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Greater Meniscal Extrusion and Inferior Patient Reported Outcomes after Medial compared to Lateral Meniscal Allograft Transplantation

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Disclosures

- **Volker Musahl**: ACL Study Group, American Orthopaedic Society for Sports Medicine/International Society of Arthroscopy, Knee Surgery, and Orthopaedic Sports Medicine/JISAKOS: Board or committee member; Knee Surgery, Sports Traumatology, Arthroscopy: Editorial or governing board; Arthrex, Inc/Smith & Nephew: Other financial or material support; Newclip: Paid consultant; Ostesys: Stock or stock Options; Springer: Publishing royalties, financial or material support
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Background and Purpose

- Meniscal extrusion is common after meniscal allograft transplantation (MAT)[1,2]
- Most previous studies have assessed meniscal extrusion without weight-bearing[3-5]
- There is no consensus on the normal extent of extrusion and how it correlates with mid- to long-term clinical outcome[5,6]

Purpose:

Investigate meniscal extrusion after medial and lateral MAT on ultrasound and evaluate its correlation with clinical outcome measures and joint degeneration.

Methods – Participants & Parameters

Inclusion criteria:

- ≥ 1 year follow-up
- all soft tissue MAT
- participation online survey

Exclusion criteria:

- bilateral MAT
- arthroplasty
- MAT resection
- untreated cartilage injury grade IV at time of MAT

Outcome parameters:

- **Patient-reported outcomes (PROs)**
  - IKDC
  - KOOS
  - MARX
- **Bilateral radiography**
  - KL grade
  - Joint space width
- **Bilateral ultrasound**
  - meniscal extrusion distance
  - meniscal extrusion CSA

Methods - Ultrasound

Positions:

- supine position
- bipodal stance
- unipodal stance

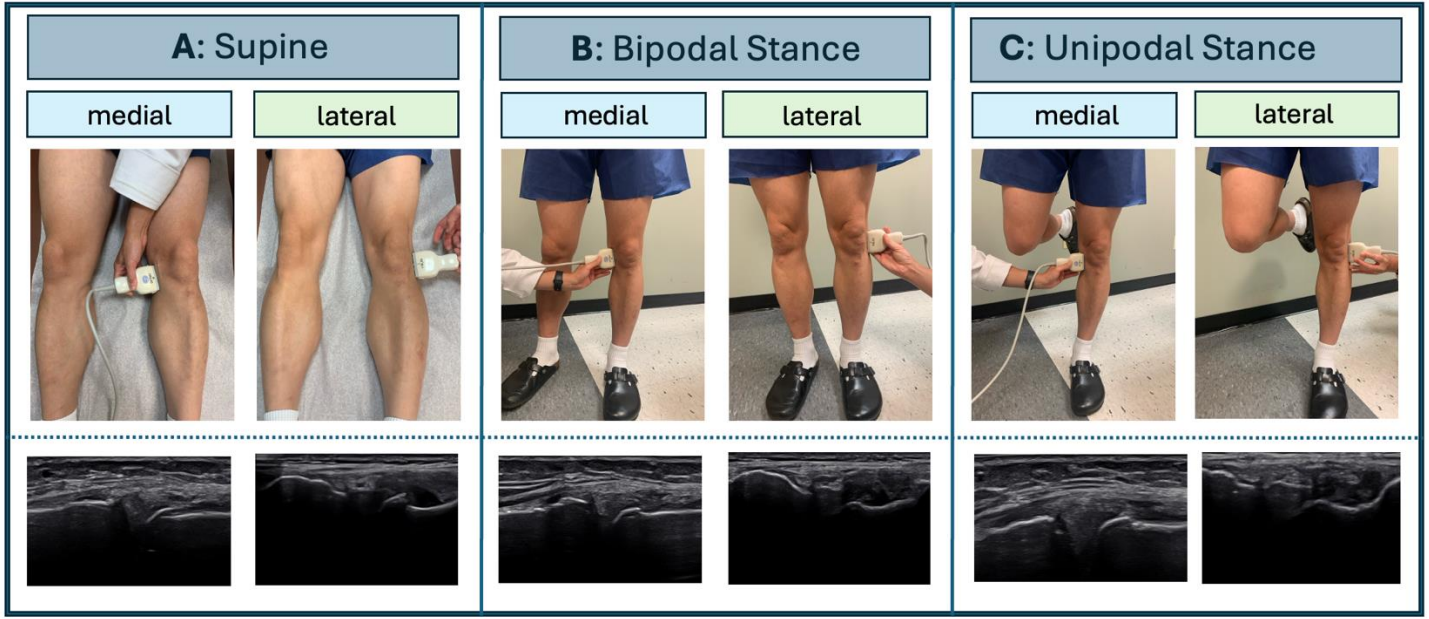

Figure 1: Acquisition of ultrasound measurements of all menisci in A) supine position (no weight-bearing), B) bipodal stance (half body weight), and C) unipodal stance (full body weight).

Methods - Ultrasound

Assessed menisci:

- transplanted meniscus
- equivalent contralateral meniscus

➢ assessing side-to-side (STS) differences

Ultrasound parameters:

- **Extrusion cross-sectional area (CSA)**
- **Extrusion distance**

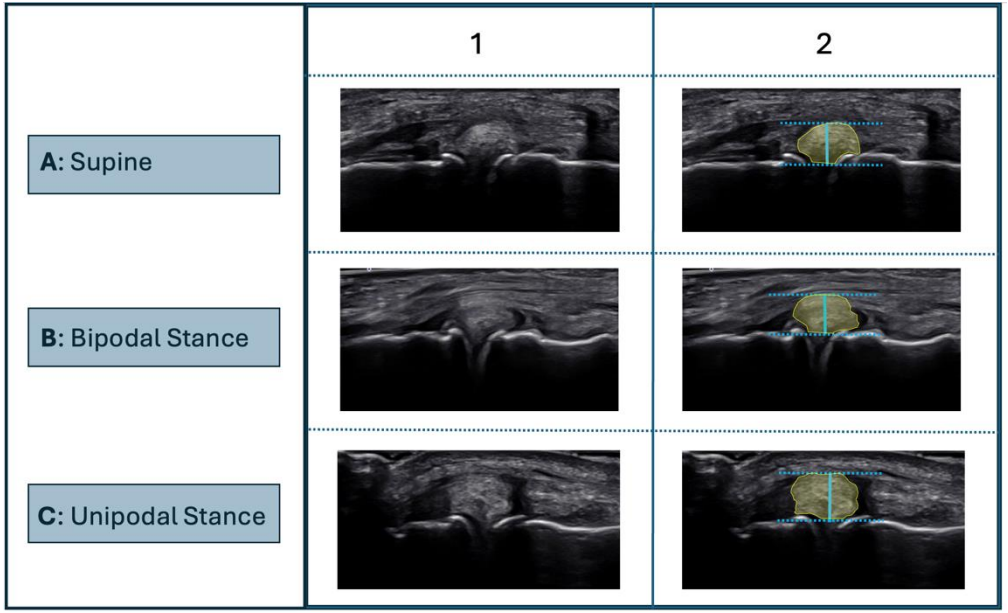

Figure 2: *Ultrasound is used to measure* extrusion CSA (yellow) and extrusion distance (blue) in 3 different weight-bearing positions

Results – Baseline demographics & PROs

Independent of MAT location:

- Follow-up 10 ± 5 years
- Mean IKDC 64 ± 19

Comparing medial and lateral MAT:

- Similar demographics between groups
- Inferior IKDC in medial MAT group

	Medial MAT (n=22)	Lateral MAT (n=11)	P value
Demographics			
Age at time of MAT (years)	30± 10	29 ± 12	0.77
Age at Follow-up (years)	41 ± 11	39 ± 15	0.66
Female sex, n (%)	8 (36)	3 (27)	0.71
Laterality right, n (%)	13 (5)	8 (73)	0.70
Height (cm)	175 ± 9	175 ± 12	0.64
Weight (kg)	85 ± 22	86 ± 16	0.56
BMI (kg/m^2)	28 ± 7	28 ± 4	0.46
Mean follow-up (years)	10 ± 5	9 ± 6	0.60
Patient-reported outcome			
IKDC SKF	57	78	**<0.05***

Table 1: *Baseline demographics of medial and lateral MAT groups*

Results – Meniscal extrusion

Independent of MAT location:

- Greater extrusion in the MAT meniscus when compared to the equivalent contralateral meniscus

Comparing medial and lateral MAT:

- Greater extrusion CSA in the medial MAT group in all positions
- Greater extrusion distance in the medial MAT group two positions

	Medial MAT (n=22)	Lateral MAT (n=11)	P value
Supine			
Extrusion CSA (mm^2)	25.8 ± 15.9	9.2 ± 10.5	<0.05*
Extrusion distance (mm)	3.3 ± 2.0	1.5 ± 1.5	<0.05*
Bipodal Stance			
Extrusion CSA (mm^2)	27.6 ± 16.9	11.8 ± 14.5	<0.05*
Extrusion distance (mm)	3.2 ± 2.0	1.8 ± 1.5	0.05
Unipodal Stance			
Extrusion CSA (mm^2)	27.4 ± 17.2	9.7 ± 14.0	<0.05*
Extrusion distance (mm)	3.2 ± 1.9	1.5 ± 1.6	<0.05*

Table 3: *Side-to-side differences between meniscal allograft and equivalent meniscus in the contralateral knee*

Discussion

- Greater extrusion in the MAT meniscus when compared to the equivalent contralateral meniscus
- Greater extrusion in standing positions than in supine position
    - ➢ Measurement in supine position may underestimate extrusion
- Medial MAT associated with
    - more pronounced meniscal extrusion
    - inferior patient-reported outcome

Conclusion

- Future studies should consider the effect of weight-bearing on meniscal extrusion
- Future studies may consider techniques to help prevent extrusion
- Medial MAT is associated with more pronounced meniscal extrusion and inferior patient-reported outcome than lateral MAT

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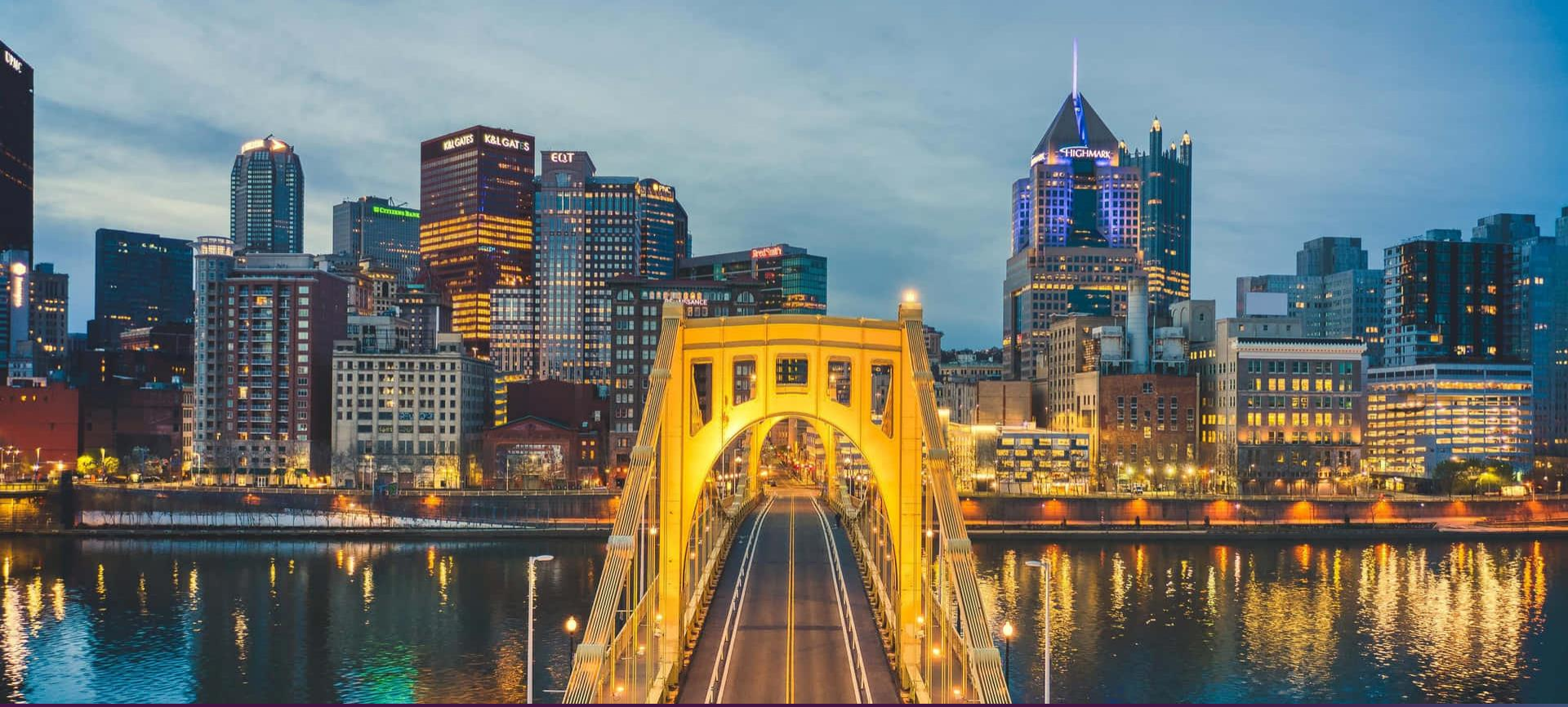

Thank you!

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