Patella Baja Incidence, Risk Factors and Motion After Revision Total Knee Arthroplasty

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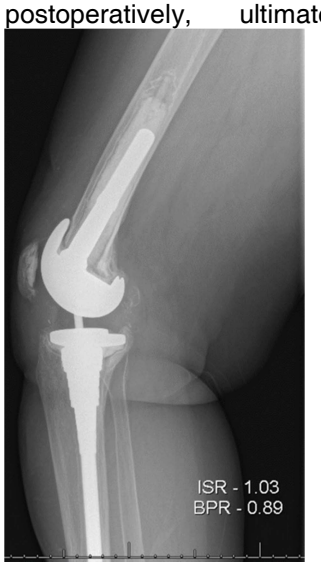
INTRODUCTION: Patella baja (PB) causes a disruption in the normal biomechanical function of the extensor mechanism of the lower extremity. Patellar height changes can have significant clinical implications, particularly in the setting of revision total knee arthroplasty (TKA). True PB is due to patellar tendon shortening, whereas pseudo-patella baja (PPB) is distal displacement of the patella due to joint line elevation. Our purpose was to examine the incidence and risk factors associated with PB and PPB following revision TKA.

METHODS: A retrospective analysis was conducted reviewing charts and radiographic images of 415 revision TKAs performed by a single surgeon between 2009-2019. Clinic notes were reviewed to obtain the senior surgeon's range of motion analysis. PB was defined as the patella positioned lower than normal due to the shortening of the patellar tendon. It was characterized by an Insall-Salvati ratio (ISR) of less than 0.8 and a Blackburne-Peel ratio (BPR) of less than 0.54. PPB was characterized by a relatively lower patella position compared to the joint line, but within the normal range of ISR (0.8-1.2) with a BPR of less than 0.54. Univariate and multiple regression analysis was employed to identify risk factors for PB and PPB.

RESULTS: 375 revision TKAs were included. Prior to revision TKA, 288 knees were identified in the normal patella group, while 58 knees demonstrated PB and 29 knees exhibited PPB. After revision TKA, 90 knees (24%) exhibited PB and 54 knees (14%) demonstrated PPB. Patients revised for infection were 8.99 times more likely to develop PB compared to other indications (p=0.002). Number of prior surgeries and preoperative PB also increased the risk of PB (OR, 2.18, p=0.013, OR, 319.90, p<0.001). Preoperative PPB increased the risk of postoperative PPB (OR, 17.44; p <0.001). There was significant difference in degrees of postoperative extension (1.81 vs 3.43, p=0.02), flexion (105.64 vs 86.52, p<0.001), and overall ROM (105.69 vs 84.07, p<0.001) between the normal patella and PB group, as well as the PPB group (105.69 vs 93.81, p<0.001). PB and PPB groups showed minimal change in ROM from preoperative to final follow up (-1.55 and 0.63 degrees), whereas the normal patella group showed an average ROM change of 7.17 degrees.

DISCUSSION AND CONCLUSION: Infection as the indication for revision, number of prior surgeries, and preoperative PB were found to be independent risk factors for PB after revision TKA. Preoperative PPB was the only independent risk factor for postoperative PPB. Knee flexion is significantly decreased in patients with PB and PPB. Understanding these risk factors can assist surgeons in formulating operative plans and setting appropriate patient expectations postoperatively, ultimately leading to optimized outcomes and improved patient satisfaction.



Surgical & Postop Comparisons	Normal Patella N = 231	Patella Baja N = 90	p-value N – PB	Pseudo Patella Baja N = 54	p-value N – PPB
Number of Prior Surgeries Mean (SD)	1.57 (.9)	2.66 (1.5)	**p < .001**	1.85 (1.0)	**p = .041**
Pre-Operative Status:					
Pre-Op PB	0.9% (2)	61.1% (55)	**p < .001**	1.9% (1)	**p < .001**
Pre-Op PPB	2.6% (6)	6.7% (6)		31.5% (17)	
Pre-Op NP	96.5% (223)	32.2% (29)		66.7% (36)	
1-Month Post-Operative Status:					
PB	0.4% (1)	92.2% (83)	**p < .001**	0.0% (0)	**p < .001**
PPB	0.9% (2)	5.6% (5)		88.9% (48)	
NP	98.7% (228)	2.2% (2)		11.1% (6)	
Reason for Revision:					
Infection	30.3% (70)	50.0% (45)	**p = .001**	29.6% (16)	p = .923
Aseptic Loosening	26.0% (60)	17.8% (16)	p = .121	25.9% (14)	p = .994
Instability	29.9% (69)	22.2% (20)	p = .169	40.7% (22)	p = .123
Fracture	1.3% (3)	4.4% (4)	p = .100	0.0% (0)	p = 1.00
Stiffness	5.2% (12)	4.4% (4)	p = 1.00	3.7% (2)	p = 1.00
Other	7.4% (17)	1.1% (1)	**p = .030**	0.0% (0)	**p = .05**
Type of Revision:					
Both Components	35.5% (82)	27.8% (25)	p = .188	42.6% (23)	p = .331
Single Component	8.7% (20)	13.3% (12)	p = .209	14.8% (8)	p = .171
Polyexchange/I&D	19.5% (45)	12.2% (11)	p = .124	16.7% (9)	p = .635
Resection/ABX Spacer	26.4% (61)	44.4% (40)	**p = .002**	24.1% (13)	p = .725
Primary Knee	5.6% (13)	2.2% (2)	p = .249	1.9% (1)	p = .481
Other					
Type of Spacer:					
Static	12.6% (29)	24.4% (22)	**p = .009**	11.1% (6)	p = .771
Articulating	16.5% (38)	20.0% (18)	p = .452	14.8% (8)	p = .769
N/A	70.6% (163)	52.2% (47)	p = .002	72.2% (39)	p = .809
Extensor Mechanism Exposure Technique:					
Medial Parapatellar	94.4% (218)	88.9% (80)	p = .087	96.3% (52)	p = .569
Rectus/Quad Snip	5.6% (5)	p = .123	1.9% (1)	p = 1.00	
V-Y Quadricepsplasty	1.7% (4)	1.1% (1)	p = .454	0.0% (0)	p = .360