Isolated Medial Patellofemoral Ligament Reconstruction With and Without Bony Patellar Fixation In Young Patients - A Multicenter Comparison of Three Operative Techniques

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INTRODUCTION: Various techniques have been described for medial patellofemoral ligament reconstruction (MPFLR) in the setting of patellofemoral instability (PFI). Most rely on bony patellar-sided fixation, carrying the small but not insignificant risk of iatrogenic patellar fracture as well as implant cost. Alternative soft tissue patellar-sided fixation options have been described, but comparisons with traditional techniques are limited. The purpose of this study was to compare postoperative complication and risk of recurrent instability among three MPFLR techniques in a multicenter population young PFI patients.

METHODS: A retrospective comparative study was conducted from 2010-2021 at two large tertiary care pediatric hospitals identifying child and adolescent (<19) who underwent isolated MPFLR. Patients were grouped based on patellar fixation: (1) allograft bony patellar fixation (BPF) with suture anchors or interference screws, (2) autograft quadriceps tendon turndown (QTT), and (3) allograft modified basketweave (MBW). The latter two techniques utilize suture-based fixation of the graft to the anterior patellar periosteum. Patient demographics, preoperative imaging measures, postoperative complications, and need for subsequent stabilization surgery were recorded. Treatment groups were compared with univariate testing.

RESULTS:

We identified 217 patients undergoing isolated MPFLR (83 BPF, 98 QTT, 36 MBW) who had a mean age of 15.3+/-2.36 years (8.0 - 18.9 years) and were predominantly female (60%). All baseline characteristics and preoperative imaging measures were similar between treatment groups (**Table 1**) except for sex distribution (p=0.017). At a mean follow-up of 1.62+/-1.63 years, there was a 6% overall rate of early postoperative complication (BPF 8%, QTT 6%, and MBW 8%), and a 13% rate of persistent subluxation or dislocation (BPF 16%, QTT 10%, and MBW 14%) of which 3.7% (BPF 3.6%, QTT 3.1% and MBW 5.6%) required revision surgical stabilization. There were no significant differences in the rate of complications or subsequent surgical treatment among treatment groups (p>0.05).

DISCUSSION AND CONCLUSION: This large, multicenter cohort of adolescents and young adults undergoing isolated MPFLR identified no significant difference in the rate of complications or persistent instability following surgical reconstruction among the three compared operative techniques. Our findings indicate that soft-tissue patellar fixation techniques demonstrate comparable risk profile and early outcomes to traditional bony fixation options. Given the risks and costs of bony constructs in the setting of the evolving patellar ossification in skeletally immature patients, pediatric surgeons may safelv consider these alternative options for patellar-sided MPFLR fixation.

	Overall	MPFL Reconstruction Type			
		Bony Patellar	Quad Tendon	Modified	
		Fixation	Turndown	Basketweave	
	N = 217	(BPF)	(OTT)	(MBW)	
Variable		N = 83	N = 98	N = 36	n-value ²
Age at time of Surgery (Vears)	15 33 + 2 36	15.08 ± 2.10	15 33 + 2 33	15.90 ± 2.90	0.47
Sev.	10.00 % 2000	10.00 = 1.10	10.00 - 2.00	10.00 - 2.00	0.017
Female	131 (60%)	58 (70%)	49 (50%)	24 (67%)	
Male	86 (40%)	25 (30%)	49 (50%)	12 (33%)	
Laterality					0.39
Left	119 (55%)	47 (57%)	56 (57%)	16 (44%)	
Right	98 (45%)	36 (43%)	42 (43%)	20 (56%)	
Race					0.15
White	153 (71%)	51 (61%)	72 (73%)	30 (83%)	
Black or African American	43 (20%)	21 (25%)	17 (17%)	5 (14%)	
Other	21 (9.7%)	11 (13%)	9 (9.2%)	1 (2.8%)	
Ethnicity					0.20
Hispanic or Latinx	18 (8.3%)	11 (13%)	6 (6.1%)	1 (2.8%)	
Not Hispanic or Latinx	193 (89%)	70 (84%)	90 (92%)	33 (92%)	
Declined to answer	6 (2.8%)	2 (2.4%)	2 (2.0%)	2 (5.6%)	
Tibial Tuberosity to Trochlear	162+47	17.2 + 6.2	167+44	166+41	0.11
Groove Distance (TTTG)(mm)	10.3 ± 4.7	17.2 = 3.3	13.7 = 4.4	15.0 ± 4.1	0.11
Caton-Dechamps Ratio (CDI)	1.29 ± 0.19	1.30 ± 0.20	1.31 ± 0.20	1.22 ± 0.16	0.062
Dejour Classification					0.90
Normal	8 (3.7%)	2 (2.4%)	5 (5.1%)	1 (2.8%)	
А	72 (33%)	25 (30%)	33 (34%)	14 (39%)	
B	70 (32%)	26 (31%)	33 (34%)	11 (31%)	
C	38 (18%)	17 (20%)	14 (14%)	7 (19%)	
D	29 (13%)	13 (16%)	13 (13%)	3 (8.3%)	
Oswestry-Bristol					0.99
Classification					
Normal	11 (5.1%)	4 (4.8%)	6 (6.1%)	1 (2.8%)	
Mild	75 (35%)	29 (35%)	32 (33%)	14 (39%)	
Stoterule	57 (26%)	28 (34%)	35 (30%)	10 (28%)	
severe	57 (20%)	22 (27%)	25 (20%)	10 (2879)	
Required Chondrai Treatment?	162 (75%)	82 (84%)	29 (81%)	51 (61%)	0.002
(Tes)					0.003
Chondrai Injury Grade	7 (3.6%)	474.495	2 (5 2%)	1 (1.4%)	0.002
	12 (6 2%)	7 (7.8%)	4 (11%)	1 (1.4%)	
	70 (36%)	40 (44%)	11 (31%)	19 (27%)	
	51 (26%)	23 (26%)	11 (31%)	17 (24%)	
None	55 (28%)	16 (18%)	7 (2055)	32 (46%)	
Not Reported	22	8	1	13	
Post-Operative Complications					0.21
Level I Complications	3 (1.4%)	0 (0%)	1 (1.0%)	2 (5.6%)	
Level 2 Complications	4 (1.8%)	3 (3.6%)	1 (1.0%)	0 (0%)	
Level 3 Complications	7 (3.2%)	4 (4.8%)	2 (2.0%)	1 (2.8%)	
None	203 (94%)	76 (92%)	94 (96%)	33 (92%)	
Additional PFI Symptoms	00 (130()	12 (2 (2))	10 (101()	6.(1.00()	0.54
after Surgery	28 (13%)	13 (10%)	10(10%)	5 (14%)	0.54
Additional Surgery Required	8 (3.7%)	3 (3.6%)	3 (3.1%)	2 (5.6%)	0.79
Length of Follow-up (Years)	1.62 ± 1.63	2.08 ± 2.08	1.32 ± 1.31	1.45 ± 1.04	0.013

²Wilcoxon rank sum test; Pearson's Chi-squared test; Fisher's exact test