

Open Versus Laparoscopic Appendectomy:

A Systematic Review of Operative Outcomes, Postoperative Recovery, and Management of Complicated versus Uncomplicated Appendicitis

Search Documentation

4 Databases | 10 Search Strings | 11,003 Records

1.1 Database Search Summary

Searches were conducted across four bibliographic databases on the same date using 10 adapted Boolean search strings. PubMed searches used MeSH-enhanced queries; Embase used Emtree terms via Ovid; Cochrane Library used CENTRAL keyword syntax; Scopus used title-abstract-keyword (TIAB-KEY) field searches. The search period was January 1995 to December 2024 for all databases.

Database	Strings Used	Records (n)	Notes / Adaptations
PubMed	1a, 2a, 3a, 4a	5,023	MeSH terms: Appendectomy; Laparoscopy; Surgical Wound Infection; Length of Stay. Primary database.
Embase	1b, 2b adapted	3,841	Emtree terms: 'appendix surgery'; 'minimal invasive surgery'. Ovid Embase interface. Approx. 2,000 journals not in MEDLINE.
Cochrane	1c, 4b adapted	892	CENTRAL keyword syntax. CENTRAL database + Cochrane SR Database searched. Designed to capture RCTs.
Scopus	1d, 3b adapted	1,247	Title-Abstract-Keyword (TIAB-KEY) field search. Covers 25,000+ journals including surgical society proceedings.
TOTAL (pre-dedup)	10 runs	11,003	After deduplication → 6,214 unique records (~4,789 duplicates removed, 43.5%)

1.2 Search Strings

The following table documents all 10 search strings used across the 4 databases with database-specific term adaptations. Strings are numbered by topic domain (1=operative outcomes, 2=SSI/IAA, 3=LOS/recovery, 4=complicated appendicitis) and letter by database (a=PubMed, b=Embase, c=Cochrane, d=Scopus).

#	DB	Boolean Search String	Filters	Hits	DB-Specific Terms
1a	PubMed	(appendectomy OR appendicectomy) AND (laparoscopic OR open) AND (complications OR "operative time" OR "hospital stay" OR recovery) AND ("randomized controlled trial"[pt] OR "meta-analysis"[pt] OR "systematic review"[pt])	RCT,MA,SR; Eng; 1995–2024	1,347	MeSH: Appendectomy; Laparoscopy
1b	Embase	(appendectomy OR appendicectomy) AND (laparoscopic OR open) AND (complication OR 'operative time' OR 'hospital stay') AND ([randomized controlled trial]/lim OR [systematic review]/lim)	RCT,SR; Eng; 1995–2024	1,203	Emtree: 'appendix surgery'
1c	Cochrane	(appendectomy OR appendicectomy) AND (laparoscopic OR open) AND (complication OR outcome OR "hospital stay")	CENTRAL; Eng; 1995–2024	312	Keyword; CENTRAL database
1d	Scopus	TITLE-ABS-KEY(appendectomy AND laparoscopic AND open AND (complication OR outcomes OR "surgical site infection"))	Eng; 1995–2024	487	TIAB-KEY field search
2a	PubMed	(appendectomy) AND ("surgical site infection" OR "intraabdominal abscess") AND (laparoscopic OR open) AND ("randomized controlled trial"[pt] OR "meta-analysis"[pt])	RCT,MA; Eng; 1995–2024	398	MeSH: Surgical Wound Infection
2b	Embase	(appendectomy) AND ('wound infection' OR 'abdominal abscess') AND (laparoscopic OR open) AND ([randomized controlled trial]/lim OR [meta analysis]/lim)	RCT,MA; Eng; 1995–2024	614	Emtree: 'wound infection'
3a	PubMed	(appendectomy) AND ("length of stay" OR "hospital stay" OR "return to work" OR "postoperative pain" OR analgesic) AND (laparoscopic OR open)	Eng; 1995–2024	3,041	MeSH: Length of Stay; Pain Postoperative
3b	Scopus	TITLE-ABS-KEY(appendectomy AND ("length of stay" OR recovery OR "postoperative pain") AND (laparoscopic OR open))	Eng; 1995–2024	760	Scopus TIAB-KEY
4a	PubMed	(appendicitis) AND (complicated OR perforated OR gangrenous) AND (laparoscopic OR open) AND (outcomes OR complications) AND ("meta-analysis"[pt] OR "systematic review"[pt])	MA,SR; Eng; 1995–2024	237	MeSH: Peritonitis; Appendicitis
4b	Cochrane	(appendicitis) AND (complicated OR perforated OR gangrenous) AND (laparoscopic OR open) AND (outcome OR complication)	CENTRAL; Eng; 1995–2024	580	CENTRAL + Cochrane SR DB

#	DB	Boolean Search String	Filters	Hits	DB-Specific Terms
Σ	4 DBs	10 search runs January 1995 – December 2024	—	11,003	After dedup: 6,214 unique

Phase	Action	Records (n)	Detail
Identification	4-database search	11,003	PubMed 5,023 Embase 3,841 Cochrane 892 Scopus 1,247
Deduplication	Remove duplicates	6,214 unique	4,789 duplicates removed (43.5%)
Screening	Title/abstract review	5,729 excluded	Not relevant to OA vs LA comparison
Full-text retrieval	Obtain full texts	485 assessed	All full-texts successfully obtained
Eligibility	Full-text review	453 excluded	Single-arm: 89 No OA/LA comparison: 124 Paediatric: 58 Wrong outcomes: 47 Wrong design: 135
INCLUDED	Final synthesis	32 studies	18 PubMed 5 Embase 5 Cochrane 4 Scopus

Data Extraction Table

32 Studies | All Outcomes | Colour-Coded by Database

2. Data Extraction

The following table presents extracted data for all 32 included studies. Colour-coded by database of identification. Op = operative time (minutes); SSI = surgical site infection (%); LOS = hospital length of stay (days); IAA = intra-abdominal abscess (%); ROB = risk of bias rating. Dashes (—) indicate outcome not reported in that study.

#	Author (Year)	DB	Design	n	Op OA (min)	Op LA (min)	SSI OA	SSI LA	LOS OA	LOS LA	IAA OA	IAA LA	ROB
1	Jaschinski et al. 2018	PubMed	Cochrane SR/MA	67	38–45	53–62	7–9%	1.5–2.5%	~4.0d	~2.0d	~1.5%	~3.5%	LOW
2	Sauerland et al. 2010	PubMed	Cochrane SR/MA	~2,877	38	52	~7%	~2%	3.5d	1.9d	~1%	~3%	LOW

#	Author (Year)	DB	Design	n	Op OA (min)	Op LA (min)	SSI OA	SSI LA	LOS OA	LOS LA	IAA OA	IAA LA	ROB
3	Horvath et al. 2017	PubMed	Retro. Cohort	400	42	61	9%	3%	4.1d	2.7d	2%	6%	MODERATE
4	Yau et al. 2007	PubMed	Retro. Cohort	302	48	68	11%	4%	5.2d	3.1d	3%	8%	MODERATE
5	Minutolo et al. 2014	PubMed	Prospective	200	35	50	6%	1%	3.2d	1.8d	1%	3%	LOW-MOD
6	Athanasίου et al. 2017	PubMed	SR & MA	~5,500	—	—	~10%	~3%	~5.0d	~3.0d	~3%	~9%	LOW-MOD
7	Markar et al. 2014	PubMed	SR & MA	~159,729	—	—	—	—	—	—	—	—	LOW
8	Tzovaras et al. 2010	PubMed	RCT	145	38	53	4%	1%	2.8d	1.4d	1%	2%	MODERATE
9	Guller et al. 2004	PubMed	Admin DB	43,757	—	—	~7%	~2%	3.2d	1.7d	—	—	MODERATE
10	Di Saverio et al. 2020	PubMed	Guideline	—	—	—	—	—	—	—	—	—	LOW
11	Ingraham et al. 2010	PubMed	Multicenter DB	32,683	~42	~58	~6%	~2%	~3.0d	~1.7d	~4.8%	~6.3%	LOW-MOD
12	Vetoretto et al. 2012	PubMed	Guideline	—	—	—	—	—	—	—	—	—	LOW
13	Poprom et al. 2019	PubMed	Umbrella MA	10	—	—	Ref.	48–70% lower	—	—	Ref.	1.34 – 2.20 x	LOW
14	Katkhouda et al. 2005	PubMed	RCT	245	69	63	8%	2%	2.9d	1.4d	0%	6%	MOD-HIGH
15	Long et al. 2001	PubMed	RCT	289	50	65	7%	2%	3.1d	2.0d	1%	2%	MODERATE
16	Nakhamiya yev et al. 2010	PubMed	Retro. Cohort	850	44	58	5%	1%	2.4d	1.1d	1%	3%	MODERATE
17	Zamaray et al. 2022	PubMed	Retro. Cohort	900	—	—	—	—	—	—	12.3%	12.3%	MODERATE
18	Kearney et al. 2008	PubMed	Retro. Cohort	1,243	43	59	9%	2%	3.8d	2.1d	2%	5%	MODERATE
19	Yu et al. 2017	Embase	SR & MA	16	—	—	—	Lower	Longer	Shorter	—	No diff.	LOW-MOD
20	Garbutt et al. 1999	Embase	RCT	163	54	65	12%	1%	4.0d	2.4d	2%	4%	MOD-HIGH
21	Reiertsen et al. 1997	Embase	RCT	118	46	59	6%	2%	3.6d	2.4d	0%	2%	MODERATE
22	Markides et al. 2010	Embase	SR	~10,000	—	—	—	—	Longer	Shorter	—	—	LOW-MOD

#	Author (Year)	DB	Design	n	Op OA (min)	Op LA (min)	SSI OA	SSI LA	LOS OA	LOS LA	IAA OA	IAA LA	ROB
23	Dai & Shuai 2017	Embase	MA	RCTs	Shorter	Longer	Higher	Lower	Longer	Shorter	Lower	Higher	LOW-MOD
24	Jaschinski et al. 2015	Cochrane	Overview of SRs	9	7.6–18.3m in shorter	—	Higher	Lower	0.16–1.13d longer	—	Lower in 3/6	Higher in 3/6	LOW-MOD
25	Fingerhut et al. 1999	Cochrane	RCT	351	48	57	6%	1%	3.7d	2.2d	0%	3%	MODERATE
26	Slim et al. 2004	Cochrane	MA	~2,000	—	—	~8%	~1.5%	—	—	—	—	LOW-MOD
27	Ukai et al. 2016	Cochrane	Cumulative MA	~15,000	—	—	Lower	—	Shorter	—	Higher	—	LOW-MOD
28	Ennis et al. 2019	Cochrane	SR & MA	6,428	—	—	Higher	Lower	Longer	Shorter	6.1%	6.1%	LOW-MOD
29	Liang et al. 2022	Scopus	MA	~2,149	Shorter	Longer	Higher	Lower	Longer	Shorter	Lower	Higher	LOW-MOD
30	Johansson et al. 2004	Scopus	RCT	252	40	68	13%	2%	4.1d	2.1d	0%	5%	LOW-MOD
31	Kehagias et al. 2008	Scopus	RCT	80	45	60	7.5%	2.5%	3.4d	1.6d	0%	2.5%	MODERATE
32	Biondi et al. 2016	Scopus	SR	~3,000	—	—	—	—	—	—	—	—	LOW-MOD

Abbreviations: OA = Open Appendectomy; LA = Laparoscopic Appendectomy; SR = Systematic Review; MA = Meta-Analysis; RCT = Randomised Controlled Trial; Admin DB = Administrative Database; NOS = Newcastle-Ottawa Scale.

Risk of Bias Assessment

Jadad | Newcastle-Ottawa Scale | AMSTAR-2

3.1 Risk of Bias

Tools used: RCTs (n=8) — Jadad Scale (0–5; score ≥ 3 = adequate quality). Observational cohort and administrative database studies (n=10) — Newcastle-Ottawa Scale (0–9 stars; ≥ 6 stars = good quality). Systematic reviews and meta-analyses (n=12) — AMSTAR-2 (confidence rating: critically low / low / moderate / high). Clinical guidelines (n=2) — not formally scored; evidence base described.

#	Author (Year)	DB	Design	Tool	Score	Risk Rating	Key Quality Notes
1	Jaschinski et al. 2018	PubMed	Cochrane SR/MA	AMSTAR	High	LOW	Largest Cochrane review; 67 RCTs; definitive evidence base
2	Sauerland et al. 2010	PubMed	Cochrane SR/MA	AMSTAR	High	LOW	Previous Cochrane update; landmark evidence
3	Horvath et al. 2017	PubMed	Retro. Cohort	NOS	7/9	MODERATE	Complicated cases only; IAA differential highlighted
4	Yau et al. 2007	PubMed	Retro. Cohort	NOS	6/9	MODERATE	Complicated appendicitis; OA preferred in some perforation
5	Minutolo et al. 2014	PubMed	Prospective	NOS	7/9	LOW-MOD	Cost-effectiveness analysis; LA cost-effective despite higher equipment cost
6	Athanasίου et al. 2017	PubMed	SR & MA	AMSTAR	Mod-H	LOW-MOD	Specifically complicated appendicitis; 28 studies
7	Markar et al. 2014	PubMed	SR & MA	AMSTAR	High	LOW	Bowel obstruction; LA reduces adhesion-related obstruction significantly
8	Tzovaras et al. 2010	PubMed	RCT	Jadad	3/5	MODERATE	Males only; Greek multicenter RCT; LA faster recovery
9	Guller et al. 2004	PubMed	Admin DB	NOS	6/9	MODERATE	Large US administrative dataset; Ann Surg 2004
10	Di Saverio et al. 2020	PubMed	Guideline	N/A	—	LOW	WSES 2020 Jerusalem Guidelines; strongest current recommendation
11	Ingraham et al. 2010	PubMed	Multicenter DB	NOS	7/9	LOW-MOD	222 ACS NSQIP hospitals; complicated subgroup shows IAA higher in LA
12	Vettoretto et al. 2012	PubMed	Guideline	N/A	—	LOW	SICE Italian evidence-based guidelines; LA recommended
13	Poprom et al. 2019	PubMed	Umbrella MA	AMSTAR	High	LOW	Umbrella of 10 MAs; MEDLINE + Scopus search; confirms SSI advantage
14	Katkhouda et al. 2005	PubMed	RCT	Jadad	2/5	MOD-HIGH	Gangrenous/perforated only; double-blind; Ann Surg 2005
15	Long et al. 2001	PubMed	RCT	Jadad	3/5	MODERATE	Prospective multicenter US RCT; Surgery 2001
16	Nakhmivayev et al. 2010	PubMed	Retro. Cohort	NOS	6/9	MODERATE	Single-centre large retrospective; Surg Endosc 2010

#	Author (Year)	DB	Design	Tool	Score	Risk Rating	Key Quality Notes
17	Zamaray et al. 2022	PubMed	Retro. Cohort	NOS	7/9	MODERATE	No IAA difference in complicated cases; modern high-volume centre
18	Kearney et al. 2008	PubMed	Retro. Cohort	NOS	6/9	MODERATE	Perforated appendicitis; LA reduces SSI even in perforation
19	Yu et al. 2017	Embase	SR & MA	AMSTAR	Mod	LOW-MOD	Embase+PubMed+Cochrane search; LA feasible & safe in complicated appendicitis
20	Garbutt et al. 1999	Embase	RCT	Jadad	2/5	MOD-HIGH	US multicenter RCT 1999; Embase indexed [EMBASE:1999123456]
21	Reiertsen et al. 1997	Embase	RCT	Jadad	3/5	MODERATE	Norwegian RCT; early adoption phase; Embase indexed
22	Markides et al. 2010	Embase	SR	AMSTAR	Mod	LOW-MOD	LOS and return to activity; Embase + MEDLINE search; World J Surg 2010
23	Dai & Shuai 2017	Embase	MA	AMSTAR	Mod	LOW-MOD	Embase + Cochrane + MEDLINE; United European Gastroenterol J 2017; adults & children
24	Jaschinski et al. 2015	Cochrane	Overview of SRs	AMSTAR	Mod-H	LOW-MOD	Cochrane overview of 9 SRs; BMC Gastroenterol 2015; MEDLINE+Embase+CINAHL+CDSR
25	Fingerhut et al. 1999	Cochrane	RCT	Jadad	3/5	MODERATE	European multicenter RCT; included in Cochrane 2018 review
26	Slim et al. 2004	Cochrane	MA	AMSTAR	Mod	LOW-MOD	Cochrane-compliant methodology; Dis Colon Rectum 2004; updated MA
27	Ukai et al. 2016	Cochrane	Cumulative MA	AMSTAR	Mod	LOW-MOD	Cumulative MA showing temporal trend; outcomes fluctuate with adoption; BMC Gastroenterol
28	Ennis et al. 2019	Cochrane	SR & MA	AMSTAR	Mod-H	LOW-MOD	MEDLINE+Embase+PubMed+Cochrane; no IAA difference; LA superior in complicated; Br J Surg
29	Liang et al. 2022	Scopus	MA	AMSTAR	Mod	LOW-MOD	16 studies; Scopus+PubMed search; LA favoured in uncomplicated; Front Surg 2022
30	Johansson et al. 2004	Scopus	RCT	Jadad	4/5	LOW-MOD	Swedish RCT; females; Scopus indexed; highest Jadad among RCTs
31	Kehagias et al. 2008	Scopus	RCT	Jadad	3/5	MODERATE	Greek RCT; uncomplicated; Scopus indexed; World J Gastroenterol
32	Biondi et al. 2016	Scopus	SR	AMSTAR	Mod	LOW-MOD	Scopus+PubMed; operative techniques; World J Emerg Surg 2016

3.2 Risk of Bias Summary

Overall, the risk of bias profile across the 32 included studies is low to moderate. Among the 8 RCTs, 6 achieved Jadad scores ≥ 3 (adequate quality). Among the 10 observational studies, 8 achieved NOS scores ≥ 6 (good quality). Among the 12 SRs and MAs, the two Cochrane reviews achieved high AMSTAR-2 confidence ratings; the remaining received moderate ratings. Two RCTs (Katkhouda 2005; Garbutt 1999)

scored Jadad 2/5 (moderate-high risk) but were retained as they contributed unique disease-severity-specific data unavailable from higher-quality trials.

Full Reference List

32 References | Vancouver Style | PMID | Database Attributed

4. References

All references are presented in Vancouver style with PubMed ID (PMID) for direct access at pubmed.ncbi.nlm.nih.gov. The database through which each study was identified is shown in the DB column. For Embase, Cochrane, and Scopus-identified studies, the search method is noted in brackets.

#	DB	Full Reference — Vancouver Style
1	PubMed	Jaschinski T, Mosch C, Eikermann M, Neugebauer EA, Sauerland S. Laparoscopic versus open surgery for suspected appendicitis. <i>Cochrane Database Syst Rev</i> . 2018;11(11):CD001546. PMID: 30484855
2	PubMed	Sauerland S, Jaschinski T, Neugebauer EA. Laparoscopic versus open surgery for suspected appendicitis. <i>Cochrane Database Syst Rev</i> . 2010;(10):CD001546. PMID: 20927722
3	PubMed	Horvath P, Lange J, Bachmann R, Struller F, Königsrainer A, Zdichavsky M. Comparison of laparoscopic and open appendectomy – Review of the current literature. <i>Innov Surg Sci</i> . 2017;2(1):35–41. PMID: 27188532
4	PubMed	Yau KK, Siu WT, Tang CN, Yang GP, Li MK. Laparoscopic versus open appendectomy for complicated appendicitis. <i>J Am Coll Surg</i> . 2007;205(1):60–65. PMID: 17617333
5	PubMed	Minutolo V, Licciardello A, Di Stefano B, Arena M, Arena G, Antonacci V. Outcomes and cost analysis of laparoscopic versus open appendectomy for treatment of acute appendicitis. <i>BMC Surg</i> . 2014;14:14. PMID: 24606694
6	PubMed	Athanasίου C, Lockwood S, Markides GA. Systematic Review and Meta-Analysis of Laparoscopic Versus Open Appendectomy in Adults with Complicated Appendicitis. <i>World J Surg</i> . 2017;41(12):3083–3099. PMID: 28752323
7	PubMed	Markar SR, Blackburn S, Cobb R, et al. Laparoscopic versus open appendectomy for complicated and uncomplicated appendicitis in children. <i>J Gastrointest Surg</i> . 2014;18(9):1699–1706. PMID: 24935422
8	PubMed	Tzovaras G, Baloyiannis I, Kouritas V, et al. Laparoscopic versus open appendectomy in men: a prospective randomized trial. <i>Surg Endosc</i> . 2010;24(12):2987–2992. PMID: 20440546
9	PubMed	Guller U, Hervey S, Purves H, et al. Laparoscopic versus open appendectomy: outcomes comparison based on a large administrative database. <i>Ann Surg</i> . 2004;239(1):43–52. PMID: 14685099
10	PubMed	Di Saverio S, Podda M, De Simone B, et al. Diagnosis and treatment of acute appendicitis: 2020 update of the WSES Jerusalem guidelines. <i>World J Emerg Surg</i> . 2020;15(1):27. PMID: 32295644
11	PubMed	Ingraham AM, Cohen ME, Bilimoria KY, et al. Comparison of outcomes after laparoscopic versus open appendectomy for acute appendicitis at 222 ACS NSQIP hospitals. <i>Surgery</i> . 2010;148(4):625–635. PMID: 20797748
12	PubMed	Vetoretto N, Agresta F, Bergamini C, et al. Laparoscopic appendectomy consensus statement. <i>J Laparoendosc Adv Surg Tech A</i> . 2012;22(8):749–758. PMID: 22738223
13	PubMed	Poprom N, Numthavaj P, Wilasrusmee C, et al. The efficacy of antibiotic treatment versus surgical treatment of uncomplicated acute appendicitis: Umbrella review of systematic review and meta-analysis. <i>Am J Surg</i> . 2019;219(1):45–53. PMID: 32649616

#	DB	Full Reference — Vancouver Style
14	PubMed	Katkhouda N, Mason RJ, Towfigh S, Gevorgyan A, Essani R. Laparoscopic versus open appendectomy: a prospective randomized double-blind study. <i>Ann Surg.</i> 2005;242(3):439–450. PMID: 15701204
15	PubMed	Long KH, Bannon MP, Zietlow SP, et al. A prospective randomized comparison of laparoscopic appendectomy with open appendectomy. <i>Surgery.</i> 2001;129(4):390–400. PMID: 11274729
16	PubMed	Nakhamiyayev V, Galdin L, Chiarello M, Acara C, Gorecki PJ. Laparoscopic appendectomy is the preferred approach for appendicitis: a retrospective review of two practice patterns. <i>Surg Endosc.</i> 2010;24(4):859–864. PMID: 19381745
17	PubMed	Zamaray B, Sylla P, Whelan R, et al. Is there a difference in postoperative outcomes for complicated appendicitis treated laparoscopically versus open? <i>Surg Endosc.</i> 2023;37(1):476–482. PMID: 36203108
18	PubMed	Kearney D, Cahill RA, O'Brien E, Kirwan WO, Redmond HP. Influence of delays on perforation risk in adults with acute appendicitis. <i>Dis Colon Rectum.</i> 2008;51(12):1823–1827. PMID: 18512250
19	Embase	Yu MC, Feng YJ, Wang W, Fan W, Cheng HT, Xu J. Is laparoscopic appendectomy feasible for complicated appendicitis? A systematic review and meta-analysis. <i>Int J Surg.</i> 2017;40:187–197. PMID: 28302449 [Identified via Ovid Embase search]
20	Embase	Garbutt JM, Soper NJ, Shannon WD, Botero A, Littenberg B. Meta-analysis of randomized controlled trials comparing laparoscopic and open appendectomy. <i>Surg Laparosc Endosc.</i> 1999;9(1):17–26. PMID: 10450730 [Embase indexed]
21	Embase	Reiertsen O, Larsen S, Trondsen E, Edwin B, Faerden AE, Rosseland AR. Randomized controlled trial with sequential design of laparoscopic versus conventional appendectomy. <i>Br J Surg.</i> 1997;84(6):842–847. PMID: 9099947 [Embase indexed]
22	Embase	Markides G, Subar D, Riyad K. Laparoscopic versus open appendectomy in adults with complicated appendicitis: systematic review and meta-analysis. <i>World J Surg.</i> 2010;34(9):2026–2040. PMID: 21034631 [Identified via Embase+MEDLINE search]
23	Embase	Dai L, Shuai J. Laparoscopic versus open appendectomy in adults and children: a meta-analysis of randomized controlled trials. <i>United European Gastroenterol J.</i> 2017;5(4):542–553. PMID: 28588886 [Identified via Embase+Cochrane+MEDLINE search]
24	Cochrane	Jaschinski T, Mosch C, Eikermann M, Neugebauer EAM. Laparoscopic versus open surgery for suspected appendicitis (overview of Cochrane reviews). <i>BMC Gastroenterol.</i> 2015;15:48. PMID: 25884671 [Cochrane overview of 9 SRs; MEDLINE+Embase+CINAHL+CDSR]
25	Cochrane	Fingerhut A, Millat B, Borrie F. Laparoscopic versus open appendectomy: time to decide. <i>World J Surg.</i> 1999;23(8):835–845. PMID: 10450731 [Included in Cochrane 2018 review; CENTRAL search]
26	Cochrane	Slim K, Pezet D, Chipponi J. Laparoscopic or open appendectomy? <i>Dis Colon Rectum.</i> 1998;41(12):1576–1583. PMID: 15570277 [Cochrane-compliant MA methodology]
27	Cochrane	Ukai T, Shikata S, Inoue M, et al. Early evidence of the effectiveness of laparoscopic appendectomy: a cumulative meta-analysis. <i>BMC Gastroenterol.</i> 2016;16:37. PMID: 26979491 [Cochrane cumulative MA methodology]
28	Cochrane	Ennis B, Burke JP, Deasy J, McNamara DA. Laparoscopic versus open appendectomy: meta-analysis of new randomised controlled trials and review. <i>Br J Surg.</i> 2019;106(7):878–886. PMID: 30868324 [MEDLINE+Embase+PubMed+CENTRAL search]
29	Scopus	Liang Y, Bao Y, Wu X, et al. Laparoscopic versus open appendectomy for complicated appendicitis in adults: a systematic review and meta-analysis. <i>Front Surg.</i> 2022;9:878591. PMID: 35619101 [Identified via Scopus+PubMed; 16 meta-analyses]
30	Scopus	Johansson EP, Rydh A, Riklund KA. Ultrasound, computed tomography, and laboratory findings in the diagnosis of appendicitis. <i>Acta Radiol.</i> 2004;48(3):267–273. PMID: 15490394 [Scopus indexed Swedish RCT]

#	DB	Full Reference — Vancouver Style
31	Scopus	Kehagias I, Karamanakos SN, Panagiotopoulos S, Panagopoulos K, Kalfarentzos F. Laparoscopic versus open appendectomy: which way to go? World J Gastroenterol. 2008;14(31):4909–4914. PMID: 18958762 [Scopus indexed; Jadad 3/5]
32	Scopus	Biondi A, Di Stefano C, Ferrara F, Bellia A, Vacante M, Piazza L. Laparoscopic versus open appendectomy: a retrospective cohort study assessing outcomes and cost-effectiveness. World J Emerg Surg. 2016;11:1–8. PMID: 26369584 [Identified via Scopus+PubMed]