Supplementary Online Content

Supplement Fig. 1--Comparison of chronic lung disease in preterm infants with pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation

Supplement Fig. 2--Comparison of chronic lung disease in preterm infants with more than 1 dose of pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation

Supplement Fig. 3--Comparison of death in preterm infants with pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation

Supplement Fig. 4--Comparison of death in preterm infants with more than 1 dose of pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation

Supplement Fig. 5--Comparison of intraventricular hemorrhage(III and IV) in preterm infants with pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation

Supplement Fig. 6--Comparison of airleak in preterm infants with pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation

Supplement Fig. 7--Comparison of retinopathy of prematurity ≥ stage 2 in preterm infants with pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation

Supplement Fig. 8--Comparison of neonatal necrotizing enterocolitis in preterm infants with pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation

Supplement Fig. 9--Comparison of periventricular leukomalacia in preterm infants with pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation

Supplement Fig. 10--Comparison of chronic lung disease or death in preterm infants with pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation after excluded the study by Clark et al in the reference of 3

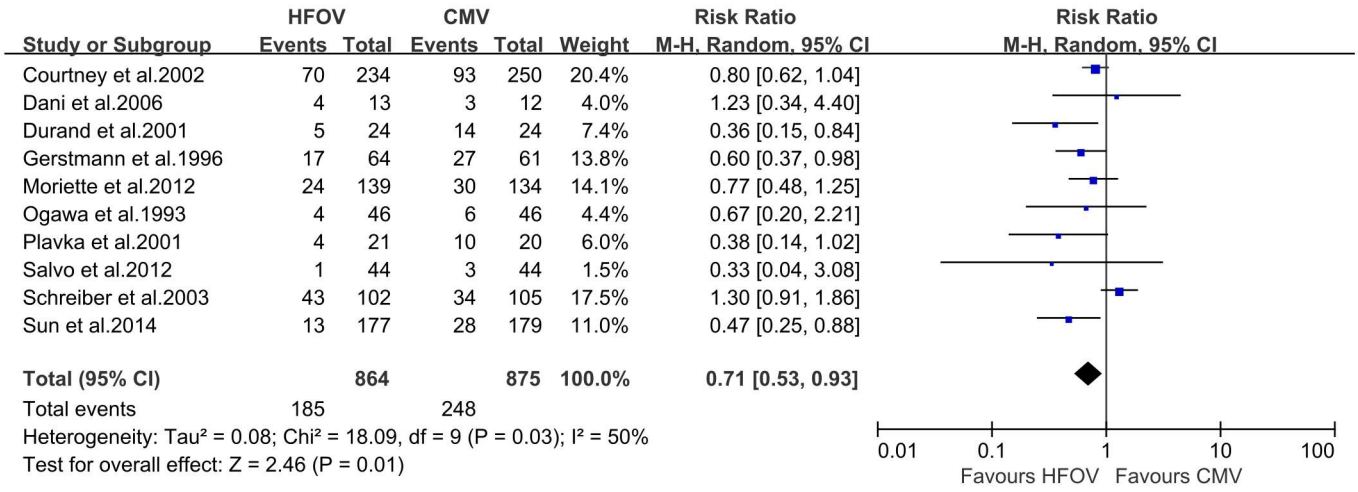
Supplement Fig. 11--Comparison of chronic lung disease in preterm infants with pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation after excluded the study by Clark et al in the reference of 3

Supplement table 1 : Search strategies

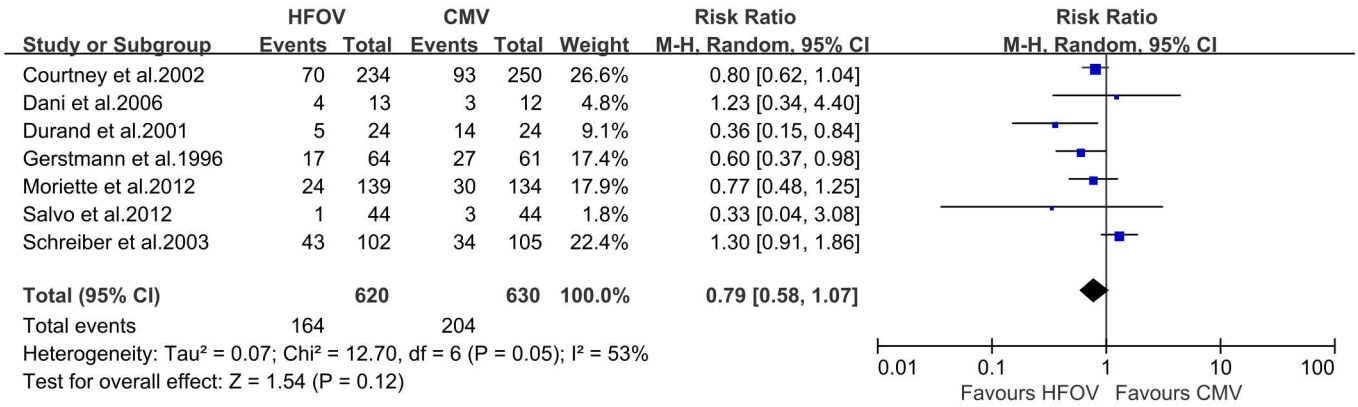
Supplement table 2 : the study characteristics and detail of the included studies

Supplement table 3 : Risk of bias

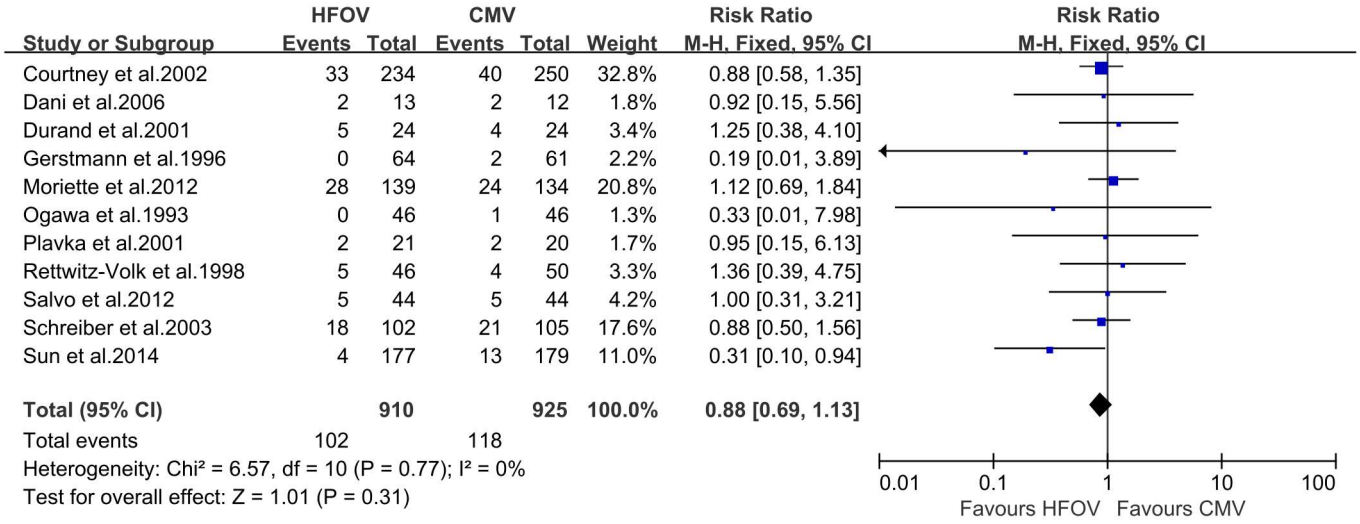
Supplement Fig. 1--Comparison of chronic lung disease in preterm infants with pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation



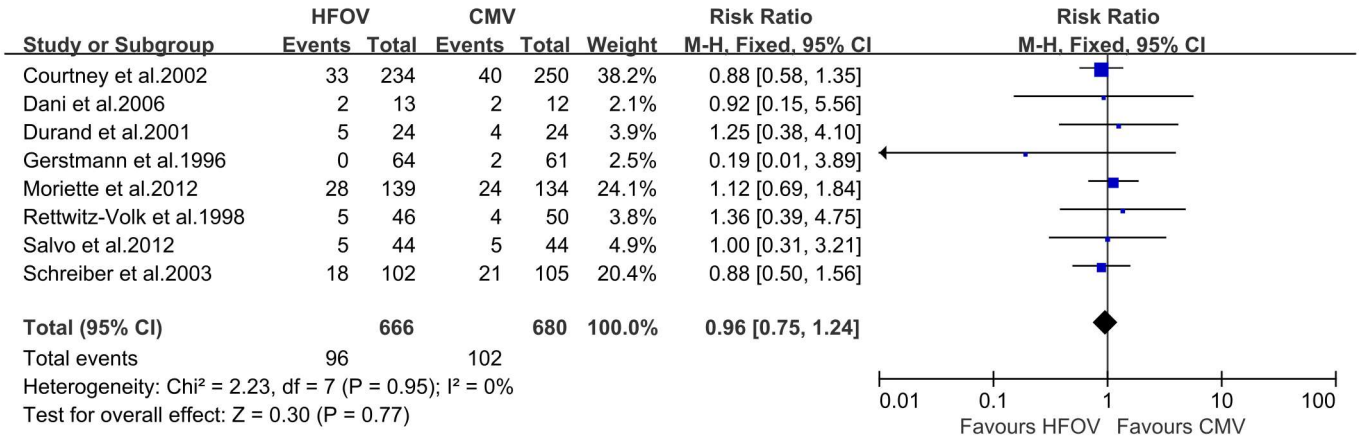
Supplement Fig. 2--Comparison of chronic lung disease in preterm infants with more than 1 dose of pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation



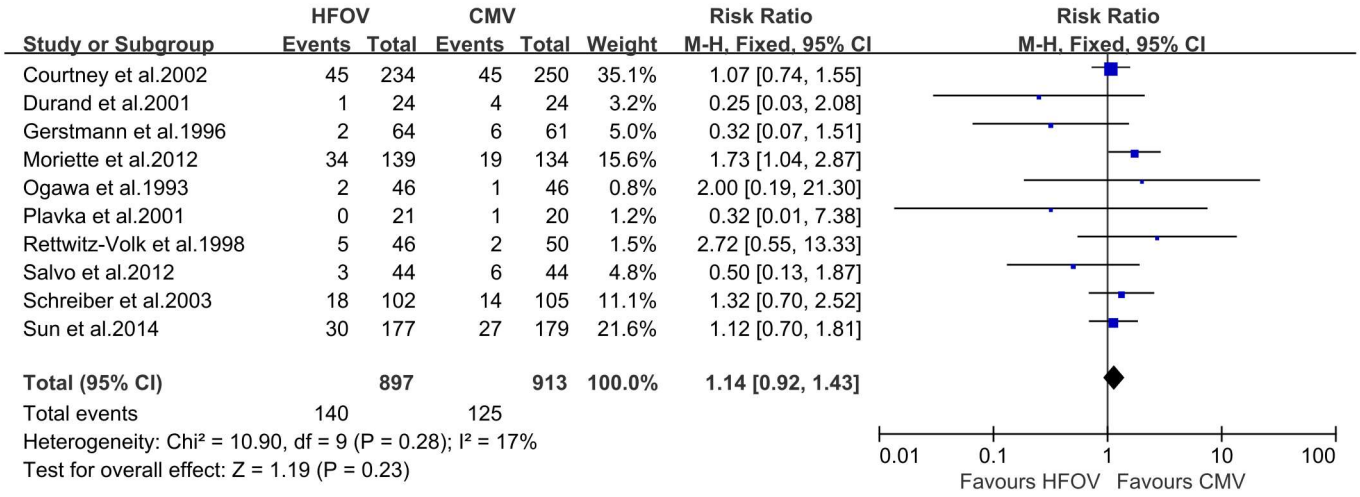
Supplement Fig. 3--Comparison of death in preterm infants with pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation



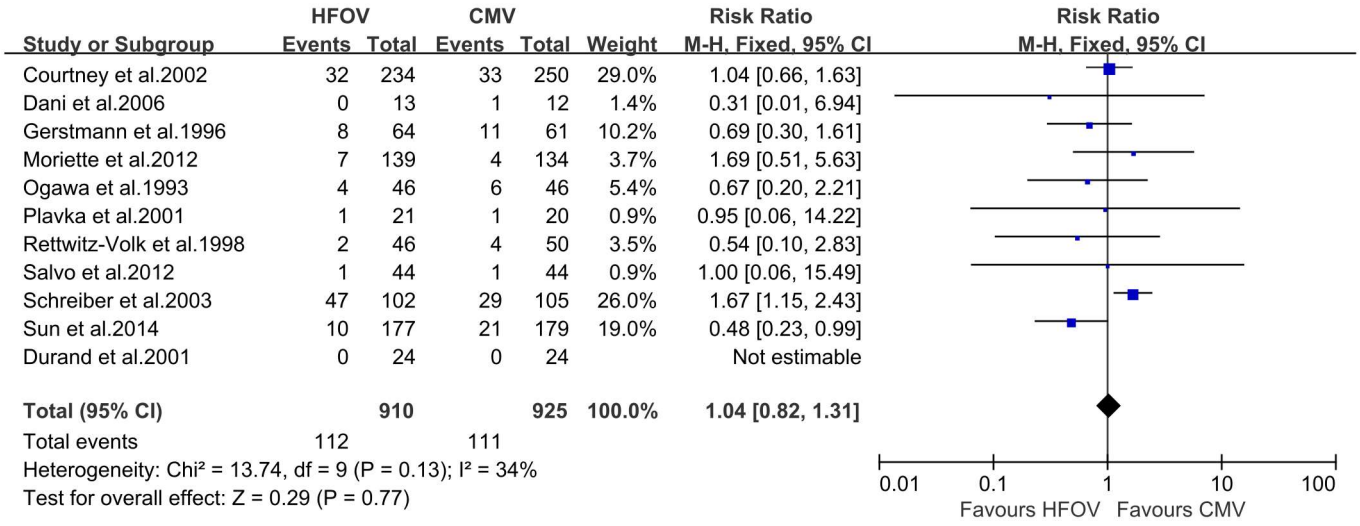
Supplement Fig. 4--Comparison of death in preterm infants with more than 1 dose of pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation



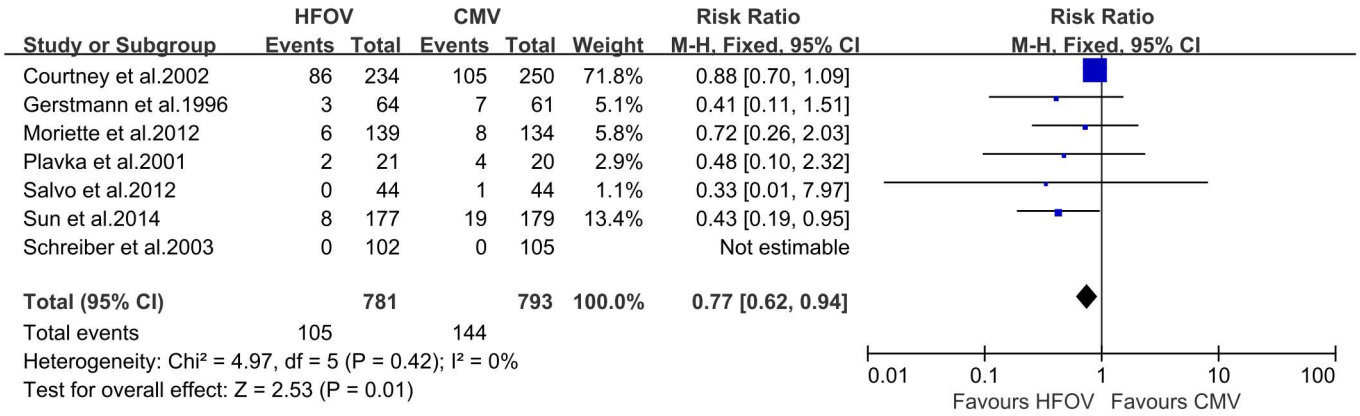
Supplement Fig. 5--Comparison of intraventricular hemorrhage(III and IV) in preterm infants with pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation



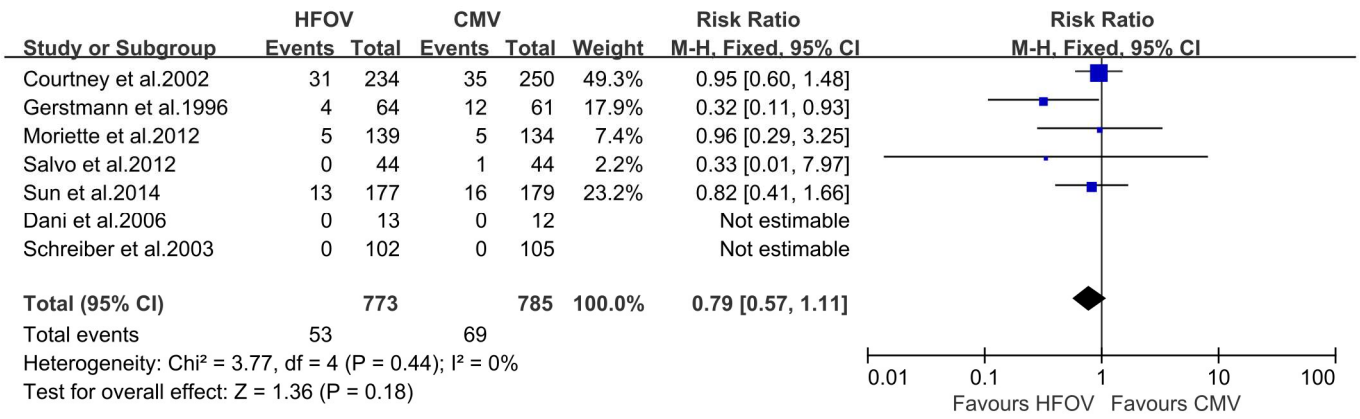
Supplement Fig. 6--Comparison of airleak in preterm infants with pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation



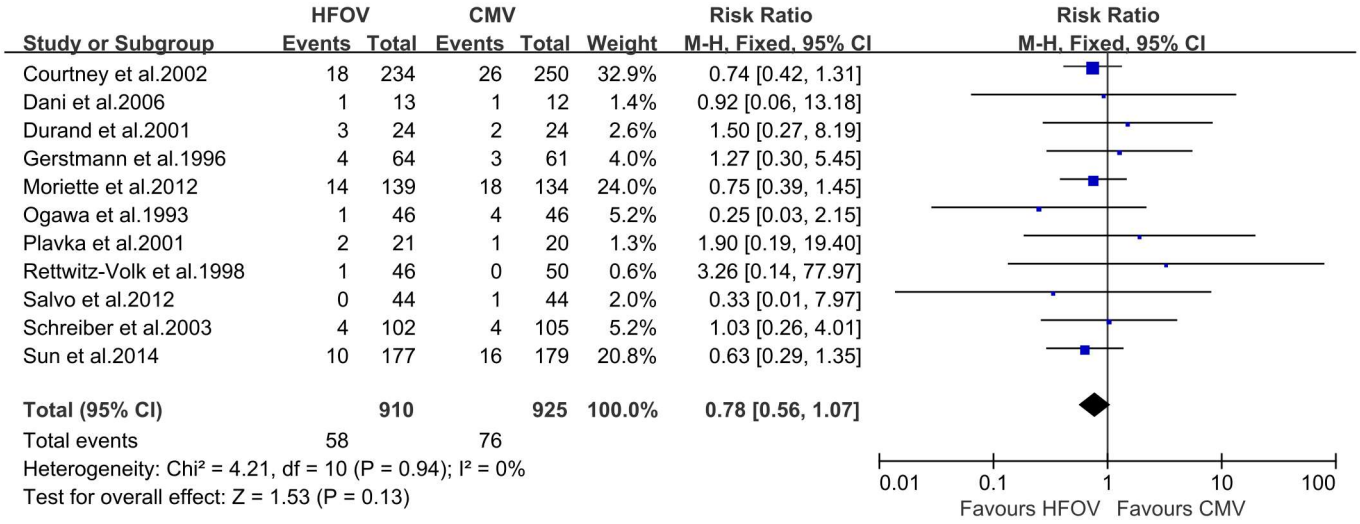
Supplement Fig. 7--Comparison of retinopathy of prematurity ≥ stage 2 in preterm infants with pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation



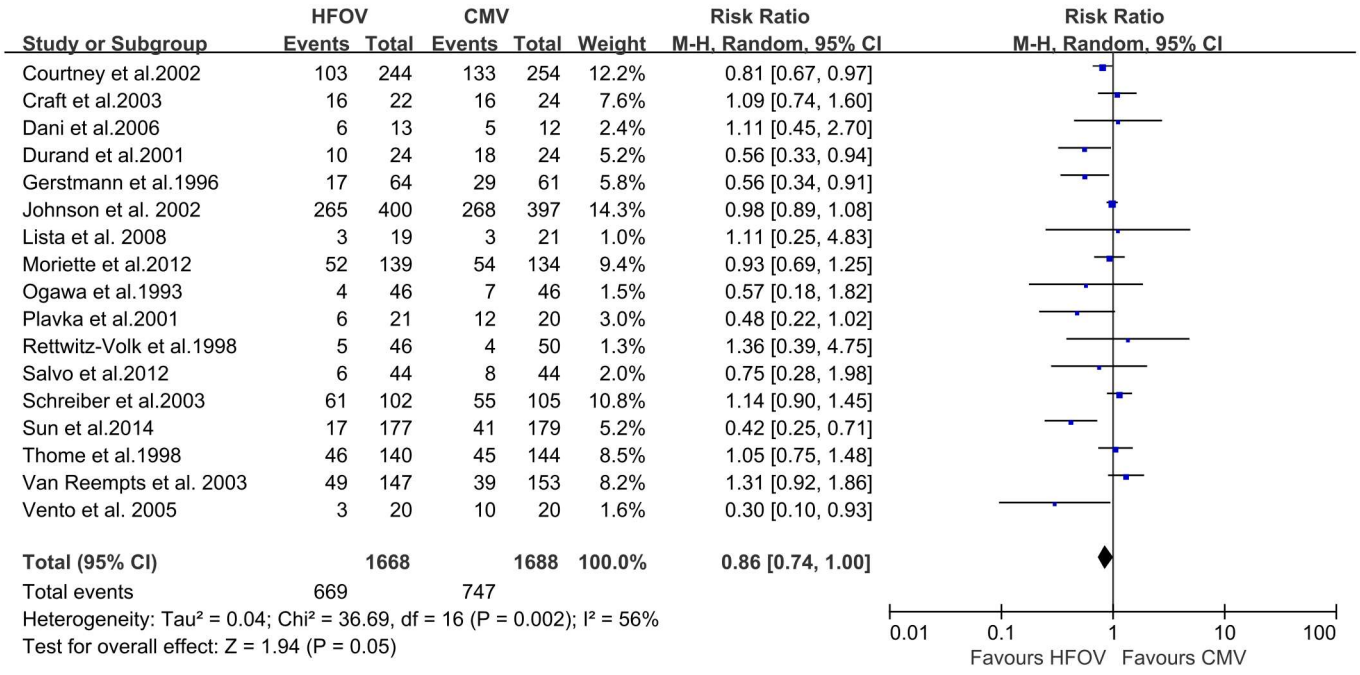
Supplement Fig. 8--Comparison of neonatal necrotizing enterocolitis in preterm infants with pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation



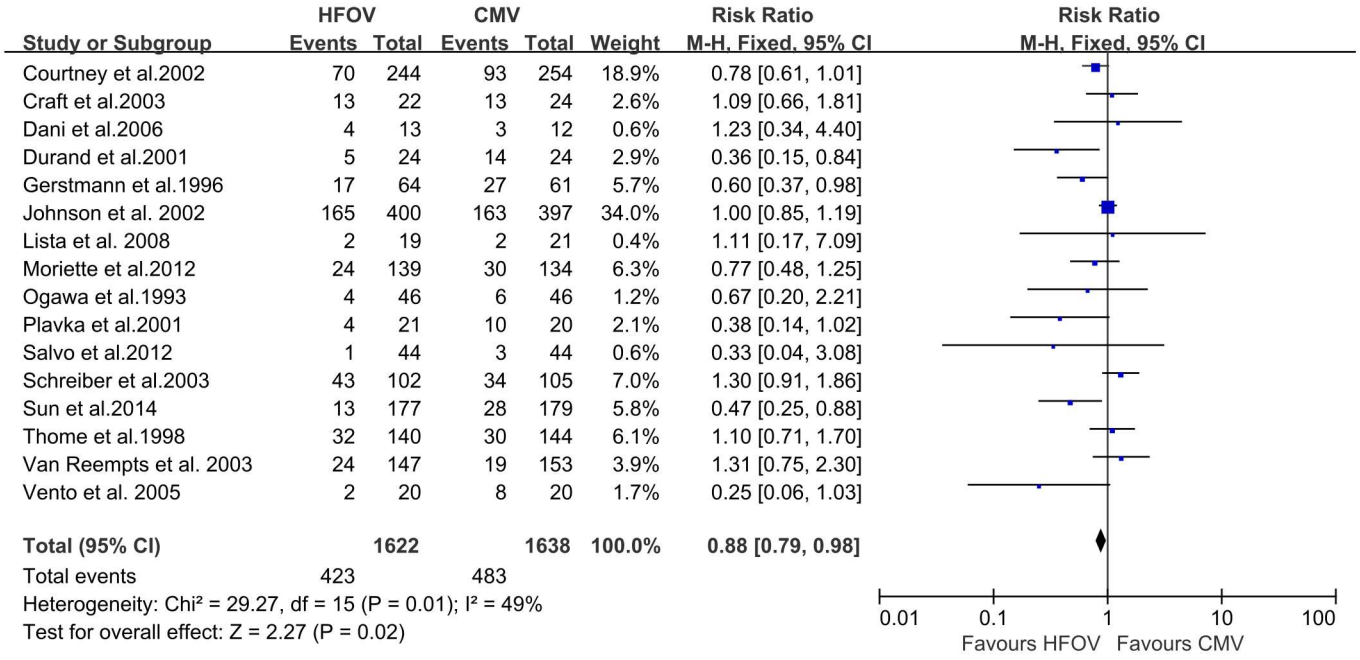
Supplement Fig. 9--Comparison of periventricular leukomalacia in preterm infants with pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation



Supplement Fig. 10--Comparison of chronic lung disease or death in preterm infants with pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation after excluded the study by Clark et al in the reference of 3



Supplement Fig. 11--Comparison of chronic lung disease in preterm infants with pulmonary surfactant between high frequency oscillatory ventilation and conventional mechanical ventilation after excluded the study by Clark et al in the reference of 3



Supplement table 1 : Search strategies

Search strategies

CNKI (January 1, 1980 – June 01, 2023)

#

1（主题：早产儿 + 晚期早产儿 + 早期早产儿）OR（主题：极早产儿 + 超早产儿）

2（主题：高频振荡通气 + '高频振荡通气(hfov)' + 高频振荡机械通气）

3（主题：随机对照试验 + 随机对照 + 随机对照研究）OR（主题：前瞻性随机对照研究 + 临床随机对照试验 + 临床随机对照研究）

4（主题：肺表面活性物质 + 猪肺表面活性物质 + 牛肺表面活性物质 + 人工肺表面活性物质 + '固尔苏(肺表面活性物质)' + 外源性肺表面活性物质）OR（主题：肺泡表面活性物质 + '肺泡表面活性物质(ps)'）

5 1 AND 2 AND 3 AND 4

Wanfang data (January 1, 1980 – June 01, 2023)

#

1 主题:(早产儿) or 主题:(极早产儿) or 主题:(超早产儿) or 主题:(早期早产儿) or 主题:(晚期早产儿)

2 主题:(高频振荡通气) or 主题:(高频振荡通气(hfov)) or 主题:(高频振荡机械通气)

3 主题:(随机对照试验) or 主题:(随机对照) or 主题:(随机对照研究) or 主题:(前瞻性随机对照研究) or 主题:(临床随机对照试验) or 主题:(临床随机对照研究)

4 主题:RCT

5 3 or 4

6 主题:(肺表面活性物质) or 主题:(猪肺表面活性物质) or 主题:(牛肺表面活性物质) or 主题:(人工肺表面活性物质) or 主题:(固尔苏(肺表面活性物质)) or 主题:(外源性肺表面活性物质)

7 主题:(肺泡表面活性物质) or 主题:(肺泡表面活性物质(ps))

8 6 or 7

9 1 and 2 and 5 and 8

Pubmed (January 1, 1980 – June 01, 2023)

#

1 preterm

2 preterm labor

3 prematurity

4 premature

5 infant

6 neonate

7 newborn

8 neonatal

9 1 OR 2 OR 3 OR 4 OR 5 OR 6 OR 7 OR 8

10 high-frequency oscillation ventilation

11 high-frequency oscillatory ventilation

12 HFOV

13 oscillatory high-frequency ventilation

14 10 OR 11 OR 12 OR 13

15 RCT

16 random

17 randomized

18 randomised
19 random controlled trial
20 15 OR 16 OR 17 OR 18 OR 19
21 calfactant
22 infasurf
23 survanta
24 beractant
25 exosurf
26 surfactant
27 curosurf
28 poractant
29 21 OR 22 OR 23 OR 24 OR 25 OR 26 OR 27 OR 28
30 9 AND 14 AND 20 AND 29
31 limit 30 to yr="1980 -2023"

Embase(January 1, 1980 – June 01, 2023)

#1' premature labor'/exp
#2 preterm:ab,ti
#3 preterm AND labor:ab,ti
#4 prematurity:ab,ti
#5 premature:ab,ti
#6 infant:ab,ti
#7 neonate:ab,ti
#8 newborn:ab,ti
#9 neonatal:ab,ti
#10 #1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9
#11 'high frequency oscillatory ventilation'/exp
#12 'high frequency' AND oscillation AND ventilation:ab,ti
#13 'high frequency' AND oscillatory AND ventilation:ab,ti
#14 hfov:ab,ti
#15 oscillatory AND 'high frequency' AND ventilation:ab,ti
#16 #11 OR #12 OR #13 OR #14 OR #15
#17 rct:ab,ti
#18 random:ab,ti
#19 randomized:ab,ti
#20 randomised:ab,ti
#21 random AND controlled AND trial:ab,ti
#22 #17 OR #18 OR #19 OR #20 OR #21
#23 'lung surfactant'/exp
#24 surfactant:ab,ti
#25 calfactant:ab,ti
#26 infasurf:ab,ti
#27 survanta:ab,ti
#28 beractant:ab,ti
#29 exosurf:ab,ti

#30 curosurf:ab,ti
#31 poractant:ab,ti
#32 #23 OR #24 OR #25 OR #26 OR #27 OR #28 OR #29 OR #30 OR #31
#33 #10 AND #16 AND #22 AND #32
#34 limit 33 to yr="1980 -2023"

Cochrane library (January 1, 1980 – June 01, 2023)

#1 MeSH descriptor: [Obstetric Labor, Premature] explode all trees
#2 MeSH descriptor: [Premature Birth] explode all trees
#3 MeSH descriptor: [Infant, Premature] explode all trees
#4 MeSH descriptor: [Infant, Newborn] explode all trees
#5 preterm or "preterm labor" or prematurity or premature or infant or neonate or newborn or neonatal
#6 #1 or #2 or #3 or #4 or #5
#7 (high-frequency oscillatory ventilation):ti,ab,kw OR (HFOV):ti,ab,kw OR (oscillatory high-frequency
#8 (RCT):ti,ab,kw OR (random):ti,ab,kw OR (randomized):ti,ab,kw OR (randomised):ti,ab,kw OR (random
#9 MeSH descriptor: [Surface-Active Agents] explode all trees
#10 (calfactant):ti,ab,kw (Word variations have been searched)
#11 (infasurf):ti,ab,kw
#12 (survanta):ti,ab,kw
#13 (beractant):ti,ab,kw
#14 (exosurf):ti,ab,kw
#15 (curosurf):ti,ab,kw
#16 (poractant):ti,ab,kw
#17 (surfactant):ti,ab,kw
#18 #9 or #10 or #11 or #12 or #13 or #14 or #15 or #16 or #17
#19 #6 and #7 and #8 and #18 with Cochrane Library publication date from Jan 1980 to Dec 2023

Web of Science (January 1, 1980 – June 01, 2023)

#1 TS=(preterm or "preterm labor" or prematurity or premature)
#2 TS=(infant or neonate or newborn or neonatal)
#3 #1 OR #2
#4 TS=(high-frequency oscillation ventilation)
#5 TS=(high-frequency oscillatory ventilation)
#6 TS=(HFOV)
#7 TS=(oscillatory high-frequency ventilation)
#8 #4 OR #5 OR #6 OR #7
#9 TS=(RCT)
#10 TS=(random)
#11 TS=(randomized)
#12 TS=(randomised)
#13 TS=(random controlled trial)
#14 #9 OR #10 OR #11 OR #12 OR #13
#15 TS=(surfactant OR calfactant OR infasurf OR survanta OR beractant OR exosurf OR curosurf OR poractant
#16 #3 AND #8 AND #14 AND #15 Timespan: 1980-01-01 to 2023-12-31

Supplement table 2 : the study characteristics and detail of the included studies

	Country	Types of ventilators		Volume guarantee		Settings		Type of surfactant	The first dose of surfactant	Administration of surfactant	criteria of surfactant	criteria of surfactant re-use	Total follow up time
		HFOV	CMV	HFOV	CMV	HFOV	CMV						
Courtney et al 2002	USA	SensorMedics 3100A	VIP Bird, Dräger Babylog 800, Bear Cub or Bear Cub 750vs	-	4-7ml/kg	MAP: initial MAP 1 to 2 > with CV 10-15Hz I:E:1:2 △P:-	PIP:- PEEP:- RR: < 60 Ti:0.25-0.4	-	-	in-line catheters	before study entry	2nd/3rd doses if infants remained intubated with FiO2 ≥ 0.30. A 4th dose at the discretion of the attending doctor	-
Dani et al 2006	Italy	SensorMedics 3100A	Dräger Babylog 8000 plus	-	5ml/kg	MAP:8 10Hz I:E:- △P:30	PIP:- PEEP:3-4 RR:- Ti:-	Curosurf	200 mg/kg	tracheal tube	all infants received	an dose of surfactant (100 mg/kg) 12 hr later if an infant	-
Durand et al 2001	USA	SensorMedics 3100A	Dräger Babylog, Bearcub, VIP Bird	-	5-6ml/kg	MAP:initial MAP 1 to 2 > with CV 15Hz I:E:0.33 △P:-	PIP:- PEEP:4-6 RR:<60 Ti:0.25-0.35	Survanta	-	Ballard Multi-Access Catheter	all infants received	-	-
Gerstmann et al 1996	USA	SensorMedics 3100A	Sechrist	-	-	MAP:initial MAP 1 to 2 > with CV 10-15Hz I:E:0.33 △P:-	PIP:<30 if < 1 kg and < 35 if > 1 kg PEEP:3-7 RR:<60 Ti:0.35-0.55	Survanta and alveofact	100 mg/kg	-	all infants received at least one dose	Pa/AO_2 < 0.5	-
Moriette et al 2001	French	OHF1 piston oscillator	Dräger babylog 8000	-	-	MAP:initial MAP 1 to 2 > with CV 15Hz I:E:1:1 △P:-	PIP:achieve target PCO2 of 40-50 PEEP:4-5 RR:- Ti: <0.45	Curosurf	200 mg/kg	-	all infants received	PO_2/FiO_2 < 200 (100 mg/kg)	-
Ogawa et al 1993	Japan	Hummingbird	Bear Cub or Sechrist	-	-	MAP:- 15Hz I:E:- △P:-	PIP:- PEEP:- RR:- Ti:-	bovine surfactant	-	-	clinical diagnosis of RDS	-	the age of 12 months
Plavka et al 1999	Czech Republic	SensorMedics 3100A	Bearcub 2100 or Infant Star	-	-	MAP:- 15Hz I:E:1:2 △P:-	PIP:reach adequate chest rise PEEP:3-5 RR:30-60 Ti:0.3-0.5	Alveofact	50 mg/kg	-	HFOV:FiO2 >0.35 or PAwDP ≥12 in infant weigh≥1kg; PAwDP >10 in infant weigh < 1kg CMV: FiO2 ≥ 0.35	HFOV: PAwDP increased by ≥15% and in both groups if the FiO2 > 0.35 or increased > 15%	-
Rettwitz-Volk et al 1998	Germany	Stephan SHF 3000 piston oscillator	Stephan HF 300 or Dräger Babylog 8000	-	-	MAP:- 10-15Hz I:E:1:1 △P:good chest movement	PIP:good chest expansion PEEP:3-4 RR:1:2 Ti:0.25-0.45	Survanta	100 mg/kg	-	chest x-ray showed RDS grade II and FiO2 > 0.60	-	-
Salvo et al 2012	Italy	SensorMedics 3100A	Bear Cub 750 PSV	-	-	MAP:6-8 15Hz I:E:1:2 △P: visible chest vibration	PIP:18-24 PEEP:5-8 RR:40-60 Ti:0.3-0.4	Curosurf	200 mg/kg	endotracheal tube	all infants received	FiO_2 ≥40% (100 mg/kg)	-
Schreiber et al 2003	USA	SensorMedics 3100A	IMV	-	-	MAP:initial MAP 1 to 2 > with CV 10-15Hz I:E:- △P: -	PIP:to inflate chest PEEP:4-6 RR:40 Ti:-	Survanta	-	-	all infants received	-	-
Sun et al 2014	China	SLE5000	Servo-i-Maquet	-	4-6ml/kg	MAP:initial MAP 1 to 2 > with CV 10Hz I:E: - △P:-	PIP: chest expansion PEEP:4-6 RR: ≤60 Ti:0.25-0.4	Curosurf	200 mg/kg	in-line catheters	PaO_2/FiO_2 was < 200 after 2 hours of ventilation	PaO_2/FiO_2 was < 200	18 months of corrected age

HFOV: high frequency oscillation ventilation; CMV: conventional mechanical ventilation; △P:pressure amplitude; "-": no data available;

Supplement table 3: Risk of bias

1. Courtney et al 2002

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Randomly assigned*
Allocation concealment (selection bias)	Low risk	Randomly assigned*
Blinding of participants and personnel (performance bias)	Low risk	It's nonsense to perform blinding in neonates.
Blinding of outcome assessment (detection bias)	Low risk	Reviewer was unaware of both the study-group assignment and the previous interpretations.*
Incomplete outcome data (attrition bias)	Low risk	The missing data was excluded from the outcome.*
Selective reporting (reporting bias)	Low risk	All the expected primary outcomes were reported.
Other bias	Low risk	No other bias

*Quoted from the original text.

2.Dani et al 2006

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not mentioned
Allocation concealment (selection bias	Low risk	Sealed opaque envelopes*
Blinding of participants and personnel (performance bias)	Low risk	It's nonsense to perform blinding in neonates.
Blinding of outcome assessment (detection bias)	Unclear risk	Not mentioned
Incomplete outcome data (attrition bias)	Low risk	No missing data
Selective reporting (reporting bias)	Low risk	All the expected primary outcomes were reported.
Other bias	Low risk	No other bias

*Quoted from the original text.

3.Durand et al 2001

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not mentioned
Allocation concealment (selection bias	Low risk	Randomly assigned*
Blinding of participants and personnel (performance bias)	Low risk	It's nonsense to perform blinding in neonates.
Blinding of outcome assessment (detection bias)	Low risk	Masked reviewer*
Incomplete outcome data (attrition bias)	Low risk	The missing data was excluded from the outcome.*
Selective reporting (reporting bias)	Low risk	All the expected primary outcomes were reported.
Other bias	Low risk	No other bias

*Quoted from the original text.

4.Gerstmann et al 1996

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	A two-tiered balanced block*
Allocation concealment (selection bias	Low risk	Blind card*
Blinding of participants and personnel (performance bias)	Low risk	It's nonsense to perform blinding in neonates.
Blinding of outcome assessment (detection bias)	Low risk	Case-mix computerized records*
Incomplete outcome data (attrition bias)	Low risk	No missing data
Selective reporting (reporting bias)	Low risk	All the expected primary outcomes were reported.
Other bias	Low risk	No other bias

*Quoted from the original text.

5.Moriette et al 2001

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated randomization*
Allocation concealment (selection bias	Low risk	Sealed envelopes*
Blinding of participants and personnel (performance bias)	Low risk	It's nonsense to perform blinding in neonates.
Blinding of outcome assessment (detection bias)	Low risk	Not informed about the group assignment*
Incomplete outcome data (attrition bias)	Low risk	No missing data
Selective reporting (reporting bias)	Low risk	All the expected primary outcomes were reported.
Other bias	Low risk	No other bias

*Quoted from the original text.

6.Ogawa et al 1993

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not mentioned
Allocation concealment (selection bias	Low risk	Opaque sealed envelopes*
Blinding of participants and personnel (performance bias)	Low risk	It's nonsense to perform blinding in neonates.
Blinding of outcome assessment (detection bias)	Unclear risk	Not mentioned
Incomplete outcome data (attrition bias)	Low risk	No missing data
Selective reporting (reporting bias)	Low risk	All the expected primary outcomes were reported.
Other bias	Low risk	No other bias

*Quoted from the original text.

7.Plavka et al 1999

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	A table of random numbers*
Allocation concealment (selection bias	Low risk	Sealed envelopes*
Blinding of participants and personnel (performance bias)	Low risk	It's nonsense to perform blinding in neonates.
Blinding of outcome assessment (detection bias)	Unclear risk	Not mentioned
Incomplete outcome data (attrition bias)	Low risk	The missing data was excluded from the outcome.*
Selective reporting (reporting bias)	Low risk	All the expected primary outcomes were reported.
Other bias	Low risk	No other bias

*Quoted from the original text.

8.Rettwitz-Volk et al 1998

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Randomized*
Allocation concealment (selection bias	Unclear risk	Not mentioned
Blinding of participants and personnel (performance bias)	Low risk	It's nonsense to perform blinding in neonates.
Blinding of outcome assessment (detection bias)	Unclear risk	Not mentioned
Incomplete outcome data (attrition bias)	Low risk	No missing data
Selective reporting (reporting bias)	Low risk	All the expected primary outcomes were reported.
Other bias	Low risk	No other bias

*Quoted from the original text.

9.Salvo et al 2012

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Randomized*
Allocation concealment (selection bias	Unclear risk	Not mentioned
Blinding of participants and personnel (performance bias)	Low risk	It's nonsense to perform blinding in neonates.
Blinding of outcome assessment (detection bias)	Unclear risk	Not mentioned
Incomplete outcome data (attrition bias)	Low risk	No missing data
Selective reporting (reporting bias)	Low risk	All the expected primary outcomes were reported.
Other bias	Low risk	No other bias

*Quoted from the original text.

10.Schreiber et al 2003

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not mentioned
Allocation concealment (selection bias	Unclear risk	Not mentioned
Blinding of participants and personnel (performance bias)	Low risk	It's nonsense to perform blinding in neonates.
Blinding of outcome assessment (detection bias)	Low risk	Investigators were unaware of the treatment assignments.*
Incomplete outcome data (attrition bias)	Low risk	No missing data
Selective reporting (reporting bias)	Low risk	All the expected primary outcomes were reported.
Other bias	Low risk	No other bias

*Quoted from the original text.

11.Sun et al 2014

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	A computer-generated randomization plan*
Allocation concealment (selection bias	Low risk	Random number allocation sequence*
Blinding of participants and personnel (performance bias)	Low risk	It's nonsense to perform blinding in neonates.
Blinding of outcome assessment (detection bias)	Low risk	Doctors were blind as to group allocation during follow-up.*
Incomplete outcome data (attrition bias)	Low risk	No missing data
Selective reporting (reporting bias)	Low risk	All the expected primary outcomes were reported.
Other bias	Low risk	No other bias

*Quoted from the original text.