Radiographic Tibial Tunnel Assessment After Anterior Cruciate Ligament Reconstruction Using Hamstring Tendon Autografts and Biocomposite Screws:

A Prospective Study with 10-Year Follow-up

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S. Balasingam: Nothing to disclose

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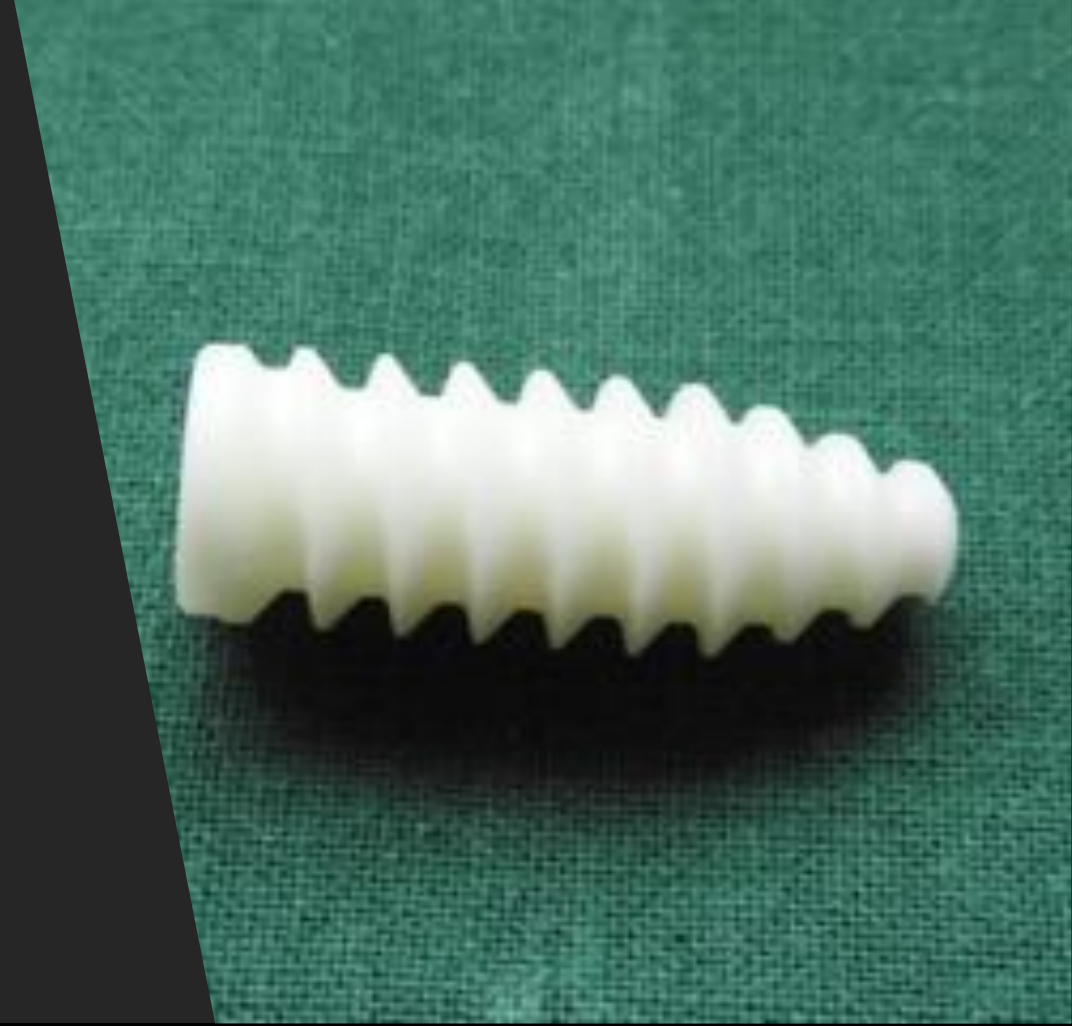
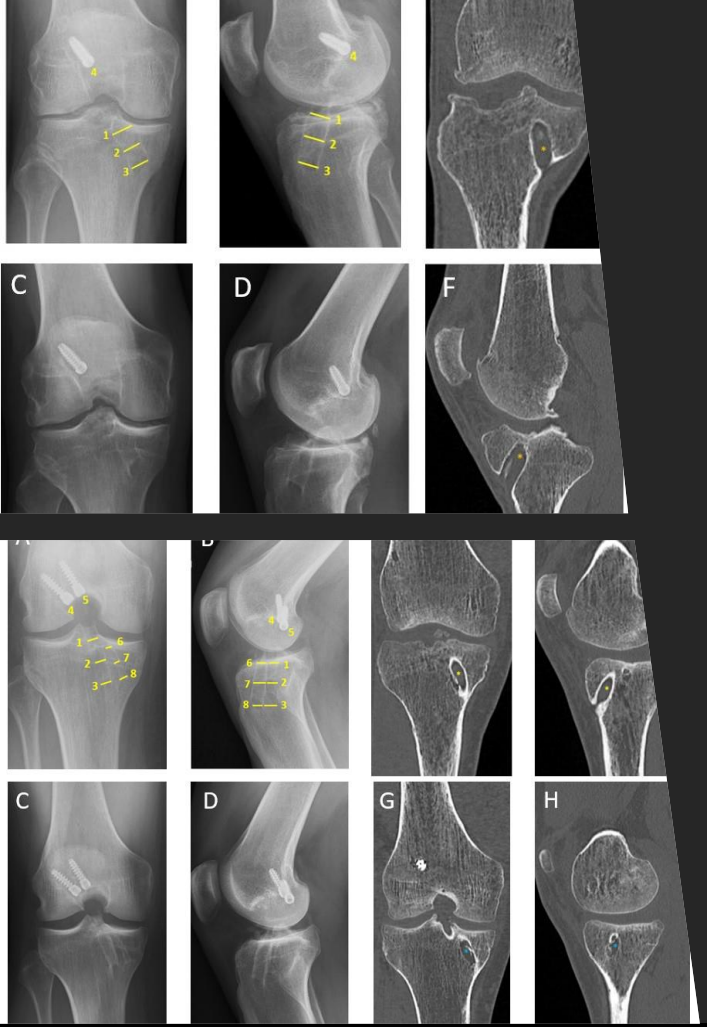
Background

- **Metallic interference screws**: proven fixation strength but risk complicating revision surgery[1,2]

- **Biocomposite interference screws**: ↑ osteoconductivity & graft incorporation[3]
  - ↑ increased tunnel widening? No clear consensus if this affects clinical outcomes[4-7]
  - Few studies have examined this in double-bundle ACL reconstruction[8]

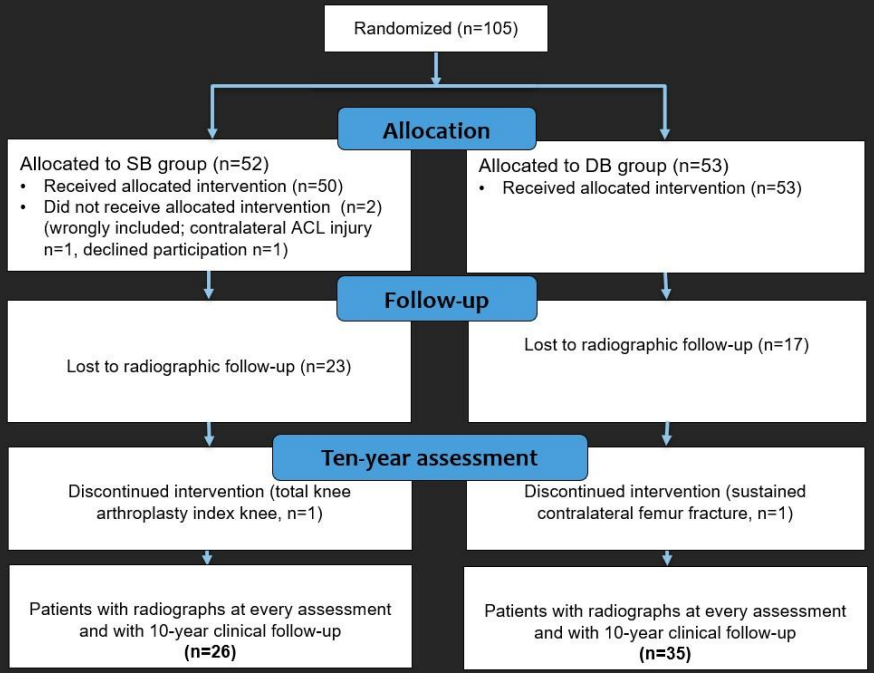




Aims

- Radiographical assessment of the tibial tunnel 10+ years after ACLR
  - Hamstring autografts with single-bundle (SB) and double-bundle (DB) methods
- **Hypothesis**:
  - No tibial tunnel enlargement would be found 10 years after ACLR in either SB or DB patients.

Methods



- Anatomic SB and DB ACLR
- Biocomposite screw with 77% PLDLA and 23% β-TCP
- 52 SB + 53 DB patients at recruitment
  - → **26 SB + 35 DB at 10yr follow-up**
- Inclusion Criteria:
  - > 18 yrs, unilateral ACL injury at index surgery
- Exclusion Criteria:
  - Concomitant PCL injury
  - MCL/LCL injury >+1
  - Previous major knee surgery
  - Contralateral ACL injury before index surgery

Methods

- Plain x-rays: early post-op, 2-, 5-, 10-year
  - AP and lateral, knee 30^{o} flexed.
  - width of tunnel measured at 3 points (1-3, 6-7)
  - Femoral screw head (4,5) used as width reference
- CT: 10-year
  - Tunnel volume

- Clinical: Pivot Shift, KT-1000 arthrometer

Results - Overview

- Follow-up 122 months (range 113-134)

- **No tibial tunnel enlargement in either group at 10-year follow-up**

- No significant decrease in tibial tunnel width on AP or lateral x-rays from early post-op to 10-year follow-up (P = >.99) apart from DB group's AM tibial tunnel in AP view (P = 0.02)

Results – Causes of additional surgery during 10-year follow-up

		SB	DB	Significance
Number of patients		26	35	
Cause of additional surgery until 10-year follow-up, index knee Number of patients	Meniscal problems	1	1	**No** (0.18)
	Meniscal and Chondral damage	1	1	
	Notchplasty	1	1	
	Loose bodies	1	-	
	Tibial interference screw removal due to cyst formation	1	-	

Results – Objective Measures

- No correlation between tunnel widths and knee laxity measured with KT-1000 arthrometer and Pivot Shift test

- Moderate but statistically significant correlation between SB tibial tunnel volume on CT and KT-1000 side to side difference ($r = 0.46$, $p = 0.038$)

Results – Change in Tunnel Width at 10-year Follow-Up

- 74% of SB plain x-rays → decrease in tibial tunnel width
  - Mean volume 2.04cm^3 (± 0.85 cm^3) on CT

- 55% of DB plain x-rays → decrease in postero-lateral tibial tunnel width
  - Mean volume 1.38 cm^3 (±0.54 cm^3) on CT
- 66% of DB plain x-rays → decrease in antero-medial tibial tunnel width
  - mean volume 2.04 cm^3 (±1.92 cm^3) on CT

Conclusions

- **The majority of patients' tibial tunnels had decreased on 1 or both radiographic views at 10-year follow-up compared to early post-operative period**
- Tibial tunnels were still visible in the majority of patients at 10-years, both on standard x-rays and CT imaging
- There may be reason to believe biocomposite screws with bioceramics such as β-TCP behave preferentially to PLLA- or PGA-based bioabsorbable screws[10-13]

Limitations

- No randomization for primary variable, no control group
- No measurement of material density at screw site → cannot comment on degradation of PLDLA/β-TCP screws used in this study.
- Underpowered sample size due to dropout over time

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