The Impact of Platelet Rich Plasma on Revision Surgery Rates following Meniscus Repair: A Matched Cohort Analysis of 3,420 Patients

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INTRODUCTION:
Meniscal repair is a commonly performed orthopaedic surgery, yet demonstrates high rates of failure which often necessitates revision surgery. Platelet rich plasma (PRP) has gained popularity in recent years as a biologic approach to potentially augment healing following meniscal repair. There has been a relative paucity of studies comparing outcomes between patients undergoing meniscal repair with versus without PRP augmentation, and furthermore even less clarity on the role of PRP augmentation for meniscus repairs performed with concomitant anterior cruciate ligament reconstruction (ACLR). Therefore, the purpose of this study was to elucidate trends in PRP augmentation of meniscal repairs in the US, and determine the association of PRP augmentation with revision surgery after both isolated meniscal repair and those performed concomitantly with ACLR.
METHODS: Utilizing CPT codes, a large insurance data set was queried to identify all patients who underwent primary meniscal repair, those who underwent concomitant ACLR and meniscal repair, and those who received ipsilateral PRP at the time of surgery. Patients who underwent primary meniscal repair – both in the presence and absence of concomitant ACLR – without PRP augmentation were then identified and matched in a 5:1 ratio to the PRP study group by age, sex, BMI, and various comorbidities. The primary outcome was revision meniscus surgery in the form of meniscectomy or revision meniscus repair.
RESULTS: A total of 3,420 patients met inclusion criteria. There were no significant differences in the reported demographics or comorbidities between the PRP group and their respective matched controls (p>0.05). There was no difference in revision rate between PRP-augmented isolated meniscal repairs and matched controls who received no augmentation (p>0.05). Compared to matched controls, patients who underwent PRP-augmentation at the time of meniscal repair with concomitant ACLR did experience a significantly lower incidence of revision surgery compared to those without PRP augmentation (5.2% vs. 7.9% respectively; OR 0.41, 95% CI 0.27-0.63, p<0.001), but the overall number of revisions was relatively small.
DISCUSSION AND CONCLUSION: There do not appear to be any clear trends or patterns in patient demographics that influence PRP augmentation for meniscus repairs across US surgeons. There was no effect of PRP-augmentation on the incidence of revision surgery following isolated primary meniscal repair; however, there was a slight decrease in the rates of revision meniscus surgery when PRP was used to augment meniscus repairs in the setting of concurrent ACLR.

Table 1: Demographic for Overall Meniscus Repairs

	Meniscus Repair with PRP (N = 570)	*5:1 Matched Controls without PRP (N = 2850)*	*All Patients (N = 3420)*	P
Age Group:				.999
Less than 20 years	147 (25.8%)	735 (25.8%)	882 (25.8%)	
20 – 29 years	101 (17.7%)	505 (17.7%)	606 (17.7%)	
30 – 39 years	90 (15.8%)	450 (15.8%)	540 (15.8%)	
40 – 49 years	92 (16.1%)	460 (16.1%)	552 (16.1%)	
50+ years	140 (24.6%)	700 (24.6%)	840 (24.6%)	
Male Sex	306 (53.7%)	1530 (53.7%)	1836 (53.7%)	.999
BMI Grouping				.957
Obese (30 – 39.9 kg/m^2)	24 (4.2%)	128 (4.5%)	152 (4.4%)	.767
Morbid Obesity (40+ kg/m^2)	26 (4.6%)	129 (4.5%)	155 (4.5%)	.971
Comorbidities				
Tobacco Use	33 (5.8%)	165 (5.8%)	198 (5.8%)	.999
Alcohol Abuse	9 (1.6%)	59 (2.1%)	68 (2.0%)	.443
Diabetes mellitus	19 (3.3%)	83 (2.9%)	102 (3.0%)	.590
Type 1 Diabetes mellitus	3 (0.5%)	13 (0.5%)	16 (0.5%)	.823
Type 2 Diabetes mellitus	16 (2.8%)	70 (2.5%)	86 (2.5%)	.625
Hyperlipidemia	53 (9.3%)	287 (10.1%)	340 (9.9%)	.574
Hypertension	48 (8.4%)	279 (9.8%)	327 (9.6%)	.310
Thyroid Disease	16 (2.8%)	84 (2.9%)	100 (2.9%)	.856
Depression	41 (7.2%)	225 (7.9%)	266 (7.8%)	.568

Data presented as number (%)

Table 2: Demographic for Meniscus Repairs without Concomitant ACL Reconstruction

	Meniscus Repair with PRP (N = 397)	*5:1 Matched Controls without PRP (N = 1985)*	*All Patients (N = 2382)*	P
Age Group:				.999
Less than 20 years	92 (23.2%)	460 (23.2%)	552 (23.2%)	
20 – 29 years	60 (15.1%)	300 (15.1%)	360 (15.1%)	
30 – 39 years	57 (14.4%)	285 (14.4%)	342 (14.4%)	
40 – 49 years	64 (16.1%)	320 (16.1%)	384 (16.1%)	
50+ years	124 (31.2%)	620 (31.2%)	744 (31.2%)	
Male Sex	214 (53.9%)	1070 (53.9%)	1284 (53.9%)	.999
BMI Grouping				.366
Obese (30 – 39.9 kg/m^2)	17 (4.3%)	115 (5.8%)	132 (5.5%)	.230
Morbid Obesity (40+ kg/m^2)	20 (5.0%)	82 (4.1%)	102 (4.3%)	.415
Comorbidities				
Tobacco Use	23 (5.8%)	115 (5.8%)	138 (5.8%)	.999
Alcohol Abuse	6 (1.5%)	46 (2.3%)	52 (2.2%)	.316
Diabetes mellitus	15 (3.8%)	61 (3.1%)	76 (3.2%)	.465
Type 1 Diabetes mellitus	2 (0.5%)	9 (0.5%)	11 (0.5%)	.892
Type 2 Diabetes mellitus	13 (3.3%)	52 (2.6%)	65 (2.7%)	.465
Hyperlipidemia	42 (10.6%)	247 (12.4%)	289 (12.1%)	.299
Hypertension	38 (9.6%)	244 (12.3%)	282 (11.8%)	.126
Thyroid Disease	14 (3.5%)	65 (3.3%)	79 (3.3%)	.798
Depression	32 (8.1%)	189 (9.5%)	221 (9.3%)	.360

Data presented as number (%)

Table 3: Demographic for Meniscus Repairs with Concomitant ACL Reconstruction

	Meniscus Repair with PRP (N = 173)	*5:1 Matched Controls without PRP (N = 865)*	*All Patients (N = 1038)*	P
Age Group:				.999
Less than 20 years	55 (31.8%)	275 (31.8%)	330 (31.8%)	
20 – 29 years	41 (23.7%)	205 (23.7%)	246 (23.7%)	
30 – 39 years	33 (19.1%)	165 (19.1%)	198 (19.1%)	
40 – 49 years	28 (16.2%)	140 (16.2%)	168 (16.2%)	
50+ years	16 (9.2%)	80 (9.2%)	96 (9.2%)	
Male Sex	92 (53.2%)	460 (53.2%)	552 (53.2%)	.999
BMI Grouping				.335
Obese (30 – 39.9 kg/m^2)	7 (4.0%)	36 (4.2%)	43 (4.1%)	.944
Morbid Obesity (40+ kg/m^2)	6 (3.5%)	15 (1.7%)	21 (2.0%)	.139
Comorbidities				
Tobacco Use	10 (5.8%)	50 (5.8%)	60 (5.8%)	.999
Alcohol Abuse	3 (1.7%)	18 (2.1%)	21 (2.0%)	.767
Diabetes mellitus	4 (2.3%)	17 (2.0%)	21 (2.0%)	.767
Type 1 Diabetes mellitus	1 (0.6%)	4 (0.5%)	5 (0.5%)	.841
Type 2 Diabetes mellitus	3 (1.7%)	13 (1.5%)	16 (1.5%)	.822
Hyperlipidemia	11 (6.4%)	59 (6.8%)	70 (6.7%)	.825
Hypertension	10 (5.8%)	54 (6.2%)	64 (6.2%)	.817
Thyroid Disease	2 (1.2%)	11 (1.3%)	13 (1.3%)	.901
Depression	9 (5.2%)	63 (7.3%)	72 (6.9%)	.325

Data presented as number (%)

Table 4: Revision Rates for PRP- and Non-augmented Meniscal Repairs

				Results of Multivariate Analysis		
Overall Revision Rates						
PRP	41	570	7.2%	**OR**	**95% CI**	**P**
Control	216	2850	7.6%	0.85	0.70 - 1.02	0.183
Isolated Meniscus Repair Revision Rates (ACLs excluded)						
PRP	32	397	8.1%	**OR**	**95% CI**	**P**
Control	163	1985	8.2%	0.87	0.70 - 1.09	0.235
Meniscus Repair Revision Rates with Concomitant ACL Recon						
PRP	9	173	5.2%	**OR**	**95% CI**	**P**
Control	68	865	7.9%	0.41	0.27 - 0.63	< 0.001

Data presented as a number (%)