

Figure S1 Meta-regression analysis of success rate based on abscess size.

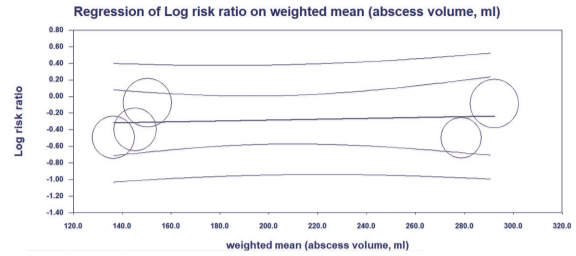


Figure S2 Meta-regression analysis of success rate based on pus volume.

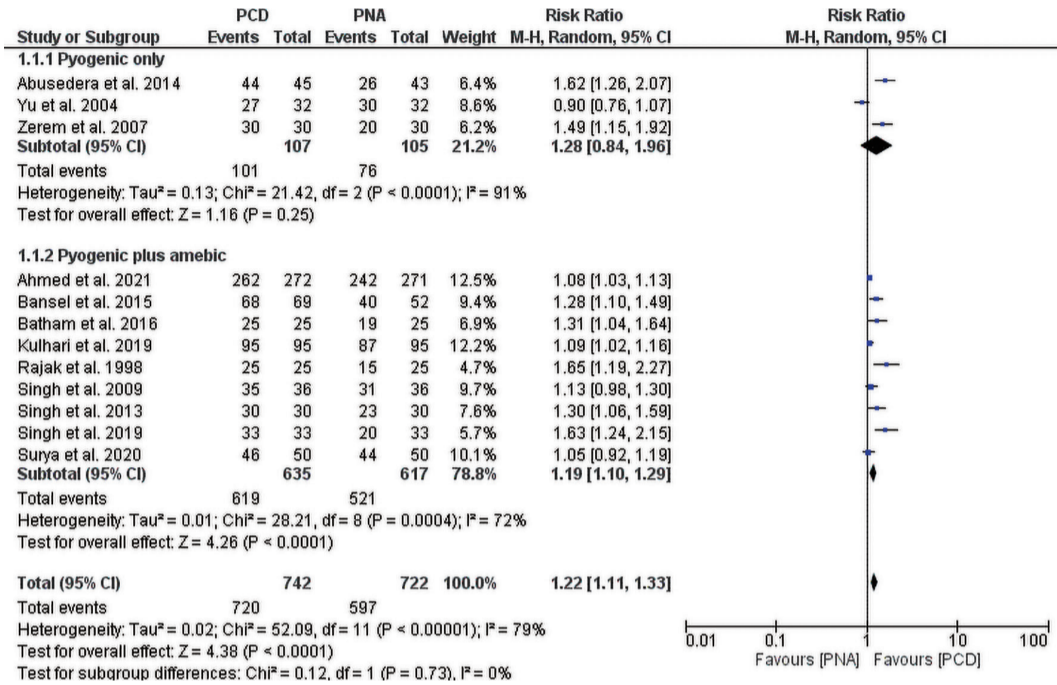


Figure S3 Forest plot of subgroup analysis of success rate based on abscess type. PCD, percutaneous catheter aspiration; PNA, percutaneous needle aspiration; CI, confidence interval; df, degree of freedom.

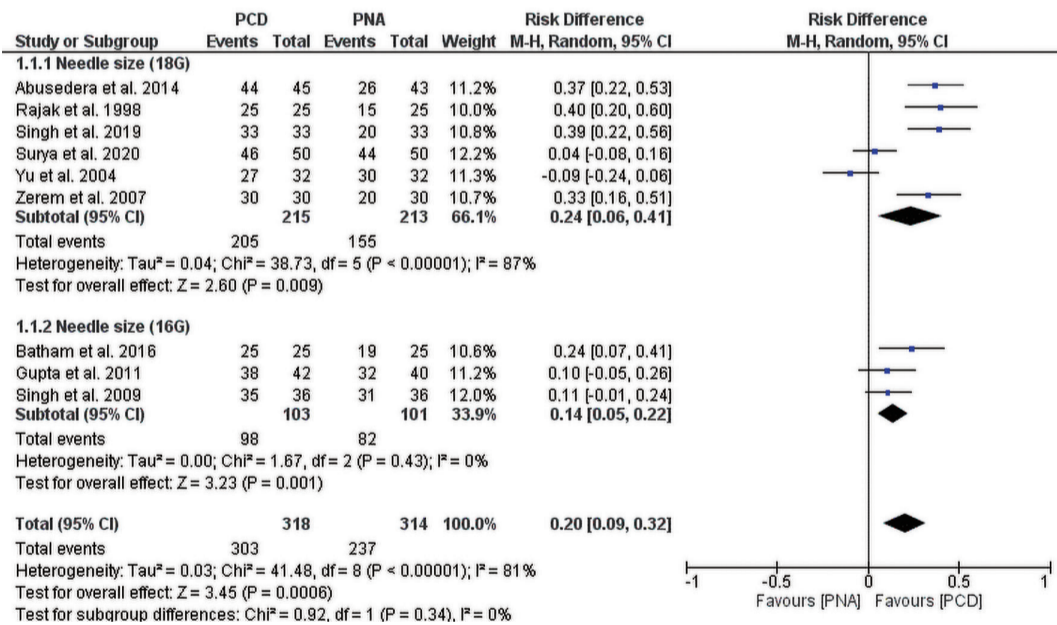
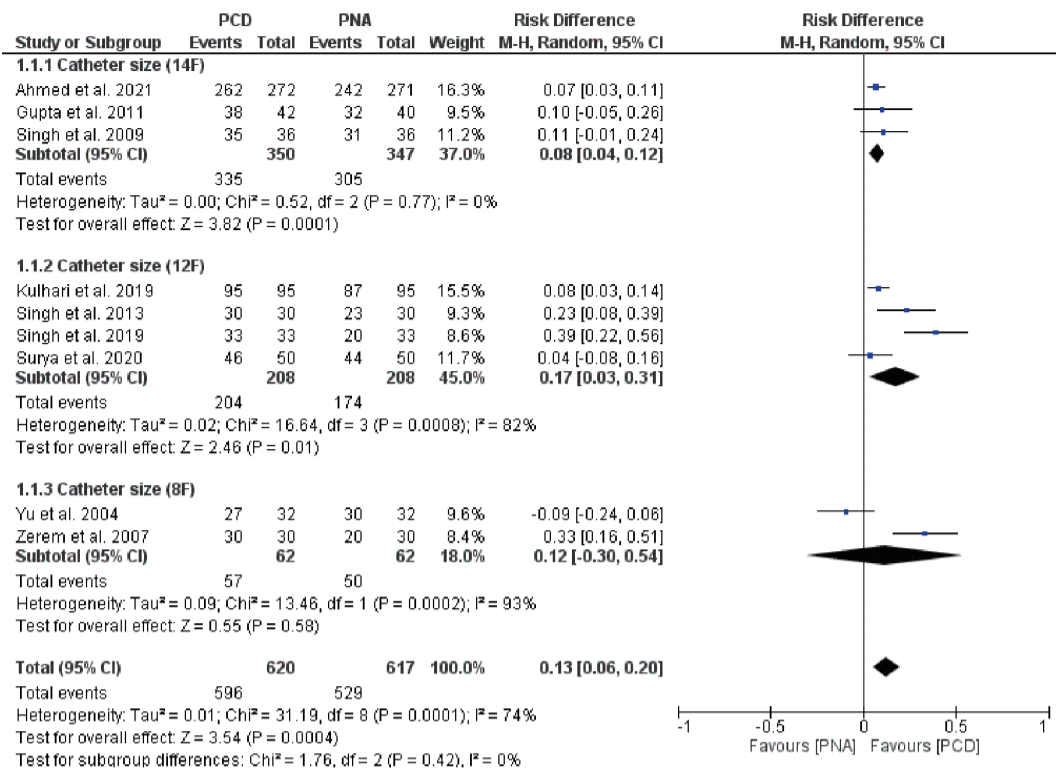
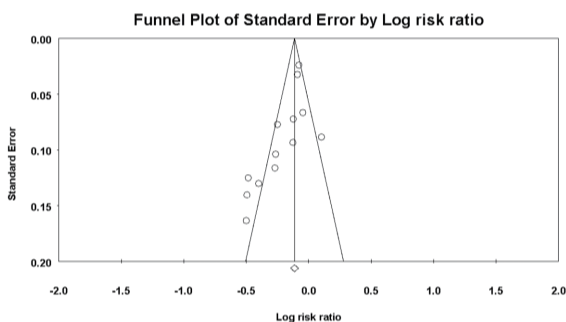


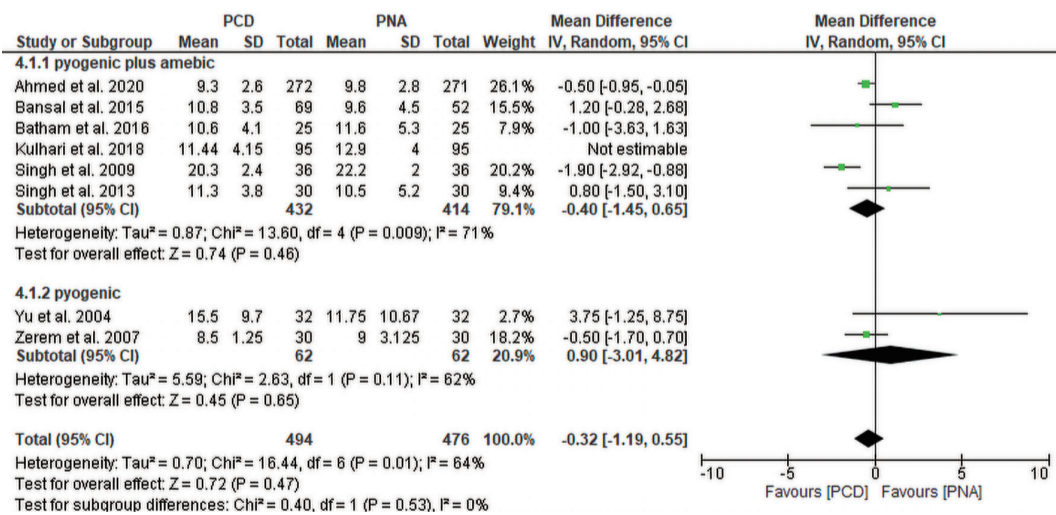
Figure S4 Forest plot of subgroup analysis of success rate based on needle size. PCD, percutaneous catheter aspiration; PNA, percutaneous needle aspiration; CI, confidence interval; df, degree of freedom.



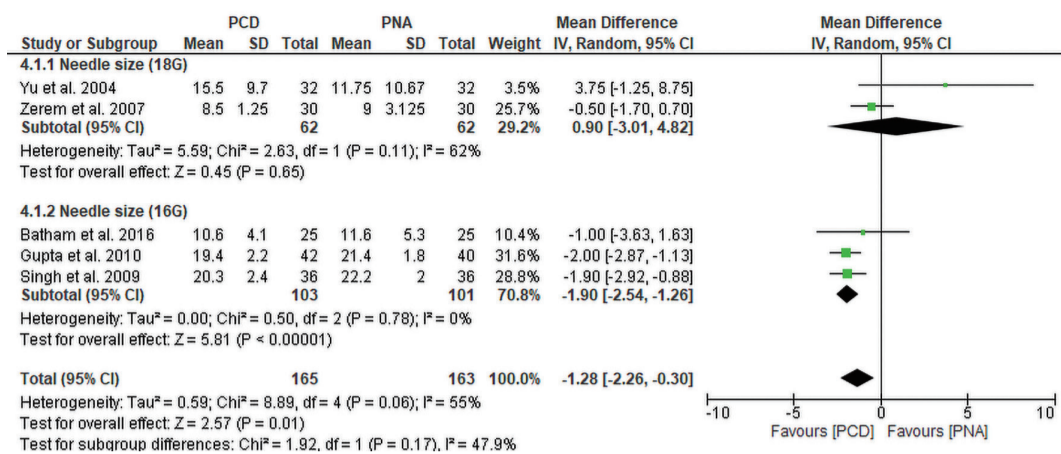
**Figure S5** Forest plot of subgroup analysis of success rate based on catheter size. PCD, percutaneous catheter aspiration; PNA, percutaneous needle aspiration; CI, confidence interval; df, degree of freedom.



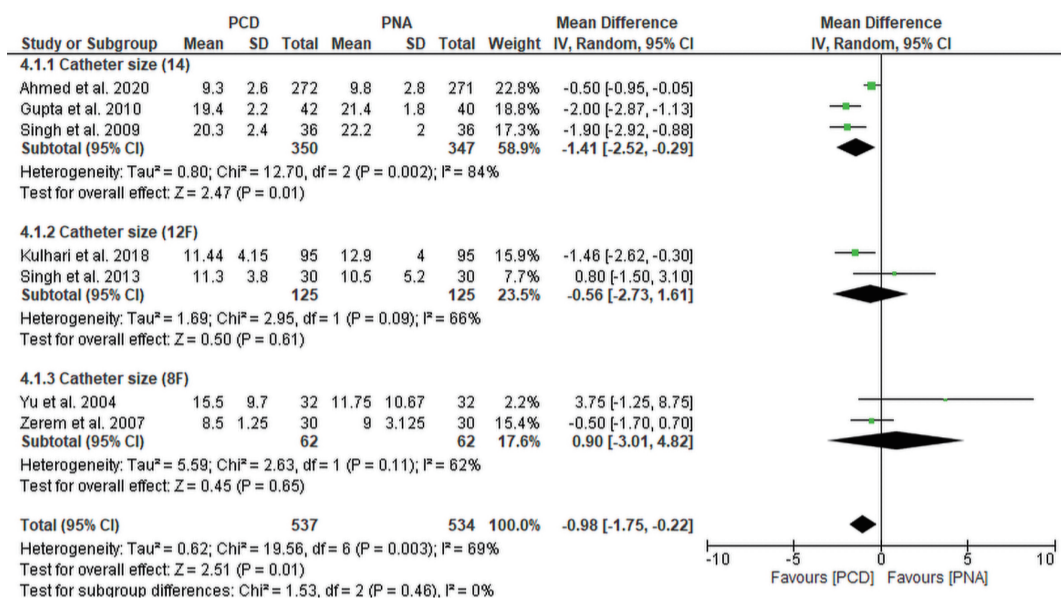
**Figure S6** Funnel plot assessing publication bias of success rate.



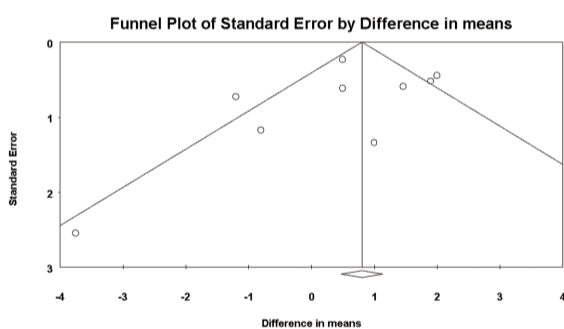
**Figure S7** Forest plot of subgroup analysis of duration of hospitalization based on abscess type. PCD, percutaneous catheter aspiration; PNA, percutaneous needle aspiration; CI, confidence interval; df, degree of freedom.



**Figure S8** Forest plot of subgroup analysis of duration of hospitalization based on needle size.



**Figure S9** Forest plot of subgroup analysis of duration of hospitalization based on catheter size. PCD, percutaneous catheter aspiration; PNA, percutaneous needle aspiration; CI, confidence interval; df, degree of freedom.



**Figure S10** Funnel plot assessing publication bias of duration of hospitalization.

**Table S1** Search terms and results in different databases

Database	Search terms	Search field	Search results
PubMed	("Hepatic abscess*" OR "liver abscess*") AND (needle OR "needle aspira*") AND (catheter OR "catheter drain*")	All Field	85
Cochrane	("Hepatic abscess*" OR "liver abscess*") AND (needle OR "needle aspira*") AND (catheter OR "catheter drain*")	All Field	19
WOS	("Hepatic abscess*" OR "liver abscess*") AND (needle OR "needle aspira*") AND (catheter OR "catheter drain*")	All Field	126
SCOPUS	("Hepatic abscess*" OR "liver abscess*") AND (needle OR "needle aspira*") AND (catheter OR "catheter drain*")	Title, Abstract, Keywords	135
EMBASE	Embase Session Results No. Query Results	All Field	93
	#4. #1 AND #2 AND #3		93 22 Jul 2022
	#3. catheter:ti,ab,kw OR 'catheter drain':ti,ab,kw		240,794 22 Jul 2022
	#2. needle:ti,ab,kw OR 'needle aspiration':ti,ab,kw		176,193 22 Jul 2022
	#1. 'hepatic abscess':ti,ab,kw OR 'liver abscess':ti,ab,kw		9,418 22 Jul 2022
Google Scholar	liver abscess needle aspiration catheter drainage	All in title	32

**Table S2** Author judgement of risk of bias

Study ID	Domain	Judgment
Abusedera <i>et al.</i> 2014	Random sequence generation (selection bias)	Unclear risk “didn’t mention the method of randomization”
	Allocation concealment (selection bias)	Unclear risk “there was not enough information”
	Selective reporting (reporting bias)	Unclear risk “no protocol was able to be retrieved”
Ahmed <i>et al.</i> 2021	Allocation concealment (selection bias)	Unclear risk “method by which allocation concealment was not mentioned in the study”
	Selective reporting (reporting bias)	Unclear risk “no protocol was able to be retrieved”
	Other bias	Unclear risk “baseline cc in the study did not compare between both groups”
Bansal <i>et al.</i> 2015	Random sequence generation (selection bias)	Unclear risk “didn’t mention the method of randomization”
	Allocation concealment (selection bias)	Unclear risk “there was not enough information”
	Selective reporting (reporting bias)	Unclear risk “no protocol was able to be retrieved”
	Other bias	Unclear risk “baseline characteristics in the study did not compare between both group”
Batham <i>et al.</i> 2016	Allocation concealment (selection bias)	Unclear risk “there was no enough information”
	Selective reporting (reporting bias)	Unclear risk “no protocol was able to be retrieved”
	Other bias	Unclear risk “baseline characteristics in the study did not compare between both groups”
Gajera <i>et al.</i> 2022	Random sequence generation (selection bias)	Unclear risk “didn’t mention the method of randomization”
	Allocation concealment (selection bias)	Unclear risk “there was not enough information”
	Selective reporting (reporting bias)	Unclear risk “no protocol was able to be retrieved”
	Other bias	Unclear risk “baseline characteristics in the study did not compare between both groups”
Gupta <i>et al.</i> 2011	Selective reporting (reporting bias)	Unclear risk “no protocol was able to be retrieved”
Hanumathappa <i>et al.</i> 2016	Random sequence generation (selection bias)	Unclear risk “didn’t mention the method of randomization”
	Allocation concealment (selection bias)	Unclear risk “there was not enough information”
	Selective reporting (reporting bias)	Unclear risk “no protocol was able to be retrieved”
	Other bias	Unclear risk “baseline characteristics in the study did not compare between both groups”
Kulhari <i>et al.</i> 2019	Random sequence generation (selection bias)	Unclear risk “didn’t mention the method of randomization”
	Allocation concealment (selection bias)	Unclear risk “there was not enough information”
	Selective reporting (reporting bias)	Unclear risk “no protocol was able to be retrieved”
Rajak <i>et al.</i> 1998	Random sequence generation (selection bias)	Unclear risk “didn’t mention the method of randomization”
	Allocation concealment (selection bias)	Unclear risk “there was not enough information”
	Selective reporting (reporting bias)	Unclear risk “no protocol was able to be retrieved”
Singh <i>et al.</i> 2013	Other bias	Unclear risk “baseline characteristics in the study did not compare between both group”
Surya <i>et al.</i> 2020	Selective reporting (reporting bias)	Unclear risk “no protocol was able to be retrieved”
Yu <i>et al.</i> 2004	Selective reporting (reporting bias)	Unclear risk “no protocol was able to be retrieved”
Zerem <i>et al.</i> 2007	Selective reporting (reporting bias)	Unclear risk “no protocol was able to be retrieved”

**Table S3** Sensitivity analysis of the primary outcomes

Outcome	Number of participants (PCD/PNA)	No. of trials	Quantitative data synthesis				Heterogeneity analysis		
			RR	95% CI	Z value	P value	DF	P value	I <sup>2</sup> (%)
<b>Success rate</b>									
All studies	784/762	13	1.21	[1.11, 1.31]	4.52	0.0001	12	0.00001	77
(Omitting) Abusedera <i>et al.</i> 2014	739/719	12	1.18	[1.09, 1.27]	4.23	0.0001	11	0.0001	72
(Omitting) Ahmed <i>et al.</i> 2021	512/491	12	1.24	[1.12, 1.37]	4.08	0.0001	11	0.00001	77
(Omitting) Bansal <i>et al.</i> 2015	715/710	12	1.20	[1.10, 1.31]	4.19	0.0001	11	0.00001	77
(Omitting) Batham <i>et al.</i> 2016	759/737	12	1.20	[1.10, 1.31]	4.25	0.0001	11	0.00001	78
(Omitting) Gupta <i>et al.</i> 2011	742/722	12	1.22	[1.11, 1.33]	4.38	0.0001	11	0.00001	79
(Omitting) Kulhari <i>et al.</i> 2019	689/667	12	1.23	[1.12, 1.36]	4.14	0.0001	11	0.00001	78
(Omitting) Rajak <i>et al.</i> 1998	784/762	12	1.21	[1.11, 1.31]	4.52	0.0001	11	0.00001	77
Singh <i>et al.</i> 2009	748/726	12	1.21	[1.11, 1.31]	4.35	0.0001	11	0.00001	79
Singh <i>et al.</i> 2013	754/732	12	1.20	[1.10, 1.31]	4.23	0.0001	11	0.00001	78
Singh <i>et al.</i> 2019	751/729	12	1.18	[1.09, 1.28]	4.23	0.0001	11	0.00001	73
Surya <i>et al.</i> 2020	734/712	12	1.23	[1.12, 1.34]	4.52	0.0001	11	0.00001	79
Yu <i>et al.</i> 2004	752/730	12	1.24	[1.14, 1.34]	4.79	0.00001	11	0.00001	76
Zerem <i>et al.</i> 2007	754/732	12	1.19	[1.10, 1.29]	4.21	0.00001	11	0.000001	76
<b>Duration of hospitalization</b>									
All studies	631/611	9	-0.72	[-1.48, 0.03]	1.87	0.06	8	0.0007	70
(Omitting) Ahmed <i>et al.</i> 2021	359/340	8	-0.70	[-1.66, 0.26]	1.44	0.15	7	0.001	70
(Omitting) Bansal <i>et al.</i> 2015	562/559	8	-1.0	[-1.71, -0.28]	2.72	0.007	7	0.007	64
(Omitting) Batham <i>et al.</i> 2016	606/586	8	-0.69	[-1.49, 0.11]	1.70	0.09	7	0.0003	74
(Omitting) Gupta <i>et al.</i> 2011	589/571	8	-0.51	[-1.28, 0.25]	1.31	0.19	7	0.009	63
(Omitting) Kulhari <i>et al.</i> 2019	536/516	8	-0.59	[-1.44, 0.26]	1.36	0.18	7	0.0006	73
(Omitting) Singh <i>et al.</i> 2009	595/575	8	-0.53	[-1.34, 0.28]	1.28	0.20	7	0.002	68
(Omitting) Singh <i>et al.</i> 2013	601/581	8	-0.84	[-1.62, -0.06]	2.10	0.04	7	0.0007	72
(Omitting) Yu <i>et al.</i> 2004	599/579	8	-0.82	[-1.56, -0.09]	2.20	0.03	7	0.001	71
(Omitting) Zerem <i>et al.</i> 2007	601/581	8	-0.73	[-1.59, 0.13]	1.66	0.10	7	0.0004	74

PCD, percutaneous catheter drainage; PNA, percutaneous needle aspiration; CI, confidence interval; DF, degrees of freedom; MD, mean difference; RR, risk ratio.

**Table S4** Failure and mortality rates

Study name	The overall number of failures		Mortality	
	PCD, N (%)	PNA, N (%)	PCD, N (%)	PNA, N (%)
Abusedera <i>et al.</i> 2014	2 (4.4)	17 (40)	0	0
Ahmed <i>et al.</i> 2021	10 (3.8)	29 (10.7)	0	3 (1)
Bansal <i>et al.</i> 2016	1	12 (23)	0	0
Batham <i>et al.</i> 2016	0	6 (25)	0	0
Gajera <i>et al.</i> 2022	NR	NR	NR	NR
Gupta <i>et al.</i> 2011	4 (9.5)	8 (20)	1 (2)	0
Hanumanthappa <i>et al.</i> 2016	NR	NR	0	0
Kulhari <i>et al.</i> 2019	0	8 (9)	0	0
Rajak <i>et al.</i> 1998	0	10 (40)	0	0
Singh <i>et al.</i> 2009	1 (3)	5 (14)	1 (3)	0
Singh <i>et al.</i> 2013	0	7 (24)	0	0
Singh <i>et al.</i> 2019	0	13 (40)	0	0
Surya <i>et al.</i> 2020	4 (8)	6 (12)	0	0
Yu <i>et al.</i> 2004	5 (16)	2 (6.25)	4 (12.5)	1 (3.125)
Zerem <i>et al.</i> 2007	0	10 (33)	0	0

PCD, percutaneous catheter drainage; PNA, percutaneous needle aspiration.

**Table S5** Sensitivity analysis of the secondary outcomes

Outcome	Number of participants (PCD/PNA)	No. of trials	Quantitative data synthesis				Heterogeneity analysis		
			MD	95% CI	Z value	P value	df	P value	I <sup>2</sup> (%)
Time to clinical improvement (days)									
All studies	569/549	7	-1.78	[-2.50, -1.06]	4.85	0.00001	6	0.00001	90
(Omitting) Ahmed <i>et al.</i> 2021	279/278	6	-1.90	[-2.71, -1.09]	4.59	.000001	5	0.00001	86
(Omitting) Bansal <i>et al.</i> 2015	500/497	6	-1.87	[-2.69, -1.04]	4.43	0.00001	5	0.00001	91
(Omitting) Batham <i>et al.</i> 2016	544/524	6	-1.92	[-2.71, -1.13]	4.77	0.00001	5	0.00001	91
(Omitting) Gupta <i>et al.</i> 2011	527/509	6	-1.56	[-2.29, -0.82]	4.14	0.0001	5	0.00001	90
(Omitting) Kulhari <i>et al.</i> 2019	474/454	6	-1.57	[-2.17, -0.97]	5.11	0.00001	5	0.001	76
(Omitting) Singh <i>et al.</i> 2009	533/513	6	-1.74	[-2.53, -0.95]	4.30	0.0001	5	0.00001	92
(Omitting) Singh <i>et al.</i> 2013	539/513	6	-1.91	[-2.70, -1.11]	4.70	0.00001	5	0.00001	91
Time to achieve a 50% reduction in abscess cavity size (days)									
All studies	491/473	5	-2.83	[-3.36, -2.30]	10.44	0.00001	4	0.0003	81
(Omitting) Ahmed <i>et al.</i> 2021	219/202	5	-2.61	[-2.90, -2.31]	17.34	0.00001	3	0.61	0
(Omitting) Bansal <i>et al.</i> 2015	422/421	5	-2.91	[-3.50, -2.31]	9.54	0.00001	3	0.0005	83
(Omitting) Batham <i>et al.</i> 2016	466/448	5	-2.77	[-3.37, -2.17]	9.04	0.00001	3	0.0001	86
(Omitting) Kulhari <i>et al.</i> 2019	396/378	5	-2.90	[-3.54, -2.26]	8.86	0.00001	3	0.02	71
(Omitting) Singh <i>et al.</i> 2013	461/443	5	-2.94	[-3.50, -2.38]	10.32	0.00001	3	0.0005	83
Duration of IV antibiotics (days)									
All studies	403/403	5	-2.13	[-3.84, -0.42]	2.44	0.01	4	0.00001	93
(Omitting) Ahmed <i>et al.</i> 2021	131/132	4	-2.22	[-4.31, -0.14]	2.09	0.04	3	0.00001	90
(Omitting) Gajera <i>et al.</i> 2022	378/378	4	-1.94	[-4.01, 0.12]	1.84	0.07	3	0.00001	95
(Omitting) Gupta <i>et al.</i> 2011	361/363	4	-1.58	[-3.79, 0.64]	1.40	0.16	3	0.00001	94
(Omitting) Singh <i>et al.</i> 2009	367/367	4	-1.49	[-3.30, 0.32]	1.62	0.11	3	0.00001	91
(Omitting) Yu <i>et al.</i> 2004	375/372	4	-3.11	[-4.68, -1.55]	3.90	0.0001	3	0.00001	93

PCD, percutaneous catheter drainage; PNA, percutaneous needle aspiration; CI, confidence interval; DF, degrees of freedom; MD, mean difference.