**IMPROVING OSSEOINTEGRATION AROUND TOTAL HIP ARTHROPLASTY WITH BONE MARROW STROMAL CELLS (BMSCS)**

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**Introduction:** Aseptic loosening at the bone-implant interface of THA acetabular components is a major cause of implant failure. Improving the fixation between the bone and implant may prevent or retard loosening. The hypothesis of this study was that spraying autologous BMSCs in fibrin glue onto the surface of HA-coated acetabular components would increase bone formation and bone-implant contact around the implant.

**Materials and Methods:** Goats’ BMSCs were isolated from bone marrow and expanded in vitro. 10 x 10^6 BMSCs/ml were suspended in thrombin, and at surgery were mixed with fibrinogen before spraying. 6 goats received fibrin-only coated cementless acetabular components (control) and 6 received cementless acetabular components coated with fibrin augmented with autologous BMSCs (experimental). Walking and ground reaction forces were assessed pre-operatively, and 6 and 12 weeks post-operatively. After 12 weeks, the acetabula were retrieved, and processed for histology. The percentage of new bone around the cups was measured within 5 radial zones. The bone-implant contact and fibrous tissue thickness was assessed at 35 radial points around the surface of the acetabular component using image analysis. Mann Whitney U test was used to show statistical significance.

**Results:** New bone formation at the periphery showed a significant increase in the BMSC group (71.97±10.91%), when compared to the controls (23.85±15.13%, p=0.028). The other zones did not show a significant difference. Overall new bone growth in the BMSC group was 30% greater than the control group (71.42±8.97% and 54.22±16.56%, respectively, p=0.58). Bone-implant contact was significantly increased at the periphery of BMSC-treated cups (34.29 ± 11.61%), compared to controls (7.14 ± 2.61%, p=0.01).

. Fibrous tissue thickness was also reduced at the periphery of the cup (327.49±20.38 mm-BMSC group; 887.21 ± 158.89 mm-controls, p=0.02).

. With regards to the force plate analysis, there was no significant difference in loading between groups at both 6 weeks and 12 weeks (p>0.05).

**Discussion:** In this study, overall bone growth was greater when cups were treated with BMSCs. Bone-implant contact was significantly improved as well. This study has clinical applications, as improved osseointegration of the implant may prevent aseptic loosening of THAs and improve their longevity. Also, this technique may improve fixation in situations where the bone stock is reduced, such as revision THAs.