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Relative meniscal extrusion after meniscal allograft transplantation progressed during a long-term follow up

: average 11 years of follow up longitudinal magnetic resonance imaging study

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Faculty Disclosure Information

- I (and/or my co-authors) have nothing to disclose



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Material and Methods

Patients

- Between Oct 1996 and Nov 2010
- Single senior surgeon, 109 MAT
- At least 8 years follow-up ($109 - 64 = 45$ cases)
- Available longitudinal MRI analysis (– 12 = 33 cases)
 - 3 time points : 1 year, 4-6 years and >8 years

Measured Meniscal extrusion on MRI

- Maximum extrusion length on coronal plane
- On sagittal plane
 - ACMD : anterior cartilage meniscal distance
 - PCMD : posterior cartilage meniscal distance



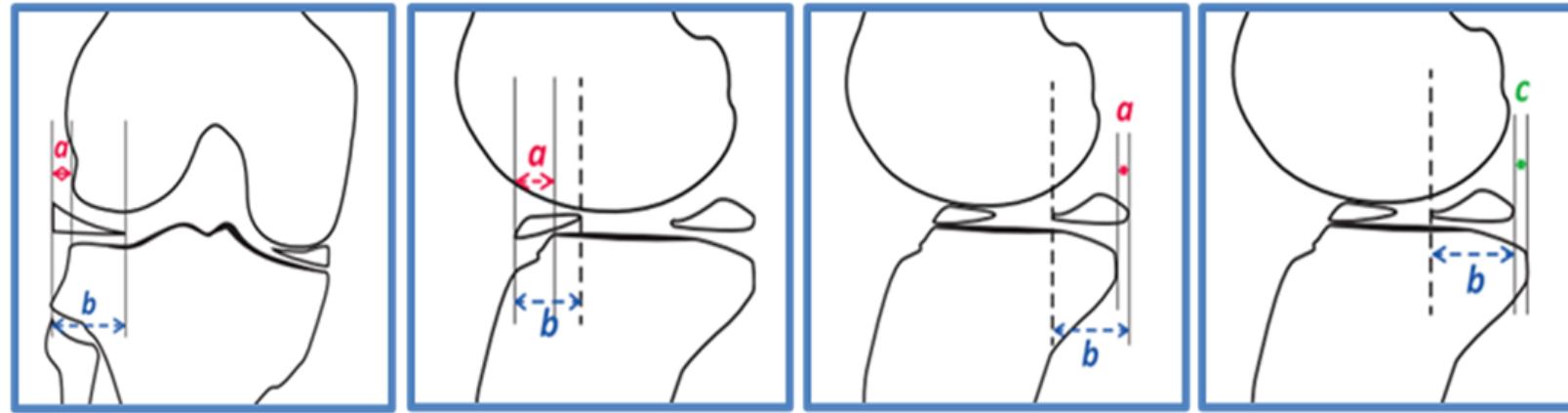
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Material and Methods

- The Absolute value / Relative value (entire meniscal width)



- Clinical assessment : Lysholm scores
- Statistical : A linear mixed model, T-test
- Inter- and intra-observer ICC : 2 weeks interval
 - ICC = 1 perfect agreement, ICC = 0 opposite
 - 1 year MRI, 3 times absolute, contralateral JSW



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Results

- Respective analysis of MRI for 27, 24, 27 cases
- ICC Inter (0.823 ~ 0.908), inter (0.823 ~ 0.927)

	Inter-observer	Intra-observer
Coronal subluxation/EMW, 1 yr	0.851/0.855	0.925/0.912
Coronal subluxation/EMW, 4-6 yr	0.810/0.882	0.917/0.831
Coronal subluxation/EMW, >8 yr	0.903/0.838	0.878/0.924
Sagittal ACMD/EMW, 1 yr	0.819/0.870	0.932/0.942
Sagittal ACMD/EMW, 4-6 yr	0.823/0.873	0.898/0.931
Sagittal ACMD/EMW, >8 yr	0.874/0.810	0.942/0.953
Sagittal PCMD/EMW, 1 yr	0.856/0.858	0.885/0.921
Sagittal PCMD/EMW, 4-6 yr	0.862/0.913	0.932/0.942
Sagittal PCMD/EMW, >8 yr	0.895/0.814	0.912/0.844



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Results

Patients' demographics

All cases	33 (100.0)
Sex, cases (%)	
Male	23 (69.7)
Female	10 (30.3)
Age (year), mean±SD	30.60 ± 9.80
Affected side, n (%)	
Right	15 (45.5)
Left	18 (54.5)
Follow-up period (yr) mean±SD	12.1 ± 2.75
MRI period (yr), mean±SD	10.9 ± 3.07

Values are presented as n (%) or mean ± SD.

P values were derived from §chi-square test, *Fisher's exact test, and †independent t-test.



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Results

Radiological Allograft Subluxation in the Coronal Plane

	Time point	Measured value mean $\pm$ SD	P		
			(vs 1 yr)	(vs 4-6 yr)	(overall)
Absolute value (mm)	1 yr	2.79 $\pm$ 0.31	-	-	0.146
	4-6 yr	2.66 $\pm$ 0.40	0.179	-	
	>8 yr	2.77 $\pm$ 0.48	0.930	0.194	
Entire meniscal width (mm)	1 yr	10.49 $\pm$ 0.64	-	-	<0.001
	4-6 yr	9.99 $\pm$ 1.07	0.059	-	
	>8 yr	8.52 $\pm$ 0.87	<0.001	<0.001	
Relative value	1 yr	0.27 $\pm$ 0.03	-	-	<0.001
	4-6 yr	0.27 $\pm$ 0.03	0.871	-	
	>8 yr	0.33 $\pm$ 0.06	<0.001	<0.001	

MRI, magnetic resonance imaging; SD, standard deviation

Relative value = absolute value/entire meniscal width

Results

Radiological Allograft Subluxation in the Sagittal Plan; [ACMD on serial MRI](#)

	Time point	Measured value mean $\pm$ SD	P value		
			(vs 1 yr)	(vs 4-6 yr)	(overall)
Absolute value (mm)	1 yr	2.48 $\pm$ 0.17	-	-	0.959
	4-6 yr	2.49 $\pm$ 0.23	0.958	-	
	>8 yr	2.51 $\pm$ 0.47	0.924	0.946	
Entire meniscal width (mm)	1 yr	12.12 $\pm$ 0.64	-	-	<0.001
	4-6 yr	11.53 $\pm$ 2.14	0.434	-	
	>8 yr	10.20 $\pm$ 1.08	<0.001	0.043	
Relative value	1 yr	0.20 $\pm$ 0.01	-	-	<0.001
	4-6 yr	0.22 $\pm$ 0.16	0.263	-	
	>8 yr	0.25 $\pm$ 0.04	<0.001	0.034	

MRI, magnetic resonance imaging; SD, standard deviation

Relative value = absolute value/entire meniscal width

Results

Radiological Allograft Subluxation in the Sagittal Plane; PCMD on serial MRI

	Time point	Measured value mean $\pm$ SD	P value		
			(vs 1 yr)	(vs 4-6 yr)	(overall)
Absolute value (mm)	1 yr	-1.55 $\pm$ 0.89	-	-	0.175
	4-6 yr	-1.46 $\pm$ 0.52	0.147	-	
	>8 yr	-1.46 $\pm$ 1.01	0.477	0.975	
Entire meniscal width (mm)	1 yr	11.38 $\pm$ 0.59	-	-	<0.001
	4-6 yr	11.14 $\pm$ 0.62	0.169	-	
	>8 yr	10.37 $\pm$ 0.61	<0.001	<0.001	
Relative value	1 yr	-0.14 $\pm$ 0.08	-	-	0.180
	4-6 yr	-0.13 $\pm$ 0.05	0.320	-	
	>8 yr	-0.14 $\pm$ 0.09	0.758	0.256	

MRI, magnetic resonance imaging; SD, standard deviation

Relative value = absolute value/entire meniscal width



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Clinical Outcomes : Mean Lysholm score

Time point	Lysholm score Mean $\pm$ SD	P value			
		Pre-op	1 yr	4-6 yr	>8 yr
Preoperative	76.9 $\pm$ 11.9	-	<0.001	<0.001	<0.001
1 yr	91.9 $\pm$ 5.9		-	0.437	0.688
4-6 yr	92.1 $\pm$ 6.9	<0.001	0.437	-	0.240
>8 yr	91.2 $\pm$ 8.0	<0.001	0.688	0.240	-



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Conclusion

- During the long-term follow-up of extrusion after lateral MAT using MRI, ***absolute extrusion remained unchanged across all planes***
- ***Relative extrusion in the coronal plane and of the ACMD in the sagittal plane significantly increased***, with no differences in the PCMD on follow-up
- Clinical outcomes after surgery improved compared with those before surgery and were maintained throughout the long-term follow-up period



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