



臺北市立萬芳醫院 - 委託財團法人臺北醫學大學辦理

Taipei Municipal Wanfang Hospital (Managed by Taipei Medical University)

Comparative efficacy of various endoscopic techniques for the treatment of common bile duct stones: a network meta-analysis

總膽管結石病人，採內視鏡十二指腸乳頭切開術合併氣球擴張治療、較單純氣球擴張治療效果較好嗎？

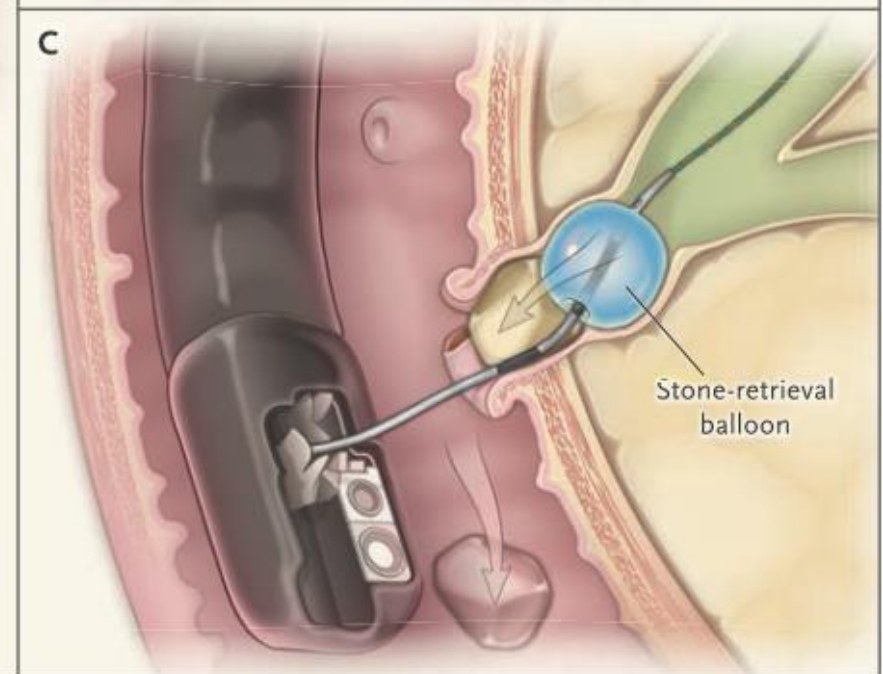
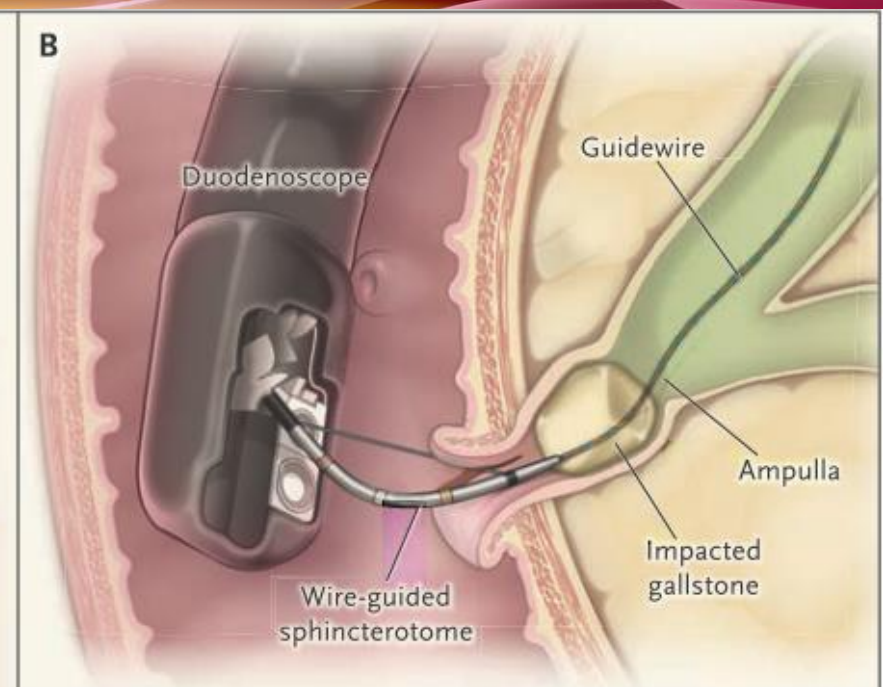
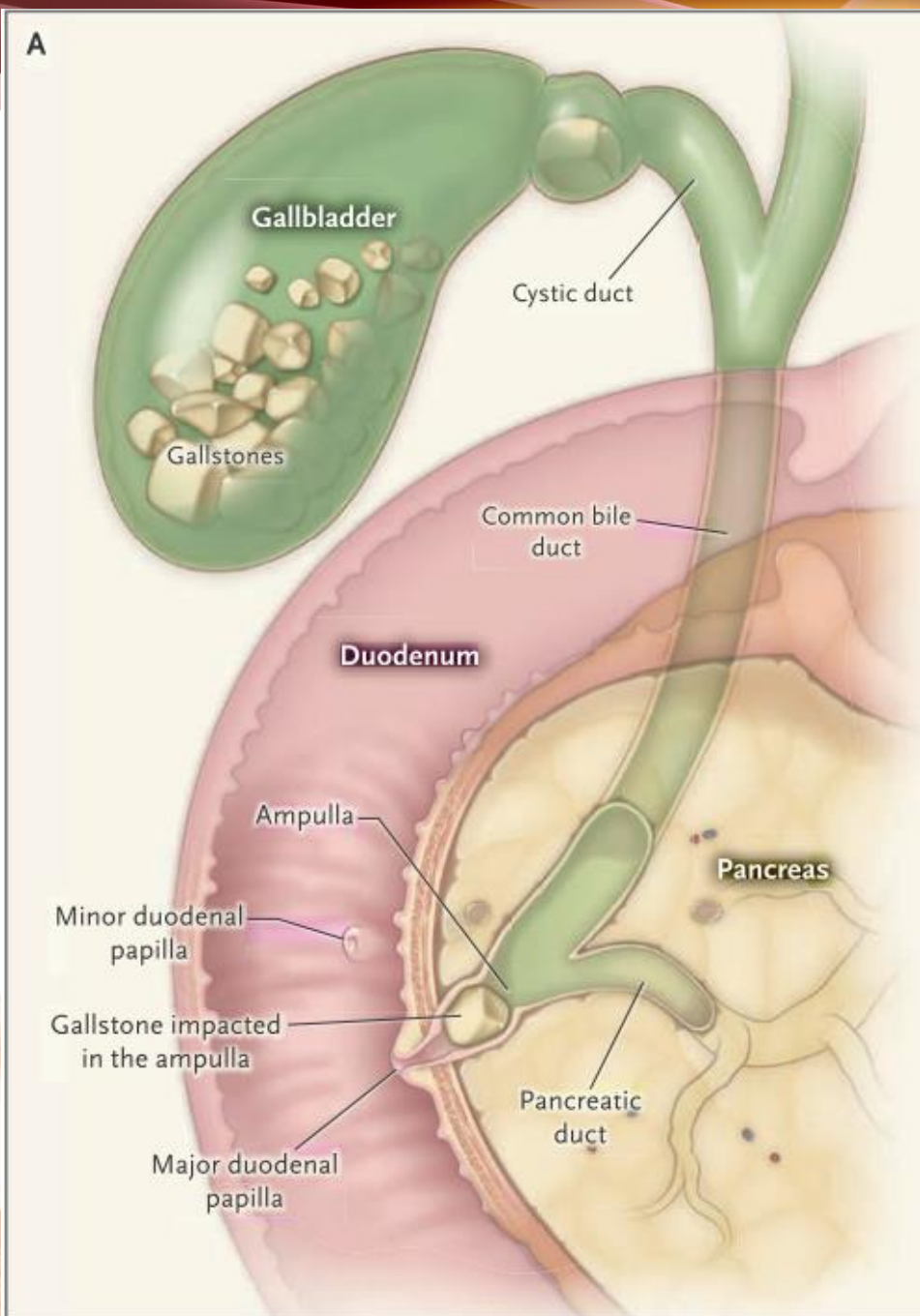
消化內科 R5 甘育安



Background

- Endoscopic sphincterotomy (EST) and bile duct stone extraction
 - First introduced in 1975
 - Standard technique for dilatation of the bile duct orifice and removal of common bile duct (CBD) stones during ERCP (Endoscopic Retrograde Cholangio-Pancreatography)

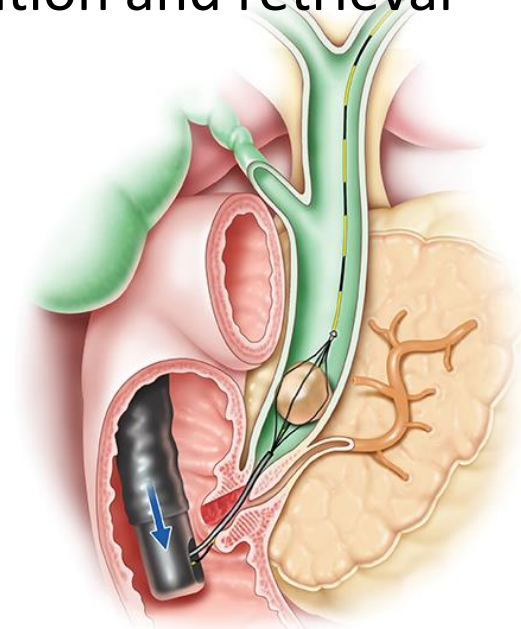






Background

- EST and bile duct stone extraction
 - Associated with frequent adverse events
 - Bleeding, perforation and pancreatitis
 - For larger CBD stones, **mechanical lithotripsy** might be required for fragmentation and retrieval





Background

- Endoscopic papillary balloon dilatation (EPBD):
 - Preservation of the papillary sphincter function
 - Lower rate of post-procedural bleeding
 - High risk of post-ERCP pancreatitis





Background

- EST with balloon dilatation (ESBD):
 - Efficient stone clearance and acceptable adverse events.
- Several traditional pairwise meta-analyses comparing stone removal rates between EST versus EPBD and EST versus ESBD were published:
 - Provided only fragmentary pairwise results
 - No comprehensive results comparing the 3 endoscopic techniques
- A network meta-analysis to evaluate comparative efficacies among EST, EPBD, and ESBD in the removal of CBD stones





步驟 1：系統性文獻回顧探討的問題為何？

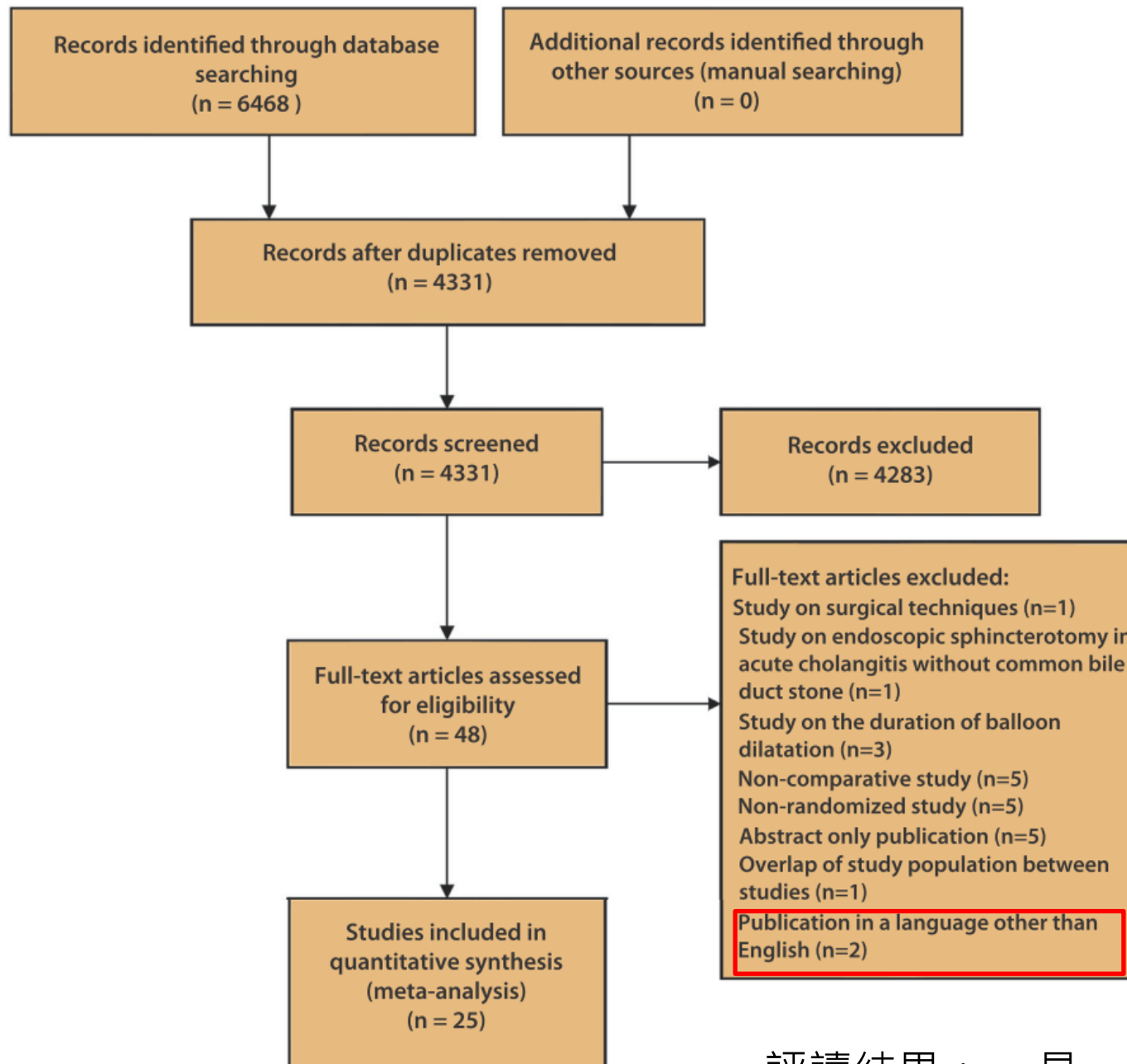
Patient/population (P)	Patients with 1 or more CBD stones
Intervention (I)	Endoscopic techniques for stone removal including EST, EPBD, and ESBD
Comparator (C)	Another endoscopic technique
Outcome (O)	Successful rate of stone removal, requirement of mechanical lithotripsy, and adverse events including bleeding, perforation, and pancreatitis



步驟 2：系統性文獻回顧的品質如何？(FAITH) F - 研究是否找到 (Find) 所有的相關證據？

- We searched for all relevant studies published between January 1970 and June 2017 that examined the efficacy of endoscopic techniques for CBD stone removal using **MEDLINE**, **EMBASE**, and the **Cochrane Library databases**.
- The following search string was used: ((bile) OR (biliary)) AND (stone*) AND ((sphincterotomy) OR (balloon) OR (large-balloon) OR (dilation) OR (dilatation)).
- To identify additional studies, we also examined the references of screened articles.





評讀結果：□ 是 ■ 否 □ 不清楚

A - 文獻是否經過嚴格評讀 (Appraisal) ?

- Two investigators independently evaluated the studies for eligibility and resolved any disagreements through discussion and consensus.
- When no agreement could be reached, a **third investigator** determined the eligibility.
- The **Cochrane Risk of Bias assessment tool** was used for assessing the risk of bias in individual studies.

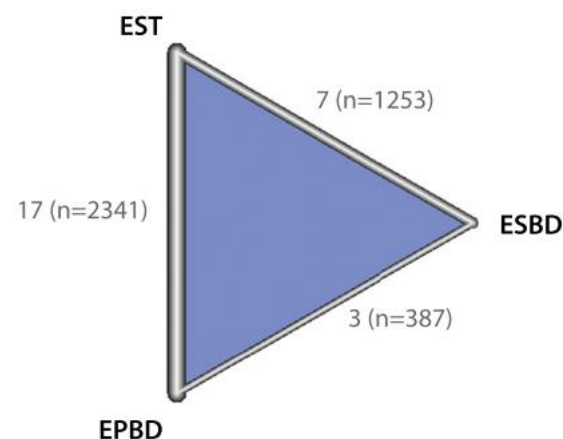
	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
1995, Minami [33]	?	?	+	+	+	+	+
1997, Bergman [32]	+	?	+	+	+	+	+
1999, Ochi [34]	?	+	+	+	+	?	+
2001, Arnold [35]	?	+	+	+	+	?	+
2001, Yasuda [6]	+	?	+	+	+	+	+
2002, Natsui [36]	?	+	+	+	+	+	+
2003, Fujita [37]	?	+	+	+	+	+	+
2003, Vlavianos [38]	+	+	+	+	+	?	+
2004, Disario [8]	+	+	+	+	+	+	+
2004, Lin [39]	?	?	+	+	+	+	+
2004, Takezawa [40]	+	+	+	+	+	+	+
2004, Tanaka [41]	?	?	+	+	+	+	+
2007, Heo [11]	?	+	+	+	+	+	+
2007, Watanabe [42]	?	+	+	+	+	+	+
2009, Kim [43]	?	?	+	+	+	+	+
2011, Stefanidis [44]	?	+	+	+	+	+	+
2012, Oh [45]	+	+	+	+	+	+	+
2013, Fu [47]	?	+	+	+	+	+	+
2013, Hwang [48]	?	+	+	+	+	+	+
2013, Qian [46]	+	+	+	+	+	+	+
2013, Teoh [49]	+	+	+	+	+	+	+
2014, Li [50]	+	+	+	+	+	+	+
2014, Seo [51]	+	+	+	+	+	+	+
2015, Guo [52]	?	+	+	+	+	?	+
2017, Cheon [53]	?	+	+	+	+	+	+

評讀結果： ■是 □否 □不清楚



I - 是否只納入 (Included) 具良好效度的文章？

- All 25 studies were randomized controlled trial
 - One was designed as a 3-arm trial that compared the efficacy between EST, EPBD, and ESBD
 - All other studies were 2-arm study designs comparing EST versus EPBD, EST versus ESBD, or EPBD versus ESBD

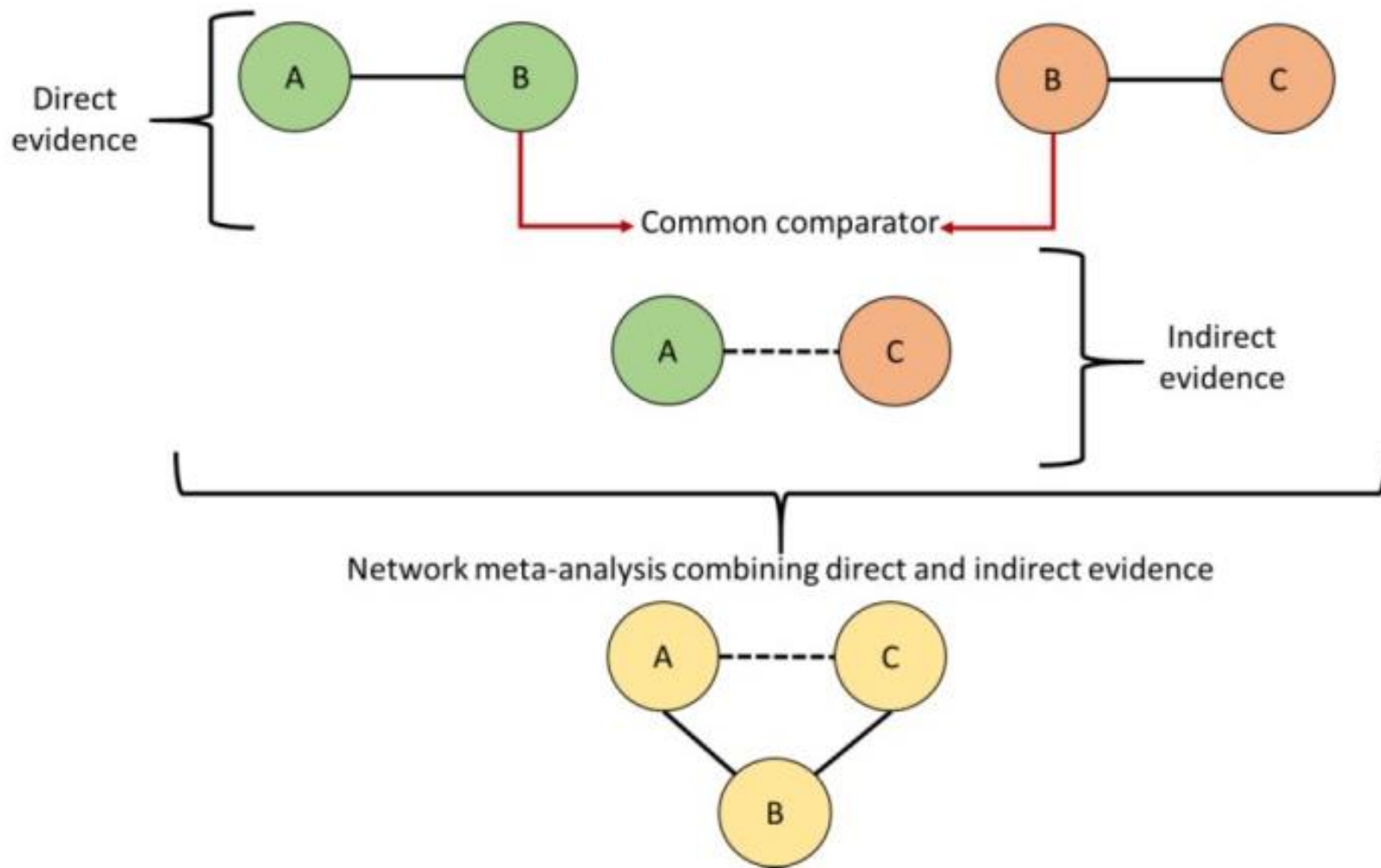




I - 是否只納入 (Included) 具良好效度的文章？

- Quality of evidence was rated for results from the network meta-analysis according to the Grading of Recommendations, Assessment, Development and Evaluations (GRADE) working group approach.
 - Risk of bias, indirectness, imprecision, heterogeneity, and/or publication bias.
 - Inconsistency between direct and indirect estimates

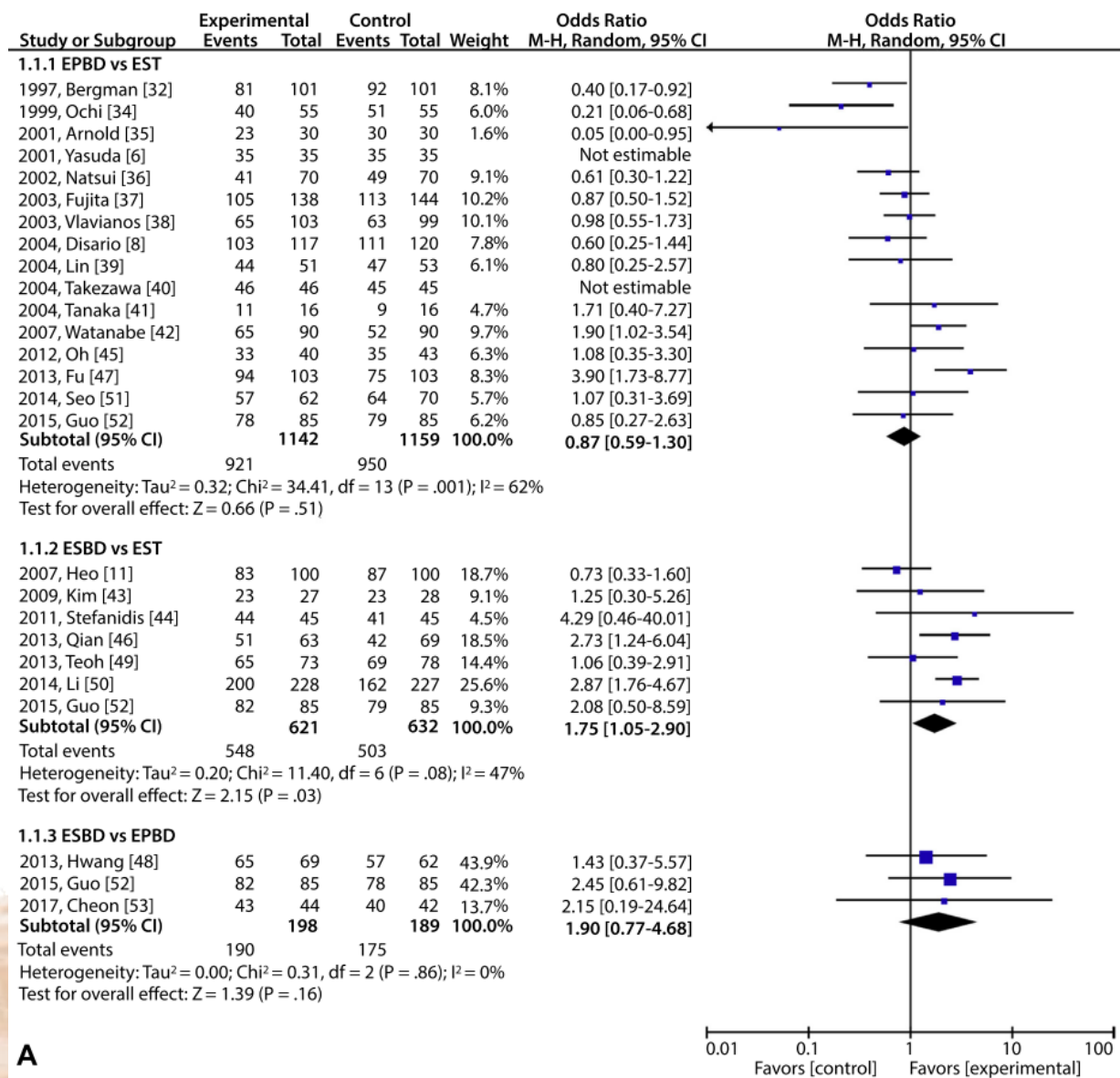
評讀結果：□ 是 □ 否 ■ 不清楚



Network meta-analysis: a technique to gather evidence from direct and indirect comparisons
Pharm Pract (Granada). 2017 Jan-Mar; 15(1): 943

T - 作者是否以表格和圖表「總結」 (Total up) 試驗結果？

- Figure 2A.
Direct meta-analysis of different endoscopic techniques for successful CBD stone removal in the first endoscopic session.



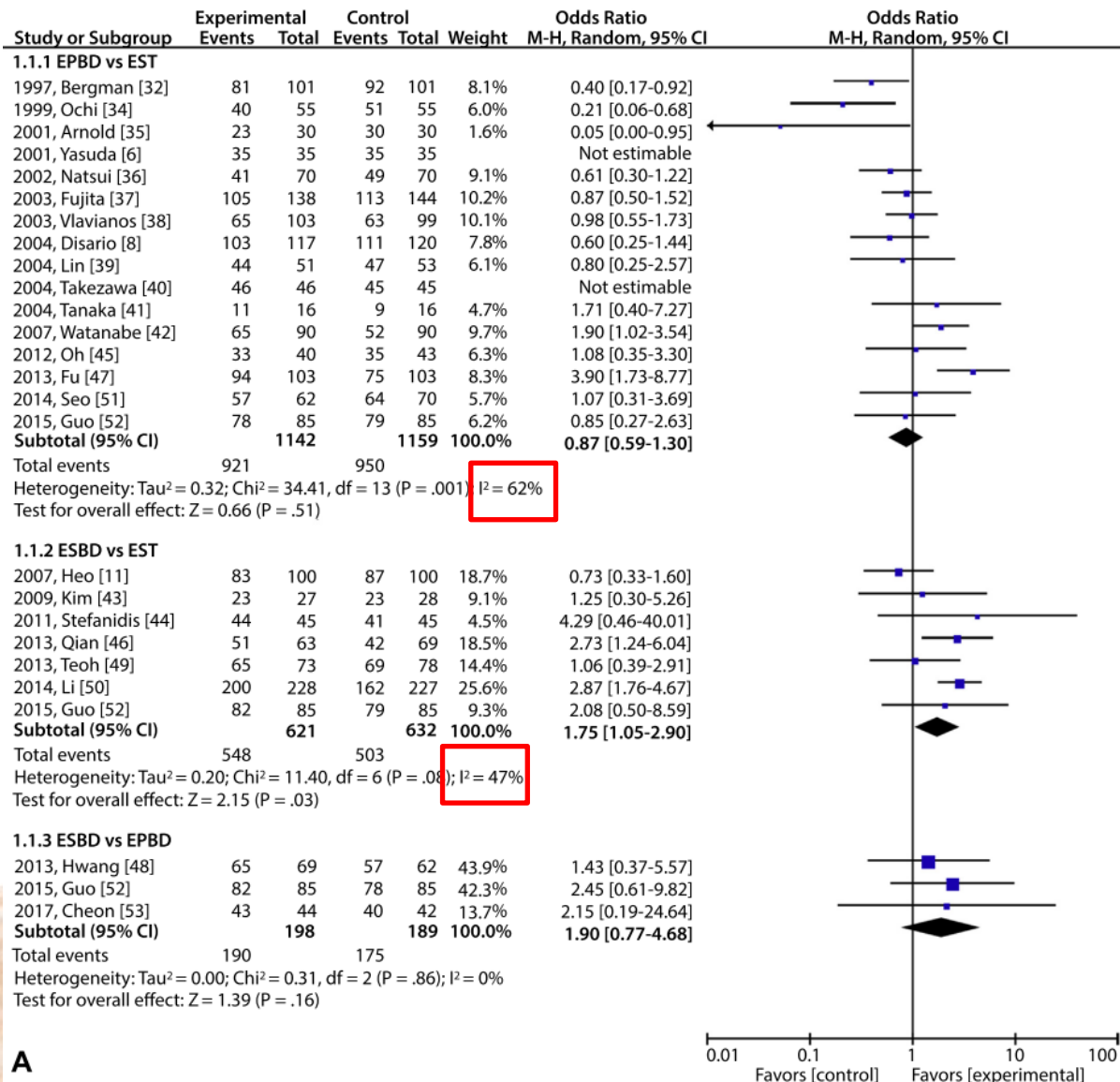
評讀結果：

■ 是 □ 否 □ 不清楚

H - 試驗的結果是否相近 - 異質性 (Heterogeneity)

Figure 2A.

Direct meta-analysis of different endoscopic techniques for successful CBD stone removal in the first endoscopic session.



評讀結果：

□ 是 ■ 否 □ 不清楚

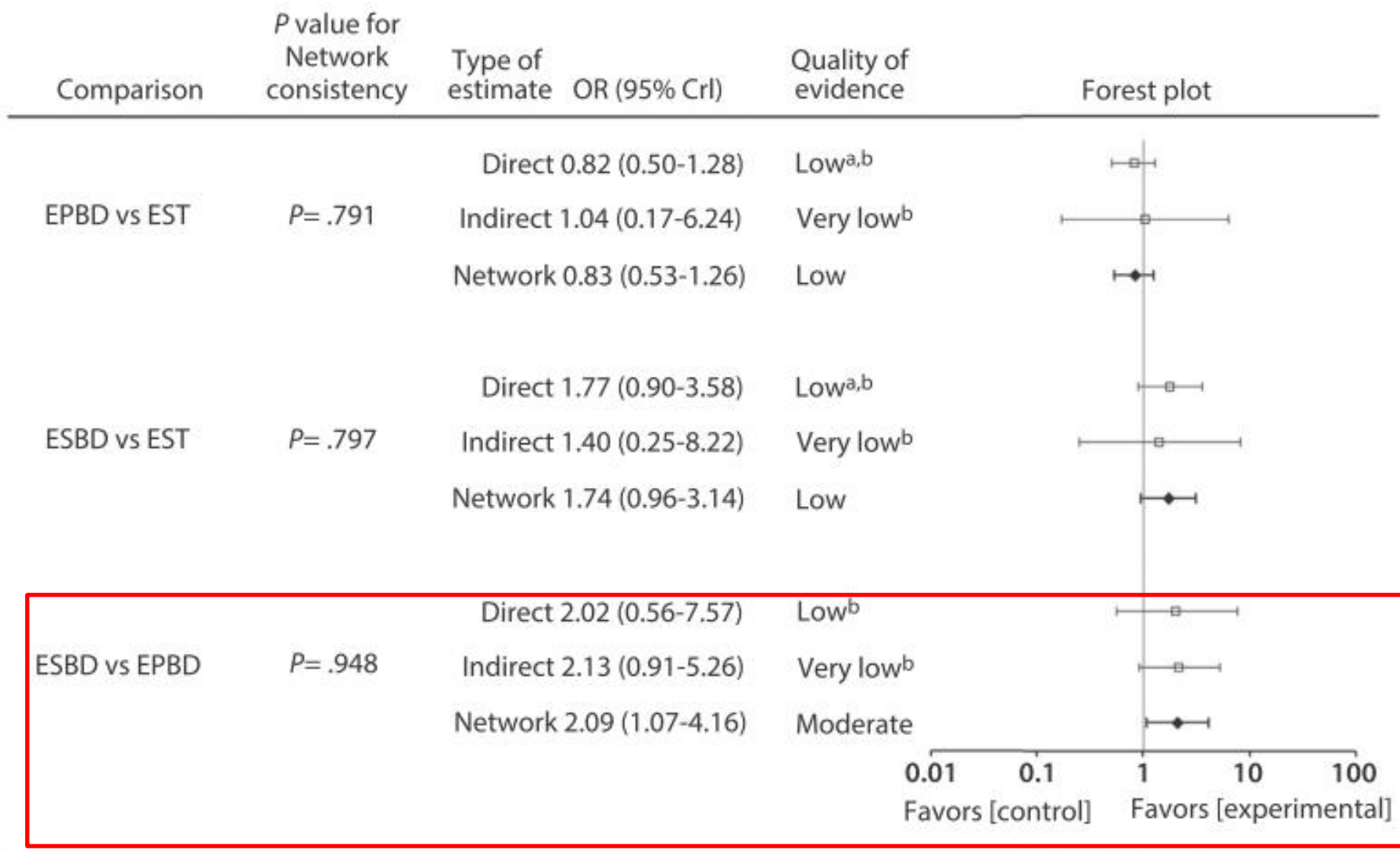


RESULT

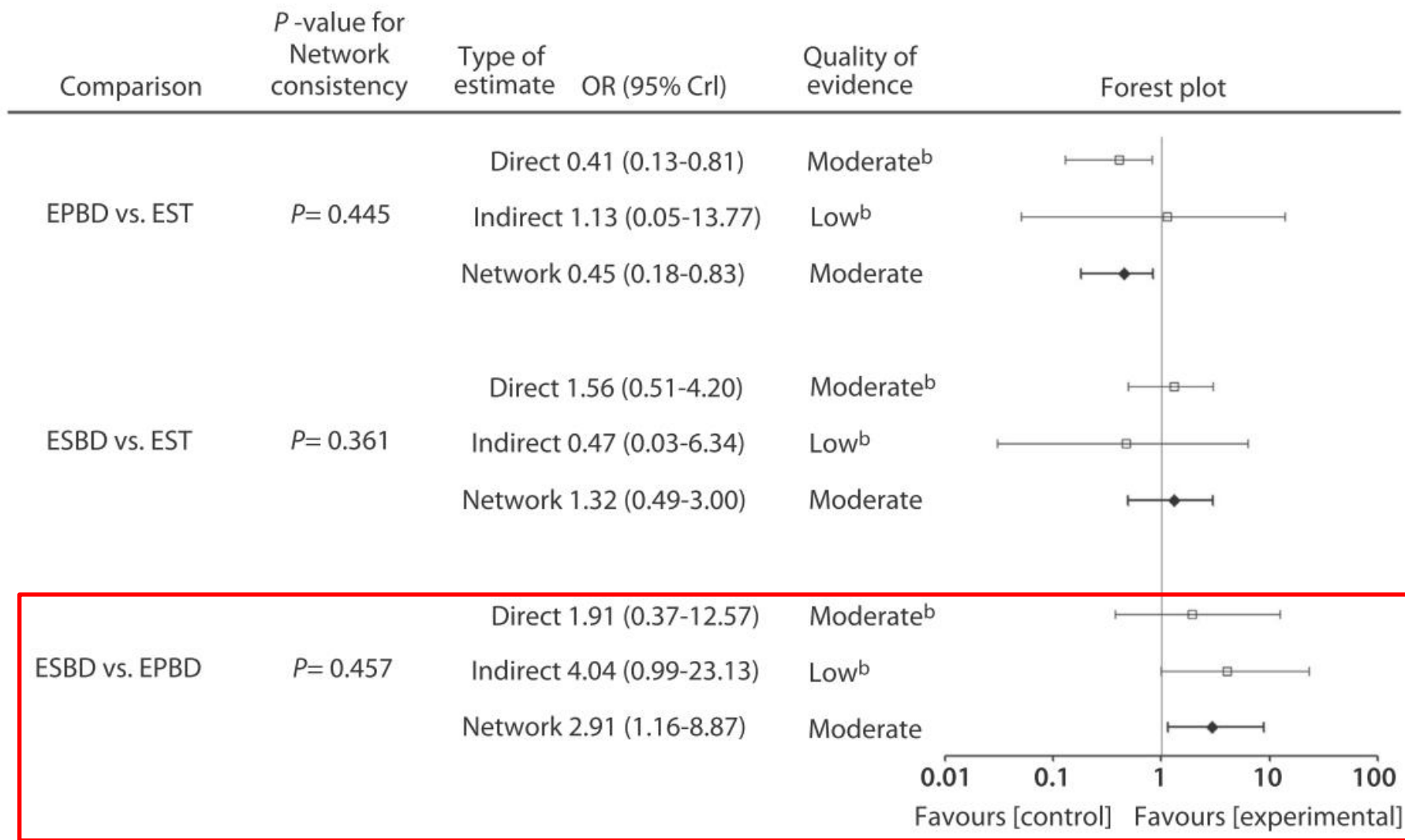
Pooled summary estimates and quality of evidence derived from direct and indirect estimates and network meta-analysis



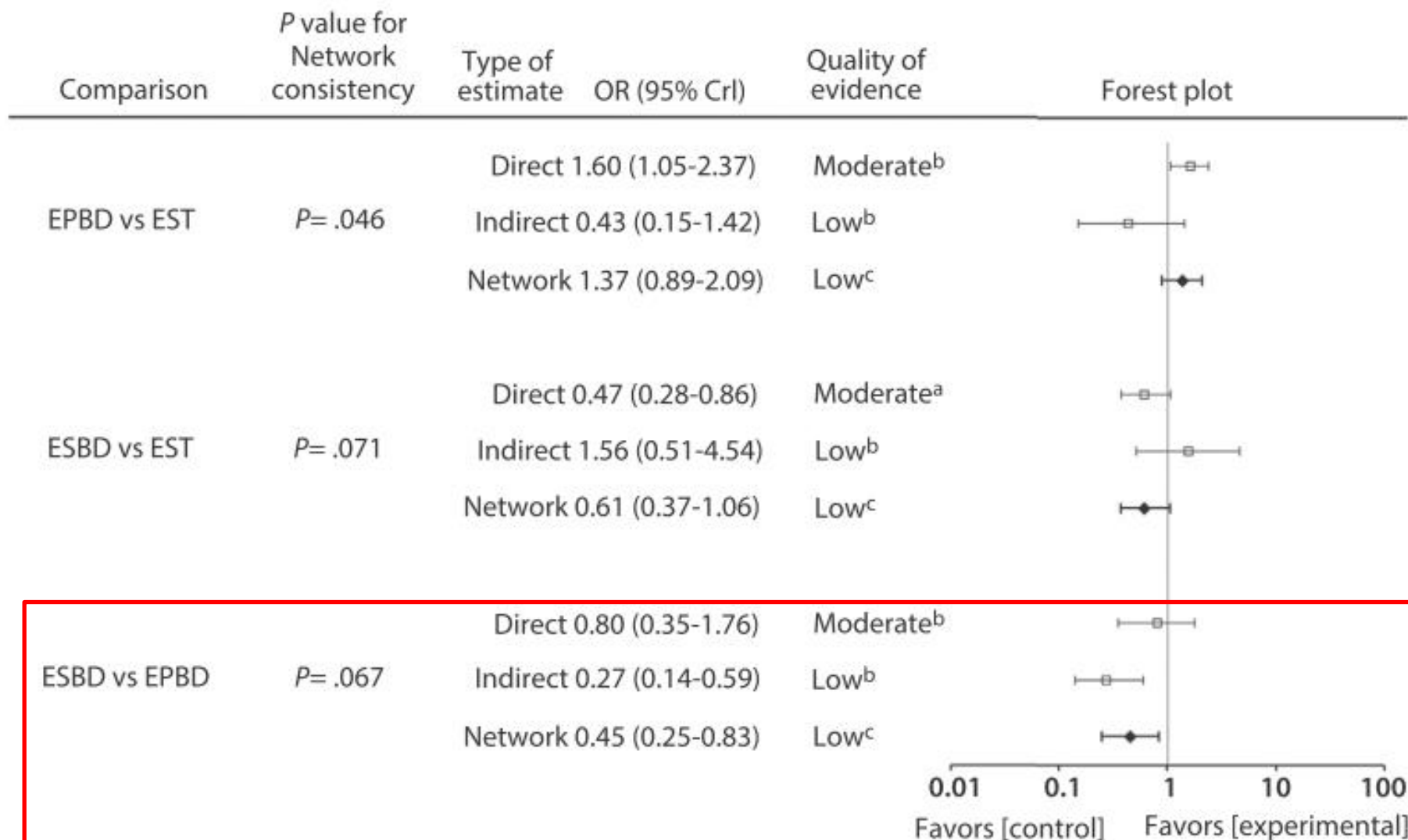
Successful stone removal (1st session)



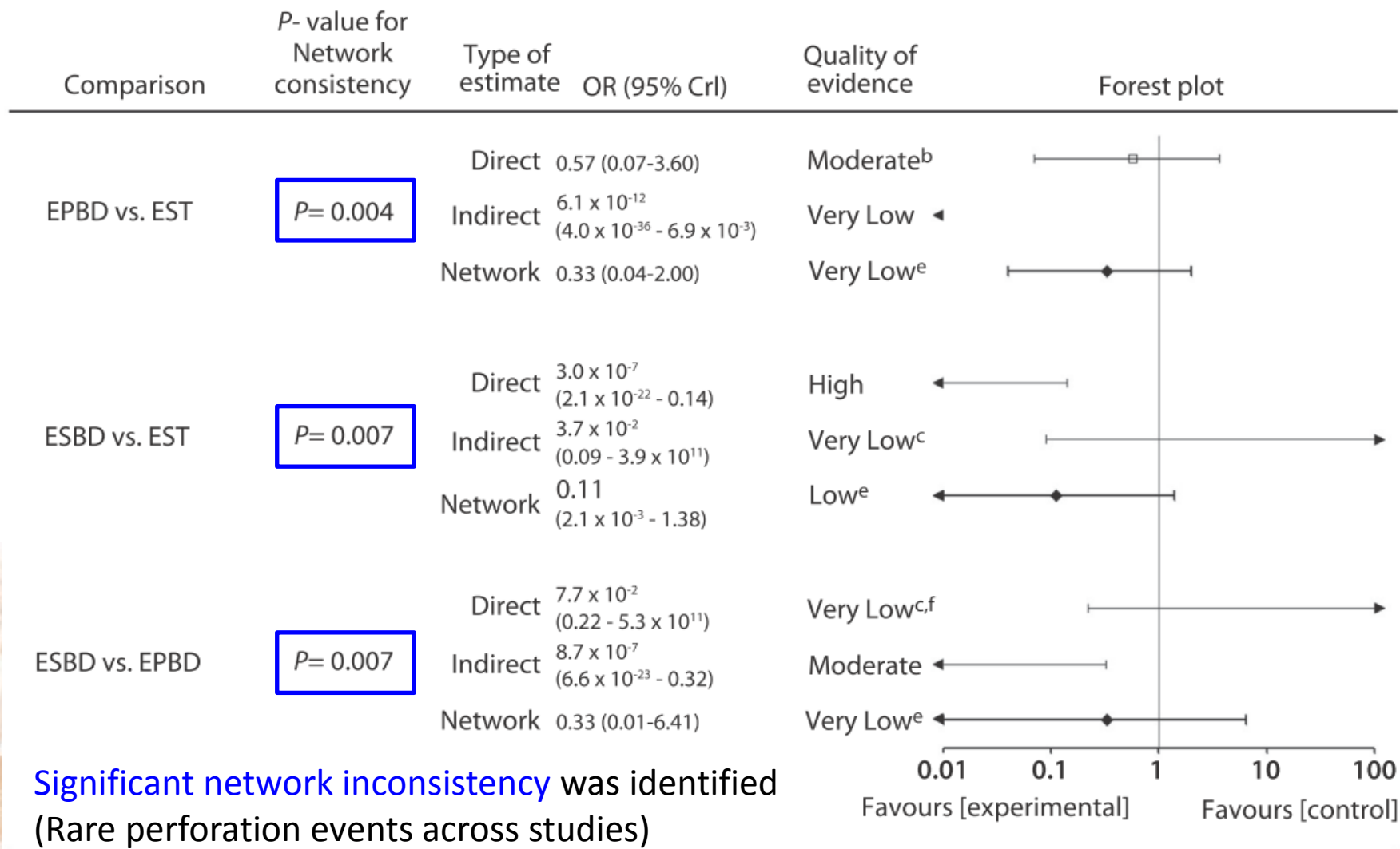
Successful stone removal (overall)



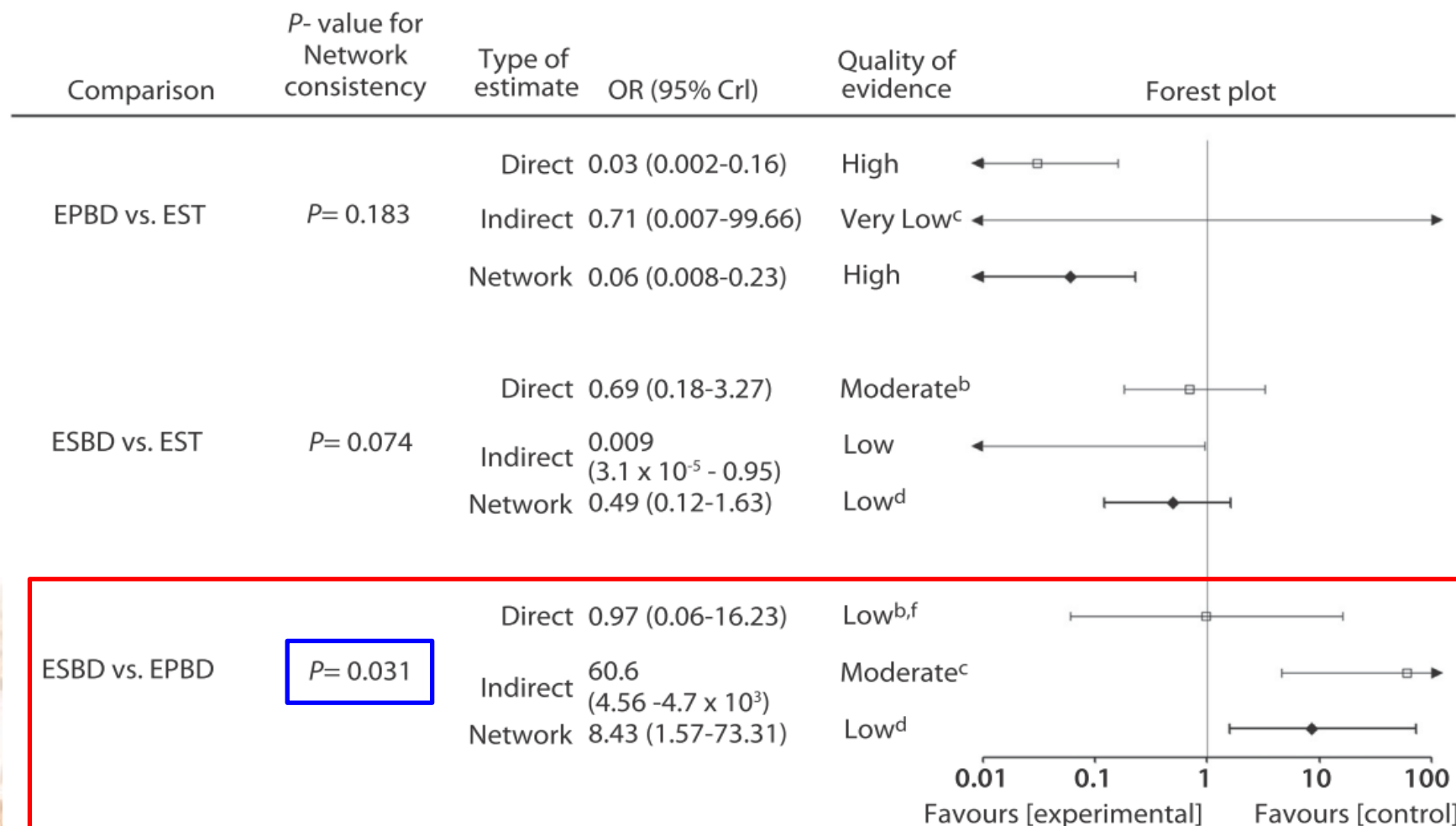
Use of mechanical lithotripsy



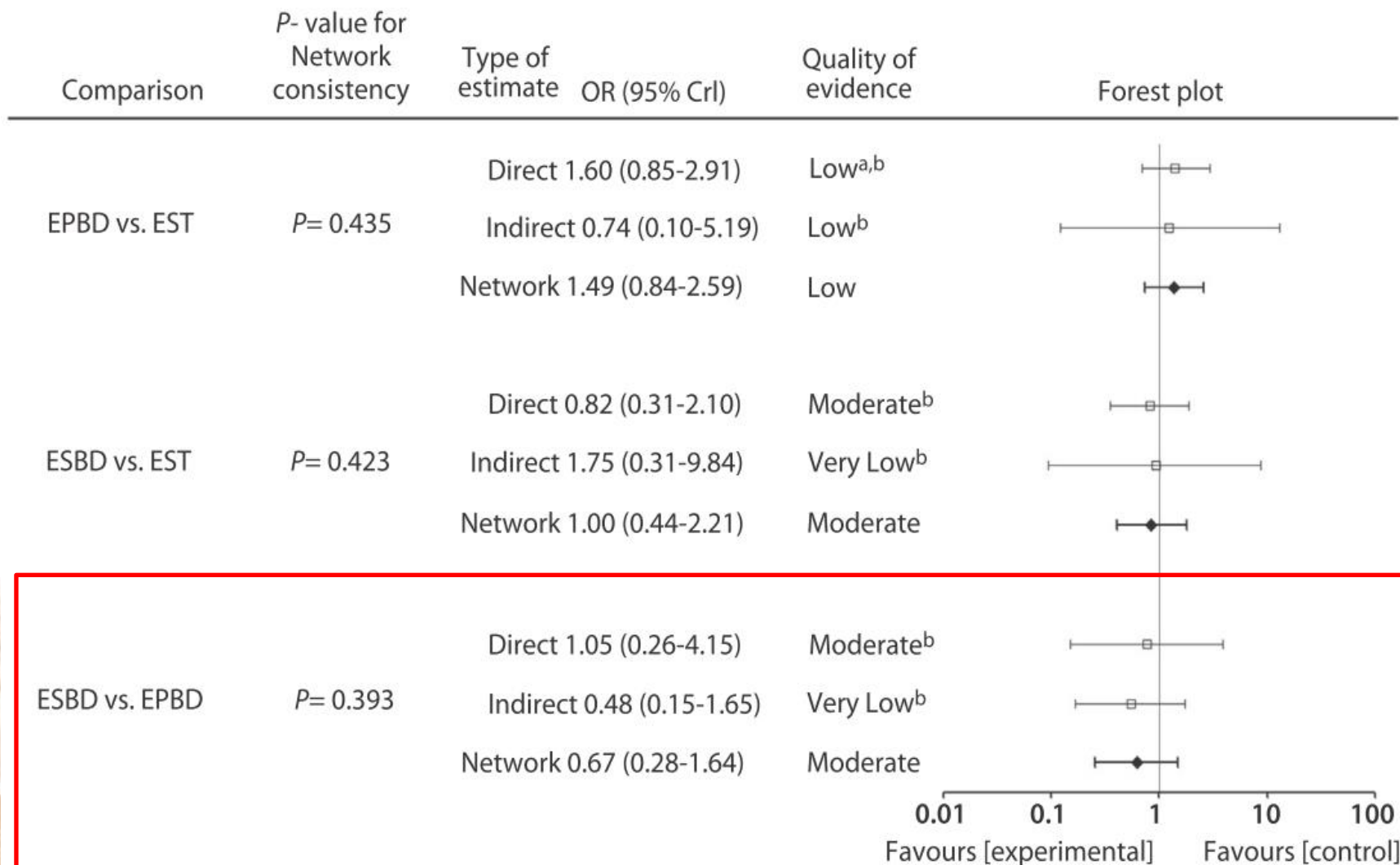
Perforation



Bleeding



Post-ERCP pancreatitis





Limitations – Potential Bias

- Some of the included studies were not conducted under the consensus guideline definition of adverse events after ERCP
- The extent (minor or major) of sphincterotomy
- Different degrees and durations of balloon dilatation
- Significant inconsistency between direct and indirect evidence was identified in post-ERCP bleeding and perforation
 - Extremely low incidence
 - A relatively small number of studies have compared ESBD with EPBD





Conclusion

- ESBD vs. EPBD:
 - Higher successful rate of stone removal
(in overall and the first endoscopic session)
 - Mechanical lithotripsy was less frequently
 - Higher risk of bleeding
 - Tended less post-ERCP pancreatitis





臺北市立萬芳醫院

—委託財團法人臺北醫學大學辦理

Taipei Municipal Wanfang Hospital (Managed by Taipei Medical University)

THANK YOU!



TABLE 1. Baseline patient and lesion characteristics of the included studies

First author and reference no.	Publication year	Country	Study period	Comparison	No. of patients	Age (y) mean \pm SD	Male (%)
Minami ³³	1995	Japan	1992-1994	EST vs EPBD	EST: 20 EPBD: 20	EST: 71.3 \pm 14.0 EPBD: 64.0 \pm 11.2	EST: 45.0 EPBD: 65.0
Bergman ³²	1997	Netherlands	1993-1994	EST vs EPBD	EST: 101 EPBD: 101	EST: median 71 (range, 29-96) EPBD: median 72 (range, 27-98)	EST: 44.6 EPBD: 42.6
Ochi ³⁴	1999	Japan	1994-1997	EST vs EPBD	EST: 55 EPBD: 55	EST: 66.3 \pm 14.3 EPBD: 62.6 \pm 15.9	EST: 31/55 (56.4%) EPBD: 34/55 (61.8%)
Arnold ³⁵	2001	Germany	NA	EST vs EPBD	EST: 30 EPBD: 30	EST: 58.5 \pm 18.5 EPBD: 54.2 \pm 18.5	EST: 43.3 EPBD: 36.7
Yasuda ⁶	2001	Japan	1998-1999	EST vs EPBD	EST: 35 EPBD: 35	EST: 69.4 (range, 43-88) EPBD: 69.5 (range, 42-86)	EST: 60.0 EPBD: 45.7
Natsui ³⁶	2002	Japan	1997-2000	EST vs EPBD	EST: 70 EPBD: 70	EST: 67.1 (range, 38-88) EPBD: 64.5 (range, 23-87)	EST: 47.1 EPBD: 47.1
Fujita ³⁷	2003	Japan	2000-2001	EST vs EPBD	EST: 144 EPBD: 138	EST: 68.4 (range, 31-93) EPBD: 66.8 (range, 26-93)	EST: 63.9 EPBD: 54.3
Vlavianos ³⁸	2003	U.K.	1995-1999	EST vs EPBD	EST: 99 EPBD: 103	EST: 61.9 \pm 4.5 EPBD: 60.8 \pm 4.2	EST: 35.4 EPBD: 24.3
Disario ⁸	2004	U.S.	1995-1997	EST vs EPBD	EST: 120 EPBD: 117	EST: 54 \pm 19 EPBD: 47 \pm 19	EST: 25.8 EPBD: 35.0
Lin ³⁹	2004	Taiwan	2001	EST vs EPBD	EST: 53 EPBD: 51	EST: 65 (range, 28-88) EPBD: 64 (range, 28-90)	EST: 58.5 EPBD: 54.9
Takezawa ⁴⁰	2004	Japan	1998-2002	EST vs EPBD	EST: 45 EPBD: 46	EST: median 69 (range, 41-93) EPBD: median 70 (range, 40-90)	EST: 66.7 EPBD: 69.6
Tanaka ⁴¹	2004	Japan	1996-1998	EST vs EPBD	EST: 16 EPBD: 16	EST: 70.6 (range, 49-87) EPBD: 67.2 (range, 50-78)	EST: 81.3 EPBD: 62.5
Heo ¹¹	2007	Korea	2004-2005	EST vs ESD	EST: 100 ESD: 100	EST: 62.8 \pm 15.7 ESD: 64.4 \pm 12.8	EST: 50.0 ESD: 48.0
Watanabe ⁴²	2007	Japan	1996-2004	EST vs EPBD	EST: 90 EPBD: 90	EST: 70.2 \pm 8.1 EPBD: 69.1 \pm 13.1	EST: 54.4 EPBD: 56.7
Kim ⁴³	2009	Korea	2006-2008	EST vs ESD	EST: 28 ESD: 27	EST: 69.8 \pm 9.2 ESD: 70.3 \pm 8.7	EST: 39.3 ESD: 37.0
Stefanidis ⁴⁴	2011	Greece	2005-2009	EST vs ESD	EST: 45 ESD: 45	EST: 68.2 \pm 18.9 ESD: 69.4 \pm 17.8	EST: 48.9 ESD: 53.3
Oh ⁴⁵	2012	Korea	2010-2011	EST vs EPBD	EST: 43 EPBD: 40	EST: 68.7 \pm 12.9 EPBD: 72.3 \pm 9.5	EST: 53.5 EPBD: 50.0
Fu ⁴⁷	2013	China	2011-2012	EST vs EPBD	EST: 103 EPBD: 103	EST: 60.5 \pm 14.7 EPBD: 61.8 \pm 17.4	EST: 50.5 EPBD: 43.7
Hwang ⁴⁸	2013	Korea	Since 2009	EPBD vs ESD	EPBD: 62 ESD: 69	EPBD: 70.4 \pm 10.9 ESD: 68.2 \pm 10.5	EPBD: 37.1 ESD: 47.8
Qian ⁴⁶	2013	China	2008-2012	EST vs ESD	EST: 69 ESD: 63	EST: 68.4 \pm 22.8 ESD: 67.3 \pm 23.4	EST: 52.2 ESD: 50.8
Teoh ⁴⁹	2013	China	2005-2011	EST vs ESD	EST: 78 ESD: 73	EST: 73.0 \pm 13.4 ESD: 71.6 \pm 14.8	EST: 51.3 ESD: 43.8
Li ⁵⁰	2014	China	2008-2011	EST vs ESD	EST: 227 ESD: 228	EST: 60.6 \pm 16.6 ESD: 61.8 \pm 16.7	EST: 37.8 ESD: 41.4
Seo ⁵¹	2014	Korea	2006-2012	EST vs EPBD	EST: 70 EPBD: 62	EST: 33.2 \pm 5.8 EPBD: 32.1 \pm 7.3	EST: 45.7 EPBD: 43.5
Guo ⁵²	2015	China	2011-2013	EST vs EPBD vs ESD	EST: 85 EPBD: 85 ESD: 85	EST: 59 \pm 16 EPBD: 62 \pm 17 ESD: 63 \pm 16	EST: 50.6 EPBD: 52.9 ESD: 54.1
Cheon ⁵³	2017	Korea	2013-2015	EPBD vs ESD	EPBD: 42 ESD: 44	EPBD: 71.0 \pm 12.4 ESD: 71.7 \pm 10.1	EPBD: 50.0 ESD: 54.5

TABLE 1. Baseline

First author and reference no.
Minami ³³
Bergman ³²
Ochi ³⁴
Arnold ³⁵
Yasuda ⁶
Natsui ³⁶
Fujita ³⁷
Vlavianos ³⁸
Disario ⁸
Lin ³⁹
Takezawa ⁴⁰
Tanaka ⁴¹
Heo ¹¹
Watanabe ⁴²
Kim ⁴³
Stefanidis ⁴⁴
Oh ⁴⁵
Fu ⁴⁷
Hwang ⁴⁸
Qian ⁴⁶
Teoh ⁴⁹
Li ⁵⁰
Seo ⁵¹
Guo ⁵²
Cheon ⁵³

TABLE 1. Continued

Inclusion criteria of CBD stones	Diameter of CBD (mm) mean \pm SD	Peripapillary diverticulum (%)	No. of CBD stones median (range) or mean \pm SD	Diameter of CBD stone (mm) mean \pm SD
Any stone	NA	NA	NA	NA
Any stone	NA	EST: 14.9 EPBD: 21.8	EST: median 1 (range, 1-15) EPBD: median 2 (range, 1-14)	EST: median 9 (range, 4-27) EPBD: median 10 (range, 3-36)
Any stone	NA	EST: 14/55 (25.5%) EPBD: 19/55 (34.5%)	EST: 1.7 \pm 1.2 ESBD: 2.1 \pm 1.9	EST: 8.8 \pm 4.2 ESBD: 8.1 \pm 3.4
≤ 20 mm, ≤ 5 stones	NA		EST: 1.8 \pm 1.5 EPBD: 1.6 \pm 1.1	EST: 10 \pm 4.7 EPBD: 7 \pm 3.5
Any stone	EST: mean 14.7 (range, 6-30) EPBD: mean 15.1 (range, 6-30)	NA	EST: 3.3 (range, 1-16) EPBD: 3.7 (range, 1-16)	EST: 12.3 (range, 5-24) EPBD: 12.4 (range, 4-24)
Any stone	NA	EST: 61.4 EPBD: 54.3	EST: 2.6 (range, 1-15) EPBD: 2.7 (range, 1-15)	EST: 9.7 (range, 3-17) ESBD: 9.2 (range, 3-22)
≤ 14 mm	EST: 12.7 \pm 4.1 EPBD: 11.8 \pm 3.8	EST: 45.1 EPBD: 42.0	EST: 2.4 \pm 2.9 EPBD: 2.4 \pm 2.5	EST: 7.3 \pm 3.4 EPBD: 7.0 \pm 3.1
Any stone	NA	NA	NA	NA
Any stone	EST: median 10 (range, 1-25) EPBD: median 10 (range, 4-20)	NA	EST: median 1 (range, 1-10) EPBD: median 1 (range, 1-100)	EST: median 5 (range, .5-14) EPBD: median 6 (range, .5-10)
≤ 20 mm	NA	EST: 37.7 EPBD: 41.2	NA	EST: 8 \pm 6 EPBD: 8 \pm 6
Any stone	EST: median 16 (range, 8-32) EPBD: median 14 (range, 9-28)	EST: 42.2 EPBD: 34.8	EST: median 1 (range, 1-7) EPBD: median 1 (range, 1-7)	EST: median 11 (range, 3-27) EPBD: median 10 (range, 1-35)
Any stone	NA	EST: 37.5 EPBD: 50.0	EST: median 2 (range, 1-4) EPBD: median 2 (range, 1-12)	EST: 12.4 \pm 6.0 EPBD: 10.2 \pm 3.5
≤ 40 mm	NA	EST: 45.0 ESBD: 49.0	EST: 2.2 \pm 1.9 ESBD: 2.7 \pm 2.7	EST: 15.0 \pm .7 ESBD: 16.0 \pm .7
Any stone	NA	EST: 38.9 EPBD: 42.2	EPBD: 2.5 \pm 2.7 ESBD: 2.7 \pm 2.8	EPBD: 7.7 \pm 2.9 ESBD: 8.1 \pm 3.2
15-50 mm	EST: 20.5 \pm 5.7 ESBD: 21.4 \pm 6.3	EST: 35.7 ESBD: 33.3	EST: 2.3 \pm 1.2 ESBD: 2.2 \pm 1.3	EST: 21.3 \pm 5.2 ESBD: 20.8 \pm 4.1
12-20 mm	EST: 16.5 \pm 4.2 ESBD: 16.8 \pm 3.7	NA	NA	NA
> 10 mm	EST: 18.2 \pm 4.6 EPBD: 18.0 \pm 4.3	EST: 39.5 EPBD: 57.5	NA	EST: 13.1 \pm 3.9 EPBD: 13.2 \pm 3.6
≤ 12 mm	EST: 12.6 \pm 3.1 EPBD: 12.7 \pm 2.8	NA	EST: 1.9 \pm 1.4 EPBD: 2.2 \pm 1.4	EST: 7.7 \pm 2.4 EPBD: 8.4 \pm 2.7
≥ 12 mm	EPBD: 20.5 \pm 4.4 ESBD: 21.4 \pm 4.6	EPBD: 53.2 ESBD: 55.1	EPBD: 2.3 \pm 1.6 ESBD: 2.8 \pm 1.8	EPBD: 15.7 \pm 3.3 ESBD: 16.5 \pm 4.2
15-50 mm	EST: 21.5 \pm 6.5 ESBD: 22.4 \pm 7.3	EST: 30.4 ESBD: 30.2	EST: 2.3 \pm 1.3 ESBD: 2.2 \pm 1.2	EST: 20.3 \pm 5.3 ESBD: 20.6 \pm 5.4
≥ 13 mm	EST: median 15 (range, 13-50) ESBD: median 15 (range, 13-30)	NA	NA	EST: 13.3 (range, 5-40) ESBD: 12.5 (range, 5-35)
≤ 30 mm	EST: 12.7 \pm 3.5 ESBD: 13.2 \pm 3.7	EST: 44.3 ESBD: 40.1	NA	NA
≤ 12 mm	NA	NA	EST: 1.8 (range, 1-8) EPBD: 1.5 (range, 1-5)	EST: 7.6 \pm 3.1 EPBD: 7.2 \pm 2.1
≥ 10 mm	EST: median 12 (range, 11-40) EPBD: median 12 (range, 11-30) ESBD: median 12 (range, 11-30)	EST: 31.8 EPBD: 30.6 ESBD: 54.1	NA	EST: median 10 (range, 10-40) EPBD: median 10 (range, 10-30) ESBD: median 10 (range, 10-30)
12-34 mm	EPBD: 15.8 \pm 3.6 ESBD: 16.1 \pm 3.2	EPBD: 50.0 ESBD: 65.9	EPBD: 2.6 \pm 6.9 ESBD: 2.6 \pm 2.3	EPBD: 14.4 \pm 3.3 ESBD: 14.0 \pm 2.1

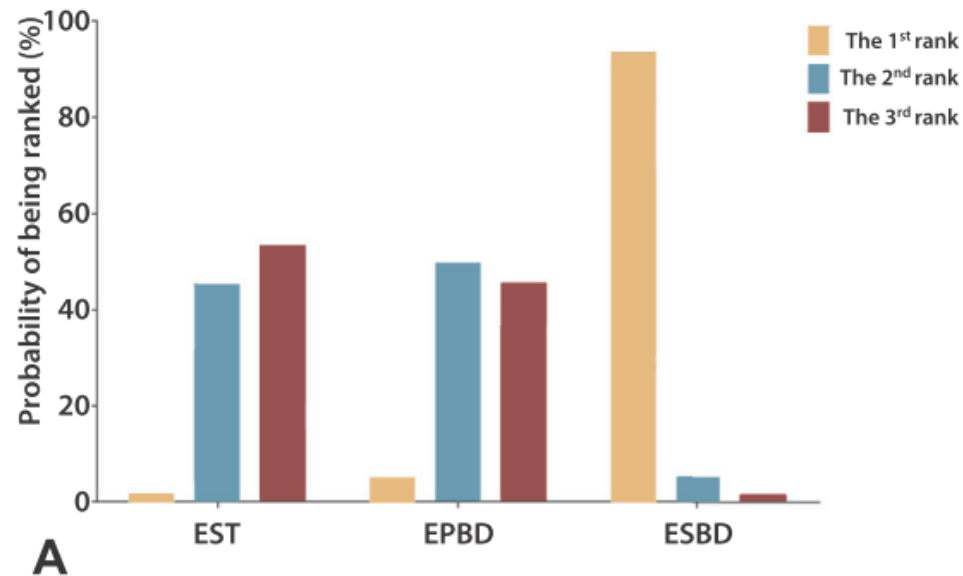
TABLE 2. Procedural outcomes and adverse events of the included studies

First author and reference number	Publication year	Diameter of the balloon (mm) mean \pm SD	Duration of the balloon dilatation (s)	Use of mechanical lithotripsy (%)	Procedure time (min) mean \pm SD	No. of sessions required for complete stone removal Median (range) or mean \pm SD
Minami ³³	1995	8	Within 180	NA	EST: 42 \pm 16 EPBD: 63 \pm 24	EST: 1.35 \pm .48 ESBD: 1.35 \pm .48
Bergman ³²	1997	8	Range, 45-60	EST: 12.9 EPBD: 30.7	NA	NA
Ochi ³⁴	1999	8	60, 3 times (total dilatation time: 180)	EST: 2/55 (3.7%) EPBD: 7/55 (13.7%)	NA	NA
Arnold ³⁵	2001	8	60, 2 times (total dilatation time: 120)	NA	EST: 17 \pm 12 EPBD: 29 \pm 15	NA
Yasuda ⁶	2001	8	60, 2 times (total dilatation time: 120)	EST: 25.7 EPBD: 48.6	NA	NA
Natsui ³⁶	2002	8	120	EST: 38.6 EPBD: 41.4	NA	EST: 1.4 (range, 1-4) ESBD: 1.7 (range, 1-5)
Fujita ³⁷	2003	range, 4-8	15	EST: 11.8 EPBD: 14.5	NA	EST: 1.3 (range, 1-4) EPBD: 1.3 (range, 1-4)
Vlavianos ³⁸	2003	10	30	NA	NA	NA
Disario ⁸	2004	≥ 8	60	NA	EST: 42 \pm 19 EPBD: 47 \pm 25	NA
Lin ³⁹	2004	Range, 10-12	Range, 120-600	EST: 3.8 EPBD: 2.0	EST: 45 \pm 3 EPBD: 44 \pm 3	NA
Takezawa ⁴⁰	2004	8	120	EST: 31.1 EPBD: 34.8	EST: 37.2 \pm 12.4 EPBD: 37.4 \pm 13.0	NA
Tanaka ⁴¹	2004	8	120	EST: 37.5 EPBD: 50.0		EST: 1.6 \pm .7 EPBD: 1.4 \pm .7
Heo ¹¹	2007	Range, 12-20	60	EST: 9.0 ESBD: 8.0	NA	EST: 1.15 \pm .39 ESBD: 1.12 \pm .36
Watanabe ⁴²	2007	8	120	EST: 64.4 EPBD: 84.4	NA	NA
Kim ⁴³	2009	Range, 15-18	NA	EST: 32 ESBD: 33	EST: 19 \pm 13 ESBD: 18 \pm 12	EST: 1.31 \pm .71 ESBD: 1.27 \pm .53
Stefanidis ⁴⁴	2011	Range, 15-20	Range, 10-12	EST: 100.0 ESBD: .0	A, NA C, NA	NA
Oh ⁴⁵	2012	11.8 (range, 10-15)	31.3 (range, 10-60)	EST: 20.9 EPBD: 10.0	A, 45 \pm 3 B, 44 \pm 3	NA
Fu ⁴⁷	2013	Range, 10-12	60, 3 times (total dilatation time: 180)	EST: .0 EPBD: .0	EST: 9.0 \pm 4.9 EPBD: 9.9 \pm 5.2	NA
Hwang ⁴⁸	2013	EPBD: 15.9 \pm 2.3 ESBD: 16.2 \pm 2.5	60	EPBD: 16.1 ESBD: 21.7	NA	NA
Qian ⁴⁶	2013	Range, 12-20	30	EST: 24.6 ESBD: 7.9	EST: 15.9 \pm 8.8 ESBD: 14.5 \pm 8.4	EST: 1.23 \pm .45 ESBD: 1.14 \pm .36
Teoh ⁴⁹	2013	≤ 15	30	EST: 46.2 ESBD: 28.8	EST: 27.2 \pm 16.9 ESBD: 24.3 \pm 12.9	EST: 1.12 \pm .32 ESBD: 1.08 \pm .28
Li ⁵⁰	2014	NA	60	EST: 35.2 ESBD: 12.3	EST: 47.1 \pm 20.2 ESBD: 38.6 \pm 15.5	NA
Seo ⁵¹	2014	Range, 6-10	Range, 90-120	EST: 8.6 EPBD: 8.1	NA	NA
Guo ⁵²	2015	Range, 10-15	NA	EST: 9.4 EPBD: 14.1 ESBD: 8.2	EST: 20 \pm 11 EPBD: 22 \pm 10 ESBD: 20 \pm 10	NA
Cheon ⁵³	2017	≥ 12	30	EPBD: 21.4 ESBD: 13.6	EPBD: 10.8 \pm 6.9 ESBD: 10.6 \pm 5.7	NA

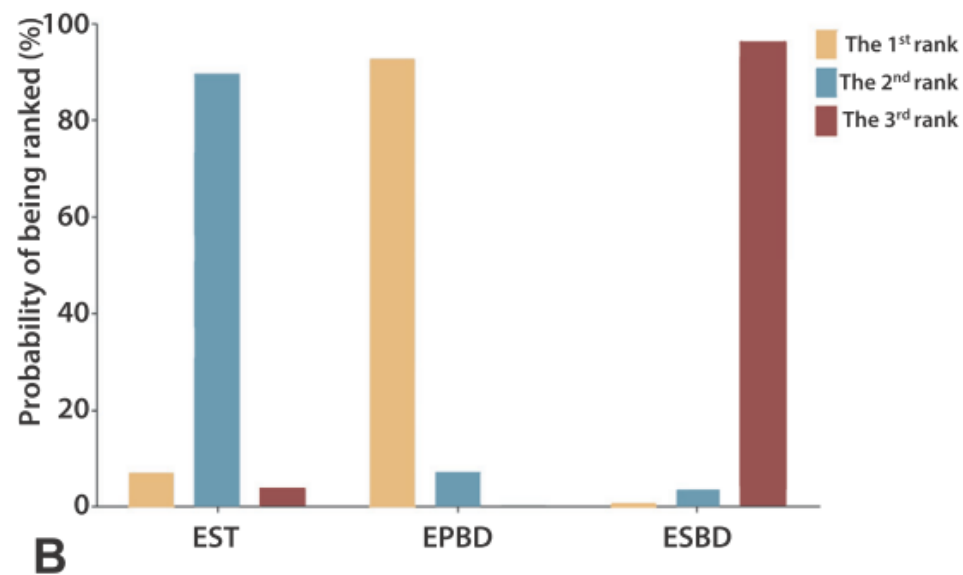
TABLE 2. Proce
TABLE 2. Continued

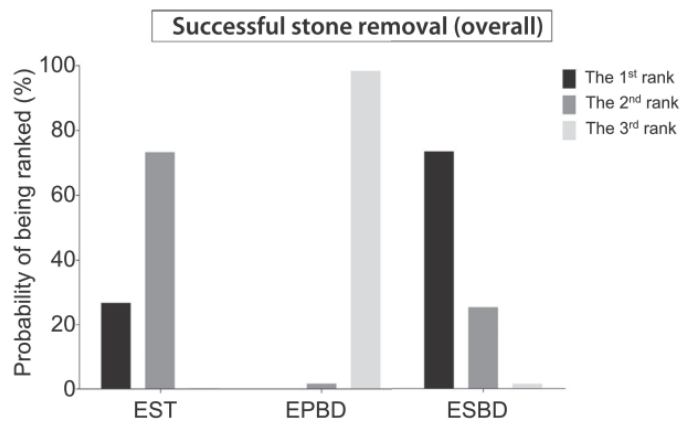
First author and reference number	Successful stone removal rate in the first session (%)	Overall successful stone removal rate (%)	Use of consensus criteria for assessment of bleeding	Bleeding (%)	Perforation (%)	Use of consensus criteria for assessment of post-ERCP pancreatitis	Post-ERCP pancreatitis (%)
Minami ³³	NA	EST: 100.0 EPBD: 100.0	NA	EST: .0 EPBD: .0	NA	NA	EST: 10.0 EPBD: 10.0
Bergman ³²	EST: 91.1 EPBD: 80.2	EST: 91.1 EPBD: 89.1	Yes	EST: 4.0 EPBD: .0	EST: 1.0 EPBD: 2.0	Yes	EST: 6.9 EPBD: 6.9
Ochi ³⁴	EST: 51/55 (94.4%) EPBD: 40/55 (78.4%)	EST: 98.1 EPBD: 92.7	Yes	NA	EST: 1/55 (1.8%) EPBD: 0/55 (.0%)	Yes	EST: 3.6 EPBD: .0
Arnold ³⁵	EST: 100.0 EPBD: 76.7	EST: 100.0 EPBD: 76.7	NA	EST: 6.7 EPBD: .0	NA	Yes	EST: 10.0 EPBD: 20.0
Yasuda ⁶	EST: 100.0 EPBD: 100.0	EST: 100.0 EPBD: 100.0	NA	EST: 2.9 EPBD: .0	EST: .0 EPBD: .0	NA	EST: 5.7 EPBD: 5.7
Natsui ³⁶	EST: 70.0 EPBD: 58.6	EST: 98.6 EPBD: 92.9	Yes	EST: 2.9 EPBD: .0	EST: .0 EPBD: .0	Yes	EST: 4.3 EPBD: 5.7
Fujita ³⁷	EST: 78.5 EPBD: 76.1	EST: 100.0 EPBD: 99.3	Yes	EST: 1.4 EPBD: .0	EST: .0 EPBD: .0	Yes	EST: 2.8 EPBD: 10.9
Vlavianos ³⁸	EST: 63.6 EPBD: 63.1	EST: 86.9 EPBD: 87.4	NA	NA	NA	NA	EST: 1.0 EPBD: 4.9
Disario ⁸	EST: 92.5 EPBD: 88.0	NA	Yes	EST: .0 EPBD: .0	EST: .8 EPBD: .0	No	EST: .8 EPBD: 15.4
Lin ³⁹	EST: 88.7 EPBD: 86.3	EST: 100.0 EPBD: 94.1	No	EST: 26.4 EPBD: 2.0	EST: .0 EPBD: .0	No	EST: .0 EPBD: .0
Takezawa ⁴⁰	EST: 100.0 EPBD: 100.0	EST: 100.0 EPBD: 100.0	Yes	EST: .0 EPBD: .0	EST: .0 EPBD: .0	Yes	EST: .0 EPBD: .0
Tanaka ⁴¹	EST: 56.3 EPBD: 68.8	EST: 100.0 EPBD: 100.0	Yes	EST: .0 EPBD: .0	EST: .0 EPBD: .0	Yes	EST: 18.8 EPBD: 18.8
Heo ¹¹	EST: 87.0 ESBD: 83.3	EST: 98.0 ESBD: 97.0	Yes	EST: 2.0 ESBD: .0	EST: .0 ESBD: .0	Yes	EST: 4.0 ESBD: 4.0
Watanabe ⁴²	EST: 57.8 EPBD: 72.2	EST: 95.6 EPBD: 86.7	Yes	EST: 1.1 EPBD: .0	EST: .0 EPBD: .0	Yes	EST: 2.2 EPBD: 10.0
Kim ⁴³	EST: 82.1 ESBD: 85.2	EST: 100.0 ESBD: 100.0	Yes	EST: 7.1 ESBD: 14.8	EST: .0 ESBD: .0	Yes	EST: .0 ESBD: .0
Stefanidis ⁴⁴	EST: 91.1 ESBD: 97.8	EST: 91.1 ESBD: 97.8	Yes	EST: 2.2 ESBD: 2.2	EST: 2.2 ESBD: .0	Yes	EST: 2.2 ESBD: 2.2
Oh ⁴⁵	EST: 81.4 EPBD: 82.5	EST: 95.3 EPBD: 97.5	Yes	EST: .0 EPBD: .0	EST: .0 EPBD: 2.5	No	EST: 7.0 EPBD: 5.0
Fu ⁴⁷	EST: 72.8 EPBD: 91.3	NA	Yes	EST: 2.9 EPBD: .0	EST: .0 EPBD: .0	No	EST: 12.5 EPBD: 3.4
Hwang ⁴⁸	EPBD: 91.9 ESBD: 94.2	EPBD: 96.8 ESBD: 95.7	Yes	EPBD: .0 ESBD: .0	EPBD: .0 ESBD: 1.4	Yes	EPBD: 6.5 ESBD: 4.3
Qian ⁴⁶	EST: 60.9 ESBD: 81.0	EST: 91.3 ESBD: 95.2	Yes	EST: .0 ESBD: .0	EST: 1.4 ESBD: .0	Yes	EST: 8.7 ESBD: 6.3
Teoh ⁴⁹	EST: 88.5 ESBD: 89.0	EST: 100.0 ESBD: 97.3	Yes	EST: .0 ESBD: 1.4	EST: 2.6 ESBD: .0	Yes	EST: 3.8 ESBD: 2.7
Li ⁵⁰	EST: 71.4 ESBD: 87.7	EST: 94.7 ESBD: 97.4	Yes	EST: 5.3 ESBD: 1.8	EST: .0 ESBD: .0	Yes	EST: 6.6 ESBD: 5.3
Seo ⁵¹	EST: 91.4 EPBD: 91.9	EST: 100.0 EPBD: 98.4	Yes	EST: 2.9 EPBD: .0	EST: 1.4 EPBD: .0	Yes	EST: 7.1 EPBD: 8.1
Guo ⁵²	EST: 92.9 EPBD: 91.8 ESBD: 96.5	EST: 92.9 EPBD: 91.8 ESBD: 96.5	Yes	EST: 1.2 EPBD: 1.2 ESBD: 1.2	NA	Yes	EST: 2.4 EPBD: 2.4 ESBD: 2.4
Cheon ⁵³	EPBD: 95.2 ESBD: 97.7	EPBD: 97.6 ESBD: 100.0	Yes	EPBD: 2.4 ESBD: 2.3	EPBD: .0 ESBD: .0	Yes	EPBD: 7.1 ESBD: 11.4

Successful stone removal (1st session)

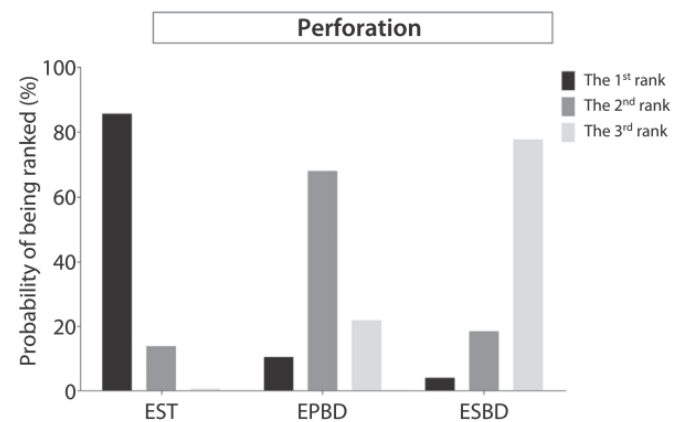


Use of mechanical lithotripsy

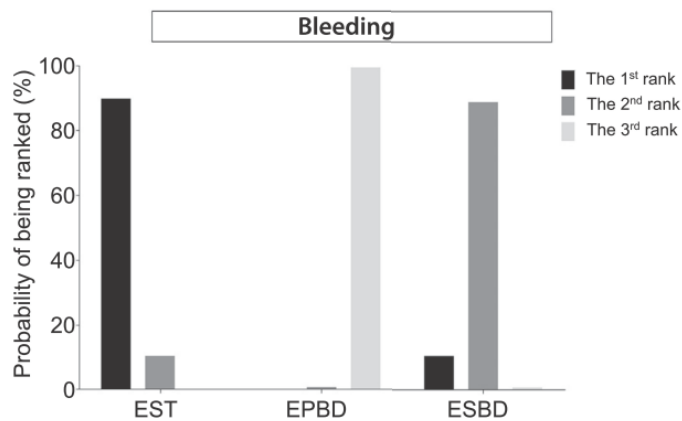




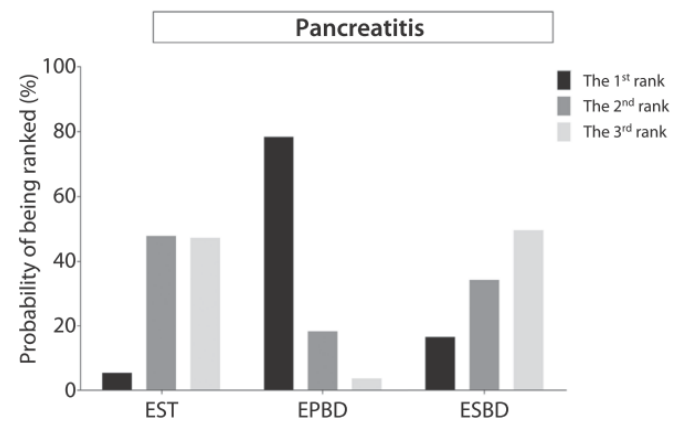
A



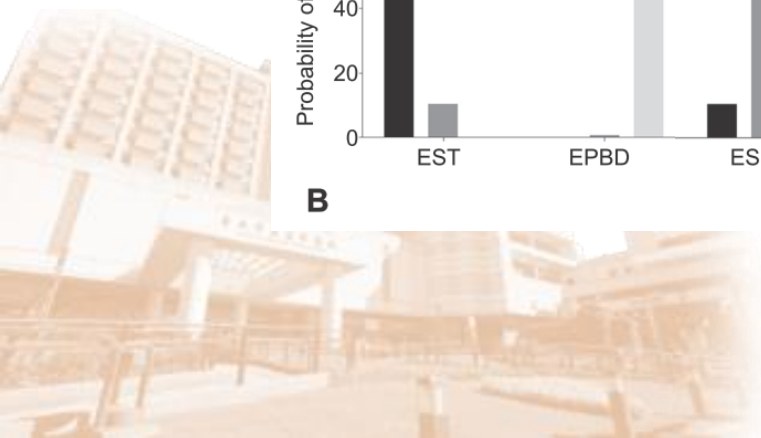
C



B



D



綠(同意) : 0人
黃(需討論): 29人
紅(不同意): 2人

