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Partial Lateral Patellar Facetectomy Is Beneficial For Patients With Patellofemoral Osteoarthritis: A Systematic Review and Meta-Analysis

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Faculty Disclosure Information

- Nothing to disclose.

Introduction

- Studies suggest that knee osteoarthritis (OA) most commonly affects the patellofemoral compartment.[1,2] As the incidence of patellofemoral OA (PFOA) is expected to rise, there is a need to evaluate the therapeutic options available.
- Surgical treatment for PFOA consists of soft tissue, bony, and arthroplasty interventions. Partial lateral facetectomy (PLF) is a bone-reducing procedure that has grown in popularity due to its efficacy and minimally invasive nature. It is commonly done in with other soft tissue procedures or realignment procedures.[3]
- Various studies have evaluated the clinical outcomes of PLF on PFOA, but no meta-analysis has been done thus far.

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2. Kobayashi S, Pappas E, Fransen M, Refshauge K, Simic M. The prevalence of patellofemoral osteoarthritis: a systematic review and meta-analysis. Osteoarthritis Cartilage. 2016;24(10):1697-707.
3. Siljander B, Tompkins M, Martinez-Cano JP. A Review of the Lateral Patellofemoral Joint: Anatomy, Biomechanics, and Surgical Procedures. J Am Acad Orthop Surg Glob Res Rev. 2022;6(7).

Aims

To review the existing literature and meta-analyse the clinical outcomes of PLF as a surgical treatment option for PFOA.

Methods

- A literature search was conducted across 3 databases (PubMed, Embase and Scopus) from inception to 5th Aug 2024.
- Inclusion criteria included (1) patients with OA that have PF involvement (2) patients undergoing PLF.
- PLF was evaluated through pairwise meta-analysis on preoperative versus postoperative values of Knee Society Score (KSS) and Congruence Angle (CA). Subgroup analysis was further performed on different concomitant procedures alongside PLF.

Systematic Review

Study	Study design	Sample size (Patients, Knees)	Follow-up duration (months)	Type of Procedure	Age (Mean± SD)	Gender (M:F)	Type of OA
Yercan et al., 2005	Case Series	11, 11	96 (36-168)	Open PLF and lateral release	62±5.96	6:5	All isolated lateral PFOA
Nho et al., 2006	Retrospective	4	62.0 +/- 4.29	Open PLF, lateral release, and anterior tibial tuberosity realignment	36±12.4	0:4	All PFOA
Becker et al., 2008	Case Series	50, 51	20.2 (7-32)	Open PLF, lateral release, and medialization of the tibial tubercle	60.1±7.80	36:14	All PFOA+TFOA (Grade I,II Ahlbäck)
Paulos et al., 2008	Case Series	63, 66	60 (24-156)	Open PLF and lateral release	53.4±7.29	NR	All stage III or IV PFOA
Wetzels et al., 2012	Retrospective	155, 168	130.9 +/-6.9	Open PLF and lateral release	57.3±9.9	28:127	All isolated lateral PFOA

Systematic Review (cont.)

Study	Study design	Sample size (Patients, Knees)	Follow-up duration (months)	Type of Procedure	Age (Mean± SD)	Gender (M:F)	Type of OA
Lopez-Franco et al., 2013	Retrospective	33, 39	126.2 (10-235)	Open PLF and lateral release	61.0±8.00	5:28	11 PFOA, 28 PFOA+TFOA (Grade I,II Ahlbäck)
Montserrat et al., 2013	Prospective	43	140.4 +/- 16.8	Open PLF with proximal tube realignment (Insall's procedure)	59.7±8.10	5:38	38 PFOA, 5 PFOA+TFOA (Grade 1 Kellgren-Lawrence)
Akilzhanov et al., 2019	Prospective	27, 27	24.1 (12-36)	Arthroscopic PLF and lateral release	59.1±8.77	9:18	7 PFOA, 14 PFOA+TFOA (Grade I,II,III Ahlbäck)
Wang et al., 2020	Case Series	27, 30	60 +/- 3.2	Open PLF and lateral lengthening	54.03±NR	6:26	All PFOA
Douiri et al., 2022	Case Series	50, 56	90.1 (24-128.5)	Open PLF and lateral lengthening	59.4±12.0	14:37	All PFOA

Total of 463 patients and 495 knees, with pooled mean follow-up of 63.2 months and pooled age of 56.3 years old.

Meta Analysis

Fig. 1: Forest plot of pairwise analysis between preoperative vs postoperative values of KSS

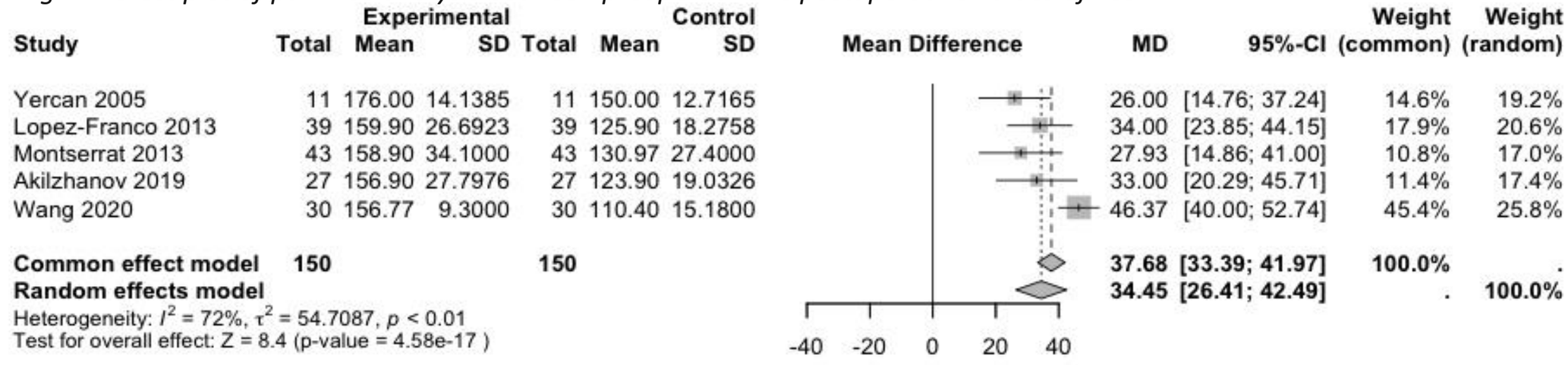
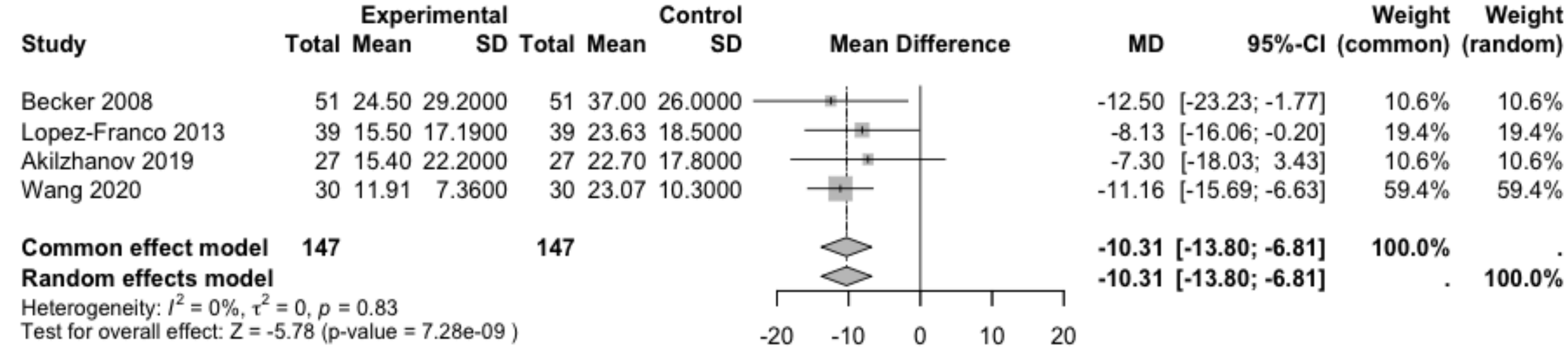


Fig. 3: Forest plot of pairwise analysis between preoperative vs postoperative values of CA

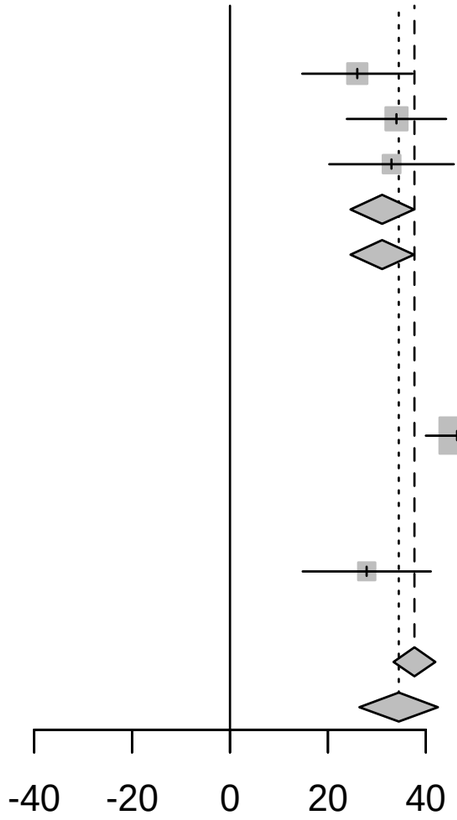


Meta-analysis of 5 studies showed significant improvement (p<0.01) in KSS of 34.45 (95%CI: 26.41 to 42.49), and meta-analysis of 4 studies showed significant improvement (p<0.01) in CA of -10.31 (95%CI:-13.80 to -6.81).

Subgroup Analysis of Congruence Angle

Fig 3. Forest plot of subgroup analysis of KSS

Study	Experimental Total	Experimental Mean	Experimental SD	Control Total	Control Mean	Control SD	MD	95%-CI	Weight (common)	Weight (random)
Subgroup = Group1										
Yercan 2005	11	176.00	14.1385	11	150.00	12.7165	26.00	[14.76; 37.24]	14.6%	19.2%
Lopez-Franco 2013	39	159.90	26.6923	39	125.90	18.2758	34.00	[23.85; 44.15]	17.9%	20.6%
Akilzhanov 2019	27	156.90	27.7976	27	123.90	19.0326	33.00	[20.29; 45.71]	11.4%	17.4%
Common effect model	**77**			**77**			**31.08**	**[24.60; 37.56]**	**43.9%**	**.**
Random effects model							**31.08**	**[24.60; 37.56]**	**.**	**57.3%**
Heterogeneity: I^2 = 0%, t^2 = 0, p = 0.55										
Subgroup = Group2										
Wang 2020	30	156.77	9.3000	30	110.40	15.1800	46.37	[40.00; 52.74]	45.4%	25.8%
Subgroup = Group3										
Montserrat 2013	43	158.90	34.1000	43	130.97	27.4000	27.93	[14.86; 41.00]	10.8%	17.0%
Common effect model	**150**			**150**			**37.68**	**[33.39; 41.97]**	**100.0%**	**.**
Random effects model							**34.45**	**[26.41; 42.49]**	**.**	**100.0%**



Heterogeneity: I^2 = 72%, t^2 = 54.7087, p < 0.01

Test for subgroup differences (common effect): c_2^2 = 13.27, df = 2 (p < 0.01)

Test for subgroup differences (random effects): c_2^2 = 13.27, df = 2 (p < 0.01)

Group 1 = PLF + Lateral release

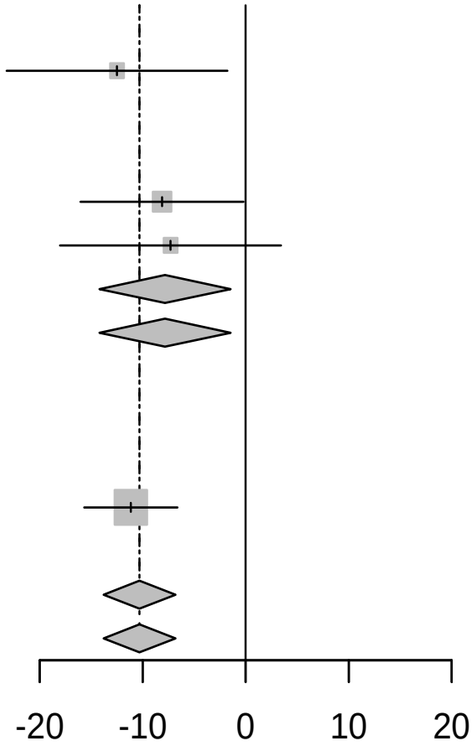
Group 2 = PLF + Lateral lengthening

Group 3 = PLF + Realignment

Subgroup Analysis of Congruence Angle

Fig 4. Forest plot of subgroup analysis of CA

Study	Experimental Total	Experimental Mean	Experimental SD	Control Total	Control Mean	Control SD	MD	95%-CI	Weight (common)	Weight (random)
Subgroup = Group3										
Becker 2008	51	24.50	29.2000	51	37.00	26.0000	-12.50	[-23.23; -1.77]	10.6%	10.6%
Subgroup = Group1										
Lopez-Franco 2013	39	15.50	17.1900	39	23.63	18.5000	-8.13	[-16.06; -0.20]	19.4%	19.4%
Akilzhanov 2019	27	15.40	22.2000	27	22.70	17.8000	-7.30	[-18.03; 3.43]	10.6%	10.6%
Common effect model	**66**			**66**			**-7.84**	**[-14.21; -1.46]**	**30.0%**	**.**
Random effects model							**-7.84**	**[-14.21; -1.46]**	**.**	**30.0%**
Heterogeneity: I^2 = 0%, t^2 = 0, p = 0.90										
Subgroup = Group2										
Wang 2020	30	11.91	7.3600	30	23.07	10.3000	-11.16	[-15.69; -6.63]	59.4%	59.4%
Common effect model	**147**			**147**			**-10.31**	**[-13.80; -6.81]**	**100.0%**	**.**
Random effects model							**-10.31**	**[-13.80; -6.81]**	**.**	**100.0%**
Heterogeneity: I^2 = 0%, t^2 = 0, p = 0.83										



Test for subgroup differences (common effect): c_2^2 = 0.87, df = 2 (p = 0.65)
Test for subgroup differences (random effects): c_2^2 = 0.87, df = 2 (p = 0.65)

Group 1 = PLF + Lateral release

Group 2 = PLF + Lateral lengthening

Group 3 = PLF + Lateral release + Realignment

Subgroup analysis between PLF with lateral release versus PLF with lateral lengthening versus PLF with lateral release and realignment revealed statistically significant difference for KSS (p<0.01) but not for CA (p=0.65).

Discussion

- All studies included in this review advocated for the use of PLF as an effective surgical option for PFOA, except for Becker et al. which reported unsatisfactory results
- KSS and CA showed significant improvement in our meta-analysis. Our subgroup analysis highlights potential differences in procedures concomitant to PLF – notably, there may be potential benefit in lateral retinacular lengthening over release and realignment.
- 4 studies conducted a long-term survival analysis that evaluated failure rates and reported positive long-term results. Wetzel et al., Montserrat et al., Douiri et al., and Lopez-Franco et al. noted failure rates of 36.9%, 26.5%, 16%, 32.35%, in 5 to 11 years of follow-up. Cumulative survival rates were noted to be 85.0% to 96.4% at 5 years, and 55.0% to 59.3% at 15 years.

Limitations

- Studies included were retrospective or prospective as no randomised controlled trials (RCTs) were found
- Many PROMs were not adequately reported which made comparison of clinical outcomes challenging
- Realignment techniques involved significant realignment that could confound results
- Heterogeneity of surgical procedures in included studies

Conclusion

- PLF is a viable surgical treatment option to treat isolated PFOA, especially in the younger population, as it is a low-risk procedure that preserves native knee function and has minimal effect on future knee procedures and arthroplasties.
- PLF has low to moderate long-term failure rates and high survival rates up to 15 years

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