		Risk of bias domains								
		D1	D2	D3	D4	D5	Overall			
	Attam 2015	+	+	+	+	+	+			
	Bansal 2017	+	+	+	+	+	+			
	Weston 2017	+	+	+	+	+	+			
	Bang 2018	+	+	+	+	+	+			
	Saxena 2018	-	+	+	+	+	-			
	Lee 2018	-	+	+	+	+	-			
	Cheng 2019	+	+	+	+	+	+			
ldy	Di Mitri 2019	+	+	+	+	+	+			
Stu	Moreira 2020	+	+	+	+	+	+			
	Tong 2020	-	+	+	-	+	-			
	Wang 2020	+	+	+	+	+	+			
	Bang 2020	+	+	+	+	+	+			
	Takasumi 2021	+	+	+	-	+	-			
	Ladd 2021	+	+	-	+	+	-			
	Zhou 2021	-	+	+	+	+	-			
	Paik 2021	+	+	+	+	+	+			
		Domains:	aing from the	randomizatio	D DF00000	Judge	ment			

Supplementary Figure 1A: Traffic light plot for the risk of bias assessment for the included studies

D1: Bias arising from the randomization process.D2: Bias due to deviations from intended intervention.D3: Bias due to missing outcome data.D4: Bias in measurement of the outcome.D5: Bias in selection of the reported result.

Some concerns

Low

Supplementary Figure 1B: Summary plot for the risk of bias assessment for the included studies



Supplementary table 1: Definition of outcomes used in the included studies

Authors	Adequacy	Cellularity	Bloodiness
Attam 2015 ^[18]	0 = inadequate aspirate for the	0 = no cells;	0 = free of blood;
	cytopathologist to make a	1 = sparsely cellular;	1 = contaminated
	diagnosis;	2 = moderately	with red blood cells;
	1 = adequate aspirate	cellular; 3 = highly	2 = blood clots present
		cellular	
Bansal	0 = inadequate aspirate for the	0 = no cells;	0 = no blood;
2017 ^[19]	cytopathologist to make a	1 = sparsely cellular;	1 = contaminated
	diagnosis;	2 = moderately cellular	with red blood cells;
	1 = adequate aspirate	3 = highly cellular	2 = blood clots present
Weston	Cellularity score $< 2 =$ inadequate;	2 = estimated cell	
2017 ^[20]	Cellularity score $2 - 3 =$ adequate	count > 500 cells;	
		3 = estimated cell	
		count > 1000 cells	
Bang 2018 ^[21]	Adequacy defined as FNA sample		mild < 33%;
	being of sufficient quality to render		moderate 33-66%;
	a preliminary diagnosis		severe > 66%
Lee 2018 ^[22]	Adequacy defined as FNA sample	fair, <10 cell nests;	3 or fewer blood clots
	being of sufficient quality to render	good, 10 to 20 cell	(<25% of the slide)
	a preliminary diagnosis	nests;	4 – 6 blood clots (25–50%
		excellent, >20 cell	of the slide)
		nests	7 or more blood clots (>
			50% of the slide)
Saxena	Adequacy defined as FNA sample		
2018 ^[23]	being of sufficient quality to render		
	a preliminary diagnosis		
Cheng 2019 ^[24]		0 (absence or $< 10\%$ of	1+ (red blood cells 10-
		cell groups);	50%);
		1+ (10–50% of cell	2+ (red blood cells 50-
		groups);	70%);
		2+ (50–70% of cell	3+ (red blood cells 70-
		groups);	90%)
		3+ (70–90% of cell	
		groups)	

Di Mitri 2019 ^[25] Moreira 2020 ^[26]	Adequacy defined as sample containing adequate cellular material for a conclusive histological diagnosis	0 = no cells; 1 = sparsely cellular; 2 = moderately cellular 3 = highly cellular	high-moderate contamination (≥33%: interference with the pathological diagnosis); none-mild contamination (≤33%: non-interference with the pathological diagnosis) 'none', absent blood cells; 'low', a few blood cells without affecting histological diagnosis; 'moderate', partially obscured by blood cells but possible histological diagnosis; 'high', hidden by blood cells leading to inadequate interpretation
Tong 2020 ^[27]	0=no valid specimen; 1=insufficient tissue to diagnose; 2=moderate tissue but still diagnosable; 3=sufficient tissue for diagnosis		0=no blood contamination; 1=slight blood contamination, sparseness of RBCs; 2=moderate blood contamination, monolayer of RBCs; 3=significant blood contamination, cell clustering or stratification
Wang 2020 ^[28]	score 0 = sample with no material; score 1 = samples did not provide histological information; score 2 = limited histological assessment; score 3 = architecturally intact piece of tissue with a length of at least 550µm Score of 2 or 3 = adequate	Score 2 = moderate Score 3 = high	score 3 = < 25%; score 2 = 25%- 50 %; score 1 = >50%; score 0 = no material
Bang 2020 ^[29]		Low Intermediate High	
Takasumi 2021 ^[30]	Adequacy defined as FNA sample being of sufficient quality to render a preliminary diagnosis	0 = no cells; 1 = sparsely cellular; 2 = moderately cellular; 3 = highly cellular	
Ladd 2021 ^[31]	Adequacy defined as FNA sample being of sufficient quality to render a preliminary diagnosis	0—insufficient material for interpretation; 1—sufficient material for limited cytological	1—blood present; 2—blood clots present

		interpretation, but may	
		not be representative of	
		the entire lesion;	
		2-sufficient material	
		for adequate	
		cytological	
		interpretation	
Zhou 2021 ^[32]	Grade A – existing core tissue	Grade A, > 4 clusters,	
	(defined as an architecturally intact	with a minimum of	
	piece of tissue with a long axis	10 cells in each cluster;	
	measuring at least 550 µm)	Grade B,	
	Grade B – existing core fragments,	approximately 2–4	
	which does not meet the criteria for	clusters, with a	
	architecturally intact histology, but	minimum of 10 cells in	
	can still yield a diagnosis based on	each cluster;	
	cell morphology;	Grade C, < 2 clusters	
	Grade C – no lesion tissue found,	or no cellular smear	
	and a diagnosis cannot be made		
	based on the sample		
Paik 2021 ^[33]	Poor-no cellular material or		
	inconspicuous whitish core mixed		
	with blood;		
	Fair—presence of whitish core;		
	Good—whitish core with the		
	presence of a wormlike tissue		
	architecture		

Supplementary Figure 2A: Pair-wise meta-analysis for dry suction vs. no suction based on lesion type

()	dequacy								
	Study or Subgroup	Dry Suc Events	tion Total	No Suc Events	tion Total	Weight	Odds Ratio M-H, Random, 95% Cl	Year	Odds Ratio M-H, Random, 95% Cl
	1.1.1 Mixed lesion								
	Subtotal (95% CI)	91	100	94	100	22.3%	0.65 [0.22, 1.89] 0.65 [0.22, 1.89]	2017	-
	Total events	91		94					
	Test for overall effect:	plicable Z = 0.80 (I	P = 0.43	2)					
	1 1 2 Dancroatic loci								
	Bang 2018	127	176	130	176	27.7%	0.92 [0.57, 1.47]	2018	
	Lee 2018	40	50	38	50	23.6%	1.26 [0.49, 3.26]	2018	
	Paik 2021 Subtotal (95% CI)	75	94 320	40	99 325	26.4% 77.7%	5.82 [3.06, 11.08] 1.89 [0.55, 6.55]	2021	
	Total events Heterogeneity: Tau ² = Test for overall effect:	242 1.07; Chi ^a Z = 1.01 (i	² = 21.0 P = 0.31	208 3, df = 2 (1)	P < 0.0	1001); l²=	90%		
	Total (95% CI)		420		425	100.0%	1.49 [0.53, 4.18]		-
	Total events	333		302					
	Test for overall effect:	Z = 0.76 (P = 0.45	6, at = 3 (5)	P < 0.0	1001); 1*=	87%		0.01 0.1 1 10 100
	Test for subgroup diff	erences: (Chi ² = 1	.66. df = 1	(P = 0	.20), I ² =	39.6%		
(B) B	loodiness	Dry Suc	tion	No Suc	tion		Odds Ratio		Odds Ratio
_	Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% Cl	Year	M-H, Random, 95% Cl
	Bansal 2017	30	100	16	100	31.4%	2.25 [1.13, 4.46]	2017	
	Subtotal (95% CI)	20	100	10	100	31.4%	2.25 [1.13, 4.46]		•
	Heterogeneity: Not ap	plicable		16					
	Test for overall effect:	Z = 2.32 (P = 0.03	2)					
	1.3.2 Pancreatic lesi	on							
	Bang 2018	40	176	26	176	49.4%	1.70 [0.98, 2.93]	2018	
	Moreira 2020	14	50	9	50	16.3%	4.26 [0.46, 39.54]	2018	
	Subtotal (95% CI)	50	276	26	276	68.6%	1.78 [1.12, 2.83]		◆
	Heterogeneity: Tau ² = Test for overall effect:	0.00; Chi ^a Z = 2.45 (i	e = 0.62 P = 0.01	, df = 2 (P 1)	= 0.73	i); I² = 0%			
	Total (05% CI)						4 00 14 24 2 041		
	Total (95% CI)		376		376	100.0%	1.92 [1.31, 2.81]		◆
	Total events Heterogeneity: Tau ² =	88 0.00; Chi ^a	376 = 0.92	52 , df = 3 (P	376 = 0.82	100.0%	1.92 [1.31, 2.81]		►
	Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff	88 0.00; Chi ^a Z = 3.33 (i erences: (376 = 0.92 P = 0.0(Chi ² = 0	52 , df = 3 (P 009) .30, df = 1	376 = 0.82 I (P = 0	100.0%); I ² = 0% 1.58), I ² =	1.92 [1.31, 2.81] 0%		0.01 0.1 1 10 100 Favours Dry suction Favours No suction
(C) C	Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff	88 0.00; Chi ^a Z = 3.33 (i erences: (Dry Suc	376 ² = 0.92 P = 0.00 Chi ² = 0 tion	52 , df = 3 (F 009) .30, df = 1 No Suc	376 = 0.82 I (P = 0 tion	100.0%); ² = 0% .58), ² =	1.92 [1.31, 2.81] 0% Odds Ratio		0.01 0.1 10 100 Favours Dry suction Favours No suction
(C) C	Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff cellularity Study or Subgroup 15.1 Mixed lesion	88 0.00; Chi ² Z = 3.33 (i erences: (Dry Suc Events	376 ² = 0.92 P = 0.00 Chi ² = 0 tion <u>Total</u>	52 , df = 3 (P 009) .30, df = 1 No Suc Events	376 = 0.82 I (P = 0 tion Total	100.0%); I ² = 0% .58), I ² = Weight	0% Odds Ratio M-H, Random, 95% Cl	Year	0.01 0.1 10 100 Favours Dry suction Favours No suction Odds Ratio M-H, Random, 95% Cl
(C) C	Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff cellularity <u>Study or Subgroup</u> 1.5.1 Mixed lesion Bansal 2017 Subtotal (05% CI)	88 0.00; Chi ² Z = 3.33 (i erences: (Dry Suc Events 84	376 ² = 0.92 P = 0.00 Chi ² = 0 tion <u>Total</u> 100 100	52 , df = 3 (F 009) .30, df = 1 No Suc Events 78	376 = 0.82 (P = 0 tion <u>Total</u> 100 100	100.0%); ² = 0% (.58), ² = 1 Weight 22.5% 22.5%	0% Odds Ratio M-H, Random, 95% Cl 1.48 (0.73, 3.02) 1.48 (0.73, 3.02)	Year 2017	0.01 0.1 10 100 Favours Dry suction Favours No suction Odds Ratio M-H, Random, 95% Cl
(C) C -	Total events Heterogeneity: Tau ² = Test for overall effect Test for subgroup diff cellularity Study or Subgroup 1.5.1 Mixed lesion Bansal 2017 Subtotal (95% CI) Total events	88 0.00; Chi ² Z = 3.33 (i erences: (Dry Suc Events 84 84	376 ² = 0.92 P = 0.00 Chi ² = 0 tion <u>Total</u> 100 100	52 , df = 3 (F 009) .30, df = 1 No Suc <u>Events</u> 78 78	376	100.0%); ² = 0% .58), ² = <u>Weight</u> 22.5% 22.5%	0% Odds Ratio M-H, Random, 95% CI 1.48 [0.73, 3.02] 1.48 [0.73, 3.02]	Year 2017	O.01 0.1 10 100 Favours Dry suction Favours No suction Odds Ratio M-H, Random, 95% Cl
(C) C	Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff cellularity Study or Subgroup 1.5.1 Mixed lesion Bansal 2017 Subtotal (95% CI) Total events Heterogeneity: Not ap Test for overall effect.	88 0.00; Chi [*] Z = 3.33 (i erences: 0 Dry Suc Events 84 84 94 plicable Z = 1.08 (i	376 ² = 0.92 P = 0.00 Chi ² = 0 tion Total 100 100 P = 0.21	52 , df = 3 (F 009) .30, df = 1 No Suc : <u>Events</u> 78 78	376 = 0.82 I (P = 0 tion <u>Total</u> 100 100	100.0%); ² = 0% .58), ² = 1 Weight 22.5% 22.5%	0% Odds Ratio M-H, Random, 95% CI 1.48 [0.73, 3.02] 1.48 [0.73, 3.02]	Year 2017	Old Ratio M-H, Random, 95% Cl
(C) C -	Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff cellularity Study or Subgroup 1.5.1 Mixed lesion Bansal 2017 Subtotal (95% CI) Total events Heterogeneity: Not ap Test for overall effect:	88 0.00; Chi ^a Z = 3.33 (i erences: C Dry Suc Events 84 84 84 84 2 = 1.08 (i	376 ² = 0.92 P = 0.00 Chi ² = 0 tion Total 100 100 P = 0.28	52 , df = 3 (P 009) .30. df = 1 No Suc <u>Events</u> 78 78 78	376 2 = 0.82 1 (P = 0 tion <u>Total</u> 100 100	100.0%); ² = 0% .58), ² = 1 <u>Weight</u> 22.5% 22.5%	0% Odds Ratio <u>M-H, Random, 95% CI</u> 1.48 [0.73, 3.02] 1.48 [0.73, 3.02]	Year 2017	0.01 0.1 10 100 Favours Dry suction Favours No suction Odds Ratio M-H, Random, 95% Cl
(C) C -	Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff cellularity Study or Subgroup 1.5.1 Mixed lesion Bansal 2017 Subtotal (95% CI) Total events Heterogeneity: Not ap Test for overall effect: 1.5.2 Pancreatic lesion Lee 2018	88 0.00; Chi ^p Z = 3.33 (i erences: C Dry Succ Events 84 84 84 9 2 = 1.08 (i on 30	376 ² = 0.92 P = 0.00 Chi ² = 0 tion Total 100 100 P = 0.23 50	52 , df = 3 (P 009) .30, df = 1 No Suc: Events 78 78 78 3)	376 = 0.82 (P = 0 tion Total 100 100 50	100.0%); ² = 0% .58), ² = <u>Weight</u> 22.5% 22.5% 18.2%	0% Odds Ratio <u>M-H, Random, 95% CI</u> 1.48 [0.73, 3.02] 1.48 [0.73, 3.02]	Year 2017 2018	0.01 0.1 10 100 Favours Dry suction Favours No suction Odds Ratio M-H, Random, 95% Cl
(C) C -	Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff cellularity Study or Subgroup 1.5.1 Mixed lesion Bansal 2017 Subtotal (95% CI) Total events Heterogeneity: Not ap Test for overall effect: 1.5.2 Pancreatic lesi Lee 2018 Moreira 2020	88 0.00; Chi ^p Z = 3.33 (i erences: 0 Dry Succ Events 84 84 9 en Z = 1.08 (i on 30 21	376 ² = 0.92 P = 0.00 Chi ² = 0 tion 100 100 P = 0.28 50 50	52 , df = 3 (F 009) .30, df = 1 No Suc <u>Events</u> 78 78 3) 25 21	376 = 0.82 (P = 0 tion Total 100 100 50 50	100.0%); ² = 0% .58), ² = 1 Weight 22.5% 22.5% 18.2% 18.2% 18.1%	0% Odds Ratio <u>M-H, Random, 95% CI</u> 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.50 [0.68, 3.31] 1.00 [0.45, 2.21]	Year 2017 2018 2020	Odds Ratio M-H, Random, 95% Cl
(C) C -	Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff cellularity Study or Subgroup 1.5.1 Mixed lesion Bansal 2017 Subtotal (95% CI) Total events Heterogeneity: Not ap Test for overall effect: 1.5.2 Pancreatic lesis Lee 2018 Moreira 2020 Bang 2020 Subtotal (95% CI)	88 0.00; Chi ² Z = 3.33 () erences: (Dry Suc Events 84 84 84 84 84 84 84 84 90 Z = 1.08 () 00 30 21 94	376 ² = 0.92 P = 0.00 Chi ² = 0 tion 100 100 P = 0.23 50 50 129 229	52 , df = 3 (F 009) .30, df = 1 No Suc <u>Events</u> 78 78 3) 25 21 81	376 P = 0.82 I (P = 0 tion Total 100 100 50 50 129 229	100.0%); ² = 0% .58), ² = 1 Weight 22.5% 22.5% 18.2% 18.2% 18.1% 41.2% 77.5%	1.52 [1.31, 2.81] O% Odds Ratio M-H, Random, 95% CI 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.50 [0.68, 3.31] 1.00 [0.45, 2.21] 1.59 [0.94, 2.70] 1.44 [0.96, 2.07]	Year 2017 2018 2020 2020	Odds Ratio M-H, Random, 95% Cl
(C) C -	Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff cellularity Study or Subgroup 1.5.1 Mixed lesion Bansal 2017 Subtotal (95% CI) Total events Heterogeneity: Not ap Test for overall effect: 1.5.2 Pancreatic lesis Lee 2018 Moreira 2020 Bang 2020 Subtotal (95% CI) Total events	88 0.00; Chi ² Z = 3.33 () erences: (Dry Succ Events 84 84 94 2 = 1.08 () 00 30 21 94 145 00	376 r = 0.92 P = 0.00 $chi^{2} = 0$ tion 100 100 P = 0.22 50 50 129 229	52 , df = 3 (F 009) .30, df = 1 No Suct Events 78 78 78 3) 25 21 81 27 21 81	376 = = 0.82 ((P = 0 tion Total 100 100 50 50 129 229	100.0%); ² = 0% .58), ² = Weight 22.5% 22.5% 18.2% 18.2% 41.2% 41.2% 77.5%	0% Odds Ratio M-H, Random, 95% CI 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.50 [0.68, 3.31] 1.00 [0.45, 2.21] 1.59 [0.94, 2.70] 1.41 [0.96, 2.07]	Year 2017 2018 2020 2020	0.01 0.1 10 100 Favours Dry suction Favours No suction 0dds Ratio M-H, Random, 95% Cl
(C) C -	Total events Heterogeneity: Tau ² = Test for overall effect Test for subgroup diff cellularity Study or Subgroup 1.5.1 Mixed lesion Bansal 2017 Subtotal (95% CI) Total events Heterogeneity: Not ap Test for overall effect: 1.5.2 Pancreatic lesis Lee 2018 Moreira 2020 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect:	88 0.00; Chi ² Z = 3.33 () erences: (Dry Succ Events 84 84 84 84 91(cable Z = 1.08 () 00 30 21 94 145 0.00; Chi ² Z = 1.74 ()	376 ² = 0.92 ² = 0.01 ² = 0.01 ¹ = 0 ¹ 00 ¹ 00 ¹ 00 ¹ 00 ¹ 29 ² = 0.94 ² = 0.94	52 , df = 3 (F 009) .30, df = 1 No Suc: Events 78 78 78 3) 25 21 81 127 , df = 2 (F 3)	376 = 0.82 (P = 0 tion Total 100 100 50 50 50 129 229 = 0.62	100.0%); ² = 0% .58), ² = 0% 22.5% 22.5% 18.2% 18.2% 18.1% 41.2% 77.5%); ² = 0%	1.92 [1.31, 2.81] O% Odds Ratio M-H, Random, 95% CI 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.50 [0.68, 3.31] 1.00 [0.45, 2.21] 1.59 [0.94, 2.70] 1.41 [0.96, 2.07]	Year 2017 2018 2020 2020	O.01 0.1 10 100 Favours Dry suction Favours No suction
(C) C -	Total events Heterogeneity: Tau ² = Test for overall effect Test for subgroup diff cellularity Study or Subgroup 1.5.1 Mixed lesion Bansal 2017 Subtotal (95% CI) Total events Heterogeneity: Not ap Test for overall effect: 1.5.2 Pancreatic lesio Lee 2018 Moreira 2020 Bang 2020 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: Total (95% CI)	88 0.00; Chi ² Z = 3.33 () erences: (Dry Suc Events 84 84 84 84 91icable Z = 1.08 () 00 21 94 145 0.00; Chi ² Z = 1.74 ()	376 ³ = 0.92 ² = 0.01 ² = 0.01 ¹ tion 100 100 ¹ 00 ¹ 00 ² = 0.94 ² = 0.94 ³ = 0.94	52 , df = 3 (F 009) .30. df = 1 No Suc: Events 78 78 78 78 3) 25 21 81 127 , df = 2 (F 3)	376 = 0.82 tion Total 100 100 50 50 50 129 229 = 0.62 329	100.0%); ² = 0% .58), ² = 1 <u>Weight</u> 22.5% 22.5% 18.2% 18.2% 18.1% 41.2% 77.5%); ² = 0% 100.0%	1.92 [1.31, 2.81] O% Odds Ratio M-H, Random, 95% CI 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.50 [0.68, 3.31] 1.00 [0.45, 2.21] 1.59 [0.94, 2.70] 1.41 [0.96, 2.07]	Year 2017 2018 2020 2020	O.01 0.1 10 100 Favours Dry suction Favours No suction 100 M-H, Random, 95% Cl
(C) C -	Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff cellularity Study or Subgroup 1.5.1 Mixed lesion Bansal 2017 Subtotal (95% CI) Total events Heterogeneity: Not ap Test for overall effect: 1.5.2 Pancreatic lesic Lee 2018 Moreira 2020 Bang 2020 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: Total (95% CI) Total events	88 0.00; Chi ² Z = 3.33 () erences: (Dry Succ Events 84 84 84 94 2 = 1.08 () 00 21 94 145 0.00; Chi ² Z = 1.74 () 229	376 ² = 0.92 ² = 0.01 ² = 0.01 ² = 0.01 ¹ 100 ¹ 100 ¹ 100 ¹ 20 ² = 0.94 ² = 0.94 ² = 0.94 ² = 0.94	52 , df = 3 (F 009) .30. df = 1 No Suct Events 78 78 3) 25 21 81 127 , df = 2 (F 3) 205	376 = 0.82 (P = 0 tion Total 100 100 50 50 50 50 52 229 229 229 229 229	100.0% (); ² = 0% (.58), ² = 1 Weight 22.5% 22.5% 18.2% 18.2% 18.1% 41.2% 77.5% (); ² = 0% 100.0%	0% Odds Ratio M-H, Random, 95% CI 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.50 [0.68, 3.31] 1.00 [0.45, 2.21] 1.59 [0.94, 2.70] 1.41 [0.96, 2.07] 1.42 [1.02, 2.00]	Year 2017 2018 2020 2020	Odds Ratio M-H, Random, 95% CI
(C) C -	Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff Study or Subgroup 1.5.1 Mixed lesion Bansal 2017 Subtotal (95% CI) Total events Heterogeneity: Not ap Test for overall effect: 1.5.2 Pancreatic lesi Lee 2018 Moreira 2020 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: Total events Heterogeneity: Tau ² = Test for overall effect: Test for overall effect: Total events Heterogeneity: Tau ² = Test for overall effect: Test for overall e	88 0.00; Chi ² Z = 3.33 () erences: C Dry Succ Events 84 84 84 84 84 84 84 94 2 = 1.08 () 00 21 94 145 0.00; Chi ² Z = 1.74 () 229 0.00; Chi ² Z = 2.05 () erences: C	376 *= 0.92 P = 0.0(Chi [#] = 0 100 100 100 100 100 229 *= 0.94 *= 0.94 *= 0.96 *= 0.96 *= 0.96 *= 0.96 *= 0.96 *= 0.92 *= 0.92	52 , df = 3 (F 009) .30. df = 1 No Suct Events 78 78 78 3) 25 21 81 127 , df = 2 (F 3) 205 , df = 3 (F 4) .01. df = 1	376 (P = 0.82 (P = 0 tion Total 100 100 50 50 50 229 229 229 229 229 229 229 22	100.0% (); ² = 0% (.58), ² = 1 Weight 22.5% 22.5% 18.2% 18.2% 18.2% 18.1% 41.2% 77.5% (); ² = 0% 100.0%); ² = 0%	0% Odds Ratio <u>M-H, Random, 95% CI</u> 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.50 [0.68, 3.31] 1.00 [0.45, 2.21] 1.59 [0.94, 2.70] 1.41 [0.96, 2.07] 1.42 [1.02, 2.00]	Year 2017 2018 2020 2020	Odds Ratio 0.01 0.1 10 100 Favours Dry suction Favours No suction 0.01 0.1 10 100 0.01 0.1 10 100 Favours No suction Favours Dry suction
(C) C - -	Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff cellularity Study or Subgroup 1.5.1 Mixed lesion Bansal 2017 Subtotal (95% CI) Total events Heterogeneity: Not ap Test for overall effect: 1.5.2 Pancreatic lesis Lee 2018 Moreira 2020 Bang 2020 Bang 2020 Bubtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: Total events Heterogeneity: Tau ² = Test for overall effect: Total events Heterogeneity: Tau ² = Test for overall effect: Test for overall effect: Test for overall effect: Test for overall effect: Test for subgroup diff ccuracy	88 0.00; Chi ² Z = 3.33 () erences: 0 Dry Succ Events 84 94 2 = 1.08 () 00 30 21 94 145 0.00; Chi ² Z = 1.74 () 229 0.00; Chi ² Z = 2.05 () erences: 0	376 ² = 0.92 P = 0.0(Chi ^p = 0 100 100 100 100 100 229 ² = 0.94 329 ² = 0.94 ² = 0.96 P = 0.0(329 ² = 0.96 P = 0.0(100 100 100 100 100 100 100 1	52 , df = 3 (F 009) 30. df = 1 No Suc: Events 78 78 78 3) 25 21 81 127 , df = 2 (F 3) 205 , df = 3 (F 4) .01, df = 1	376 = 0.82 (P = 0 tion Total 100 100 500 500 129 229 329 = 0.82 329 = 0.81 (P = 0	100.0% (); ² = 0% (.58), ² = 1 22.5% 22.5% 18.2% 18.1% 41.2% 77.5% (); ² = 0% 100.0% (); ² = 0% (.90), ² = 1	Odds Ratio M-H, Random, 95% CI 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.50 [0.68, 3.31] 1.00 [0.45, 2.21] 1.59 [0.94, 2.70] 1.41 [0.96, 2.07] 1.42 [1.02, 2.00]	Year 2017 2018 2020 2020	Odds Ratio 0.01 0.1 10 100 Favours Dry suction Favours No suction 0dds Ratio M-H, Random, 95% Cl 0.01 0.1 10 100 Favours No suction Favours Dry suction
(C) C - -	Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff cellularity Study or Subgroup 1.5.1 Mixed lesion Bansal 2017 Subtotal (95% CI) Total events Heterogeneity: Not ap Test for overall effect: 1.5.2 Pancreatic lesi Lee 2018 Moreira 2020 Bang 2020 Bang 2020 Bang 2020 Bang 2020 Bang 2020 Bang 2020 For events Heterogeneity: Tau ² = Test for overall effect: Total events Heterogeneity: Tau ² = Test for overall effect: Total events Heterogeneity: Tau ² = Test for overall effect: Test for overall effect: Test for subgroup diff ccuracy Study or Subgroup	88 0.00; Chi ² Z = 3.33 () erences: 0 Dry Suc Events 84 94 94 2 = 1.08 () 00 30 21 94 145 0.00; Chi ² Z = 2.05 () erences: 0 Dry Suc Events	376 $r^{2} = 0.92$ P = 0.00 $Chi^{2} = 0$ 100 100 100 100 100 100 229 $r^{2} = 0.94$ 329 $r^{2} = 0.94$ 329 $r^{2} = 0.96$ $r^{2} = 0.9$	52 , df = 3 (F 009) 30, df = 1 No Suc: Events 78 78 78 78 78 78 78 78 78 78 78 78 78	376 (P = 0.82 (P = 0 tion Total 100 100 50 50 129 229 = 0.62 329 = 0.81 (P = 0 tion Total	100.0% (); ² = 0% (.58), ² = 1 22.5% 22.5% 18.2% 18.1% 41.2% 77.5% (); ² = 0% 100.0%); ² = 0% (.90), ² = 1 Weight	Odds Ratio M-H, Random, 95% CI 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 0.00 [0.68, 3.31] 1.00 [0.68, 3.31] 1.00 [0.45, 2.21] 1.41 [0.96, 2.07] 1.42 [1.02, 2.00] 0% Odds Ratio M-H, Random, 95% CI	Year 2017 2018 2020 2020 Year	Odds Ratio 0.01 0.1 10 Favours Dry suction Favours No suction 0dds Ratio 0.01 0.1 10 0dds Ratio 0.01 0.1 10 Favours No suction 100 0 0 0 100 0 0 100 0 0 100 0 0 100 0 0 100 0 0 0 100 0 0 0 100 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
(C) C - - (D) A -	Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff cellularity Study or Subgroup 1.5.1 Mixed lesion Bansal 2017 Subtotal (95% CI) Total events Heterogeneity: Not ap Test for overall effect: 1.5.2 Pancreatic lesi Lee 2018 Moreira 2020 Bang 2020 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: Total (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff ccuracy Study or Subgroup Bang 2018	88 0.00; Chi ² Z = 3.33 () erences: 0 Dry Succ Events 84 84 plicable Z = 1.08 () on 30 21 94 145 0.00; Chi ² Z = 2.05 () erences: 0 Dry Succ Events 124	376 $r^{2} = 0.92$ P = 0.00 $Chi^{2} = 0$ tion 100 100 P = 0.20 50 50 129 229 $r^{2} = 0.944$ 329 $r^{2} = 0.944$ 329 $r^{2} = 0.94$ 329 $r^{2} = 0.94$ $r^{2} =$	52 , df = 3 (F 009) 30. df = 1 No Suc: Events 78 78 78 78 78 78 78 78 78 78 78 78 78	376 (P = 0.82 (P = 0 tion Total 100 100 50 50 50 129 229 = 0.62 329 = 0.81 (P = 0 129 229 129 (P = 0 100 100 100 100 100 100 100 100 100 1	100.0% (); ² = 0% (.58), ² = 1 22.5% 22.5% 18.2% 18.1% 41.2% 77.5% (); ² = 0% 100.0% (); ² = 0% (.90), ² = 1 Weight 79.3%	Odds Ratio M-H, Random, 95% CI 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.41 [0.96, 2.07] 1.42 [1.02, 2.00] 0% Odds Ratio M-H, Random, 95% CI	Year 2017 2020 2020 2020 <u>Year</u> 2018	Odds Ratio 0.01 0.1 10 100 Favours Dry suction Favours No suction 0dds Ratio M-H, Random, 95% Cl 0.01 0.1 10 100 Favours No suction Favours Dry suction 0dds Ratio M-H, Random, 95% Cl
(C) C - - (D) A -	Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff cellularity Study or Subgroup 1.5.1 Mixed lesion Bansal 2017 Subtotal (95% CI) Total events Heterogeneity: Not ap Test for overall effect: 1.5.2 Pancreatic lesis Lee 2018 Moreira 2020 Bang 2020 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: Total (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff ccuracy Study or Subgroup Bang 2018 Moreira 2020	88 0.00; Chi ² Z = 3.33 () erences: 0 Dry Succ Events 84 84 91 0 cable Z = 1.08 () 0 0 30 21 94 145 0.00; Chi ² Z = 2.05 () erences: 0 Dry Succ Events 124 39	376 ² = 0.92 P = 0.0(Chi ^P = 0 tion Total 100 P = 0.2(50 50 129 229 229 329 ² = 0.946 P = 0.0(329 ² = 0.966 P = 0.0(100 129 229 129 129 129 129 129 129	52 , df = 3 (F 009) 30. df = 1 No Suc Events 78 78 78 78 78 78 78 78 78 78 78 78 78	376 (P = 0.82 (P = 0 tion Total 100 50 50 50 129 229 = 0.62 329 = 0.81 (P = 0 tion Total 100 50 50 100 100 100 100 100	100.0% (); ² = 0% (.58), ² = 1 22.5% 22.5% 18.2% 18.1% 41.2% 77.5% (); ² = 0% 100.0% (); ² = 0% .90), ² = 1 <u>Weight</u> 79.3% 20.7%	Odds Ratio M-H, Random, 95% CI 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 0.44 [0.96, 2.07] 0.44 [0.96, 2.07] 0.44 [0.96, 2.00] 0% Odds Ratio M-H, Random, 95% CI 0.87 [0.55, 1.38] 1.38 [0.55, 3.43]	Year 2017 2020 2020 2020 <u>Year</u> 2018 2020	Odds Ratio 0.01 0.1 10 Favours Dry suction Favours No suction 0.01 0.1 10 0.01 0.1 10 0.01 10 Favours No suction 100 0.01 10 0.01
(C) C - - (D) A -	Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff Sellularity Study or Subgroup 1.5.1 Mixed lesion Bansal 2017 Subtotal (95% CI) Total events Heterogeneity: Not ap Test for overall effect: 1.5.2 Pancreatic lesis Lee 2018 Moreira 2020 Bang 2020 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: Total (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: Test for overall effect: Test for subgroup diff ccuracy Study or Subgroup Bang 2018 Moreira 2020 Total (95% CI) Total events Heterogeneity: Tau ² = Test for subgroup diff ccuracy Study or Subgroup Bang 2018 Moreira 2020 Total events	88 0.00; Chi ² Z = 3.33 () erences: 0 Dry Succ Events 84 84 84 94 2 = 1.08 () on 30 21 94 145 0.00; Chi ² Z = 2.05 () erences: 0 Dry Succ Events 124 39	376 r = 0.92 P = 0.0() $hi^{2} = 0$ 100 129 229 229 229 100 329 100 329 100 100 100 100 100 100 100 100 100 100 100 100 129 229 100 129 229 100 129 229 100 100 100 100 100 100 129 229 1000 1000 1000 1000 1000 1000 1000 1000 10	52 , df = 3 (F 009) .30. df = 1 No Suc: Events 78 78 78 78 78 78 78 78 78 78 78 78 78	376 (P = 0.82 (P = 0 100 100 100 100 100 129 229 229 229 229 229 229 229 229 229	100.0% (); ² = 0% (.58), ² = 1 22.5% 22.5% 18.2% 18.2% 18.1% 41.2% 77.5% (); ² = 0% 100.0% (.90), ² = 1 Weight 79.3% 20.7% 100.0%	Odds Ratio M-H, Random, 95% Cl 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.49 [0.94, 2.70] 1.41 [0.96, 2.07] 1.42 [1.02, 2.00] 0% Odds Ratio M-H, Random, 95% Cl 0.87 [0.55, 1.38] 1.38 [0.55, 3.43] 0.96 [0.63, 1.45]	Year 2017 2020 2020 2020 2020 <u>Year</u> 2018 2020	Odds Ratio 0.01 0.1 Favours Dry suction Favours No suction 0 0 0 0 Ratio M-H, Random, 95% Cl 0.01 0.1 10 100 Favours No suction Favours Dry suction 0 0 0 Ratio M-H, Random, 95% Cl 0 0 0 Ratio 0 0 0 Ratio
(C) C - - (D) A -	Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff Sellularity Study or Subgroup 1.5.1 Mixed lesion Bansal 2017 Subtotal (95% CI) Total events Heterogeneity: Not ap Test for overall effect: 1.5.2 Pancreatic lesis Lee 2018 Moreira 2020 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: Total (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: Total (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect: Test for subgroup diff ccuracy Study or Subgroup Bang 2018 Moreira 2020 Total events Heterogeneity: Tau ² =	88 0.00; Chi ² Z = 3.33 () erences: (Dry Succ Events 84 84 84 84 84 84 84 94 145 0.00; Chi ² Z = 1.74 () 229 0.00; Chi ² Z = 1.74 () 229 0.00; Chi ² Z = 2.05 () erences: (Dry Succ Events 124 39 163 0.00; Chi ²	376 r = 0.92 P = 0.01 hr = 0 100 100 100 100 100 100 100 129 229 r = 0.94 r = 0.94	52 , df = 3 (F 009) .30. df = 1 No Suct Events 78 78 78 3) 25 21 81 127 , df = 2 (F 3) 205 , df = 3 (F 4) .01. df = 1 No Suct Events 129 36 , df = 1 (F	376 (P = 0.82 (P = 0 100 100 100 100 129 229 329 229 329 229 229 229 329 229 2	100.0% (); ² = 0% (.58), ² = 1 22.5% 22.5% 18.2% 18.2% 18.1% 41.2% 77.5% 100.0% (); ² = 0% (.90), ² = 1 Weight 79.3% 20.7% 100.0% (); ² = 0%	Odds Ratio M-H, Random, 95% Cl 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.48 [0.73, 3.02] 1.49 [0.73, 3.02] 0.49 [0.68, 3.31] 0.96 [0.63, 1.45]	Year 2017 2018 2020 2020 2020 2020	Odds Ratio 0.01 0.1 Favours Dry suction Favours No suction 0.01 0.1 Favours Dry suction 95% CI 0.01 0.1 10 100 Favours No suction Favours Dry suction 0.01 0.1 10 100 0.01 0.1 10 100 0.01 10 100 0.01 10 100

Supplementary Figure 2B: Pair-wise meta-analysis for dry suction vs. no suction based on needle type

(A) Adequacy Dry Suction No Suction Odds Ratio Events Total Events Total Weight M-H, Random, 95% CI Year Odds Ratio Study or Subgroup 1.2.1 FNA needle M-H, Random, 95% Cl 100 94 22.3% Bansal 2017 91 100 0.65 [0.22, 1.89] 2017 1.26 [0.49, 3.26] 2018 Lee 2018 40 50 38 50 23.6% Bang 2018 Subtotal (95% CI) 0.92 [0.62, 1.47] 0.92 [0.62, 1.37] 127 176 326 130 176 326 27.7% 73.6% 2018 258 262 Total events Heterogeneity: Tau² = 0.00; Chi² = 0.85, df = 2 (P = 0.65); l² = 0% Test for overall effect: Z = 0.39 (P = 0.69) 1.2.2 FNB needle Paik 2021 Subtotal (95% CI) 75 40 5.82 [3.06, 11.08] 2021 5.82 [3.06, 11.08] 94 94 99 26.4% 99 26.4% Total events 75 Heterogeneity: Not applicable Test for overall effect: Z = 5.36 (P < 0.00001) 40 Total (95% CI) 1.49 [0.53, 4.18] 420 425 100.0% Total events 333 302 There events and the events and the events of the event of the even of the event of the event of the event of the even of t 0.01 0.1 1 1 Favours No suction Favours Dry 10 100 uction (B) Bloodiness **Dry Suction** No Suction Odds Ratio Odds Ratio Study or Subgroup 1.4.1 FNA needle Bansal 2017 Events Total Events Total Weight M-H, Random, 95% CI Year M-H, Rand m, 95% Cl 100 16 31.4% 2.25 [1.13, 4.46] 2017 30 100 Bang 2018 Subtotal (95% CI) 40 176 276 26 176 276 49.4% 80.7% 2018 1.70 [0.98, 2.93] 1.89 [1.24, 2.90] Total events 70 42 Heterogeneity: Tau² = 0.00; Chi² = 0.40, df = 1 (P = 0.53); i² = 0% Test for overall effect: Z = 2.93 (P = 0.003) 1.4.2 FNB needlle 50 3.0% 4.26 [0.46, 39.54] 2018 Lee 2018 50 Moreira 2020 Subtotal (95% Cl) 14 50 100 9 50 100 16.3% 19.3% 1.77 [0.69, 4.58] 2.03 [0.85, 4.86] 2020 Total events 18 10 Heterogeneity: Tau² = 0.00; Chi² = 0.51, df = 1 (P = 0.48); l² = 0% Test for overall effect: Z = 1.59 (P = 0.11) Total (95% CI) 376 376 100.0% 1.92 [1.31, 2.81] 88 Total events 52 0.01 10 100 0.1 Favours Dry suction Favours No suction (C) Cellularity No Sucti Dry Suction Odds Ratio Odds Ratio Study or Subgroup 1.6.1 FNA needle Events Total Events Total Weight M-H, Random, 95% CI Year M-H, Random, 95% Cl Bansal 2017 Subtotal (95% CI) 84 100 100 78 100 100 22.5% 22.5% 1.48 [0.73, 3.02] 2017 1.48 [0.73, 3.02] Total events 84 Heterogeneity: Not applicable Test for overall effect: Z = 1.08 (P = 0.28) 78 1.6.2 FNB needle Lee 2018 Moreira 2020 Bang 2020 Subtotal (95% CI) 18.2% 18.1% 41.2% **77.5**% 1.50 [0.68, 3.31] 2018 1.00 [0.45, 2.21] 2020 1.59 [0.94, 2.70] 2020 **1.41 [0.96, 2.07]** 30 50 25 50 50 21 50 21 129 229 94 81 129 229 145 127 Total events Heterogeneity: Tau² = 0.00; Chi² = 0.94, df = 2 (P = 0.62); I² = 0% Test for overall effect: Z = 1.74 (P = 0.08) Total (95% CI) 329 1.42 [1.02, 2.00] 329 100.0% Total events 229 205 Heterogeneity: Tau² = 0.00; Chi² = 0.96, df = 3 (P = 0.81); I² = 0% Test for overall effect: Z = 2.05 (P = 0.04) Test for subgroup differences: Chi² = 0.01, df = 1 (P = 0.90), I² = 0% 0.1 1 10 Favours No suction Favours Dry suction 0.01 100 (D) Accuracy Dry Suction No Suction Odds Ratio Events Total Events Total Weight M-H, Random, 95% CI Year Odds Ratio Study or Subgroup M-H, Ran lom, 95% Cl Bang 2018 Moreira 2020 176 50 0.87 [0.55, 1.38] 2018 1.38 [0.55, 3.43] 2020 124 129 176 79.3% 20.7% 39 36 50 Total (95% CI) 226 226 100.0% 0.96 [0.63, 1.45] Total events 163 165 Heterogeneity: Tau² = 0.00; Chi² = 0.78, df = 1 (P = 0.38); i² = 0% 0.01 10 100 0.1 Test for overall effect: Z = 0.21 (P = 0.83) Favours No suction Favours Dry suction

Supplementary Figure 3A: Pair-wise meta-analysis for dry suction vs. wet suction based on lesion type

(A) Adequacy Odds Ratio Odds Ratio **Dry suction** Wet suct Study or Subgroup 2.1.1 Mixed lesion Events Total Events Total Weight M-H, Random, 95% CI Year M-H, Random, 95% CI 117 22.2% 100 19.0% 269 22.7% 0.52 [0.27, 1.00] 2015 1.00 [0.38, 2.63] 2017 0.20 [0.11, 0.38] 2020 117 100 Attam 2015 Bansal 2017 88 91 255 19 91 100 269 Wang 2020 212 2.82 [0.64, 12.44] 2021 0.63 [0.24, 1.65] Takasumi 2021 Subtotal (95% CI) 23 26 13.9% 512 77.8% 26 512 Subtrata (95% L1) 512 512 77.8% Total events 414 465 Heterogeneity: Tau^a = 0.72; Chi^a = 15.08, df = 3 (P = 0.002); I^a = 80% Test for overall effect: Z = 0.94 (P = 0.35) 0.15 [0.02, 1.29] 2020 1.23 [0.26, 5.90] 2021 1.23 [0.26, 5.90] 0.49 [0.06, 3.91] Total (95% CI) 582 579 100.0% 0.60 [0.27, 1.34] Total events 474 527 Heterogeneity: Tau² = 0.64; Chi² = 17.70, df = 5 (P = 0.003); l² = 72% Test for overall effect: Z = 1.24 (P = 0.21) Test for subgroup differences: Chi² = 0.05, df = 1 (P = 0.82), l² = 0% 0.002 500 0.1 Favours Wet suction 10 Favours Dry suction (B) Bloodiness Dry suction Wet sucti **Odds Ratio Odds Ratio** M-H, Random, 95% CI Study or Subgroup 2.3.1 Mixed lesion Events Total Events Total Weight M-H, Random, 95% CI Year 117 26.3% 100 24.6% 117 21 Attam 2015 Bansal 2017 18 0.83 [0.42, 1.66] 2015 100 269 **486** 4.33 [1.93, 9.72] 2017 1.00 [0.35, 2.89] 2020 1.54 [0.52, 4.58] 30 7 9 7 Wang 2020 Subtotal (95% Cl) 269 20.9% 486 71.7% 55 Total events 37 Total events 55 37 Heterogeneity: Tau² = 0.73; Chi² = 10.05, df = 2 (P = 0.007); i² = 80% Test for overall effect: Z = 0.78 (P = 0.43) 2.3.2 Pancreatic lesion 22 1 3.58 [1.44, 8.91] 2020 2.69 [0.10, 70.49] 2021 **3.51 [1.46, 8.44]** 50 23.0% 17 5.2% 67 28.3% Tong 2020 Ladd 2021 Subtotal (95% CI) 50 9 0 20 70 Total events 23 9 Heterogeneity: Tau² = 0.00; Chi² = 0.03, df = 1 (P = 0.87); i² = 0% Test for overall effect: Z = 2.80 (P = 0.005) Total (95% CI) 556 553 100.0% 1.93 [0.85, 4.36] Total events 78 46 Heterogeneity: Tau² = 0.54; Chi² = 12.81, df = 4 (P = 0.01); i² = 69% Test for overall effect: Z = 1.58 (P = 0.11) Test for subgroup differences: Chi² = 1.32, df = 1 (P = 0.25), i² = 24.5% 0.005 200 0.1 1 10 Favours Dry suction Favours Wet suction (C) Cellularity Dry suction Wet suction **Odds Ratio** Odds Ratio Study or Subgroup 2.5.1 Mixed lesion Events Total Events Total Weight M-H, Random, 95% CI Year M-H, Rando m, 95% CI
 117
 21.6%

 100
 20.1%

 269
 21.0%

 26
 16.1%

 512 78.8%
 117 100 269 0.38 [0.23, 0.65] 2015 1.23 [0.59, 2.56] 2017 0.20 [0.11, 0.38] 2020 Attam 2015 Bansal 2017 52 79 81 84 Wang 2020 212 255 16 Takasumi 2021 Subtotal (95% CI) 20 26 512 2.08 [0.62, 6.96] 2021 0.61 [0.24, 1.55] 368 431 Total events ogeneity: Tau² = 0.74; Chi² = 20.19, df = 3 (P = 0.0002); l² = 85% Test for overall effect: Z = 1.03 (P = 0.30) 2.5.2 Pancreatic lesion Tong 2020 Ladd 2021 Subtotal (95% CI) 0.15 [0.02, 1.29] 2020 3.75 [0.62, 22.58] 2021 **0.79 [0.03, 19.18]** 50 50 9.5% 49 12 18 20 70 17 11.7% 67 21.2% $\begin{array}{l} \mbox{Total events} & 62 & 61 \\ \mbox{Heterogeneity: } Tau^a = 4.27; \mbox{ Chi}^a = 5.17, \mbox{ df} = 1 \ (P = 0.02); \mbox{ i}^a = 81\% \\ \mbox{Test for overall effect: } Z = 0.14 \ (P = 0.89) \end{array}$ Total (95% CI) 582 0.67 [0.28, 1.58] 579 100.0%
 Total (95% CI)
 582
 579
 100.0%

 Total events
 430
 492

 Heterogeneity: Tau² = 0.83; Chi² = 26.39, df = 5 (P < 0.0001); i² = 81%

 Test for overall effect: Z = 0.92 (P = 0.36)

 Test for subgroup differences: Chi² = 0.02, df = 1 (P = 0.88), i² = 0%
 0.002 0.1 Favours Wet suction 500 10 Favours Dry suction (D) Accuracy Odds Ratio Odds Rat Dry sucti
 Dry suction
 Weet suction
 Odds Natio

 Events
 Total
 Events
 Total
 Weight
 M-H, Random, 95% CI
 Year

 45
 50
 46
 50
 9.4%
 0.78 (0.20, 3.10)
 2020
 M-H, Random, 95% CI Study or Subgroup 50 269 13 50 9.4% 269 87.8% 13 2.8% Tong 2020 0.77 [0.49, 1.21] 2020 0.46 [0.04, 5.79] 2021 Wang 2020 Takasumi 2021 218 228 12 11 332 100.0% Total (95% CI) 332 0.76 [0.50, 1.16]
 Total events
 274
 286

 Heterogeneity: Tau² = 0.00; Chi² = 0.16, df = 2 (P = 0.92); I² = 0%
 Test for overall effect Z = 1.28 (P = 0.20)

0.01 0.1 1 10 Favours Dry suction Favours Wet suction

100

Supplementary Figure 3B: Pair-wise meta-analysis for dry suction vs. wet suction based on needle type

(A) Adequacy Dry suction Wet suc Events Total Events tion Odds Ratio Total Weight M-H, Random, 95% Cl Yea Odds Ratio om, 95% Cl Study or Subgroup 2.2.1 FNA needle 2.2.1 FNA needle Attam 2015 Bansal 2017 Wang 2020 Takasumi 2021 Subtotal (95% CI) 22.2% 19.0% 22.7% 13.9% **77.8**% 0.52 [0.27, 1.00] 1.00 [0.38, 2.63] 0.20 [0.11, 0.38] 2.82 [0.64, 12.44] **0.63 [0.24, 1.65]** 117 100 269 26 **512** 2015 2017 2020 2021 88 91 212 23 100 91 255 19 117 117 100 269 26 512 Total events 414 465 Heterogeneity: Tau² = 0.72; Chi² = 15.08, df = 3 (P = 0.002); l² = 80% Test for overall effect: Z = 0.94 (P = 0.35) 2.2.2 FNB needle Tong 2020 Ladd 2021 Subtotal (95% CI) 44 16 0.15 [0.02, 1.29] 1.23 [0.26, 5.90] 0.49 [0.06, 3.91] 50 50 17 67 9.1% 13.1% **22.2**% 49 13 2020 2021 20 70 60 Total events 60 62 Heterogeneity: Tau² = 1,36; Chi² = 2,47, df = 1 (P = 0,12); l² = 60% Test for overall effect: Z = 0.67 (P = 0.50) Total (95% CI) 582 0.60 [0.27, 1.34] 579 100.0%
 Total events
 474
 527

 Heterogeneity: Tau^a = 0.64; Chi^a = 17.70, df = 5 (P = 0.003); l^a = 72%, Test for overall effect: Z = 1.24 (P = 0.21)
 Test for subarous differences: Chi^a = 0.05, df = 1 (P = 0.82), l^a = 0%
 474 0.002 500 0.1 1 10 Favours Wet suction Favours Dry suction (B) Bloodiness Odds Ratio M-H, Random, 9 Dry suction Wet suction Odds Ratio Events Total Events Total Weight M-H, Random, 95% CI Year om, 95% Cl Study or Subgroup 2.4.1 FNA needle 21 9 7 Attam 2015 Bansal 2017 Wang 2020 Subtotal (95% CI) 117 100 269 **486** 117 26.3% 100 24.6% 269 20.9% **486 71.7**% 0.83 [0.42, 1.66] 4.33 [1.93, 9.72] 1.00 [0.35, 2.89] **1.54 [0.52, 4.58]** 2015 2017 2020 18 30 7 Total events 55 37 Heterogeneity: Tau^a = 0.73, Chi^a = 10.05, df = 2 (P = 0.007); l^a = 80% Test for overall effect: Z = 0.78 (P = 0.43) 2.4.2 FNB needle Tong 2020 Ladd 2021 Subtotal (95% CI) 50 23.0% 17 5.2% 67 28.3% 3.58 [1.44, 8.91] 2020 2.69 [0.10, 70.49] 2021 **3.51 [1.46, 8.44]** 50 22 1 9 0 20 70 Total events 23 9 Heterogeneity: Tau^a = 0.00; Chi^a = 0.03, df = 1 (P = 0.87); I^a = 0% Test for overall effect: Z = 2.80 (P = 0.005) Total (95% CI) 556 1.93 [0.85, 4.36] 553 100.0%
 Total events
 78
 46

 Heterogeneity:
 Tau² = 0.54; Chi² = 12.81, df = 4 (P = 0.01); l² = 69%

 Test for overall effect:
 Z = 1.58 (P = 0.11)

 Test for subaroup differences:
 Chi² = 1.32, df = 1 (P = 0.25); l² = 24.5%
 0.005 200 0.1 1 10 Favours Dry suction Favours Wet suction (C) Cellularity Dry suction Wet suction Odds Ratio Events Total Events Total Weight M-H, Random, 95% CI Year Odds Ratio M-H, Random, 95% Cl Study or Subgroup 2.6.1 FNA needle 117 21.6% 100 20.1% 269 21.0% 26 16.1% 512 78.8% 0.38 [0.23, 0.65] 2015 1.23 [0.59, 2.56] 2017 0.20 [0.11, 0.38] 2020 2.08 [0.62, 6.96] 2021 0.61 [0.24, 1.55] 52 117 79 Attam 2015 Bansal 2017 84 212 20 81 255 16 100 269 Wang 2020 Takasumi 2021 Subtotal (95% CI) 2.08 [0.62, 6.96] 0.61 [0.24, 1.55] 26 512
 Subtrati (95% L)
 512

 Total events
 368
 431

 Heterogeneity: Tau² = 0.74; Chi² = 20.19, df = 3 (P
 7

 Test for overall effect: Z = 1.03 (P = 0.30)
 8
 = 0.0002); I^z = 85% 2.6.2 FNB needle Tong 2020 Ladd 2021 Subtotal (95% CI) 50 9.5% 17 11.7% 67 21.2% 0.15 [0.02, 1.29] 2020 3.75 [0.62, 22.58] 2021 **0.79 [0.03, 19.18]** 44 18 50 20 70 49 12 Total events 62 61 Heterogeneity: Tau^a = 4.27; Chi^a = 5.17, df = 1 (P = 0.02); l^a = 81% Test for overall effect: Z = 0.14 (P = 0.89) Total (95% CI) 582 579 100.0% 0.67 [0.28, 1.58]
 Total events
 582
 579
 Totulow

 Total events
 430
 492

 Heterogeneity: Tau² = 0.83; Chi² = 26.39, df = 5 (P < 0.0001); I² = 81%

 Test for overall effect: Z = 0.92 (P = 0.36)

 Test for subgroup differences: Chi² = 0.02, df = 1 (P = 0.88), I² = 0%
 0.002 0.1 1 10 Favours Wet suction Favours Dry suction 500 (D) Accuracy Dry suc Odds Ratio Odds Ra Events Total Events Total Weight M-H, Random, 95% CI Year Study or Subgroup M-H, Random, 95% Cl 0.78 [0.20, 3.10] 2020 0.77 [0.49, 1.21] 2020 0.46 [0.04, 5.79] 2021 Tong 2020 45 50 269 46 9.4% Wang 2020 Takasumi 2021 228 269 87.8% 13 2.8% 218 11 13 12 Total (95% CI) 0.76 [0.50, 1.16] 332 332 100.0%
 Total events
 274
 286

 Heterogeneity: Tau² = 0.00; Chi² = 0.16, df = 2 (P = 0.92); i² = 0%

 Test for overall effect: Z = 1.28 (P = 0.20)
 0.01 100 0.1 1 10 Favours Dry suction Favours Wet suction

Supplementary Figure 4: Pair-wise meta-analysis for dry suction vs. stylet slow pull based on needle type

	Dry suctio	on	Stylet slow	v pull		Odds Ratio		Odds Ratio
3.2.1 ENA poodlo	Events T	otal	Events	Total	Weight	M-H, Random, 95% CI	Year	M-H, Random, 95% Cl
3.2.1 FNA needle	24	20	24	30	19 7%	1 20 10 22 4 471	2017	
Saxena 2018	45	60	53	61	26.2%	0.45 [0.18, 1.17]	2018	
Subtotal (95% CI)		89		91	44.9%	0.66 [0.26, 1.67]		-
Total events	69		77					
Heterogeneity: Tau ² = Test for overall effect: 3	0.13; Chi ² = Z = 0.88 (P =	: 1.39, = 0.38	, df = 1 (P = 3)	0.24); F	² = 28%			
3.2.2 FNB needle	40	50	45	50	21 696	0.4410.14.1.411	201.0	
Ladd 2021	16	20	11	18	16.6%	2.55 [0.60, 10.84]	2010	
Zhou 2021	57	60	50	56	16.8%	2.28 [0.54, 9.59]	2021	
Subtotal (95% CI)		130		124	55.1%	1.28 [0.39, 4.15]		-
Total events Heterogeneity: Tau² = Test for overall effect: :	113 0.62; Chi≇ = Z = 0.41 (P =	4.63, = 0.68	106 , df= 2 (P = 3)	0.10); F	= 57%			
Total (95% CI)		219		215	100.0%	0.95 [0.45, 1.99]		-
Total events	182		183					
Heterogeneity: Tau ² = Test for overall effect: 2 Test for subgroup diffe	0.31; Chi ² = Z = 0.14 (P =	7.19, = 0.89	df = 4 (P = 3) 74 df = 1 ()	0.13); F	a = 44%			0.01 0.1 1 10 Favours Stylet slow pull Favours Dry suction
Bloodiness	siences. on	1 - 0.		- 0.58	i), i = 0 %			
	Dry suctio	n	Stylet slow	v pull		Odds Ratio		Odds Ratio
Study or Subgroup	Events T	otal	Events	Total	Weight	M-H, Random, 95% CI	Year	M-H, Random, 95% Cl
Lee 2018	4	50	4	50	83.6%	1 00 00 24 4 241	2018	
Ladd 2021	1	20	0	18	16.4%	2.85 [0.11, 74.38]	2021	— —
Subtotal (95% CI)		70		68	100.0%	1.19 [0.32, 4.45]		-
Total events	5		4	_				
Heterogeneity: Tau ² = Test for overall effect: 2	0.00; Chi ^z = Z = 0.25 (P =	: 0.33, = 0.80	, df = 1 (P =))	0.56); P	*= 0%			
Total (95% CI)		70		68	100.0%	1.19 [0.32, 4.45]		-
Total events	5		4					
Heterogeneity: Tau ² =	$0.00; Chi^2 = 7 = 0.25 /P = 10.00$	0.33,	df = 1 (P = 1)	0.56); P	'= 0%			0.002 0.1 1 10
Test for subgroup diffe	z = 0.25 (P = erences: No	t appl	licable					Favours Stylet slow pull Favours Dry suction
Cellularity	51611065.140	appi	licable					
Chuche or Cucherrown	Dry suctio	n	Stylet slov	v pull	Mainht	Odds Ratio	Vear	Odds Ratio
Study of Subdroup	Events 1	otai	Events	Total	weight	M-H, Random, 95% CI	rear	M-H, Kandom, 95% CI
3.9.1 ENA needle								
3.8.1 FNA needle Weston 2017	24	29	24	30	17.3%	1 20 10 32 4 471	2017	
3.8.1 FNA needle Weston 2017 Cheng 2019	24 26	29 44	24 20	30 44	17.3%	1.20 [0.32, 4.47] 1.73 [0.74, 4.03]	2017 2019	
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% Cl)	24 26	29 44 73	24 20	30 44 74	17.3% 22.9% 40.1 %	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17]	2017 2019	
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events	24 26 50	29 44 73	24 20 44	30 44 74	17.3% 22.9% 4 0.1 %	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17]	2017 2019	•
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% Cl) Total events Heterogeneity: Tau ² = Test for overall effect 2	24 26 50 0.00; Chi [#] = Z = 1.22 (P =	29 44 73 0.21, = 0.22	24 20 44 df = 1 (P =	30 44 74 0.64); F	17.3% 22.9% 40.1 %	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17]	2017 2019	
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% Ct) Total events Heterogeneity: Tau ² = Test for overall effect 2 3.8.2 FNB needle	24 26 50 0.00; Chi ^a = Z = 1.22 (P =	29 44 73 : 0.21, = 0.22	24 20 , df = 1 (P = 2)	30 44 74 0.64); F	17.3% 22.9% 40.1 %	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17]	2017 2019	*
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity: Tau ^a = Test for overall effect : 3.8.2 FNB needle Lee 2018	24 26 50 0.00; Chi ^a = Z = 1.22 (P = 40	29 44 73 : 0.21, = 0.22	24 20 , df = 1 (P = 2) 45	30 44 74 0.64); F 50	17.3% 22.9% 40.1 % ² = 0% 19.1%	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41]	2017 2019 2018	
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity: Tau ^a = Test for overall effect ; 3.8.2 FNB needle Lee 2018 Bang 2020	24 26 50 0.00; Chi [#] = Z = 1.22 (P = 40 94	29 44 73 = 0.21, = 0.22 50 129	24 20 , df = 1 (P = 2) 45 115	30 44 74 0.64); F 50 129	17.3% 22.9% 40.1 % *= 0% 19.1% 24.9%	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64]	2017 2019 2018 2018 2020	
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity: Tau [#] = Test for overall effect : 3.8.2 FNB needle Lee 2018 Bang 2020 Ladd 2021 Subtotal (95% CI)	24 26 50 0.00; Chi≇ = Z = 1.22 (P = 40 94 16	29 44 73 = 0.21, = 0.22 50 129 20 199	24 20 , df = 1 (P = 2) 45 115 11	30 44 74 0.64); F 50 129 18 197	17.3% 22.9% 40.1% '= 0% 19.1% 24.9% 15.9% 59.9%	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86]	2017 2019 2018 2020 2021	
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.8.2 FNB needle Lee 2018 Bang 2020 Ladd 2021 Subtotal (95% CI) Total events	24 26 50 0.00; Chi≇ = Z = 1.22 (P = 40 94 16 150	29 44 73 = 0.21, = 0.22 50 129 20 199	24 20 , df = 1 (P = 45 115 11 171	30 44 74 0.64); F 50 129 18 197	17.3% 22.9% 40.1% '= 0% 19.1% 24.9% 15.9% 59.9%	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86]	2017 2019 2018 2020 2021	
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity. Tau ² = Test for overall effect : 3.8.2 FNB needle Lee 2018 Bang 2020 Ladd 2021 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect :	24 26 50 0.00; Chi≇ = Z = 1.22 (P = 40 94 16 150 0.63; Chi≇ = Z = 0.85 (P =	29 44 73 = 0.21, = 0.22 50 129 20 199 = 6.34, = 0.40	24 20 4f = 1 (P = 2) 45 115 11 171 , df = 2 (P = 3)	30 44 74 0.64); F 50 129 18 197 0.04); F	17.3% 22.9% 40.1% '= 0% 19.1% 24.9% 15.9% 59.9% '= 68%	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86]	2017 2019 2018 2020 2021	
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.8.2 FNB needle Lee 2018 Bang 2020 Ladd 2021 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : Total (95% CI)	24 26 0.00; Chi™ = Z = 1.22 (P = 40 94 16 150 0.63; Chi™ = Z = 0.85 (P =	29 44 73 : 0.21, 50 129 20 199 : 6.34, = 0.40 272	24 20 44 (df = 1 (P = 2) 45 115 11 171 (df = 2 (P = 3))	30 44 74 0.64); F 50 129 18 197 0.04); F 271	17.3% 22.9% 40.1% *= 0% 19.1% 24.9% 15.9% 59.9% *= 68% 100.0%	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86]	2017 2019 2018 2020 2021	
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect 2 3.8.2 FNB needle Lee 2018 Bang 2020 Ladd 2021 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect 2 Total (95% CI) Total events Heterogeneity: Tau ² = Total (95% CI) Total events	24 26 50 0.00; Chi [#] = Z = 1.22 (P = 40 94 16 150 0.63; Chi [#] = Z = 0.85 (P = 200	29 44 73 : 0.21, = 0.22 50 129 20 199 : 6.34, = 0.40 272	24 20 44 45 115 11 45 115 11 , df = 2 (P =	30 44 74 0.64); F 50 129 18 197 0.04); F 271	17.3% 22.9% 40.1% *= 0% 19.1% 24.9% 15.9% 59.9% *= 68% 100.0%	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86]	2017 2019 2018 2020 2021	
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% Cl) Total events Heterogeneity: Tau ²² = Test for overall effect : 3.8.2 FNB needle Lee 2018 Bang 2020 Ladd 2021 Subtotal (95% Cl) Total events Heterogeneity: Tau ²² = Test for overall effect : Total events Heterogeneity: Tau ²² = Test for overall effect : Test for subarroun diffect : Test for subarroun diffect :	24 26 0.00; Chiª = Z = 1.22 (P = 40 94 16 0.63; Chiª = Z = 0.85 (P = 200 0.63; Chiª = Z = 0.29 (P = remences: Ch	29 44 73 0.21, = 0.22 50 129 20 199 6.34, = 0.40 272 : 13.5 ² = 0.77	24 20 44 45 115 11 45 115 11 , df = 2 (P =)) 215 5, df = 4 (P) 90, df = 1 0	30 44 74 0.64); F 50 129 18 197 0.04); F 271 = 0.009 P = 0.17	17.3% 22.9% 40.1% *= 0% 19.1% 24.9% 15.9% 59.9% *= 68% 100.0% ;; *= 709	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86] 0.88 [0.38, 2.05] 6	2017 2019 2018 2020 2021	0.01 0.1 10 Favours Stylet slow pull Favours Dry suction
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events Heterogeneily: Tau ^a = Test for overall effect 2 3.8.2 FNB needle Lee 2018 Bang 2020 Ladd 2021 Subtotal (95% CI) Total events Heterogeneily: Tau ^a = Test for overall effect 2 Total (95% CI) Total events Heterogeneity: Tau ^a = Test for overall effect 2 Test for osubgroup diffe Accuracy	24 26 50 0.00; Chi [#] = Z = 1.22 (P = 40 94 16 150 0.63; Chi [#] = 200 0.63; Chi [#] = 200 0.63; Chi [#] = 200 0.63; Chi [#] = Z = 0.29 (P = erences: Ch	29 44 73 : 0.21, 50 129 20 199 : 6.34, = 0.40 272 : 13.5% = 0.77 i ² = 1.	24 20 df = 1 (P = 45 115 11 171 df = 2 (P =)) 215 5, $df = 4$ (P- ') 90, $df = 1$ ()	30 44 74 0.64); F 50 129 18 197 0.04); F 271 = 0.009 P = 0.17	17.3% 22.9% 40.1% *= 0% 19.1% 24.9% 15.9% 59.9% *= 68% 100.0% ;; !*= 709 ;), !*= 47.	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86] 0.88 [0.38, 2.05] 6	2017 2019 2018 2020 2021	0.01 0.1 10 Favours Stylet slow pull Favours Dry suction
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.8.2 FNB needle Lee 2018 Bang 2020 Ladd 2021 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : Total (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : Test for overall effect : Test for subgroup diffe Accuracy	24 26 50 0.00; Chi [#] = Z = 1.22 (P = 40 94 16 150 0.63; Chi [#] = Z = 0.85 (P = 200 0.63; Chi [#] = Z = 0.29 (P = erences: Ch	29 44 73 0.21, = 0.22 50 129 20 199 6.34, = 0.40 272 : 13.5? = 0.77 i ² = 1.	24 20 44 45 115 11 df = 1 (P = 2) 215 5, df = 4 (P = 2) 90, df = 1 (I Stylet slov	300 44 74 0.64); F 50 129 18 197 0.04); F 271 = 0.009 P = 0.17 v pull	17.3% 22.9% 40.1% *= 0% 19.1% 24.9% 15.9% 59.9% *= 68% 100.0% ;; !*= 709 ;), !*= 47.	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86] 0.88 [0.38, 2.05] 6 2% Odds Ratio	2017 2019 2018 2020 2021	0.01 0.1 Favours Stylet slow pull Favours Dry suction
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.8.2 FNB needle Lee 2018 Bang 2020 Ladd 2021 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : Total events Heterogeneity: Tau ² = Test for overall effect : Total events Heterogeneity: Tau ² = Test for overall effect : Total events Heterogeneity: Tau ² = Test for subgroup diffe Accuracy Subgroup	24 26 50 0.00; Chi [#] = Z = 1.22 (P = 40 94 94 15 150 0.63; Chi [#] = 200 0.63; Chi [#] = 220 0.63; Chi [#] = 200 0.63; Chi [#] = 200 0.64; Chi [#] = 200 0.65; Ch	29 44 73 : 0.21, = 0.22 50 129 20 199 : 6.34, = 0.40 272 : 13.5? = 0.77 i ² = 1. on fotal	$\begin{array}{c} 24\\ 20\\ 44\\ df=1\ (P=\\ ?)\\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ $	30 44 74 0.64); F 50 129 18 197 0.04); F 271 = 0.009 P = 0.17 V pull Total	17.3% 22.9% 40.1% *= 0% 19.1% 24.9% 15.9% *= 68% 100.0% 0; !*= 709 0; !*= 47. Weight	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86] 0.88 [0.38, 2.05] 6 2% Odds Ratio M-H, Random, 95% CI	2017 2019 2018 2020 2021 Year	0.01 0.1 10 Favours Stylet slow pull Favours Dry suction Odds Ratio M-H, Random, 95% Cl
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity, Tau ² = Test for overall effect : 3.8.2 FNB needle Lee 2018 Bang 2020 Ladd 2021 Subtotal (95% CI) Total events Heterogeneity, Tau ² = Test for overall effect : Total (95% CI) Total events Heterogeneity, Tau ² = Test for overall effect : Test for overall effect : Test for overall effect : Test for overall effect : Subty or Subgroup diffe Accuracy Savena 2018	24 26 50 0.00; Chi≇= Z = 1.22 (P = 40 94 16 150 0.63; Chi≇= Z = 0.85 (P = 200 0.63; Chi≇= 200 0.63; Chi≇= Z = 0.29 (P = rences: Ch Dry suctio Events T 42	29 44 73 : 0.21, = 0.22 50 129 20 199 : 6.34, = 0.40 272 : 13.5? = 0.77 i ² = 1. on fotal 60	24 20 44 df = 1 (P = 2) 45 115 11 171 df = 2 (P = 3) 215 5, df = 4 (P 2) 90, df = 1 (0 Stylet slov Events 49	30 44 74 0.64); F 50 129 18 197 0.04); F 271 271 271 271 0 0 0 0 0 0 0 0 1 1 1 0 1 1 1 1 1 1 1 1 1 1	17.3% 22.9% 40.1% *= 0% 19.1% 24.9% 15.9% 59.9% *= 68% 100.0% ; * = 709 ;), * = 47. Weight 40.5%	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86] 0.88 [0.38, 2.05] 6 2% Odds Ratio M-H, Random, 95% CI 0.57 [0.25, 1.32]	2017 2019 2018 2020 2021 Year 2018	0.01 0.1 10 Favours Stylet slow pull Favours Dry suction Odds Ratio M-H, Random, 95% Cl
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% Cl) Total events Heterogeneity, Tau ² = Test for overall effect : 3.8.2 FNB needle Lee 2018 Bang 2020 Ladd 2021 Subtotal (95% Cl) Total events Heterogeneity, Tau ² = Test for overall effect : Total (95% Cl) Total events Heterogeneity, Tau ² = Test for subgroup diffe Accuracy Study or Subgroup 3.6.1 FNA needle Saxena 2018 Cheng 2019	24 26 50 0.00; Chi≇= Z = 1.22 (P = 40 94 16 150 0.63; Chi [#] = Z = 0.85 (P = 200 0.63; Chi [#] = 2 = 0.29 (P = erences: Ch Dry suctio Events T 42 42	$\begin{array}{c} 29\\ 44\\ 73\\ \hline \\ 60.21\\ = 0.22\\ 50\\ 129\\ 20\\ 199\\ \hline \\ 6.34\\ = 0.40\\ 272\\ \hline \\ 13.56\\ = 0.77\\ \hline \\ 13.56\\ = 0.77\\ \hline \\ 13.56\\ = 0.40\\ 272\\ \hline \\ 13.56\\ = 0.40\\ \hline \\ 0.40\\ \hline \\ 0.44\\ \hline \end{array}$	24 20 44 45 115 11 171 4f = 2 (P =)) 215 5, df = 4 (P)) 90, df = 1 (I Stylet slov Events 49 41	30 44 74 0.64); F 50 129 18 197 0.04); F 271 0.04); F 271 271 0.009 P = 0.17 Total 61 44	17.3% 22.9% 40.1% '= 0% 19.1% 24.9% 15.9% 59.9% i= 68% 100.0% ; I" = 709), I" = 47. Weight 40.5% 11.8%	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86] 0.88 [0.38, 2.05] 6 2% Odds Ratio M-H, Random, 95% CI 0.57 [0.25, 1.32] 1.54 [0.24, 9.68]	2017 2019 2018 2020 2021 Year 2018 2020 2021	0.01 0.1 10 Favours Stylet slow pull Favours Dry suction M-H, Random, 95% Cl
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% Cl) Total events Heterogeneity, Tau ² = Test for overall effect : 3.8.2 FNB needle Lee 2018 Bang 2020 Ladd 2021 Subtotal (95% Cl) Total events Heterogeneity, Tau ² = Test for overall effect : Total (95% Cl) Total events Heterogeneity, Tau ² = Test for subgroup diffe Accurracy Study or Subgroup 3.6.1 FNA needle Savena 2018 Cheng 2019 Subtotal (95% Cl)	24 26 50 0.00; Chi [#] = Z = 1.22 (P = 40 94 16 150 0.63; Chi [#] = 200 0.63; Chi [#] = 200 0.63; Chi [#] = 200 0.63; Chi [#] = 200 0.63; Chi [#] = 42 42 42	29 44 73 0.21, = 0.22 50 129 20 199 : 6.34, = 0.40 272 : 13.54 = 0.77 j ² = 1. on total 60 44	24 20 44 45 115 11 171 df = 2 (P =)) 215 5, df = 4 (P)) 90, df = 1 () Events 49 41	30 44 74 0.64); F 50 129 18 197 0.04); F 271 271 271 271 271 271 271 1 271 1 1 1 1 1 1 1 1 1 	17.3% 22.9% 40.1% 19.1% 24.9% 15.9% 59.9% 100.0% b; P = 709 b; P = 47. Weight 40.5% 52.3%	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86] 0.88 [0.38, 2.05] 6 2% Odds Ratio M-H, Random, 95% CI 0.57 [0.25, 1.32] 1.54 [0.24, 9.68] 0.68 [0.32, 1.45]	2017 2019 2018 2020 2021 Year 2018 2019	0.01 0.1 10 Favours Stylet slow pull Favours Dry suction Odds Ratio M-H, Random, 95% Cl
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.8.2 FNB needle Lee 2018 Bang 2020 Ladd 2021 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : Total (95% CI) Total events Heterogeneity: Tau ² = Test for subgroup 3.6.1 FNA needle Saxena 2018 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : Total events Heterogeneity: Tau ² = Test for overall effect : Total events Heterogeneity: Tau ² = Test for overall effect : Test for overall effect : Heterogeneity: Tau ² =	24 26 50 0.00; Chi [#] = Z = 1.22 (P = 40 94 16 150 0.63; Chi [#] = 200 0.63; Chi [#] = 200 0.63; Chi [#] = 200 0.63; Chi [#] = 42 42 42 42 42 15 15 15 15 15 15 15 15 15 15	29 44 73 :0.21, 50 129 20 199 :6.34, = 0.40 272 :13.56 = 0.77 i ² = 1. on total 60 44 104 :0.92, = 0.32	24 20 44 45 115 11 df = 1 (P = 2) 215 5, df = 4 (P = 2) 90, df = 1 (I Events 49 41 90 df = 1 (P = 2)	30 44 74 0.64); F 50 129 18 197 0.04); F 271 271 271 271 271 271 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771 771	17.3% 22.9% 40.1% = 0% 19.1% 24.9% 15.9% 59.9% 100.0%); I*= 709); I*= 47. Weight 40.5% 11.8% 52.3%	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86] 0.88 [0.38, 2.05] 6 2% Odds Ratio M-H, Random, 95% CI 0.57 [0.25, 1.32] 1.54 [0.32, 1.45]	2017 2019 2018 2020 2021 <u>Year</u> 2018 2019	0.01 0.1 Favours Stylet slow pull Favours Dry suction
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.8.2 FNB needle Lee 2018 Bang 2020 Ladd 2021 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : Total (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : Subty or Subgroup 3.6.1 FNA needle Sauena 2018 Cheng 2019 Subty al (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.6.1 FNA needle Subty al (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.6.2 FNB needle	$\begin{array}{c} 24\\ 26\\ 50\\ 0.00; \ Chi^{a}=\\ Z=1,22 \ (P=\\ 40\\ 94\\ 16\\ 150\\ 0.63; \ Chi^{a}=\\ Z=0.85 \ (P=\\ 200\\ 0.63; \ Chi^{a}=\\ Z=0.29 \ (P=\\ chi^{a}=\\ 200\\ 0.63; \ Chi^{a}=\\ 220\\ 0.63; \ Chi^{a}=\\ 24\\ 42\\ 42\\ 42\\ 84\\ 0.00; \ Chi^{a}=\\ Z=1,00 \ (P=\\ 22\\ Z=1,00 \ (P=\\ 2$	$\begin{array}{c} 29\\ 44\\ 73\\ \hline\\ 50\\ 129\\ 20\\ 199\\ \hline\\ 6.34, \\ = 0.40\\ 272\\ \hline\\ 13.52\\ = 0.77\\ j^2 = 1.\\ \hline\\ 60\\ 44\\ 104\\ \hline\\ 6.92, \\ = 0.32\\ \end{array}$	$\begin{array}{c} 24\\ 20\\ 44\\ 20\\ 4f = 1 \ (P = 2)\\ 115\\ 11\\ 171\\ df = 2 \ (P = 2)\\ 0, df = 1 \ (P = 2)\\ 0, df = 1 \ (P = 2)\\ 49\\ 41\\ 90\\ df = 1 \ (P = 2)\\ 0 \end{array}$	$\begin{array}{c} 30\\ 44\\ 74\\ 0.64); F\\ 50\\ 129\\ 18\\ 197\\ 0.04); F\\ 271\\ 0.04); F\\ 0.04); F\\ 0.04); F\\ 0.04); F\\ 0.034); F\\ \end{array}$	17.3% 22.9% 40.1% = 0% 19.1% 24.9% 15.9% 59.9% 100.0%); I* = 709 0; I* = 709); I* = 47. Weight 40.5% 52.3%	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86] 0.88 [0.38, 2.05] 6 2% Odds Ratio M-H, Random, 95% CI 0.57 [0.25, 1.32] 1.54 [0.32, 1.45]	2017 2019 2018 2020 2021 Year 2018 2019	0.01 0.1 Favours Stylet slow pull Favours Dry suction
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity, Tau ² = Test for overall effect : 3.8.2 FNB needle Lee 2018 Bang 2020 Ladd 2021 Subtotal (95% CI) Total events Heterogeneity, Tau ² = Test for overall effect : Total (95% CI) Total events Heterogeneity, Tau ² = Test for subgroup 3.6.1 FNA needle Saxena 2018 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity, Tau ² = Test for subgroup 3.6.1 FNA needle Saxena 2018 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity, Tau ² = Test for overall effect : 3.6.2 FNB needle DiMitri 2019	24 26 50 0.00; Chi [#] = Z = 1.22 (P = 40 94 15 150 0.63; Chi [#] = Z = 0.85 (P = 200 0.63; Chi [#] = Z = 0.29 (P = erences: Ch Dry suction Events T 42 42 84 0.00; Chi [#] = Z = 1.00 (P = 53	$\begin{array}{c} 29\\ 44\\ 73\\ 60.21,\\ =0.22\\ 50\\ 129\\ 20\\ 199\\ 6.34,\\ =0.40\\ 272\\ 113.56\\ =0.77\\ 113.56\\ =0.77\\ 101\\ 60\\ 44\\ 104\\ 104\\ 60.92,\\ =0.32\\ 55\\ \end{array}$	24 20 44 df = 1 ($P =$ 2) 45 111 171 df = 2 ($P =$ 3) 215 5, df = 4 ($P =$ 7) 90, df = 1 ($P =$ 49 41 90 df = 1 ($P =$ 2) 54	30 44 74 0.64); F 50 129 18 197 0.04); F 271 0.04); F 271 0.04); F 0.04); F 0.04); F 0.034); F	17.3% 22.9% 40.1% * = 0% 19.1% 59.9% 559.9% * = 68% 100.0% ;; i ² = 709 0, j ² = 47. Weight 11.8% 52.3% * = 0%	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86] 0.88 [0.38, 2.05] 6 2% Odds Ratio M-H, Random, 95% CI 0.57 [0.25, 1.32] 1.54 [0.24, 9.68] 0.68 [0.32, 1.45] 2.08 [0.36, 41, 85]	2017 2019 2018 2020 2021 Year 2018 2019 2019	0.01 0.1 10 Favours Stylet slow pull Favours Dry suction Odds Ratio M-H, Random, 95% Cl
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity, Tau ² = Test for overall effect : 3.8.2 FNB needle Lee 2018 Bang 2020 Ladd 2021 Subtotal (95% CI) Total events Heterogeneity, Tau ² = Test for overall effect : Total (95% CI) Total events Heterogeneity, Tau ² = Test for overall effect : Test for overall effect : Test for overall effect : Test for overall effect : Saxena 2018 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity, Tau ² = Test for overall effect : 3.6.2 FNB needle DiMitri 2019 Zhou 2021	24 26 50 0.00; Chi≇= Z = 1.22 (P = 40 94 94 16 150 0.63; Chi≇= Z = 0.85 (P = 200 0.63; Chi≇= Z = 0.29 (P = erences: Ch Dry suctio Events T 42 42 84 0.00; Chi≇= Z = 1.00 (P = 53 51	29 44 73 50 129 20 199 6.34, = 0.40 272 13.56 = 0.77 i ² = 1. 60 44 104 : 0.92, = 0.32	$\begin{array}{c} 24\\ 20\\ 44\\ 4f = 1 \ (P = 2)\\ 45\\ 111\\ 171\\ 171\\ 4f = 2 \ (P = 2)\\ 215\\ 5, df = 4 \ (P - 2)\\ 90, df = 1 \ (P = 2)\\ 49\\ 41\\ 41\\ 41\\ 41\\ 41\\ 41\\ 41\\ 41\\ 41\\ 41$	$\begin{array}{c} 30\\ 44\\ 74\\ 0.64); F\\ 129\\ 18\\ 197\\ 0.04); F\\ 271\\ 0.04); F\\ 271\\ 0.04); F\\ 0.04); F\\ 0.04); F\\ 0.04); F\\ 0.04); F\\ 0.04); F\\ 55\\ 56\\ 56\\ 56\end{array}$	17.3% 22.9% 40.1% *= 0% 19.1% 24.9% 15.9% 59.9% *= 68% 100.0% (); [*= 709 ();	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86] 0.88 [0.38, 2.05] 6 2% Odds Ratio M-H, Random, 95% CI 0.57 [0.25, 1.32] 1.54 [0.24, 9.68] 0.68 [0.32, 1.45] 2.08 [0.36, 11.85] 1.71 [0.67, 4.30]	2017 2019 2018 2020 2021 Year 2018 2019 2021	0.01 0.1 10 Favours Stylet slow pull Favours Dry suction Odds Ratio M-H, Random, 95% Cl
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity, Tau ²² = Test for overall effect : 3.8.2 FNB needle Lee 2018 Bang 2020 Ladd 2021 Subtotal (95% CI) Total events Heterogeneity, Tau ²² = Test for overall effect : Total (95% CI) Total events Heterogeneity, Tau ²³ = Test for overall effect : Test for overall effect : Subtotal (95% CI) Total events Heterogeneity, Tau ²³ = Test for overall effect : Subtotal (95% CI) Total events Heterogeneity, Tau ²³ = Test for overall effect : 3.6.1 FNA needle Savena 2018 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity, Tau ²³ = Test for overall effect : 3.6.2 FNB needle DiMitri 2019 Zhou 2021 Zubtotal (95% CI)	$\begin{array}{c} 24\\ 26\\ 50\\ 0.00; \ Chi^{a}=\\ Z=1,22 \ (P=\\ 40\\ 94\\ 16\\ 150\\ 0.63; \ Chi^{a}=\\ Z=0.85 \ (P=\\ 200\\ 0.63; \ Chi^{a}=\\ Z=0.29 \ (P=\\ 200\\ Chi^{a}=\\ 200\\$	29 44 73 50 129 20 199 6.34, = 0.40 272 13.55 60 44 104 : 0.92, 55 60 115	$\begin{array}{c} 24\\ 20\\ 44\\ 20\\ 4f = 1 \ (P = 2)\\ 45\\ 115\\ 11\\ 171\\ df = 2 \ (P = 2)\\ 215\\ 5, df = 4 \ (P = 2)\\ 90, df = 1 \ (P = 2)\\ 49\\ 41\\ 90\\ 41\\ 41\\ 90\\ 41\\ 41\\ 90\\ 41\\ 41\\ 90\\ 41\\ 43\\ 43\\ 43\\ 43\\ 43\\ 43\\ 43\\ 43\\ 43\\ 43$	30 44 74 0.64); F 50 129 18 197 0.04); F 271 = 0.009 P = 0.17 7 v pull Total 61 44 105 0.34); F 55 55 55 55	17.3% 22.9% 40.1% = 0% 19.1% 24.9% 15.9% 59.9% 59.9% 100.0% 0; P = 709 0; P = 47; Weight 40.5% 22.3% = 0% 13.0%	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86] 0.88 [0.38, 2.05] 6 2% Odds Ratio M-H, Random, 95% CI 0.57 [0.25, 1.32] 1.54 [0.24, 9.68] 0.68 [0.32, 1.45] 1.54 [0.32, 1.45] 2.08 [0.36, 11.85] 1.71 [0.67, 4.39] 1.78 [0.78, 4.10]	2017 2019 2018 2020 2021 2021 2021 2018 2019 2019 2021	0.01 0.1 10 Favours Stylet slow pull Favours Dry suction Odds Ratio M-H, Random, 95% Cl
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.8.2 FNB needle Lee 2018 Bang 2020 Ladd 2021 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : Total (95% CI) Total events Heterogeneity: Tau ² = Test for subgroup 3.6.1 FNA needle Saxena 2018 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.6.2 FNB needle DiMitri 2019 Zhou 2021 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.6.2 FNB needle DiMitri 2019 Zhou 2021 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.6.2 FNB needle	$\begin{array}{c} 24\\ 24\\ 50\\ 0.00; Chi^{a}=\\ Z=1.22 (P=\\ 40\\ 94\\ 16\\ 150\\ 0.63; Chi^{a}=\\ Z=0.85 (P=\\ 200\\ 0.63; Chi^{a}=\\ Z=0.29 (P=\\ 200\\ 0.63; Chi^{a}=\\ Z=0.29 (P=\\ 200\\ 0.63; Chi^{a}=\\ 200\\ Chi^{a}=\\ Z=1.00 (P=\\ 53\\ 51\\ 1\\ 0.00; Chi^{a}=\\ Z=1.38 (P=\\ Z$	29 44 73 50 129 20 199 ϵ 6.34, ϵ 0.40 272 ϵ 13.56 ϵ 0.40 272 ϵ 13.57 ϵ 0.32 ϵ 0.33 ϵ	24 20 44 20 45 115 11 $df = 1 (P = 2)^{2}$ 215 5, df = 4 (P = 2)^{2} 215 5, df = 4 (P = 2)^{2} 215 5, df = 4 (P = 2)^{2} 215 5, df = 1 (P = 2)^{2} 51 43 94 , df = 1 (P = 2)^{2}	$\begin{array}{c} 30\\ 44\\ 74\\ 0.64); F\\ 50\\ 129\\ 18\\ 197\\ 0.04); F\\ 271\\ e 0.009\\ P = 0.17\\ \hline 70\\ 100\\ 100\\ 100\\ 100\\ 11\\ 100\\ 100\\ 1$	17.3% 22.9% 40.1% = 0% 19.1% 24.9% 15.9% 59.9% i= 68% 100.0% p; P = 709 p; P = 47. Weight 40.5% 55.3% i= 0% 13.0% 34.7%	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86] 0.88 [0.38, 2.05] 6 2% Odds Ratio M-H, Random, 95% CI 0.57 [0.25, 1.32] 1.54 [0.24, 9.68] 0.68 [0.32, 1.45] 2.08 [0.36, 11.85] 1.71 [0.67, 4.39] 1.79 [0.78, 4.10]	2017 2019 2020 2021 Year 2018 2019 2021	0.01 0.1 10 Favours Stylet slow pull Favours Dry suction M-H, Random, 95% CI
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.9.2 FNB needle Lee 2018 Bang 2020 Ladd 2021 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : Total (95% CI) Total events Heterogeneity: Tau ² = Test for subgroup 3.6.1 FNA needle Saxena 2018 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.6.2 FNB needle DiMitri 2019 Zhou 2021 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.6.2 FNB needle DiMitri 2019 Zhou 2021 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.6.2 FNB needle DiMitri 2019 Zhou 2021 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : Subtotal (95% CI)	$\begin{array}{c} 24\\ 26\\ 50\\ 0.00; {\rm Ch} ^{2}=\\ Z=1,22 \ ({\rm P}^{2}\\ 40\\ 94\\ 16\\ 150\\ 0.63; {\rm Ch} ^{2}=\\ Z=0.85 \ ({\rm P}^{2}\\ Z=0.85 \ ({\rm P}^{2}\\ 200\\ 0.63; {\rm Ch} ^{2}=\\ 200\\ 0.63; {\rm Ch} ^{2}=\\ 200\\ Creation Control ({\rm P}^{2})\\ 200\\ Creation Control ({\rm P}^{2})\\ 42\\ 42\\ 42\\ 84\\ 0.00; {\rm Ch} ^{2}=\\ 53\\ 51\\ 104\\ 0.00; {\rm Ch} ^{2}=\\ Z=1,38 \ ({\rm P}^{2})\\ 22\\ Z=$	29 44 73 50 129 20 199 6.34, = 0.40 272 13.55 60 44 104 :0.92, = 0.32 55 60 44 104 :0.92, = 0.32	$\begin{array}{c} 24\\ 20\\ 44\\ 20\\ 4f = 1 \ (P = 2)\\ 115\\ 111\\ 171\\ df = 2 \ (P = 2)\\ 0, df = 1 \ (P = 2)\\ 0, df = 1 \ (P = 2)\\ 100\\ 100\\ 100\\ 100\\ 100\\ 100\\ 100\\ 10$	$\begin{array}{c} 30\\ 44\\ 74\\ 0.64); F\\ 50\\ 129\\ 18\\ 197\\ 0.04); F\\ 271\\ 0.04); F\\ 271\\ 0.04); F\\ 0.04); F\\ 0.04); F\\ 0.034); F\\ 55\\ 56\\ 111\\ 0.85); F\\ 0.85); F\\ 0.040$	17.3% 22.9% 40.1% = 0% 19.1% 59.9% 15.9% 59.9% = 68% 100.0%); P = 709); P = 47. Weight 40.5% 11.8% 52.3% = 0% 13.0% 34.7% = 0%	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86] 0.88 [0.38, 2.05] 6 2% Odds Ratio M-H, Random, 95% CI 0.57 [0.25, 1.32] 1.54 [0.24, 9.68] 0.68 [0.32, 1.45] 2.08 [0.36, 11.85] 1.71 [0.67, 4.39] 1.79 [0.78, 4.10]	2017 2019 2020 2021 2021 2021 2018 2019 2021	0.01 0.1 Favours Stylet slow pull Favours Dry suction
3.8.1 FNA needle Weston 2017 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.8.2 FNB needle Led 2018 Bang 2020 Ladd 2021 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : Total (95% CI) Total events Heterogeneity: Tau ² = Test for subgroup 3.6.1 FNA needle Saxena 2018 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.6.2 FNB needle Saxena 2018 Cheng 2019 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.6.2 FNB needle DiMitri 2019 Zhou 2021 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : 3.6.2 FNB needle DiMitri 2019 Zhou 2021 Subtotal (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : Total (95% CI) Total events Heterogeneity: Tau ² = Test for overall effect : Total (95% CI)	24 24 50 0.00; Chi [#] = Z = 1.22 (P = 40 94 15 150 0.63; Chi [#] = Z = 0.85 (P = 200 0.63; Chi [#] = Z = 0.29 (P = rences: Ch Dry suction Events T 42 42 84 0.00; Chi [#] = 53 51 104 0.00; Chi [#] = Z = 1.38 (P = 400 0.63; Chi [#] = 53 51 104 0.00; Chi [#] = 200 0.63; Chi [#] = 200 0.65; Chi [#]	29 44 73 50 129 20 199 6.34, e 0.40 272 13.55 60 60 44 104 55 60 0.92, 20 20 20 20 20 20 20 20 20 20 20 20 20	24 20 44 45 115 11 171 df = 2 (P = 1) 215 5, df = 4 (P = 1) 20, df = 1 (P = 1) 20, df = 1 (P = 1) 43 df = 1 (P = 1) 43	$\begin{array}{c} 30\\ 44\\ 74\\ 0.64); F\\ 129\\ 18\\ 197\\ 0.04); F\\ 271\\ 0.04); F\\ 271\\ 0.04); F\\ 271\\ 105\\ 0.034); F\\ 55\\ 56\\ 111\\ 0.85); F\\ 216\\ \end{array}$	17.3% 22.9% 40.1% 19.1% 19.1% 19.1% 59.9% 19.1% 59.9% 100.0% 19.1% 10.0% 11.8% 11.8% 11.3% 1	1.20 [0.32, 4.47] 1.73 [0.74, 4.03] 1.56 [0.76, 3.17] 0.44 [0.14, 1.41] 0.33 [0.17, 0.64] 2.55 [0.60, 10.84] 0.62 [0.21, 1.86] 0.88 [0.38, 2.05] 6 2% Odds Ratio M-H, Random, 95% CI 0.57 [0.25, 1.32] 1.54 [0.24, 9.68] 0.68 [0.32, 1.45] 2.08 [0.36, 11.85] 1.71 [0.67, 4.39] 1.79 [0.78, 4.10] 1.11 [0.57, 2.16]	2017 2019 2020 2021 2021 2021 2019 2019 2019	0.01 0.1 10 Favours Stylet slow pull Favours Dry suction

Supplementary Figure 5: Network plots for the outcomes (5A) Sample adequacy, (5B) Moderate to high cellularity, (5C) Gross bloodiness, (5D) Diagnostic accuracy



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Supplementary table 2: League table for the treatment estimates from the Bayesian network metaanalysis for sample adequacy

No sustion		
No suction		
0.64	Stylet slow pull	
(0.19, 2.23)	Stylet slow pull	
0.42	0.65	Wat suction
(0.13, 1.38)	(0.19, 2.24)	wet suction
	No suction 0.64 (0.19, 2.23) 0.42 (0.13, 1.38)	No suction Stylet slow pull 0.64 Stylet slow pull (0.19, 2.23) 0.65 0.42 0.65 (0.13, 1.38) (0.19, 2.24)

Supplementary table 3: League table for the treatment estimates from the Bayesian network metaanalysis for cellularity

Dry suction			
1.47	No suction		
(0.63, 3.52)	No suction		
0.67	0.46	Slow stylet null	
(0.29, 1.60)	(0.17, 1.31)	Slow stylet pull	
0.65	0.45	0.97	Wat sugtion
(0.31, 1.48)	(0.16, 1.33)	(0.33, 2.91)	wet suction

Supplementary table 4: League table for the treatment estimates from the Bayesian network metaanalysis for gross bloodiness

Dry suction			
1.84]	
(0.94, 3.79)	No suction		
1.00	0.54		
(0.44, 2.25)	(0.19, 1.47)	Stylet slow pull	
2.00	1.02	1.88	Wat suction
(1.03, 4.14)	(0.41, 2.44)	(0.68, 5.34)	wet suction

Dry suction			
0.99	No Sustian		
(0.53, 1.97)	No Suction		
1.08	1.10	Stylet slow pull	
(0.57, 2.20)	(0.43, 2.89)	Stylet slow pull	
0.75	0.76	0.69	Wat sugation
(0.37, 1.46)	(0.28, 1.86)	(0.25, 1.73)	wet suction

Supplementary table 5: League table for the treatment estimates from the Bayesian network metaanalysis for diagnostic accuracy

Supplementary Figure 6: Bayesian Forest plot for adequacy



Supplementary Figure 7: Bayesian Forest plot for moderate to high cellularity







Supplementary Figure 9: Funnel plot for assessment of small study effect for various outcomes (9A) Sample adequacy, (9B) Moderate to high cellularity, (9C) Gross bloodiness, (9D) Diagnostic accuracy



Outcomes	Chi-square with degrees of freedom	P-value
Sample adequacy	$chi^2(6) = 3.48$	0.747
Moderate to high cellularity	$chi^2(6) = 10.29$	0.113
Gross bloodiness	$chi^2(6) = 4.01$	0.674
Diagnostic accuracy	$chi^2(0) = 0.00$	-

Supplementary Table 6: Wald test for estimation of global inconsistency in networks of outcomes

Supplementary Table 7: Summary of findings table with quality of evidence

	Direct OR	Confidence	Indirect OR	Confidence	NMA OR	Confidence			
Sample adequacy									
DS - NS	1.48 (0.66 – 3.29)	Low ^{¶, §}	1.13 (0.07 - 18.91)	Low ^{¶, §}	1.45 (0.67 – 3.13)	Low ^{¶, Δ}			
DS - SSP	0.99 (0.40 - 2.44)	Moderate¶	0.61 (0.03 - 10.71)	Low ^{¶, §}	0.94 (0.40 - 2.24)	Low ^{¶, Δ}			
$\mathbf{DS} - \mathbf{WS}$	0.60 (0.27 - 1.35)	Low ^{¶, §}	1.29 (0.07 - 22.50)	Low ^{¶, §}	0.64 (0.29 - 1.39)	$\mathrm{Low}^{\P,\Delta}$			
NS - SSP	0.35 (0.05 - 2.48)	Low ^{¶, §}	0.86 (0.23 – 3.16)	Low ^{¶, §}	0.65 (0.22 - 1.93)	$\mathrm{Low}^{\P,\Delta}$			
NS - WS	1.55 (0.23 - 10.57)	Low ^{¶, §}	0.26 (0.07 - 0.90)	Low ^{¶, §}	0.44 (0.16 - 1.23)	Low ^{¶, Δ}			
SSP - WS	0.48 (0.05 - 4.22)	Low ^{¶, §}	0.76 (0.21 – 7.88)	Low ^{¶, §}	0.67 (0.22 - 2.03)	Low ^{¶, Δ}			
Moderate t	o high cellularity								
DS - NS	1.38 (0.66 – 2.89)	Moderate¶	2.10 (0.28 - 15.88)	Low ^{¶, §}	1.45 (0.73 – 2.90)	$\mathrm{Low}^{\P,\Delta}$			
DS - SSP	0.82 (0.39 - 1.73)	Low ^{¶, §}	0.11 (0.01 - 1.02)	Low ^{¶, §}	0.67 (0.33 – 1.72)	$\mathrm{Low}^{\P,\Delta}$			
$\mathbf{DS} - \mathbf{WS}$	0.64 (0.32 - 1.26)	Low ^{¶, §}	1.14 (0.11 – 11.36)	Low ^{¶, §}	0.67 (0.35 – 1.29)	$\mathrm{Low}^{\P,\Delta}$			
NS - SSP	0.28 (0.10 - 0.80)	Low ^{¶, §}	1.13 (0.28 - 4.57)	Low ^{¶, §}	0.46 (0.20 - 1.07)	Low ^{¶, Δ}			
NS - WS	0.83 (0.19 - 3.60)	Low ^{¶, §}	0.33 (0.11 - 0.98)	Low ^{¶, §}	0.46 (0.19 - 1.03)	Low ^{¶, Δ}			
SSP - WS	2.08 (0.26 - 16.56)	Low ^{¶, §}	0.84 (0.30 - 2.30)	Low ^{¶, §}	1.00 (0.40 - 2.47)	Low ^{¶, Δ}			
Gross blood	liness								
DS - NS	1.97 (1.15 – 3.38)	Moderate¶	0.26 (0.02 - 2.90)	Low ^{¶, §}	1.79 (1.06 – 3.03)	Low ^{¶,§}			
DS - SSP	1.09 (0.55 - 2.13)	Moderate¶	0.19 (0.00 - 12.98)	Low ^{¶, §}	1.04 (0.53 - 2.03)	Low ^{¶, Δ}			
$\mathbf{DS} - \mathbf{WS}$	1.88 (1.11 – 3.20)	Low ^{¶, §}	2.12 (0.12 - 37.52)	Low ^{¶, §}	1.89 (1.12 – 3.18)	Low ^{¶, §}			
NS - SSP	0.23 (0.02 - 2.39)	Low ^{¶, §}	0.66 (0.27 - 1.62)	Moderate	0.58(0.25 - 1.34)	$\mathrm{Low}^{\P,\Delta}$			
NS - WS	1.93 (0.65 - 5.70)	Low ^{¶, §}	0.70 (0.29 - 1.71)	Low ^{¶, §}	1.05 (0.53 - 2.10)	$\mathrm{Low}^{\P,\Delta}$			
SSP-WS	0.95 (0.02 - 53.06)	Low ^{¶, §}	1.87 (0.79 – 4.41)	Low ^{¶, §}	1.81 (0.78 – 4.20)	Low¶, ∆			
Diagnostic	accuracy								
DS - NS	0.96 (0.63 - 1.45)	Moderate¶	-	-	0.96 (0.63 - 1.45)	Very low ^{¶, Δ, ¥}			
DS - SSP	1.06 (0.60 - 1.85)	Moderate	-	-	1.06 (0.60 - 1.85)	Very low¶, △, ¥			
$\mathbf{DS} - \mathbf{WS}$	0.76 (0.50 - 1.16)	Moderate	-	-	0.76 (0.50 - 1.16)	Very low¶, △, ¥			
NS - SSP	-	-	1.11 (0.55 – 2.22)	Moderate¶	1.11 (0.55 – 2.22)	Very low ^{¶, Δ, ¥}			
NS - WS	-	-	0.79 (0.44 - 1.43)	Moderate¶	0.79 (0.44 - 1.43)	Very low ^{¶, Δ, ¥}			
SSP-WS	-	-	0.72 (0.35 - 1.45)	Moderate¶	0.72 (0.35 - 1.45)	Very low¶, △, ¥			

¶ risk of bias; Δ Imprecision; § Heterogeneity; ¥ Incoherence