Long-Term Results of Autologous Bone Marrow-Derived Stem Cell Implantation for Chondral Defects of the Knee

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I have no financial conflicts to disclose
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Background

• Treatment of articular cartilage defects is challenging\(^1\)

• Autologous BMSC overcomes some of the limitations of ACI\(^2\)
  • Enhanced proliferative potential\(^3\) (stem cells vs chondrocytes)
  • One fewer surgery

• Safety concerns
  • Tumour formation
  • Infection

• No long-term efficacy or safety data
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Aims and hypothesis

• This study thus aimed to demonstrate the long-term efficacy and safety data for autologous BMSC implantation for chondral defects of the knee

• We hypothesised that intra-articular BMSC implantation would result in good patient-reported outcomes at up to 10 years post-operatively with no increased risk of adverse events
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Patients and methods

• Patient cohort
  • 36 patients
  • Symptomatic full-thickness knee chondral defects
  • Underwent autologous BMSC implantation
  • Follow up visits at 3,6,12 months then annually up to 10 years

• Surgical procedure
  • 30mls bone marrow aspirate obtained from iliac crest under local anaesthesia
  • In-vitro expansion to 10-15 million cells (4-5 weeks)
  • Chondral defect debrided and covered with periosteal patch from proximal tibia/distal femur
  • Cultures cells implanted under patch and sealed with tissue glue
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Patients and methods

• Primary outcome measure
  • Lysholm knee score\(^4\)
    • Before surgery and at 10 years

• Secondary outcome measures
  • Subsequent surgical procedures to same knee
  • Tumour development
  • Infection
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Results

• Mean age at surgery – 43.5±11.2 years
• Mean chondral defect size – 4.6±3.5cm²
• 6 patients lost to follow up
• Primary outcome
  • 75% of cohort maintained at least MCID⁵ at 10 years
  • 61% achieved at least Lysholm ‘Fair’ grading
• Secondary outcomes
  • One patient underwent a total knee replacement
  • Four patients underwent further knee arthroscopies
  • No tumours nor infections developed
Discussion

• Autologous BMSC implantation for knee chondral defects is a safe and effective treatment modality

• Post-operative improvements sustained up to 10 years post-operatively

• No increased risk of infection or tumour formation

• Limitations
  • No control group
  • Small sample size
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References