The True Incidence of Anterior Knee Pain and Kneeling Pain following Anterior Cruciate Ligament Reconstruction with Bone-Patellar Tendon-Bone Autograft: A Systematic Review of Level I Studies

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INTRODUCTION:
Bone-patellar tendon-bone (BPTB) is a common autograft source used for anterior cruciate ligament reconstruction (ACLR). Although BPTB autografts carry the postoperative risk of donor site morbidity and anterior knee pain, there remains a lack of consensus on the true incidence of such complications. The purpose of this study was to 1) perform a systematic review of level I randomized controlled trials detailing the incidence of anterior knee pain and kneeling pain following ACLR with BPTB autograft and 2) investigate the effect of bone grafting the patella harvest site on anterior knee and kneeling pain.
METHODS: A systematic review of the level I studies from 1980 to 2023 was performed according to PRISMA guidelines. The primary outcome evaluated was the presence of donor site morbidity in the form of anterior knee pain or kneeling pain. Chi-squared testing was performed to assess for differences in the incidence of postoperative pain between patient groups undergoing ACLR with BPTB receiving harvest-site bone grafting versus those in which the defect was left untreated.
RESULTS:
Following full-text review, 23 studies reporting on a total of 1,231 patients met final inclusion criteria. Patients were followed for an average of 4.2 years (range, 0.33 to 15.3 years) and the mean age ranged from 21.8-38 years old. The incidence of anterior knee pain, calculated from 672 patients across 15 studies, was 26.0% (188/723) and the incidence of postoperative kneeling pain was 38.4% (223/581) in 581 patients from 11 studies. Patients receiving donor-site bone grafting reported a significantly higher incidence of postoperative pain (129/221, 58.4%) compared to those that did not (93/284, 24.2%) ($p < 0.0001$) and were four-times more likely to report pain at final follow up (OR = 4.4, RR = 2.4).
DISCUSSION AND CONCLUSION:
Based on the current level 1 randomized control trial data, the incidence of anterior knee pain and kneeling pain following ACLR with BPTB autograft are 26.0% and 38.4%, respectively. Although BPTB autograft remains the gold standard graft choice for ACLR, the information from this study will allow surgeons to more accurately explain to patients what to expect in terms of postoperative knee and kneeling pain.

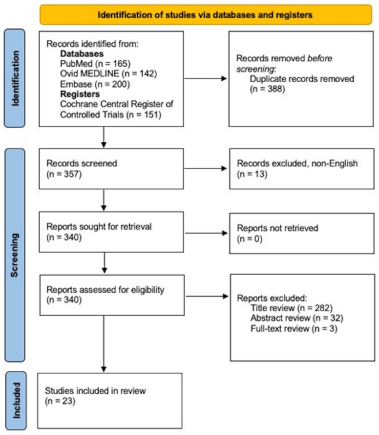

Table 1. Study demographics. NR, not reported.

Authors, Year	Jadad Score	Follow-Up (yrs.)	n (Male, Female)	Mean Age (yrs.)
Aglietti et al, 2004[1]	4	2.00	60 (46, 14)	25.0
Aune et al, 2001[3]	3	2.00	35 (19, 16)	25.0
Barenius et al, 2010[4]	3	8.40	78 (38, 14)	33.0
Brandsson et al, 1998[6]	4	2.00	60 (40, 20)	28.0
Drogset et al, 2010[11]	4	2.00	50 (NR)	26.0
Eriksson et al, 2001[12]	3	0.51	50 (NR)	27.0
Feller et al, 2001[14]	4	0.33	31 (23, 8)	26.2
Feller et al, 2003[13]	3	3.00	31 (23, 8)	25.8
Guglielmetti et al, 2021[16]	3	2.00	31 (23, 8)	25.2
Gupta et al, 2020[17]	4	2.00	80 (79, 1)	25.0
Ibrahim et al, 2005[20]	3	6.75	40 (40, 0)	22.3
Kautzner et al, 2015[25]	3	1.00	75 (0, 75)	26.0
Matsumoto et al, 2006[33]	3	7.25	37 (21, 16)	23.7
Mohtadi et al, 2016[32]	3	2.00	110 (63, 47)	28.7
Mohtadi et al, 2019[33]	4	5.00	103 (60, 43)	33.8
Sajovic et al, 2006[43]	3	5.00	26 (14, 12)	27.0
Sajovic et al, 2011[39]	3	11.00	25 (16, 9)	38.0
Sarzaeem et al, 2014[43]	3	1.00	158 (131, 27)	29.8
Shaieb et al, 2002[42]	3	2.75	33 (26, 7)	32.0
Taylor et al, 2009[45]	4	2.70	32 (25, 7)	21.7
Webster et al, 2016[54]	3	15.30	22 (16, 6)	26.6
Zaffagnini et al, 2006[48]	3	5.00	25 (16, 9)	30.5
Zaffagnini et al, 2011[47]	4	8.60	39 (20, 19)	26.0

Table 2. Incidence of anterior knee pain and pain with kneeling by study.

Authors, Year	N, Patients Analyzed	N, Anterior Knee Pain	Incidence Anterior Knee Pain	N, Kneeling Pain	Incidence Kneeling Pain
Aglietti et al, 2004[1]	60	-	-	37	61.7%
Aune et al, 2001[3]	29	6	20.7%	-	-
Barenius et al, 2010[4]	78	-	-	59	75.6%
Brandsson et al, 1998[6]	50	9	18.0%	-	-
Drogset et al, 2010[11]	50	12	24.0%	2	4.0%
Eriksson et al, 2001[12]	50	3	6.0%	-	-
Feller et al, 2001[14]	26	11	42.3%	17	65.4%
Feller et al, 2003[13]	31	25	80.6%	28	90.3%
Guglielmetti et al, 2021[16]	31	15	48.4%	-	-
Gupta et al, 2020[17]	80	-	-	12	15.0%
Ibrahim et al, 2005[20]	40	10	25.0%	-	-
Kautzner et al, 2015[25]	75	15	20.0%	-	-
Matsumoto et al, 2006[33]	37	2	5.4%	4	10.8%
Mohtadi et al, 2016[32]	98	-	-	17	17.3%
Mohtadi et al, 2019[33]	103	-	-	10	9.7%
Sajovic et al, 2006[43]	26	12	46.2%	-	-
Sajovic et al, 2011[39]	25	5	20.0%	-	-
Sarzaeem et al, 2014[43]	136	19	14.0%	-	-
Shaieb et al, 2002[42]	31	13	41.9%	-	-
Taylor et al, 2009[45]	21	-	-	8	38.1%
Webster et al, 2016[54]	22	8	36.4%	11	50.0%
Zaffagnini et al, 2006[48]	25	14	56.0%	-	-
Zaffagnini et al, 2011[47]	39	9	23.1%	18	72.0%
Total	1163	188	26.0% (188/723)	223	38.4% (223/581)