Title:

Therapeutic angiogenesis for the salvage of ischemic limb – single center experience

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Abstract

Introduction: Therapeutic angiogenesis (TA) using bone-marrow-derive mononuclear cells (BMMNC) is a promising option for the salvage of ischemic limb in patients with unreconstructable critical limb ischemia (CLI). Objective was to study efficacy and safety of TA.

Methods: 25 patients with critical limb ischemia were enrolled. Bone marrow (600±50 ml) was collected from iliac spine. Heparin solution in saline (80 IU/ml) was used as anticoagulant. Differential centrifugation (22°C, 3100 rpm, 2 min) was employed. Bone-marrow-derive mononuclear cells (BMMNC) were separated by automated Top-&-Bottom system (Optipress). BMMNC (100-120 ml) were implanted to the ischemic limb

using deep intramuscular injections. Patients were followed up prior to, 1, 3, 6 and 12 months after TA.

Results: BMMNC concentrate contained 5.2x more CD34+ (413.87±46.64x10^6/l) and 6x more CD133+/CD34- (91.3±13.97x10^6/l) than raw BM. The viability of stem cells was 75%-95%. One patient died from toxic liver failure. Six patients (24%) underwent major limb amputation. No treatment-related adverse events were observed. Ankle-brachial index improved from 0.41±0.23 to 0.60±0.27 and 0.63±0.26, after 6 and 12 months ($p<0.01$). Pain index decreased. Claudication interval prolonged from 0 to 400 (150-1000) m after 6 months and 500 (175-1000) m after 1 year ($p<0.01$). Wound healing was observed in 10 patients out of 13 (77%), 3 underwent minor amputations (23%).

Conclusion: Major advantages are cost-effectiveness, simplicity and good accessibility (procedure feasible in regional hospitals).

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Key words: Therapeutic angiogenesis; Critical limb ischemia; Bone-marrow-derived mononuclear cells