle that had gradually onset over 15 years
- Failed conservative treatments include orthosis, topical NSAIDS, and arthrocentesis

Procedure

- Ankle primary fusion was undertaken (Figs. 1&2)
- Valgus rotation with marginal spurring of full thickness cartilage loss observed
- 5 cc of ViviGen was used

Results

- Fusion was achieved by seven weeks
- Preoperative moderate pain decreased to an occasional ache post-operatively
- Patient was full weight bearing at four weeks using a boot and discontinued boot use at seven weeks

Conclusion

- Patient was “very pleased with the result” and no complications were observed
- Arthrodesis using ViviGen was successful at inducing fusion within seven weeks (Figs. 3&4)

1. Yasui Y, Hannon CP, Seow D, Kennedy JG. Ankle arthrodesis: A systematic approach and review of the literature. *World J Orthop.* 2016;7(11):700-708.
2. Khan WS, Rayan F, Dhinsa BS, Marsh D. An osteoconductive, osteoinductive, and osteogenic tissue-engineered product for trauma and orthopaedic surgery: how far are we? *Stem Cells Int.* 2012;2012:236231.
3. Reichert JC, Quent VM, Noth U, Hutmacher DW. Ovine cortical osteoblasts outperform bone marrow cells in an ectopic bone assay. *J Tissue Eng Regen Med.* 2011;5(10):831-844.
4. Tortelli F, Tasso R, Loiacono F, Cancedda R. The development of tissue-engineered bone of different origin through endochondral and intramembranous ossification following the implantation of mesenchymal stem cells and osteoblasts in a murine model. *Biomaterials.* 2010;31(2):242-249.

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Fig. 1 AP Preoperative

Fig. 2 Lateral Preoperative

Fig. 3 AP Postoperative
At *8 Weeks Post Op*

Fig. 4 Lateral Postoperative
At *8 Weeks Post Op*

Results from case studies are not predictive of results in other cases. Results in other cases may vary.

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