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OPTIMIZATION OF ALLOGENEIC MESENCHYMAL PROGENITOR CELLS FOR POSTEROLATERAL SPINAL FUSION WITH POSTERIOR INSTRUMENTATION IN SHEEP

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INTRODUCTION

Autologous bone is finite resource and harvesting is associated with significant morbidity. This study investigated the safety and efficacy of allogeneic mesenchymal progenitor cells delivered via calcium phosphate carrier to stimulate bone growth in spinal fusion compared to autograft control in an ovine model.

METHODS

Forty-two mature sheep underwent instrumented posterolateral lumbar spinal fusion using 25 million, 75 million or 225 million commercially prepared allogeneic mesenchymal progenitor cells (MPCs) and carrier (MasterGraft Matrix, Medtronic). Controls received carrier or iliac crest autograft only. Clinical pathology was assessed at monthly intervals and fusion was assessed by fine cut CT scan and mechanical testing ex vivo after 3 and 9 months.

RESULTS

There were no adverse clinical findings. CT scan and histology showed moderate to good fusion in all treatments after 3 months with more solid fusion after 9 months. Supplementation of the carriers with MPCs promoted fusion to the same extent as autologous bone graft although there was no clear dose response, consistent with the mechanical testing.

DISCUSSION

MPCs promote early development of spinal fusion equivalent to autologous bone graft in this ovine model. Given the potential for significant clinical problems with autologous grafting consideration must be given to using MPCs in this setting.