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BACKGROUND

- Minimally invasive dorsal cheilectomy (MIDC) is a joint-preserving procedure that has become an increasingly popular alternative to an open approach.

- Several recent studies have reported numerous benefits to this approach: smaller incisions, reduced soft-tissue disruption, reduced postoperative morbidity, accelerated recovery time, and improved aesthetics post-procedure.

- Despite reports of good postoperative outcomes, there is no consensus regarding subjective clinical outcomes, radiographic outcomes, complication rates, and recurrence rates following MIDC for hallux rigidus.

OBJECTIVE

The purpose of this systematic review was to evaluate the clinical and radiological outcomes together with the complication rates and failure rates following minimally invasive dorsal cheilectomy (MIDC) for the management of hallux rigidus.

METHODS

- During August 2023, the PubMed, Embase and Cochrane library databases were systematically reviewed to identify clinical studies examining outcomes following MIDC for the management of hallux rigidus.

- Data regarding study characteristics, patient demographics, severity, subjective clinical outcomes, radiological outcomes, complications and failure rates were extracted and analysed. In addition, the level of evidence and quality of evidence for each individual study was also assessed.

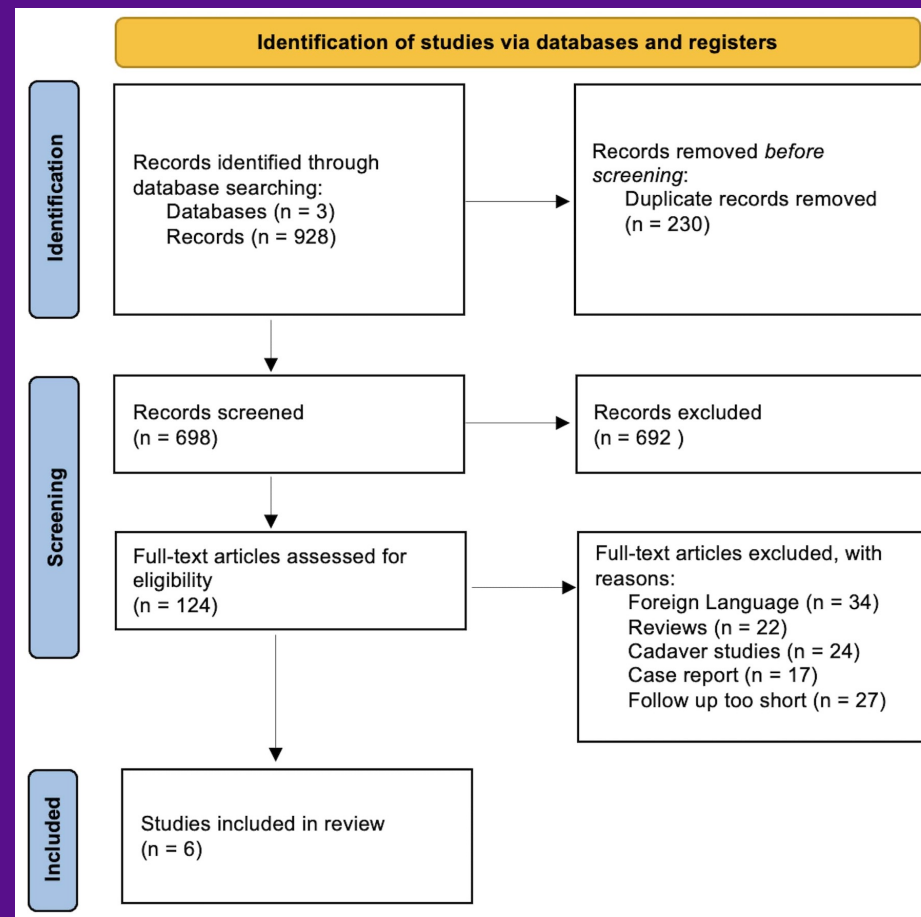


Figure 1. PRISMA Flow Diagram

Author	LOE	Patients (n)	Feet (n)	Mean follow-up (mo)	Mean age (y)	Sex (M/F)	Coughlin and Shurna's Grade
Glenn et al 2021[4]	4	20	20	16.5	52	M=6; F=14	
Hickey et al 2020[5]	4	36	36	56.4	50	M=10; F=26	I=5; II=27; III=1
Levaj et al 2021[6]	4	29	29	31.2	41.8	M=19; F=10	I=11; II=12; III=6
Pastides et al 2014[7]	4	41	54	17	43	M=6; F=35	I=9; II=19; III=26
Stevens et al 2020[8]	3	133	133	36	54		
Teoh et al 2019[9]	4	89	98	50	54	M=25; F=64	I=33; II=54; III=11

N, number; mo, months; y, years; M/F, male/female

Table 2. Summary of Study Characteristics and Outcomes

	Bias due to confounding	Bias in selection of participants into the study	Bias in classification of interventions	Bias due to deviations from intended interventions	Bias due to missing data	Bias in measurement of outcomes	Bias in the selection of reported results	Overall
Glenn et al 2021[4]	?	?	●	×	?	?	●	?
Hickey et al 2020[5]	×	?	●	?	?	×	●	?
Levaj et al 2021[6]	?	?	●	●	×	?	?	?
Pastides et al 2014[7]	×	?	●	?	?	×	×	?
Stevens et al 2020[8]	?	?	●	×	?	×	?	?
Teoh et al 2019[9]	×	?	●	×	?	?	×	?

● Low risk of bias
? Moderate risk of bias
× Serious risk of bias

Table 3. Risk Of Bias In Non-randomised Studies-of Interventions (ROBINS-I)

Author	Patients (n)	Feet (n)	PROM	1 st MTPJ ROM (°)		Complications	Failures	Secondary surgical procedures		
				Preop	Postop					
Glenn et al 2021[4]	20	20	VAS	7.1	0.8	47	67	0	0	0
Hickey et al 2020[5]	36	36	AOFAS	66.6	n/r	31.9	72.7	EHL Rupture = 1, Neuropathic pain = 3, Joint stiffness = 1	0	Repeat arthroscopic cheilectomy = 1, Manipulation under anaesthetic = 3
Levaj et al 2021[6]	29	29	n/r			0	0	Joint stiffness = 1	1	Open revision = 1
Pastides et al 2014[7]	41	54	AOFAS	71.1	87.1	39	48	Neuropathic pain = 2	2	MTPJ fusion = 2
Stevens et al 2020[8]	133	133	n/r			0	0	EHL rupture = 1, Neuropathic pain = 3, Superficial wound problems = 2, Joint stiffness/pain = 7, Ectopic bone in wound = 2	17	MTPJ arthrodesis=9, open cheilectomy= 3, MIS cheilectomy= 2, interposition arthroplasty=1, hallux valgus correction=2
Teoh et al 2019[9]	89	98	VAS	8	3	11.3	69.1	Neuropathic pain = 4, Superficial wound problems = 2, Wound infection = 2,	12	repeat cheilectomy = 4, open removal of loose bone = 1, 1 st MTPJ arthrodesis = 7

N, number; VAS, visual analog scale; AOFAS, American orthopedic foot and ankle society; Preop, preoperative; Postop, postoperative; EHL, extensor hallucis longus; MTPJ, metatarsophalangeal joint; PROM, patient reported outcome measurement; ROM, range of motion

Table 4. Summary of clinical and functional outcomes, complications, failures and secondary surgical procedures

RESULTS

- Six studies with 348 patients (370 feet) were included.

- Weighted mean follow-up: 37.9 ± 16.5 months.

- C&S classification:

- I (58 patients, 27.1%)
- II (112 patients, 52.3%)
- III (44 patients, 20.6%).

- Three studies performed an additional 1st MTPJ arthroscopy and debridement following MIDC.

- Retained intra-articular bone debris was observed in 100% of patients

- Weighted mean AOFAS score: 68.9 ± 3.2 → 87.1.

- Complication rate: 8.4%, the most common of which was persistent joint pain and stiffness.

- Failure rate: 8.7%

- Secondary procedure rate: 8.9% weighted mean time of 8.6 ± 3.2 months following the index procedure.

CONCLUSIONS

- This systematic review demonstrated improvements in subjective clinical outcomes together with a moderate complication rate following MIDC for the management of hallux rigidus at mid-term follow-up.

- A moderate re-operation rate at short-term follow-up was recorded. However, the marked heterogeneity between included studies and paucity of high quality comparative studies limits the generation of any robust conclusions.

- Further research with a longer follow-up is warranted to determine the precise role for minimally invasive cheilectomy in the management of hallux rigidus.