Table SI. Results of full search strategy of database.

Database	Search strategy
PubMed	#1 “Carcinoma, Hepatocellular”[Mesh] OR “Liver Neoplasms”[Mesh] OR HCC[Title/Abstract] #2 ((((carcinoma*[Title/Abstract]) OR (cancer*[Title/Abstract])) OR (tumor*[Title/Abstract])) OR (malign*[Title/Abstract])) OR (neoplasm*[Title/Abstract]) #3 ((liver*[Title/Abstract]) OR (hepatic*[Title/Abstract])) OR (hepato*[Title/Abstract]) #4 #1 OR (#2 AND #3) #5 ((sorafenib[Title/Abstract]) OR (nexavar[Title/Abstract])) OR (tosylate[Title/Abstract]) #6 ((lenvatinib[Title/Abstract]) OR (lenvima[Title/Abstract])) OR (E7080[Title/Abstract]) #7 ((((((“Chemoembolization, Therapeutic"[Mesh]) OR (Chemoemboli*[Title/Abstract])) OR (emboli*[Title/Abstract])) OR (TACE[Title/Abstract])) OR (TAE[Title/Abstract])) OR (transarterial[Title/Abstract])) OR (transcatheter[Title/Abstract]) #8 #5 OR #6 OR #7 #9 (“Clinical Trials as Topic”[Mesh] OR “Clinical Trials as Topic”[Mesh] OR "Randomized Controlled Trials as Topic"[Mesh]) OR (((((random*[Title/Abstract]) OR (clinical trial*[Title/Abstract])) OR (placebo[Title/Abstract])) OR (controlled trial*[Title/Abstract])) OR (RCT[Title/Abstract])) #10 #4 AND #8 AND #9
Cochrane	#1 MeSH descriptor: [Carcinoma, Hepatocellular] explode all trees #2 MeSH descriptor: [Liver Neoplasms] explode all trees #3 (carcinoma*):ti,ab,kw OR (cancer*):ti,ab,kw OR (tumor*):ti,ab,kw OR (malign*):ti,ab,kw AND (neoplasm*):ti,ab,kw #4 (liver*):ti,ab,kw OR (hepatic*):ti,ab,kw OR (hepato*):ti,ab,kw #5 #3 AND #4 #6 #1 OR #2 OR #5 #7 (sorafenib):ti,ab,kw OR (nexavar):ti,ab,kw OR (tosylate):ti,ab,kw #8 (lenvatinib):ti,ab,kw OR (lenvima):ti,ab,kw OR (E7080):ti,ab,kw #9 MeSH descriptor: [Chemoembolization, Therapeutic] explode all trees #10 (Chemoemboli*):ti,ab,kw OR (emboli*):ti,ab,kw OR (TACE):ti,ab,kw OR (transarterial):ti,ab,kw OR (transcatheter):ti,ab,kw #11 #7 OR #8 OR #9 OR #10 #12 MeSH descriptor: [Randomized Controlled Trial] explode all trees #13 (random*):ti,ab,kw OR (clinical trial*):ti,ab,kw OR (placebo):ti,ab,kw OR (controlled trial*):ti,ab,kw OR (RCT):ti,ab,kw #14 #12 OR #13 #15 #6 AND #11 AND #14
Embase	#1 ‘liver cancer’/exp OR ‘liver cancer’ OR ‘liver cell carcinoma’/exp OR ‘liver cell carcinoma’ #2 carcinoma*:ab,kw,ti OR cancer*:ab,kw,ti OR tumor*:ab,kw,ti OR malign*:ab,kw,ti OR neoplasm*:ab,kw,ti #3 liver*:ab,kw,ti OR hepatic*:ab,kw,ti OR hepato*:ab,kw,ti #4 #1 OR (#2 AND #3) #5 ‘sorafenib’:ab,kw,ti OR ‘nexavar’:ab,kw,ti OR ‘tosylate’:ab,kw,ti #6 ‘lenvatinib’:ab,kw,ti OR ‘lenvima’:ab,kw,ti OR ‘e7080’:ab,kw,ti #7 ‘chemoembolization’/exp OR ‘chemoembolization’ OR ’chemoemboli*‘:ab,kw,ti OR ’emboli*‘:ab,kw,ti OR ‘tace’:ab,kw,ti OR ‘transarterial’:ab,kw,ti OR ‘transcatheter’:ab,kw,ti #8 #5 OR #6 OR #7 #9 ‘randomized controlled trial’/exp OR ‘random*’:ab,kw,ti OR ‘clinical trial*’:ab,kw,ti OR ‘placebo’:ab,kw,ti OR ‘controlled trial*’:ab,kw,ti OR ‘rct’:ab,kw,ti #10 #4 AND #8 AND #9
Web of Science	#1 (TS=(liver cancer)) OR TS=(hepatocellular carcinoma) #2 ((((TS=(carcinoma*)) OR TS=(cancer*)) OR TS=(tumor*)) OR TS=(malign*)) OR TS=(neoplasm*) #3 ((TS=(liver*)) OR TS=(hepatic*)) OR TS=(hepato*) #4 #1 OR (#2 AND #3) #5 (((((TS=(sorafenib)) OR TS=(nexavar)) OR TS=(tosylate)) OR TS=(lenvatinib)) OR TS=(lenvima)) OR TS=(E7080) #6 ((((TS=(chemoembolization)) OR TS=(emboli*)) OR TS=(TACE)) OR TS=(transarterial)) OR

	TS=(transcatheter) #7 #5 OR #6 #8 (((((TS=(randomized controlled trial)) OR TS=(random*)) OR TS=(clinical trial*)) OR TS=(placebo)) OR TS=(controlled trial*)) OR TS=(RCT) #9 #4 AND #7 AND #8

Table SII. Top three most common grade 3/4 adverse events of treatments.

A, Sorafenib + TACE	
AEs	Patients, %
Elevated AST	21.6
Hypertension	15.4
Abdominal pain	8.3
B, TACE	
AEs	Patients, %
Elevated AST	10.9
Abdominal pain	9.4
Elevated ALT	8.2
C, Lenvatinib	
AEs	Patients, %
Hypertension	22.3
Weight decrease	7.4
Hyperbilirubinemia	5.6
D, Sorafenib	
AEs	Patients, %
Hypertension	11.8
Hand-foot skin reaction	11.4
Elevated AST	7.2

TACE, transarterial chemoembolization; AEs, adverse events; AST, aspartate transaminase; ALT, alanine aminotransferase.

Table SIII. Indirect comparisons of grade 3/4 adverse events among different treatments.

A, Hand-foot skin reaction				
Drug treatment	Lenvatinib + TACE	Sorafenib + TACE	TACE	Lenvatinib
Sorafenib + TACE	0.28 (0.07-1.03)			
TACE	18.35 (2.89-184.05)	64.83 (19.28-457.15)		
Lenvatinib	1.06 (0.36-3.18)	3.81 (1.66-9.06)	0.06 (0.01-0.26)	
Sorafenib	0.26 (0.08-0.88)	0.95 (0.50-1.75)	0.01 (0-0.06)	0.25 (0.13-0.43)
B, Diarrhea				
Drug treatment	Lenvatinib + TACE	Sorafenib + TACE	TACE	Lenvatinib
Sorafenib + TACE	1.03 (0.22-4.80)			
TACE	5.80 (1.01-33.96)	5.53 (2.67-13.65)		
Lenvatinib	1.29 (0.49-3.52)	1.26 (0.39-4.27)	0.22 (0.05-0.95)	
Sorafenib	1.29 (0.4-4.15)	1.25 (0.46-3.52)	0.22 (0.06-0.82)	1.00 (0.54-1.84)
C, Hypertension				
Drug treatment	Lenvatinib + TACE	Sorafenib + TACE	TACE	Lenvatinib
Sorafenib + TACE	3.23 (0.63-26.29)			
TACE	11.27 (2.05-95.19)	3.45 (2.15-5.86)		
Lenvatinib	1.07 (0.70-1.63)	0.33 (0.04-1.72)	0.09 (0.01-0.54)	
Sorafenib	1.75 (1.05-2.91)	0.54 (0.07-2.91)	0.15 (0.02-0.9)	1.64 (1.25-2.17)
D, Elevated aspartate transaminase				
Drug treatment	Lenvatinib + TACE	Sorafenib + TACE	TACE	Lenvatinib
Sorafenib + TACE	0.69 (0.32-1.48)			
TACE	1.14 (0.49-2.63)	1.66 (1.22-2.31)		
Lenvatinib	8.86 (4.27-20.75)	13.04 (6.21-29.34)	7.80 (3.47-18.76)	
Sorafenib	5.07 (2.30-12.01)	7.34 (3.89-15.64)	4.42 (2.15-10.11)	0.57 (0.35-0.91)

E, Abdominal pain				
Drug treatment	Lenvatinib + TACE	Sorafenib + TACE	TACE	Lenvatinib
Sorafenib + TACE	0.69 (0.31-1.50)			
TACE	1.14 (0.49-2.62)	1.66 (1.22-2.30)		
Lenvatinib	8.88 (4.23-20.39)	12.96 (6.16-29.46)	7.84 (3.49-18.62)	
Sorafenib	5.07 (2.28-11.80)	7.34 (3.83-15.82)	4.45 (2.14-10.05)	0.57 (0.35-0.91)
F, Fatigue				
Drug treatment	Lenvatinib + TACE	Sorafenib + TACE	TACE	Lenvatinib
Sorafenib + TACE	0.68 (0.31-1.46)			
TACE	1.13 (0.50-2.60)	1.66 (1.21-2.3)		
Lenvatinib	8.83 (4.22-20.66)	12.98 (6.17-29.91)	7.81 (3.49-18.78)	
Sorafenib	5.05 (2.28-11.92)	7.35 (3.84-15.80)	4.44 (2.14-10.02)	0.57 (0.35-0.91)
G, Nausea				
Drug treatment	Lenvatinib + TACE	Sorafenib + TACE	TACE	Lenvatinib
Sorafenib + TACE	0.68 (0.31-1.46)			
TACE	1.13 (0.50-2.60)	1.66 (1.21-2.30)		
Lenvatinib	8.83 (4.22-20.66)	12.98 (6.17-29.91)	7.81 (3.49-18.78)	
Sorafenib	5.11 (2.30-12.05)	7.38 (3.86-15.73)	4.47 (2.14-10.02)	0.57 (0.35-0.91)

TACE, transarterial chemoembolization.

Table SIV. Results of global inconsistency analysis.

Intervention	Deviance Information Criteria		I^2	
	Consistency model	Inconsistency model	Consistency model, %	Inconsistency model, %
Overall survival	8.989524	12.421999	0.0	0.0
Progression-free survival	9.067884	9.551256	21.0	18.0
Objective response rate	25.122640	26.520960	0.0	3.0
Disease control rate	24.904910	26.373670	0.1	4.0

The Fixed-effect model was used to reported outcomes. Deviance Information Criteria was adopted to detect global inconsistency. The difference in values of DICs between consistency and inconsistency model were all <1, which indicated that data was consistent. Further, values of I^2<50% indicated no considerable heterogeneity.