Stem Cells Concentrated from Bone Marrow Aspirate mixed with Crushed Cancellous Bone Chips: A Substitute for Autograft Fusion of the Spine?

CASE REPORT
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BACKGROUND

Autologous Iliac Crest Bone Graft (ICBG) remains the Gold Standard because it contains the key elements needed to achieve a solid spinal fusion.[1] The advantages of autologous ICBG should be balanced against the known complications, which include chronic pain, increased blood loss, increased operative time, deep infection, vascular and neural injuries and poor cosmetic results.[2,3,4] A new, less invasive approach,[5] has been reported in the literature that suggests harvesting Bone Marrow Aspirate (BMA) from the ilium[6] and concentrating the stem cells improve outcomes in tibial non-unions,[7] avascular necrosis of the hip[8,9] and critical limb ischemia.[10] This case report describes the use of concentrated stem cells added to crushed cancellous allograft in treating degenerative spondylosis.

CASE REPORT

A 67 YO healthy female (5'4", 174 pounds) non-smoker with a successful previous lumbar fusion in 1998 of L4-5 developed degenerative disc disease with facet arthropathy at L3-4 and L5-S1 with concordant pain reproduction of 7/10 and 9/10 intensity respectively. L2-3 was normal. Conservative measures included PT, medication and steroid injections.

In December 2006, Pt underwent exploration of L4-5 which was solidly fused and fusion of L3-4 and L5-S1 with pedicle screws, plates, allograft and concentrated Stem Cells.

Due to previous autograft harvest and to reduce donor site morbitity, a new approach was considered. 120 mL of bone marrow was obtained from the posterior iliac crest using an 11 gauge, 5 side hole Jamshidi needle (Figure 1). Marrow was then placed into a sterile blood bag containing ACD-A anticoagulant and handed to the circulator who immediately processed the marrow in the OR in the SmartPReP2 System (Harvest Technologies Corp., Plymouth, MA). Stem cells were concentrated in 15 minutes to a 20 mL volume and sterilely transferred back to the field. The concentrated Stem cells were added to crushed cancellous allograft (SpineSmith, Austin, TX) at a 1:1 ratio using the Graft Delivery kit (Harvest Technologies Corp., Plymouth, MA) to form two 10 cc consolidated allograft "logs" (Figure 2). Following placement of the pedicle screws and plates, approximately 5 cc of the consolidated allograft was placed at each level to be fused.

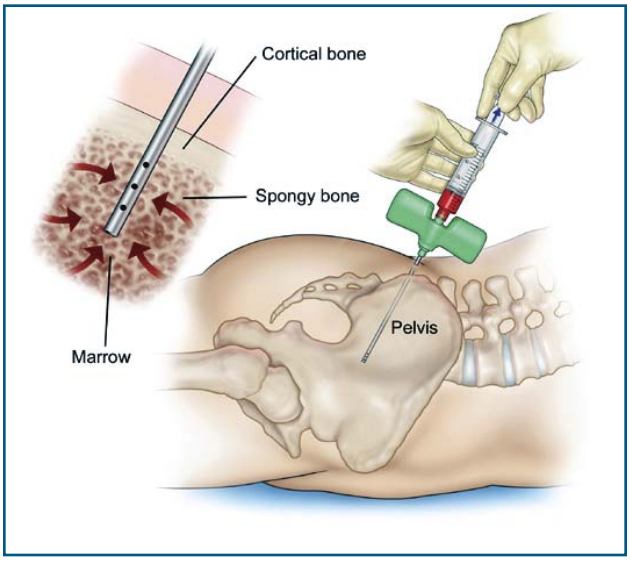

Figure 1

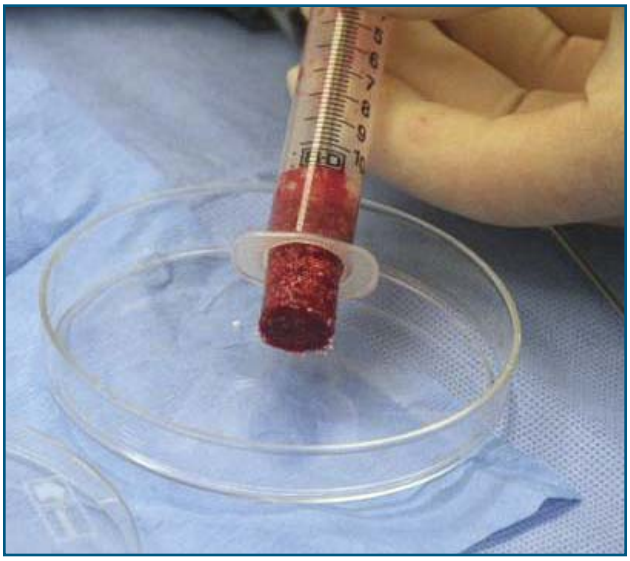

Figure 2

Stem Cell Graft vs. Previous Autograft Fusion

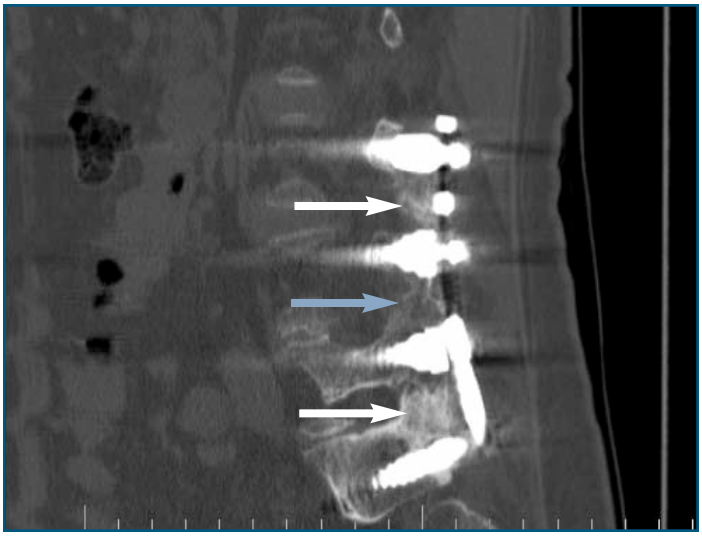

Figure 3

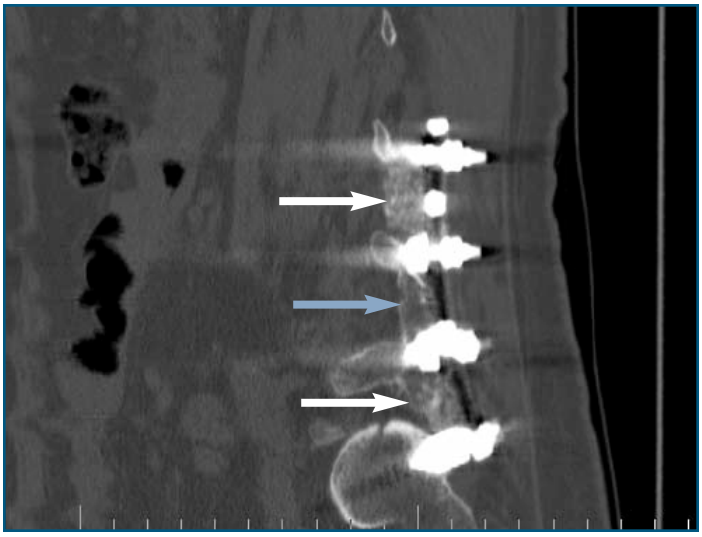

Figure 4

Figure 5

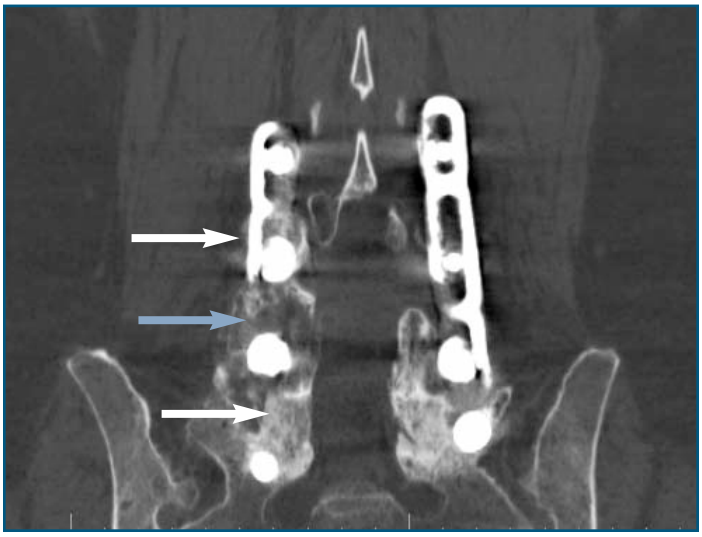

Figure 6

Light Blue Arrows indicate previous solid autograft fusion. White arrows show excellent bridging and solid stem cell bone at 12 months.

RESULTS

At 12 month follow-up, CT Scans Lat (Figure 3, Figure 4) and AP (Figure 5, Figure 6) show solid bone formation at L3-4 and L5-S1 comparable to the previous autograft completed in 1998.

CONCLUSION

Concentrated Stem Cell Allograft (SCG) composite offers an effective alternative to ICBG.

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