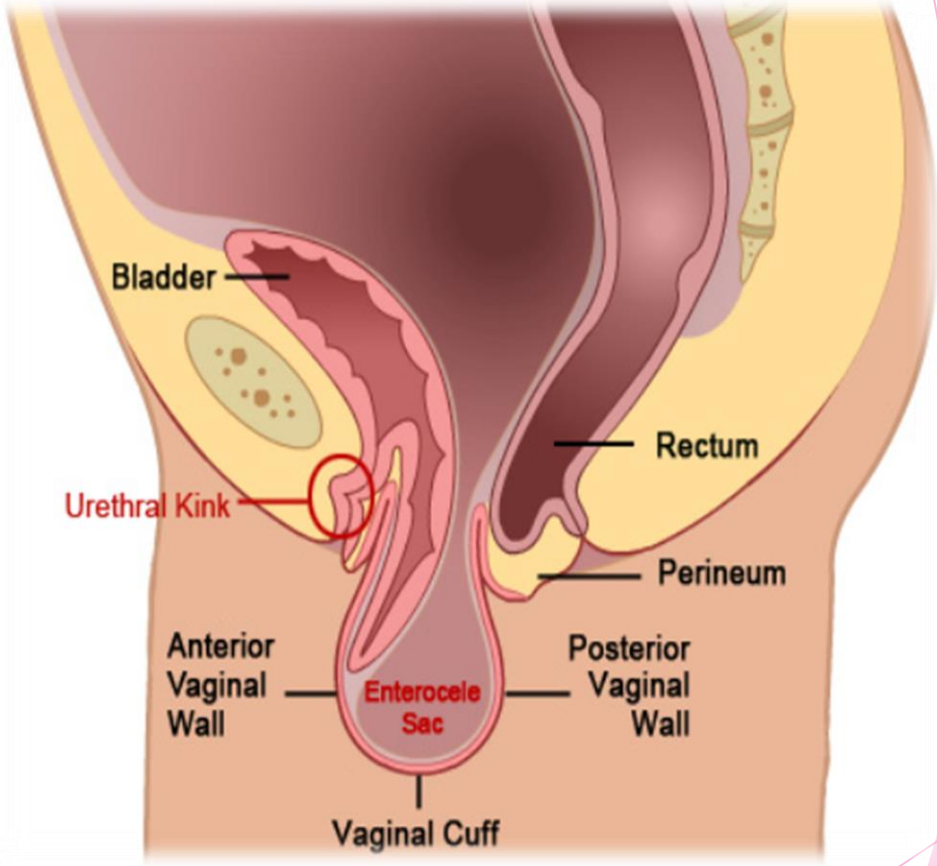
Comparison of the effectiveness of sacrospinous ligament fixation and sacrocolpopexy: a meta-analysis

R3 張懿芬

指導醫師: 張嘉珮 醫師

Introduction

- The prevalence of POP will increase from 3.3 million to 4.9 million over the next 40 years.
- More than 220,000 women seek surgical management every year.
- Restoration of apical support is thought to be important for treating POP



1962 Lane: abdominal sacrocolpopexy

- Used to fix prolapse of the TOP vaginal compartment
- Mesh suspends the top 1/3 of vagina
- Gold standard
- High success rate(78-100%), long-term durability
- Laparoscopy: high success rate + cosmetic

BJUI
BJU INTERNATIONAL

Surgery Illustrated – Surgical Atlas
Laparoscopic sacrocolpopexy

Richard Gaston and Alistair Ramsden
Clinique Saint Augustin, Bordeaux, France

ILLUSTRATIONS by STEPHAN SPITZER, www.spitzer-illustration.com

PLANNING AND PREPARATION

INDICATIONS

Sacrocolpopexy is the treatment of choice for women with female genital organ prolapse associated with symptoms of descent or stress/mixed urinary incontinence. It is a technique with demonstrated success in the setting of vaginal vault prolapse as well as multi-compartment pelvic organ prolapse. Subjective success rates range from 74% to 98%, although follow-up in many case series is short.



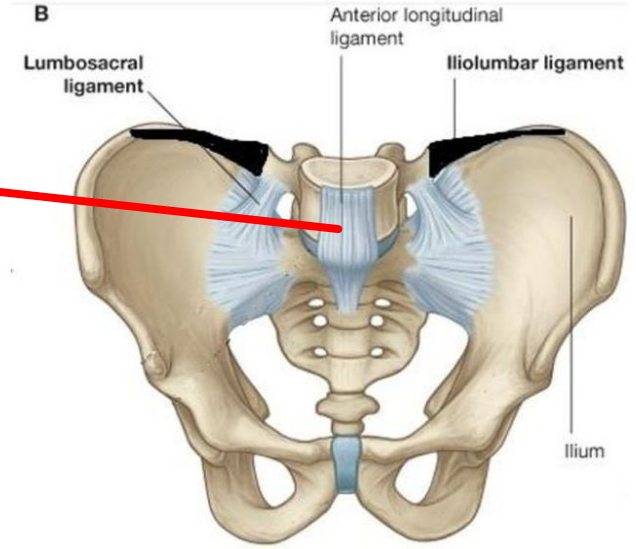


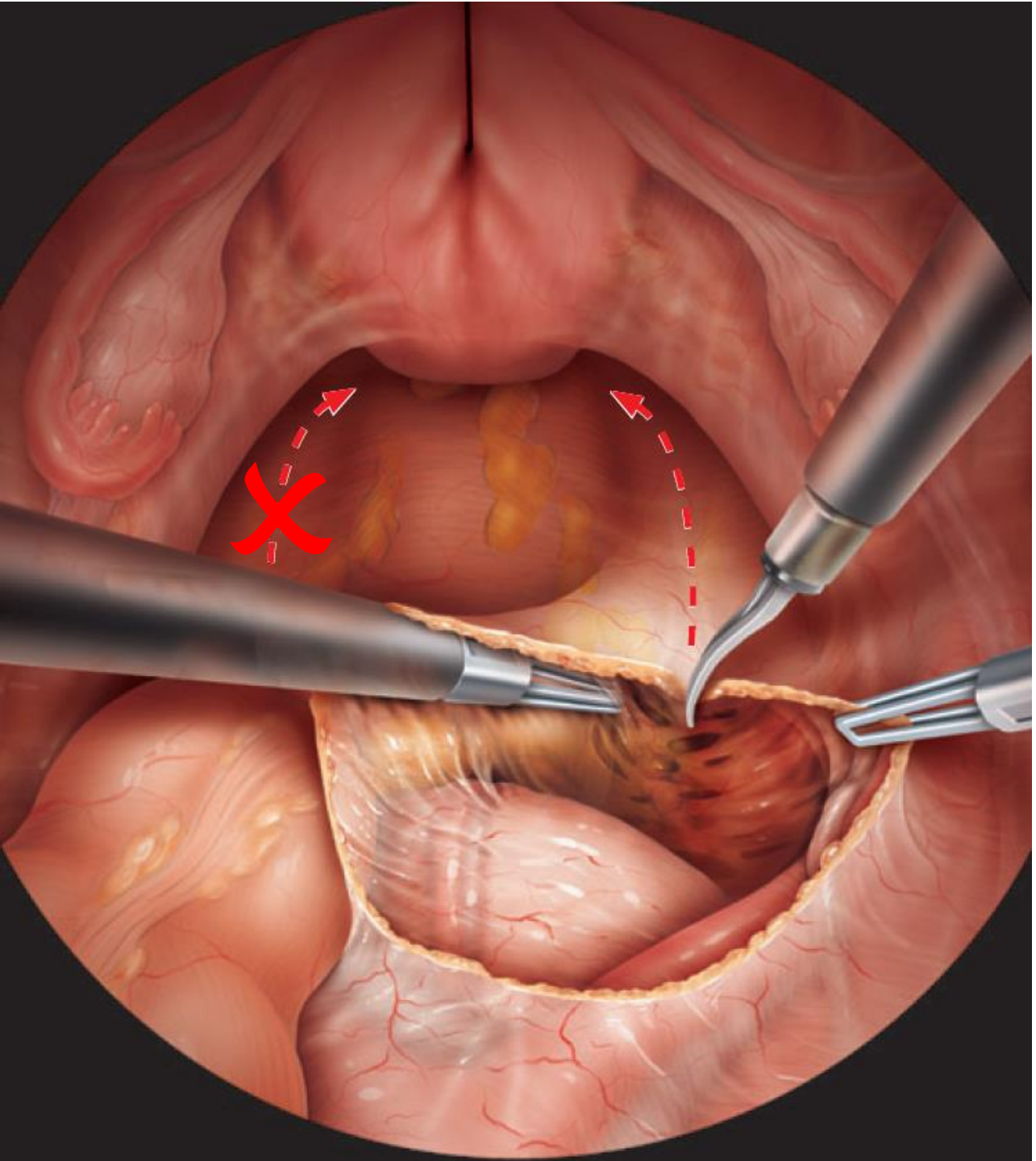

Surgical Step

1. Exposing the longitudinal vertebral ligament by opening the parietal peritoneum covering the sacral promontory

→ Blunt dissection of retroperitoneal tissue.

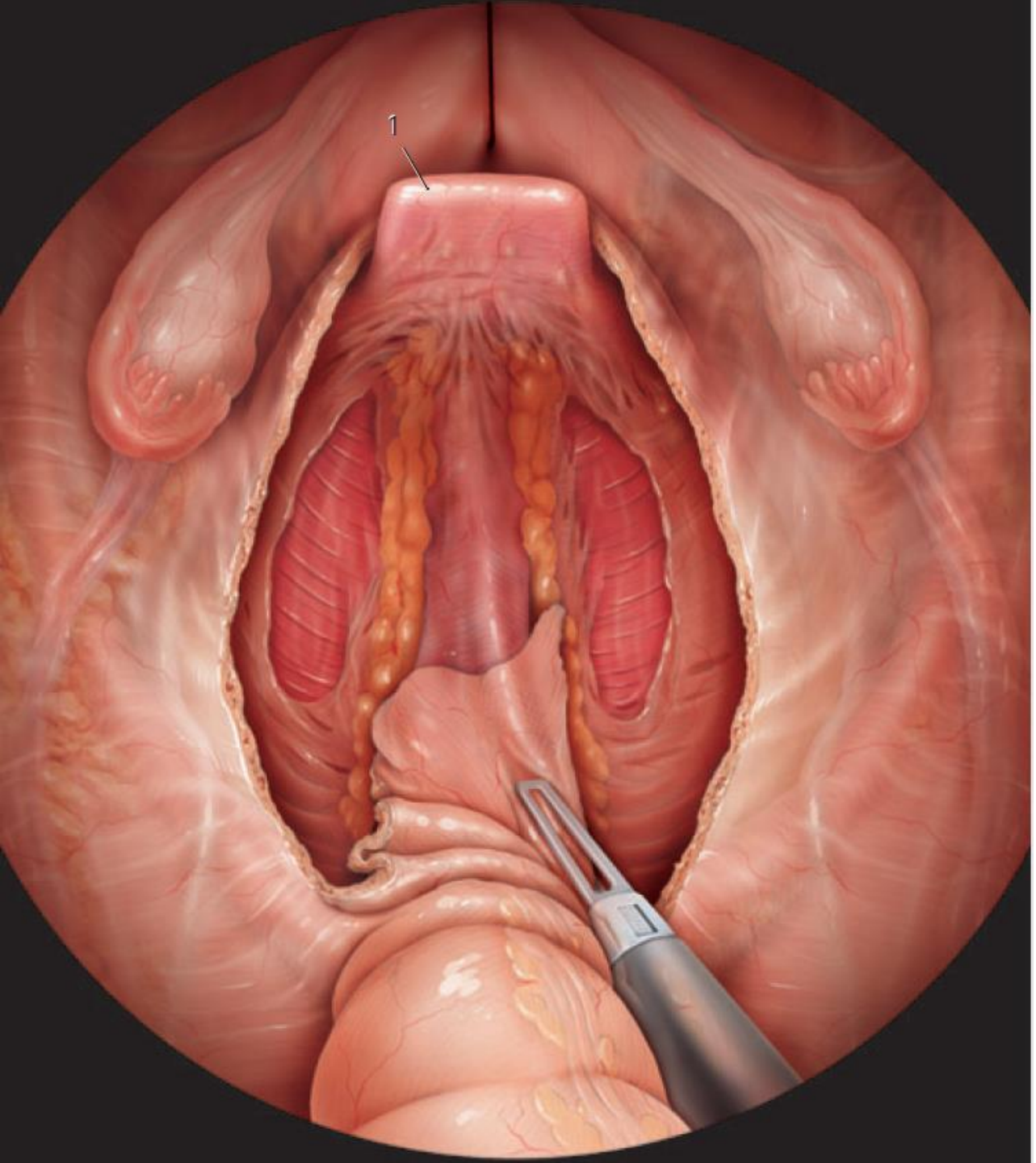
→ Median sacral vessels were pushed back inward during dissection and coagulated





Surgical Step

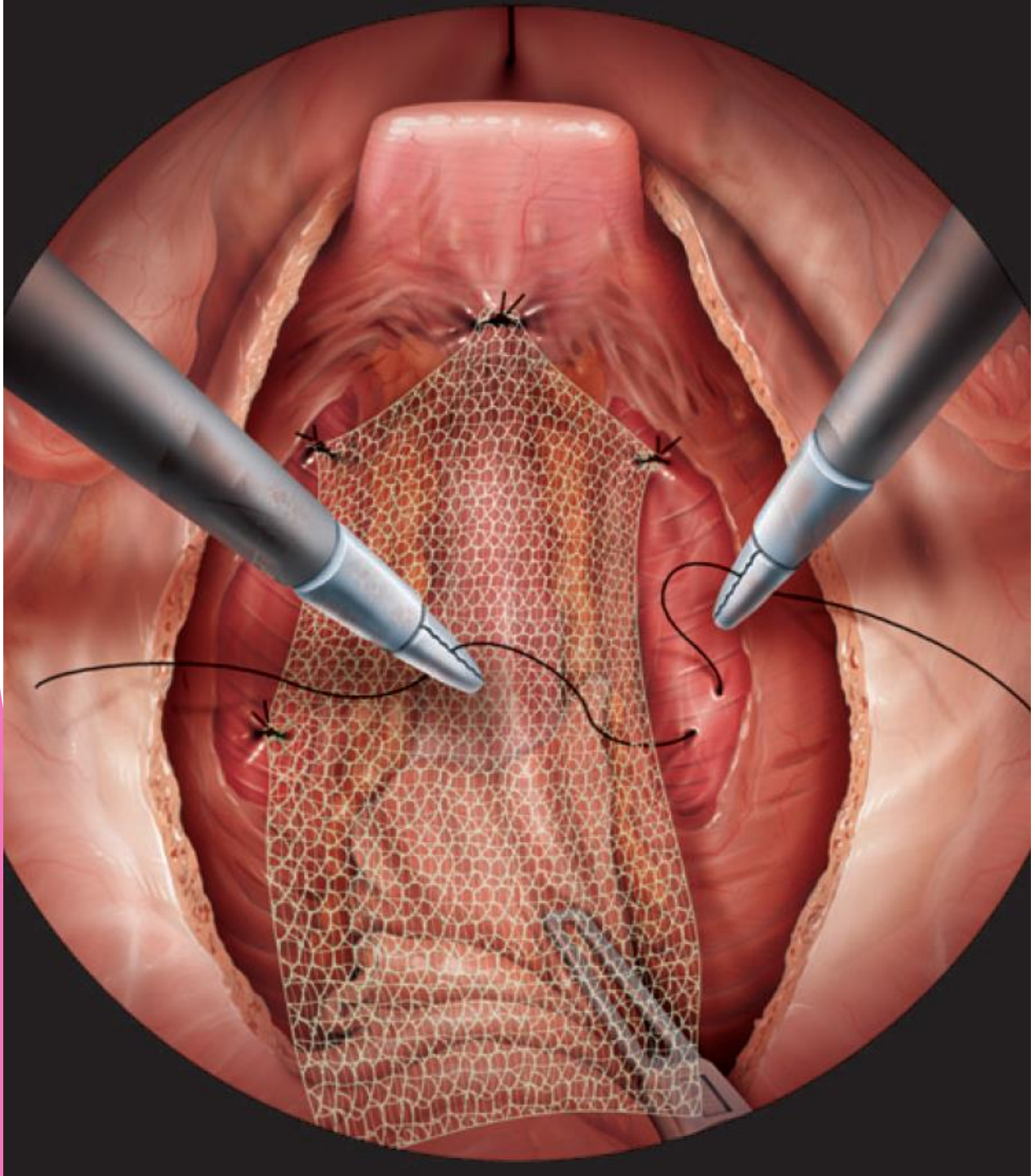
2. Peritoneal incision was prolonged along the right pelvic wall up to the uterine isthmus



Surgical Step

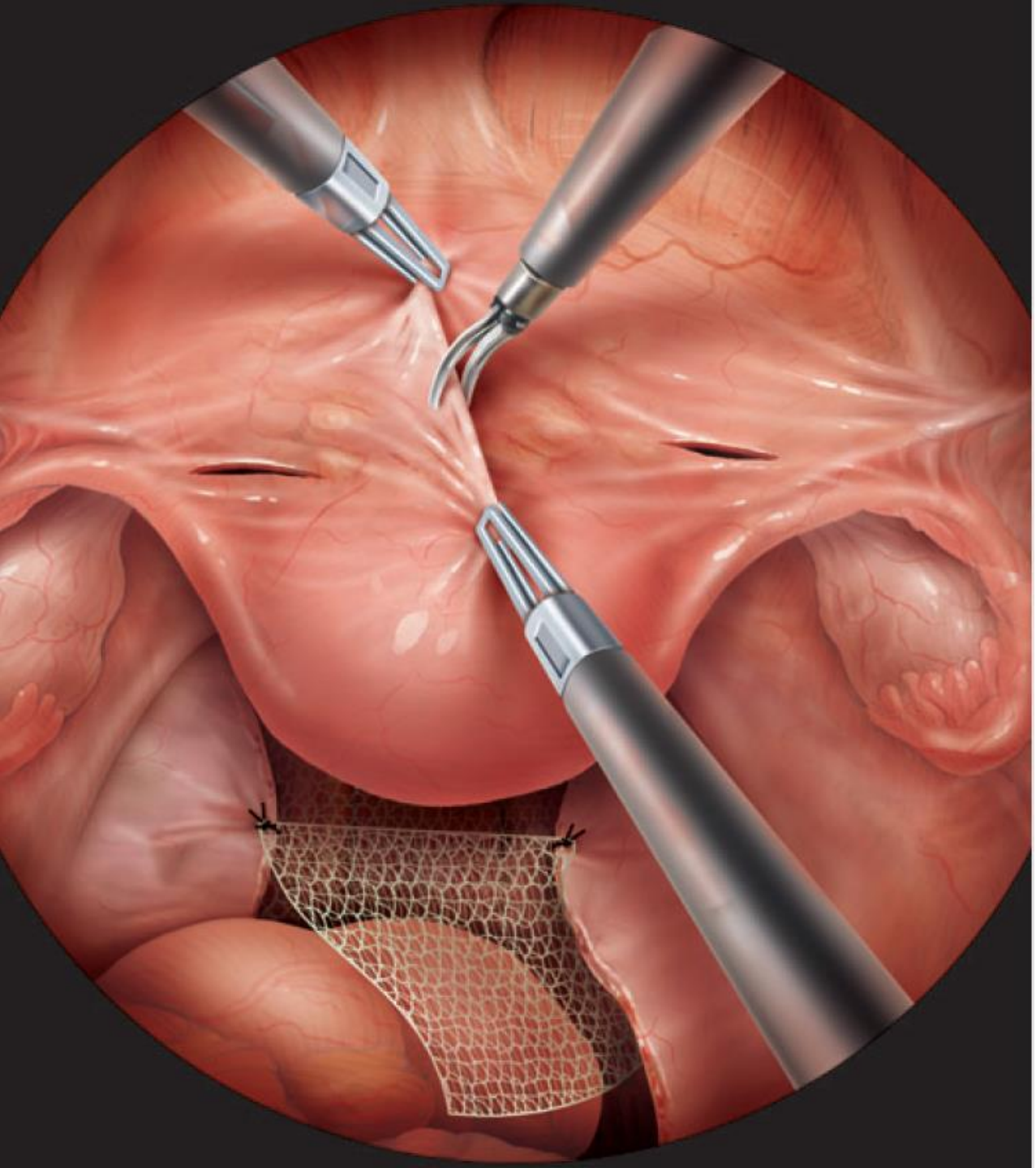
3. The Douglas pouch was incised between the left and right uterosacral ligaments

→ rectovaginal space was fully dissected.
→ the dissection was carried out lateral to the rectum upward to identify the pelvic parietal fascia covering the levator ani muscle.



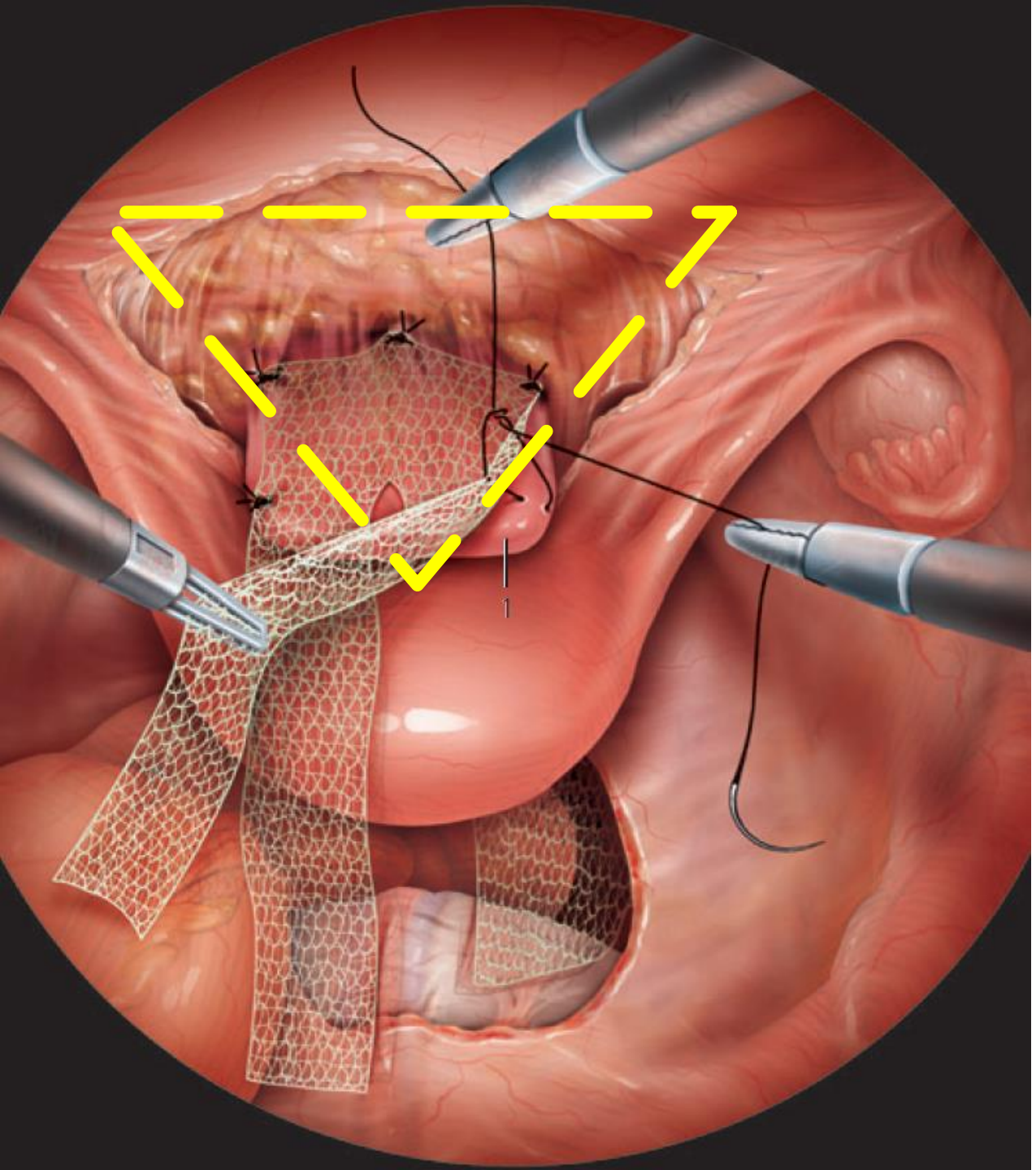
Surgical Step

4. An adequately shaped polypropylene type 1 mesh (Restorelle XL, Coloplast Corp., Minneapolis, MN, USA) was placed and fixed to the vaginal wall by four 3–0 non-absorbable sutures to cover the entire dissection space without tension



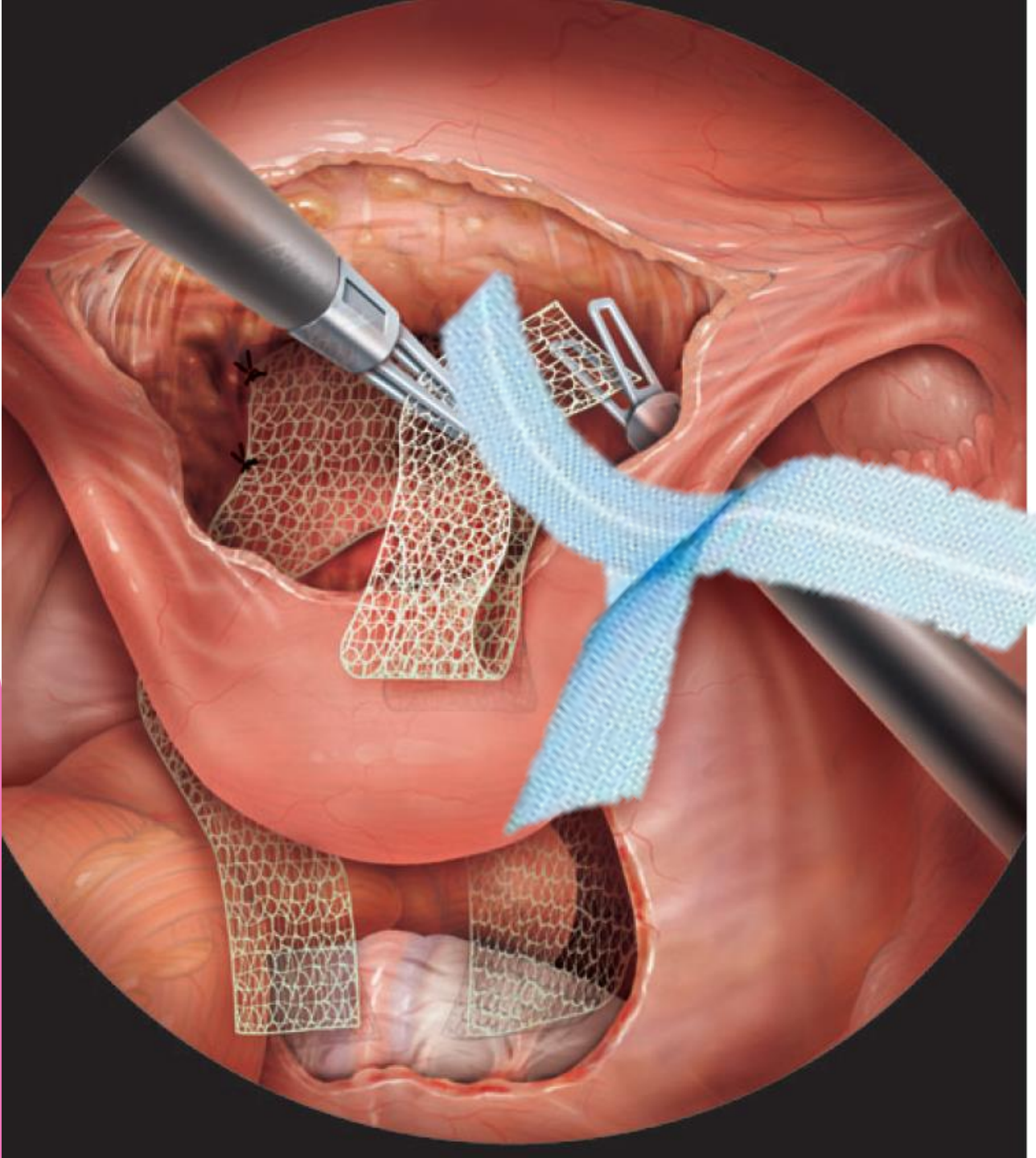
Surgical Step

5. The vesico-uterine peritoneum was opened



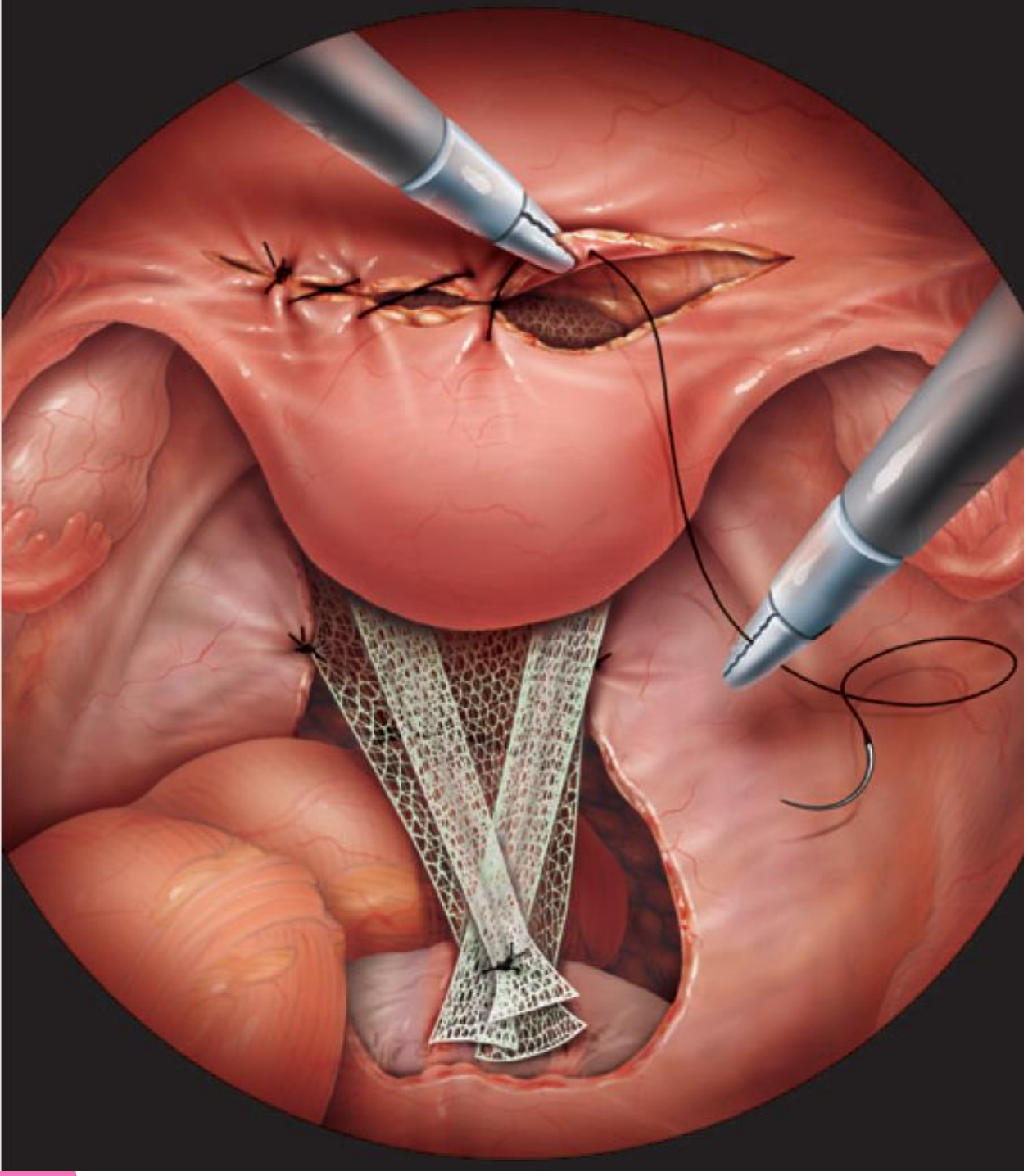
Surgical Step

6. A triangular-shaped vesicovaginal space with the apex at the dorsal end of the bladder trigone and the lateral limits represented by the bladder pillars.



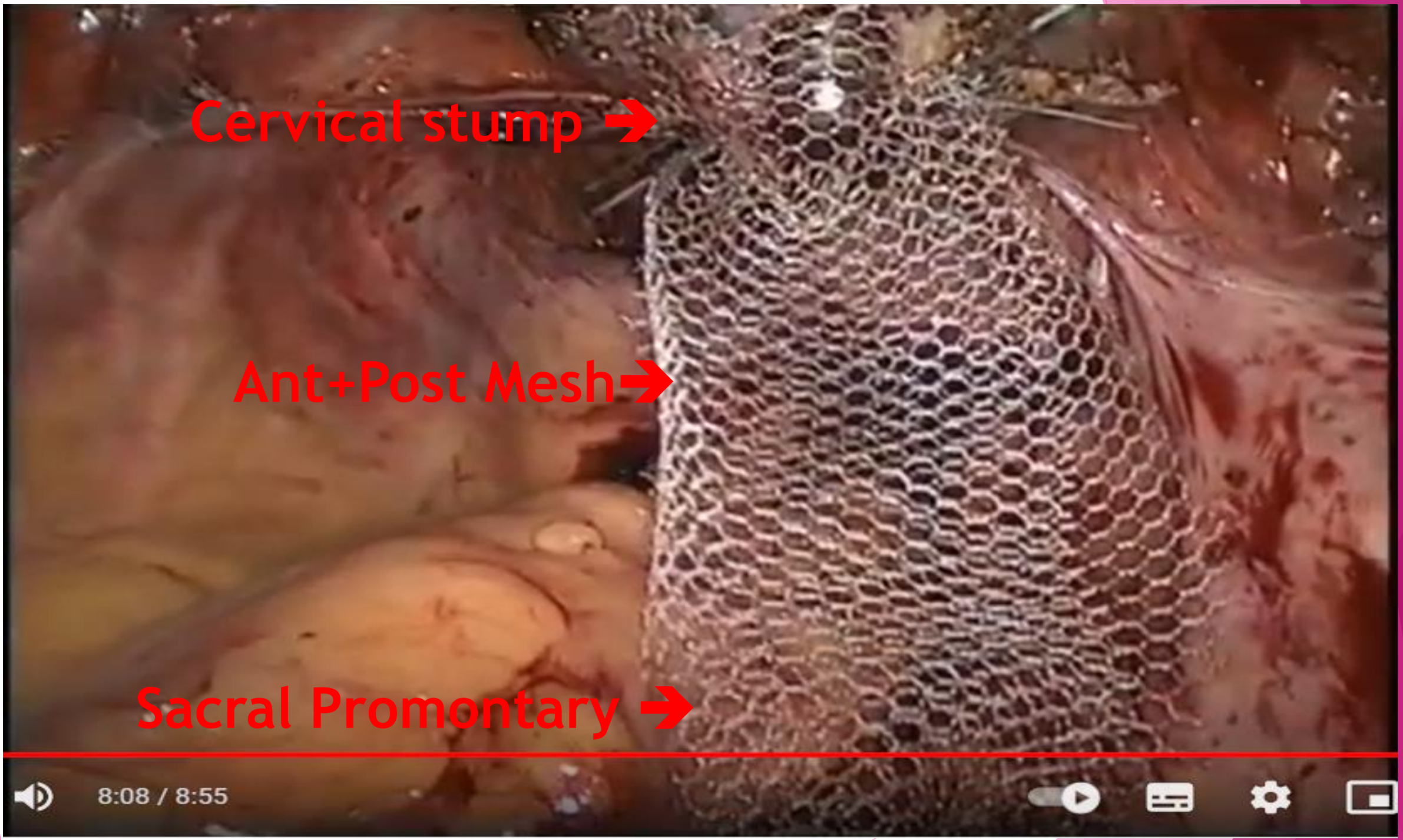
Surgical Step

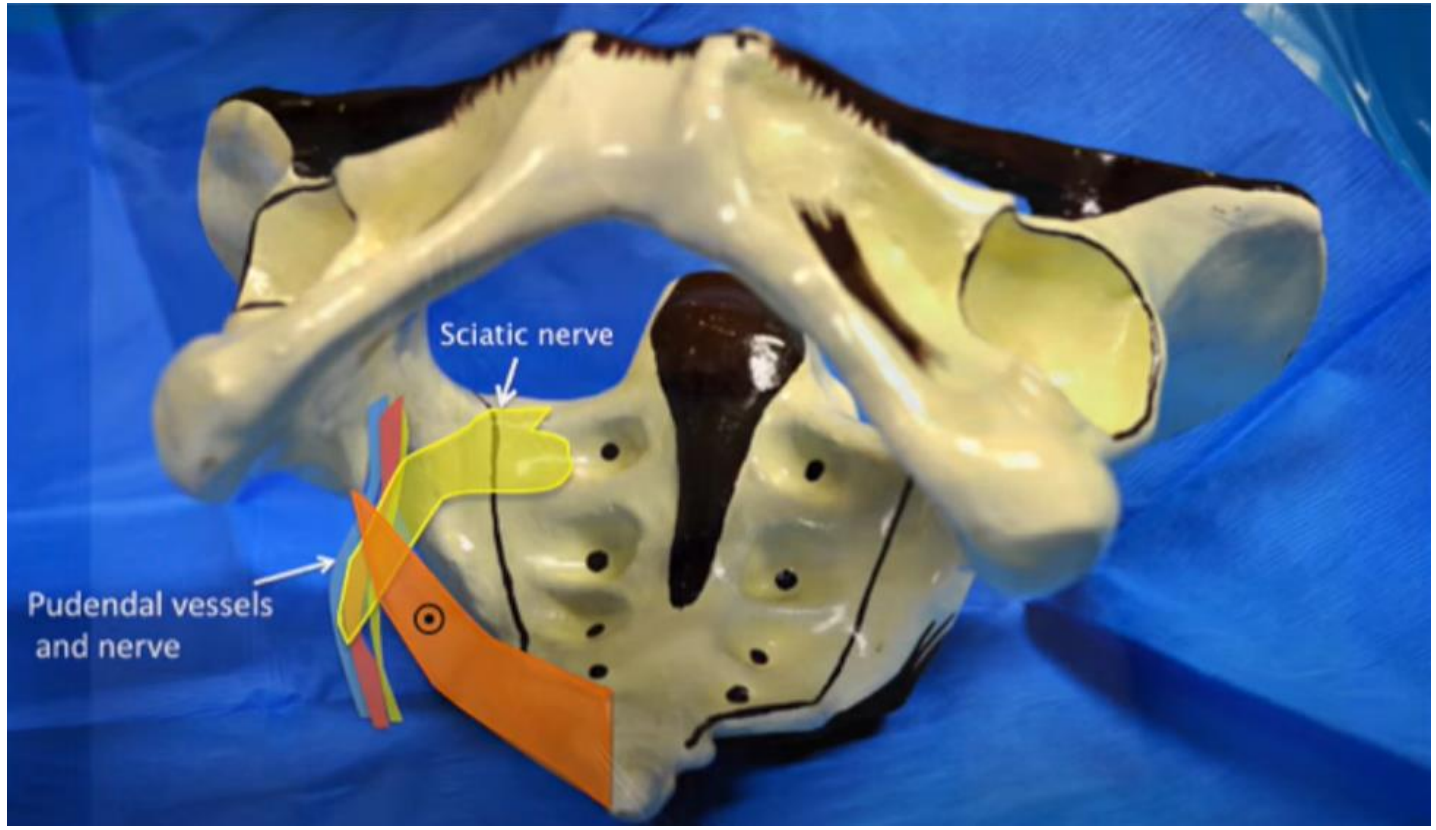
- Hysteropexy group: right broad ligament was fenestrated at the level of the cervico-uterine junction
- Supracervical hysterectomy: subtotal hysterectomy was carried out



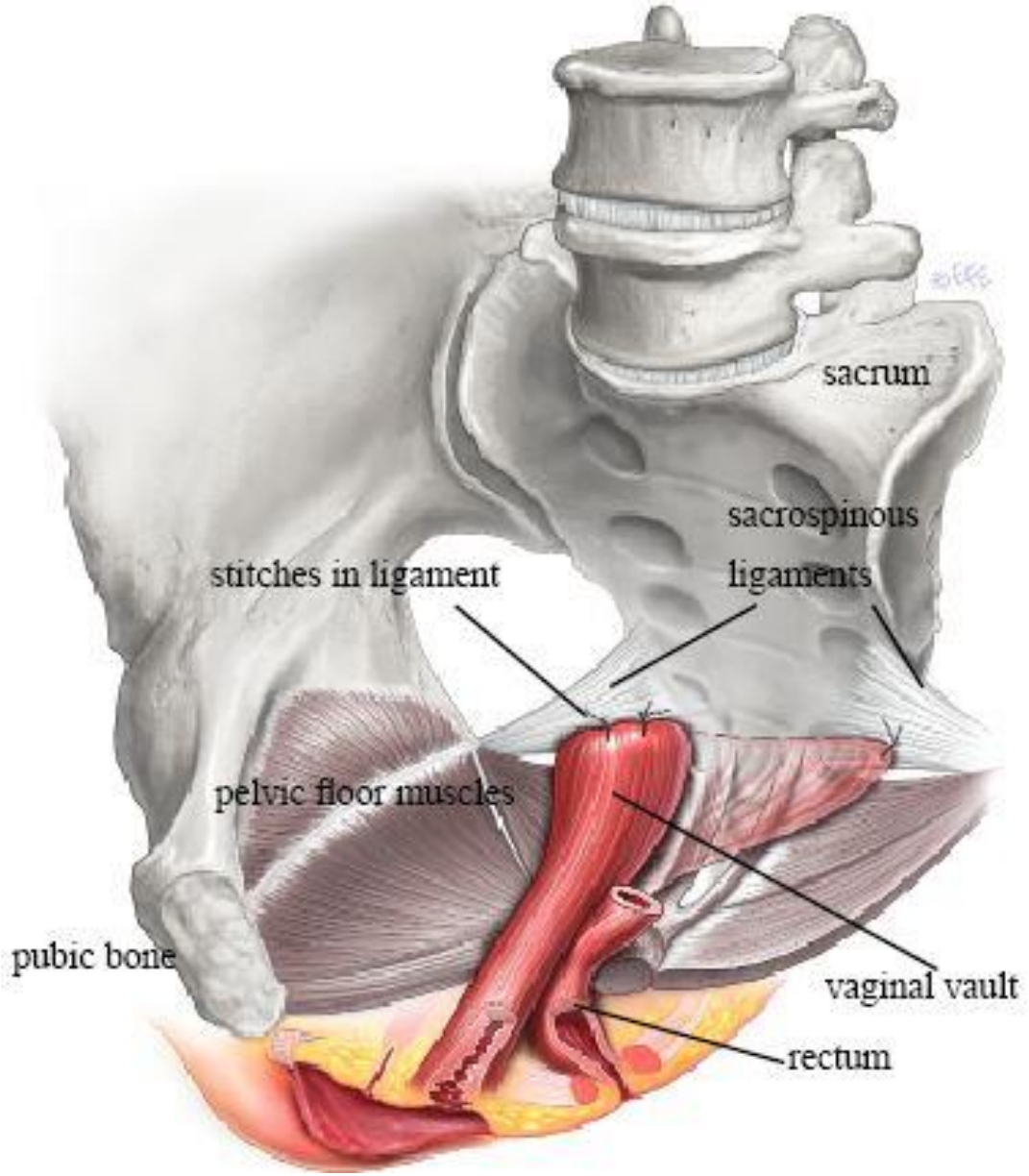
Surgical Step

- The anterior mesh was threaded up toward the promontory from the vagina
- Fixed to the longitudinal vertebral ligament anterior to the L5–S1 intervertebral space with 1–0 non-absorbable suture


Cervical stump ➔
Ant+Post Mesh➔
Sacral Promontary ➔
8:08 / 8:55



1968 Richter: sacrospinous lig. fixation



Post vagina incision

↓

Extend to the top vagina

↓

Free the vagina from underlying rectovaginal fascia and rectum

↓

Pelvic floor (puborectalis) muscle seen

↓

Blunt dissection the ligament to the sacral bone is palpated and identified

↓

Two sutures are placed through the ligament

↓

Fascial defects in the vagina are repaired

ASC/LSC VS. SSLF

- No guidelines for which should be performed
- Mostly depends on the preference and experiences of the surgeon
- Most are small series with conflicting results
- Systematic review and meta-analysis

Materials and Methods-literature research

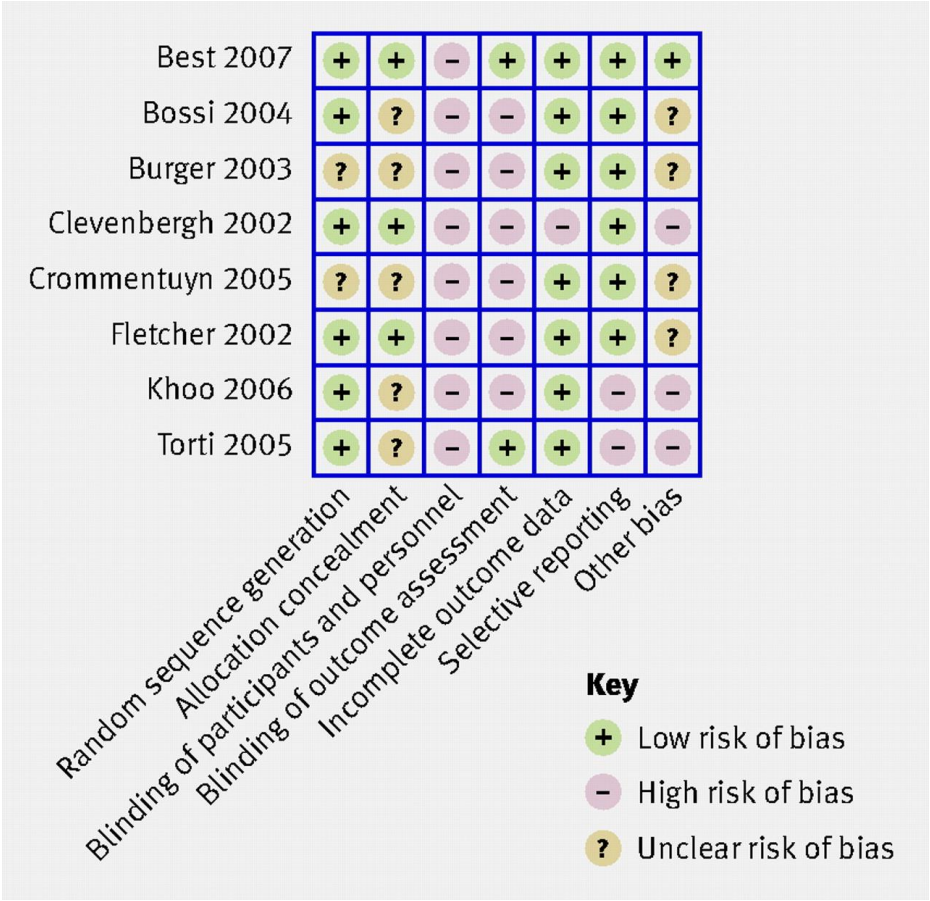
- Last updated in October, 2020
- MEDLINE, Embase, and the Cochrane Library
- “sacrospinous colpopexy,” “sacrospinous ligament fixation,” “sacrospinous ligament colpopexy,” “sacrospinous ligament suspension,”“sacrospinous hysteropexy,” “sacrospinous fixation
- “sacrocolpopexy,” “colposacropexy,” “sacrohysteropexy,”and “sacral colpopexy.
- Comparative studies (randomized controlled trials [RCTs], case–control, or cohort studies)

Materials and Methods-data extraction

- Data were extracted and summarized independently by two reviewers

1. Study characteristics
2. Patient characteristics
3. Interventions
4. Outcome definitions
5. Surgical outcomes and complications
6. Methodological quality items

Materials and Methods- quality assessment and statistical analysis

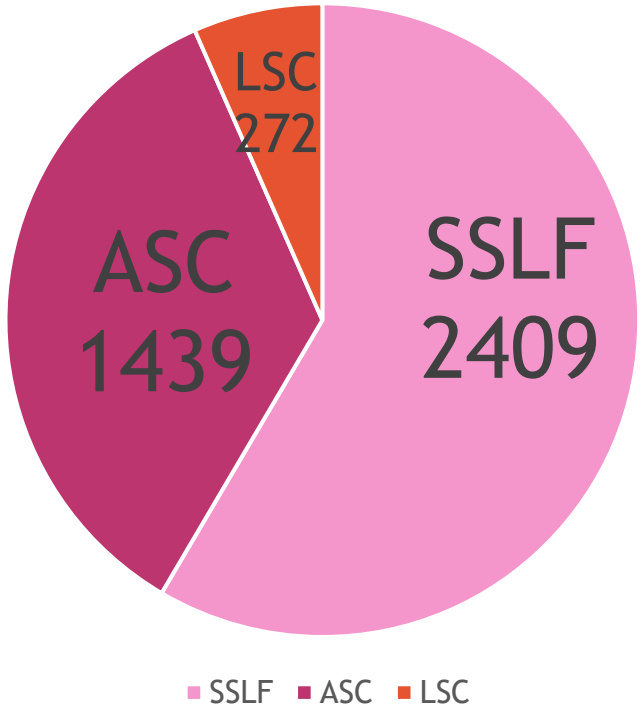


- RCT: Cochrane risk of bias tool
- Case–control and cohort: modified Newcastle–Ottawa scale
- Review manager 5.0
- Odds ratio (OR) and weighted mean difference (WMD)

- Dichotomous data: numbers of events in the two groups to calculate Mantel–Haenszel odds ratios (ORs).
- Continuous data: the mean difference (MDs) and the standard deviations (STDs)
- Statistical heterogeneity: Chi-squared test with significance set at $p < 0.10$, quantified using the I^2 statistic
- Subgroup analyses: compare ASC and LSC with SSLF
- Sensitivity analyses were performed for high-quality studies

Result

4120 case



PubMed: n = 107

Embase: n = 267

Cochrane: n = 36

Studies identified through initial searches of electronic databases: n = 410

Duplications: n = 137

Titles and abstracts screened: n = 273

Excluded studies: n = 176
- Irrelevant topics : n = 100
- Non-comparative studies: n = 33
- Meeting reports: n = 3
- Abstract data not extractable: n = 40

Full-text articles screened: n = 97

Excluded studies: n = 82
- Reviews: n = 70
- Protocol: n = 11
- Duplicate reports: n = 1

Included studies: n = 15

Table 1 Characteristics of the studies included

Study	Level of evidence	Design	Surgery	Patient number			Matching[a]	Follow-up, months	Quality score
				SSLF	ASC	LSC			
Benson and McClellan [29]	2b	RCT	SSLF/ASC	42	38		1,2,6,7	30	RCT
Biler et al. [27]	2b	R	SSLF/ASC/LSC	57	68	13	1,2,3,4,5,6 7	Perioperative	★★★★★★★
de Castro et al. [25]	1b	RCT	SSLF/ASC	35	36		1,2,3,4, 5,7	13.6	RCT
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van IJsselmuiden et al. [14]	1b	RCT	SSLF/LSC	58		59	1,2,3,4,5,6	12	RCT
Juliato et al. [22]	2b	R	SSLF/ASC	41	48		1,2,3,4, 5,6,7	6–9	★★★★★★★
Lo and Wang [21]	2b	RCT	SSLF/ASC	66	52		1,2,6,7	25	RCT
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Ramanah et al. [17]	2b	P	SSLF/LSC	64		87	1,2,3,4, 6	30	★★★★★★
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Methodological quality of included study

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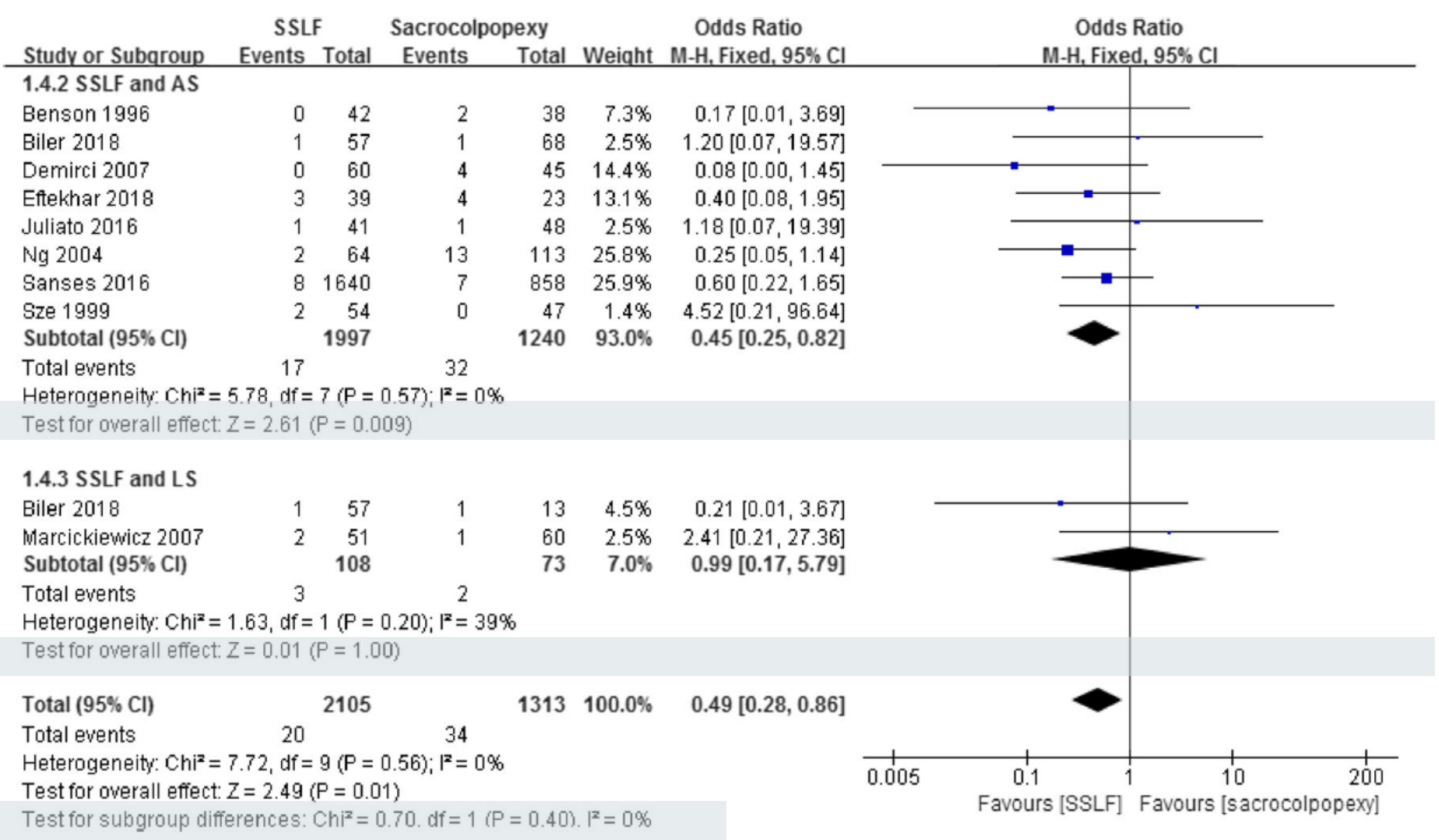
Operation time

- 10 studies including 1,132 patients reported operative time
- The OP time was significantly shorter in the SSLF group than in the ASC group (WMD:−25.08 min; p = 0.004).
- 4 studies assessed OP time in 419 patients show no significant difference between SSLF and LSC (WMD: −37.56 min; p = 0.09).

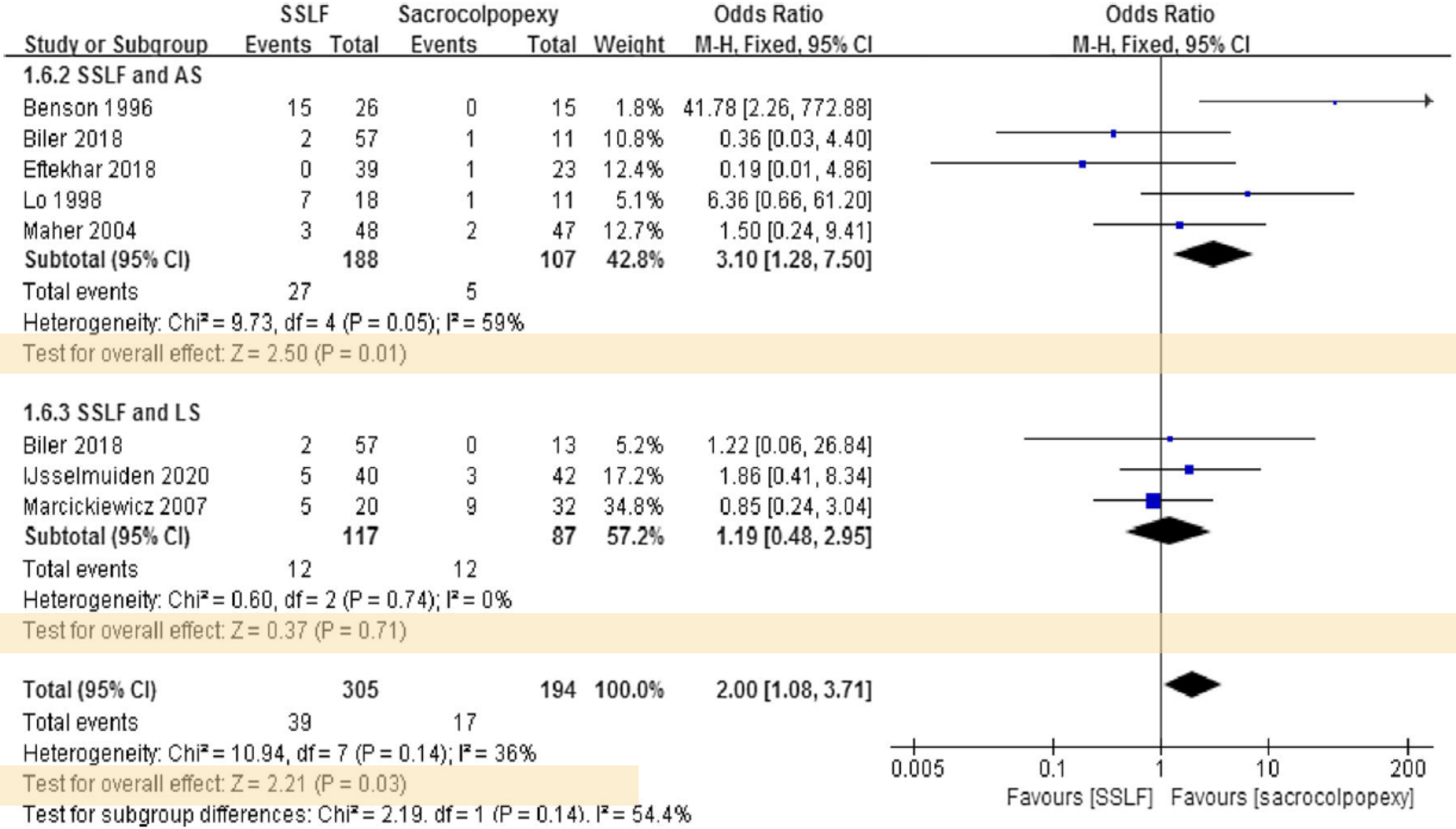
Hemorrhage

- 9 studies assessed hemorrhage in 3,418 patients: a significant difference between the SSLF and sacrocolpopexy groups (0.95% and 2.59%; OR: 0.49; p = 0.01)
- A significant difference between SSLF and ASC (0.85% and 2.58%; OR 0.45; 95% CI 0.25–0.85; p = 0.009)
- No difference between SSLF and LSC (2.78% and 2.74%; OR: 0.99; 95% CI 0.17–5.79; p = 1.0


SSLF
Sacrocolpopexy
Odds Ratio
Odds Ratio
Study or Subgroup
Events
Total
Events
Total
Weight
M-H, Fixed, 95% CI
M-H, Fixed, 95% CI
1.4.2 SSLF and AS
Benson 1996 0 42 2 38 7.3% 0.17 [0.01, 3.69]
Biler 2018 1 57 1 68 2.5% 1.20 [0.07, 19.57]
Demirci 2007 0 60 4 45 14.4% 0.08 [0.00, 1.45]
Eftekhar 2018 3 39 4 23 13.1% 0.40 [0.08, 1.95]
Juliato 2016 1 41 1 48 2.5% 1.18 [0.07, 19.39]
Ng 2004 2 64 13 113 25.8% 0.25 [0.05, 1.14]
Sanses 2016 8 1640 7 858 25.9% 0.60 [0.22, 1.65]
Sze 1999 2 54 0 47 1.4% 4.52 [0.21, 96.64]
Subtotal (95% CI) 1997 1240 93.0% 0.45 [0.25, 0.82]
Total events 17 32
Heterogeneity: Chi² = 5.78, df = 7 (P = 0.57); I² = 0%
Test for overall effect: Z = 2.61 (P = 0.009)
1.4.3 SSLF and LS
Biler 2018 1 57 1 13 4.5% 0.21 [0.01, 3.67]
Marcickiewicz 2007 2 51 1 60 2.5% 2.41 [0.21, 27.36]
Subtotal (95% CI) 108 73 7.0% 0.99 [0.17, 5.79]
Total events 3 2
Heterogeneity: Chi² = 1.63, df = 1 (P = 0.20); I² = 39%
Test for overall effect: Z = 0.01 (P = 1.00)
Total (95% CI) 2105 1313 100.0% 0.49 [0.28, 0.86]
Total events 20 34
Heterogeneity: Chi² = 7.72, df = 9 (P = 0.56); I² = 0%
Test for overall effect: Z = 2.49 (P = 0.01)
Test for subgroup differences: Chi² = 0.70, df = 1 (P = 0.40), I² = 0%
0.005
0.1
1
10
200
Favours [SSLF]
Favours [sacrocolpopexy]

Dyspareunia

- 7 studies including 499 patients reported dyspareunia
- A significant difference between SSLF and sacrocolpopexy groups (12.79% and 8.76%; OR 2.00; p = 0.03)
- A significant difference between SSLF and ASC (14.36% and 4.67%; OR 3.10; p = 0.01)
- No difference between SSLF and LSC (10.26% and 13.79%; OR 1.19; 95% CI 0.48–2.95; p = 0.71)


SSLF
Sacrocolpopexy
Odds Ratio
Odds Ratio
Study or Subgroup Events Total Events Total Weight M-H, Fixed, 95% CI
M-H, Fixed, 95% CI
1.6.2 SSLF and AS
Benson 1996 15 26 0 15 1.8% 41.78 [2.26, 772.88]
Biler 2018 2 57 1 11 10.8% 0.36 [0.03, 4.40]
Eftekhar 2018 0 39 1 23 12.4% 0.19 [0.01, 4.86]
Lo 1998 7 18 1 11 5.1% 6.36 [0.66, 61.20]
Maher 2004 3 48 2 47 12.7% 1.50 [0.24, 9.41]
Subtotal (95% CI) 188 107 42.8% 3.10 [1.28, 7.50]
Total events 27 5
Heterogeneity: Chi² = 9.73, df = 4 (P = 0.05); I² = 59%
Test for overall effect: Z = 2.50 (P = 0.01)
1.6.3 SSLF and LS
Biler 2018 2 57 0 13 5.2% 1.22 [0.06, 26.84]
IJsselmuiden 2020 5 40 3 42 17.2% 1.86 [0.41, 8.34]
Marcickiewicz 2007 5 20 9 32 34.8% 0.85 [0.24, 3.04]
Subtotal (95% CI) 117 87 57.2% 1.19 [0.48, 2.95]
Total events 12 12
Heterogeneity: Chi² = 0.60, df = 2 (P = 0.74); I² = 0%
Test for overall effect: Z = 0.37 (P = 0.71)
Total (95% CI) 305 194 100.0% 2.00 [1.08, 3.71]
Total events 39 17
Heterogeneity: Chi² = 10.94, df = 7 (P = 0.14); I² = 36%
Test for overall effect: Z = 2.21 (P = 0.03)
Test for subgroup differences: Chi² = 2.19, df = 1 (P = 0.14), I² = 54.4%
0.005
0.1
1
10
200
Favours [SSLF]
Favours [sacrocolpopexy]

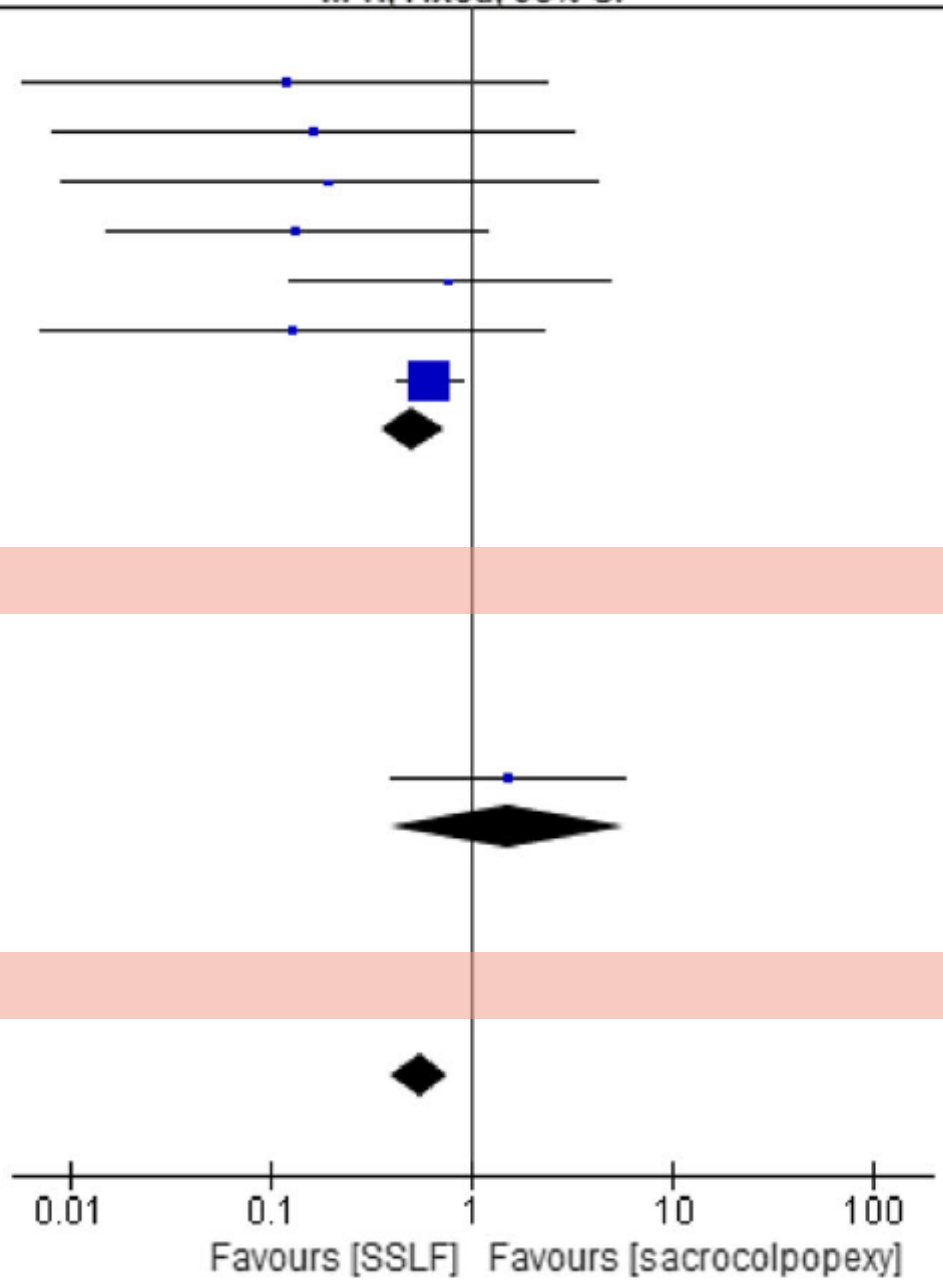
Wound infection

- 8 studies including 3,430 patients reported wound infection
- A significant difference between the SSLF and sacrocolpopexy groups

  (3.30% and 5.76%; OR 0.55; p = 0.0005)
- 7 studies in the subgroup of SSLF and ASC, a significant difference

  (3.30% and 6.03%; OR 0.51; p = 0.0002)
- No significant difference in wound infection rates between SSLF and LSC (3.29% and 3.17%; OR 1.51; p = 0.55

Study or Subgroup	SSLF Events	SSLF Total	Sacrocolpopexy Events	Sacrocolpopexy Total	Weight	Odds Ratio M-H, Fixed, 95% CI
1.8.2 SSLF and AS						
Benson 1996	0	42	3	38	4.0%	0.12 [0.01, 2.39]
Biler 2018	0	57	3	68	3.5%	0.16 [0.01, 3.22]
Castro 2020	0	35	2	36	2.7%	0.19 [0.01, 4.20]
Demirci 2007	1	60	5	45	6.2%	0.14 [0.02, 1.20]
Juliato 2016	2	41	3	48	2.9%	0.77 [0.12, 4.84]
Ng 2004	0	64	6	113	5.2%	0.13 [0.01, 2.31]
Sanses 2016	61	1642	51	863	71.5%	0.61 [0.42, 0.90]
Subtotal (95% CI)		**1941**		**1211**	**96.2%**	**0.51 [0.36, 0.73]**
Total events	64		73			
Heterogeneity: Chi² = 5.22, df = 6 (P = 0.52); I² = 0%						
Test for overall effect: Z = 3.78 (P = 0.0002)						
1.8.3 SSLF and LS						
Biler 2018	0	57	0	13		Not estimable
Chen 2016	5	95	4	113	3.8%	1.51 [0.39, 5.81]
Subtotal (95% CI)		**152**		**126**	**3.8%**	**1.51 [0.39, 5.81]**
Total events	5		4			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.60 (P = 0.55)						
Total (95% CI)		**2093**		**1337**	**100.0%**	**0.55 [0.39, 0.77]**
Total events	69		77			
Heterogeneity: Chi² = 7.25, df = 7 (P = 0.40); I² = 4%						
Test for overall effect: Z = 3.49 (P = 0.0005)						
Test for subgroup differences: Chi² = 2.34, df = 1 (P = 0.13), I² = 57.2%						



Gastrointestinal complication

- Symptoms of ileus, a bowel obstruction
- 7 studies including 3,220 patients reported GI complications
- The difference in gastrointestinal complications was significantly lower in SSLF than in ASC

  (1.33% and 6.19%; OR 0.33; 95% CI 0.15–0.76; p = 0.009).

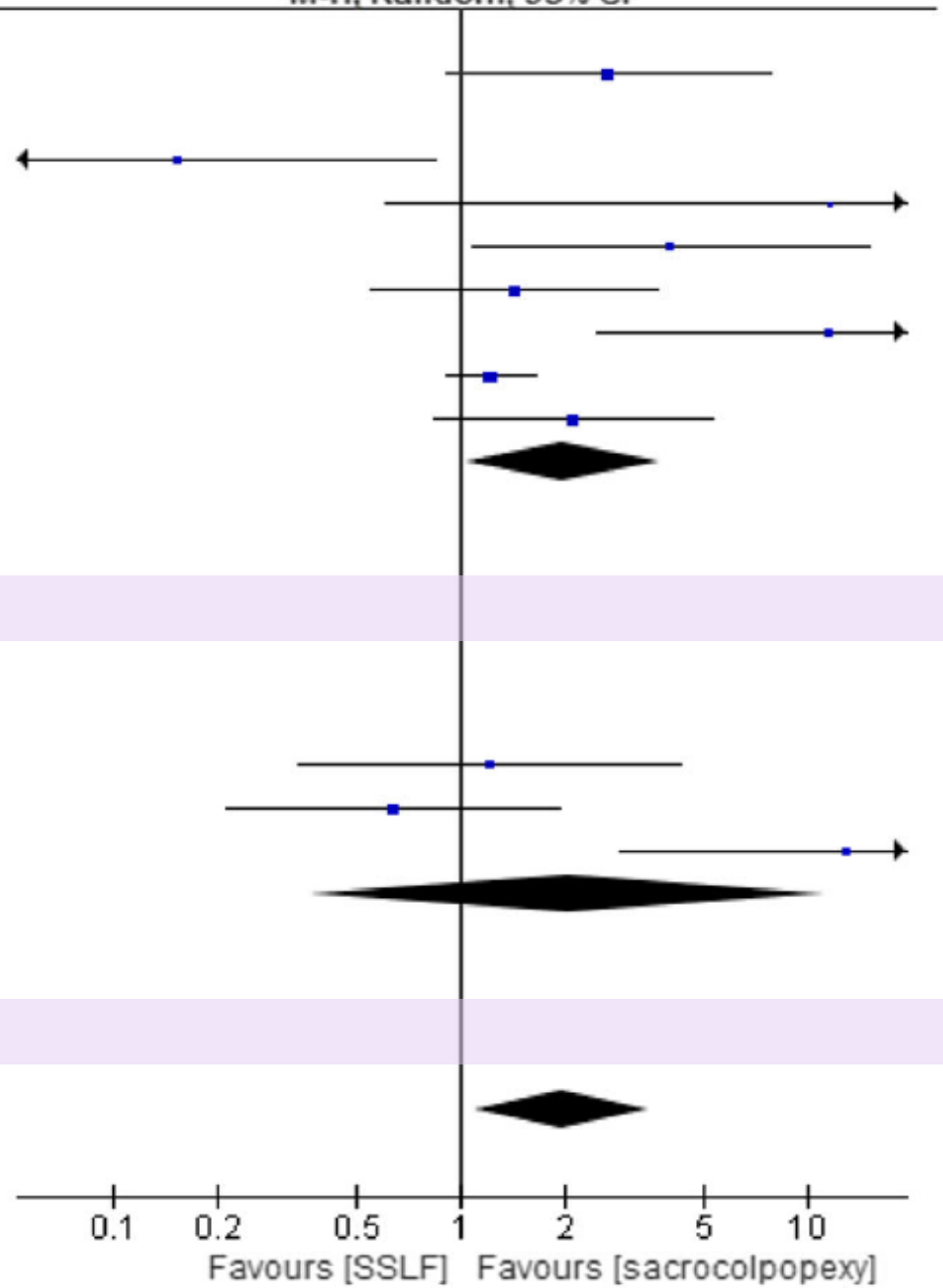
Tissue injury

- Bladder, ureter, and bowel injuries during the operation.
- 9 studies including 3,318 patients reported tissue injuries
- No difference between the SSLF and sacrocolpopexy groups (4.95% and 5.25%; OR 0.87; p = 0.38)
- There was no difference between SSLF with ASC (5.02% and 5.35%; OR 0.87; 95% CI 0.63–1.20; p = 0.41)
- No difference between SSLF and LSC.

Recurrence rate

- 12 studies that assessed recurrence in 3,890 patients
- The recurrence rate was significant higher in the SSLF group (11.34% and 7.90%; OR 1.96; p = 0.02)
- The recurrence rate was statistically significant in favor of ASC (11.58% and 8.32%; OR 1.97; p = 0.04)
- No significant difference between SSLF and LSC (9.52% and 5.88%; OR 2.03; p = 0.42)

Study or Subgroup	SSLF Events	SSLF Total	Sacrocolpopexy Events	Sacrocolpopexy Total	Weight	Odds Ratio M-H, Random, 95% CI
1.14.2 SSLF and AS						
Benson 1996	14	42	6	38	10.1%	2.67 [0.90, 7.87]
Biler 2018	0	57	0	68		Not estimable
Eftekhar 2018	2	39	6	23	6.6%	0.15 [0.03, 0.84]
Juliato 2016	4	41	0	48	3.0%	11.64 [0.61, 222.99]
Lo 1998	13	66	3	52	8.7%	4.01 [1.08, 14.91]
Maher 2004	13	42	11	46	11.1%	1.43 [0.56, 3.66]
Ng 2004	11	64	2	113	7.4%	11.52 [2.47, 53.83]
Sanses 2016	162	1642	71	863	15.3%	1.22 [0.91, 1.64]
Sze 1999	18	54	9	47	11.3%	2.11 [0.84, 5.30]
Subtotal (95% CI)		**2047**		**1298**	**73.5%**	**1.97 [1.04, 3.76]**
Total events	237		108			
Heterogeneity: Tau² = 0.48; Chi² = 21.11, df = 7 (P = 0.004); I² = 67%						
Test for overall effect: Z = 2.07 (P = 0.04)						
1.14.3 SSLF and LS						
Biler 2018	0	57	0	13		Not estimable
Chen 2016	5	94	5	113	8.9%	1.21 [0.34, 4.33]
IJsselmuiden 2020	6	58	9	59	10.0%	0.64 [0.21, 1.93]
Ramanah 2012	15	64	2	87	7.5%	13.01 [2.85, 59.29]
Subtotal (95% CI)		**273**		**272**	**26.5%**	**2.03 [0.37, 11.19]**
Total events	26		16			
Heterogeneity: Tau² = 1.84; Chi² = 10.54, df = 2 (P = 0.005); I² = 81%						
Test for overall effect: Z = 0.81 (P = 0.42)						
Total (95% CI)		**2320**		**1570**	**100.0%**	**1.96 [1.10, 3.47]**
Total events	263		124			
Heterogeneity: Tau² = 0.54; Chi² = 31.51, df = 10 (P = 0.0005); I² = 68%						
Test for overall effect: Z = 2.29 (P = 0.02)						
Test for subgroup differences: Chi² = 0.00, df = 1 (P = 0.98), I² = 0%						



SSLF and ASC

- Vault prolapse: statistically significant in favor of ASC (OR3.31; p = 0.04)
- No significant difference in cystocele recurrence and rectocele recurrence

SSLF and LSC

- No significant difference in the vault prolapse, cystocele and rectocele recurrence

Success Rate

- 12 studies wit 3,890 patients
- SSLF were significantly lower than in the sacrocolpopexy group (88.58% and 91.91%; OR 0.53; p = 0.02)
- Significant difference between SSLF and ASC

  (88.32% and 91.45%; OR 0.52, p = 0.03)
- No difference between SSLF and LSC

  (90.48%and 94.12%; OR 0.49; p = 0.42)

Study or Subgroup	SSLF Events	SSLF Total	Sacrocolpopexy Events	Sacrocolpopexy Total	Weight	Odds Ratio M-H, Random, 95% CI
1.15.2 SSLF and AS						
Benson 1996	28	42	32	38	9.9%	0.38 [0.13, 1.11]
Biler 2018	57	57	68	68		Not estimable
Eftekhar 2018	37	39	17	23	6.3%	6.53 [1.19, 35.75]
Juliato 2016	37	41	48	48	2.8%	0.09 [0.00, 1.65]
Lo 1998	53	66	49	52	8.3%	0.25 [0.07, 0.93]
Maher 2004	29	42	35	46	10.9%	0.70 [0.27, 1.80]
Ng 2004	51	64	108	113	9.9%	0.18 [0.06, 0.54]
Sanses 2016	1480	1642	792	863	15.4%	0.82 [0.61, 1.10]
Sze 1999	36	54	38	47	11.0%	0.47 [0.19, 1.19]
Subtotal (95% CI)		**2047**		**1298**	**74.5%**	**0.52 [0.29, 0.95]**
Total events	1808		1187			
Heterogeneity: Tau² = 0.41; Chi² = 19.94, df = 7 (P = 0.006); I² = 65%						
Test for overall effect: Z = 2.11 (P = 0.03)						
1.15.3 SSLF and LS						
Biler 2018	57	57	13	13		Not estimable
Chen 2016	89	94	108	113	8.6%	0.82 [0.23, 2.94]
IJsselmuiden 2020	52	58	50	59	9.7%	1.56 [0.52, 4.70]
Ramanah 2012	49	64	85	87	7.2%	0.08 [0.02, 0.35]
Subtotal (95% CI)		**273**		**272**	**25.5%**	**0.49 [0.09, 2.72]**
Total events	247		256			
Heterogeneity: Tau² = 1.84; Chi² = 10.54, df = 2 (P = 0.005); I² = 81%						
Test for overall effect: Z = 0.81 (P = 0.42)						
Total (95% CI)		**2320**		**1570**	**100.0%**	**0.53 [0.31, 0.91]**
Total events	2055		1443			
Heterogeneity: Tau² = 0.48; Chi² = 30.26, df = 10 (P = 0.0008); I² = 67%						
Test for overall effect: Z = 2.30 (P = 0.02)						
Test for subgroup differences: Chi² = 0.00, df = 1 (P = 0.95), I² = 0%						

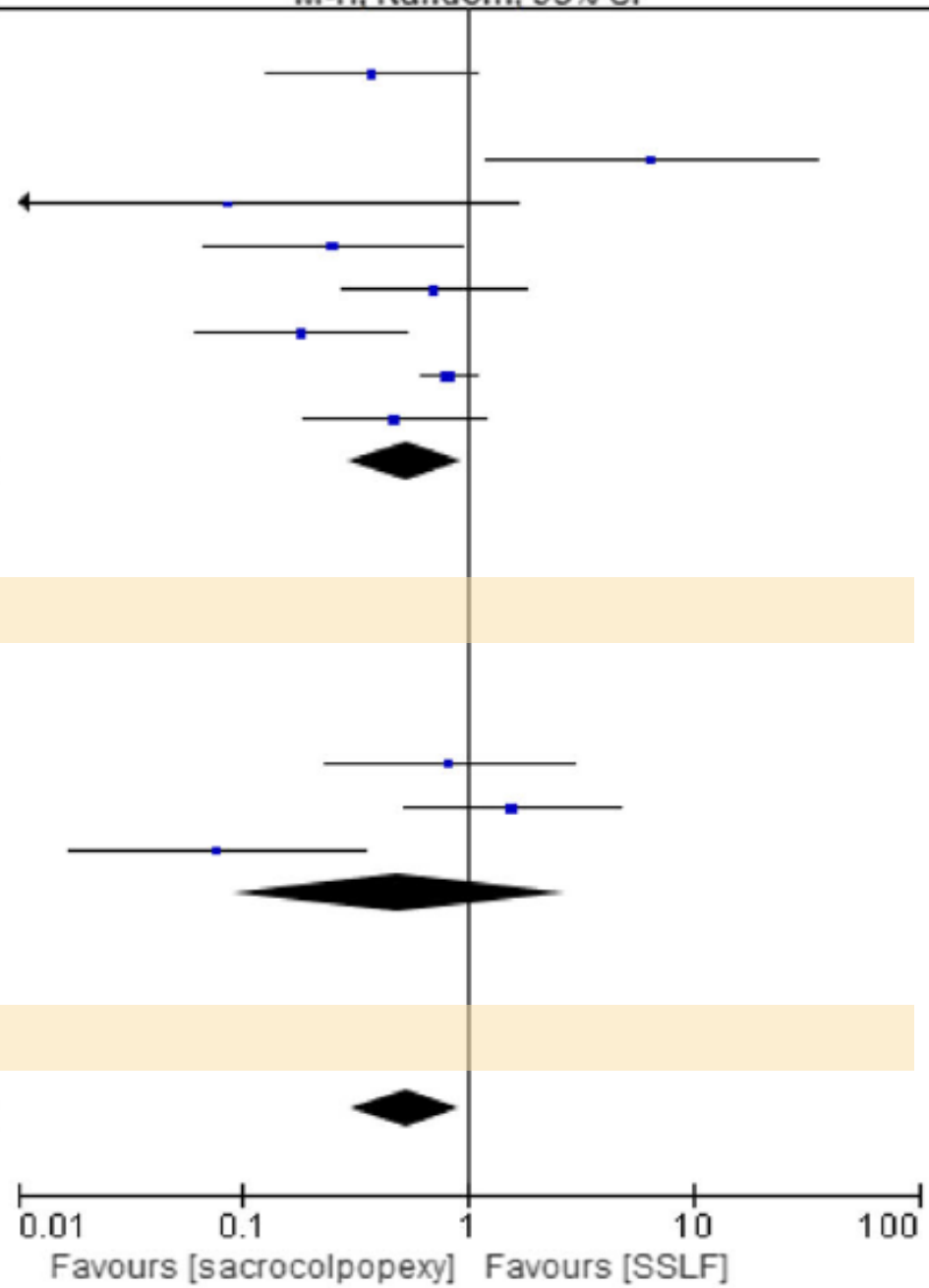
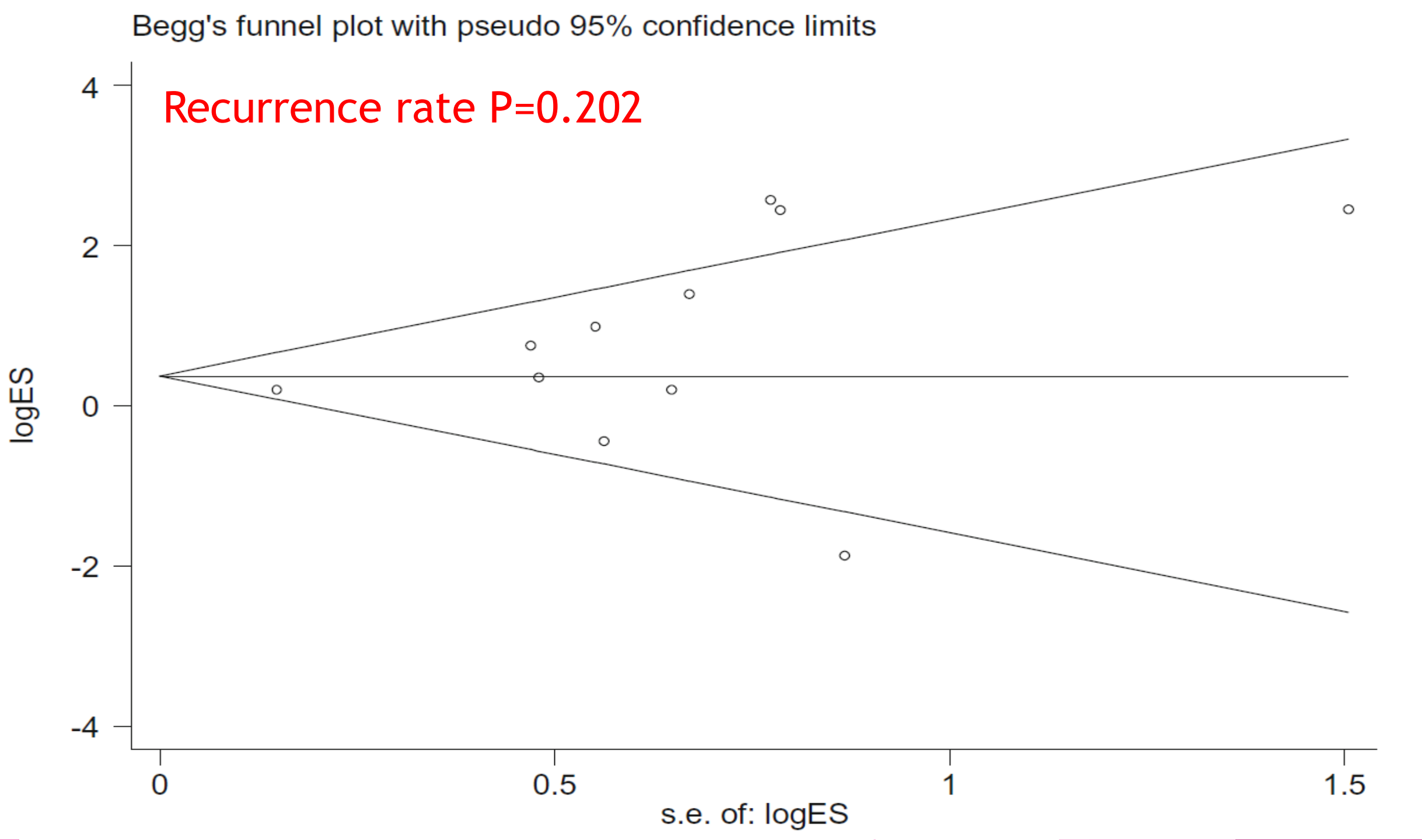


Table 3 Sensitivity analysis comparison of sacrospinous ligament fixation (SSLF) and sacrocolpopexy

Outcomes of interest	Study, number.	SSLF, patient, number	Sacrocolpopexy, patients, number	WMD/OR (95% CI)	*p* value*	Study heterogeneity			
						$\chi 2$	df	I^2, %	*p* value
OT, min	8	515	540	−31.67 (−48.69, −14.65)	**<0.00003**	125.33	8	94	<0.00001
Hemorrhage	5	312	340	0.46 (0.19, 1.10)	0.08	3.97	5	0	0.55
Dyspareunia	6	266	171	2.26 (1.19, 4.30)	**0.01**	9.38	6	36	0.15
Gastrointestinal complications	5	331	290	0.59 (0.28, 1.22)	0.16	2.01	4	0	0.73
Wound infection	6	391	429	0.46(0.21, 1.02)	0.06	5.59	5	11	0.35
Tissue injury	6	301	345	1.45 (0.65, 3.25)	0.37	3.24	5	0	0.66
Recurrence	8	521	550	2.26 (1.10, 4.65)	**0.03**	13	6	54	0.04
Success	8	521	550	0.47(0.25, 0.89)	**0.02**	11.27	6	47	0.08


Begg's funnel plot with pseudo 95% confidence limits
Recurrence rate P=0.202
4
2
0
-2
-4
logES
0
0.5
1
1.5
s.e. of: logES

Discussion

- ASC has better anatomical results and lower recurrence
- No significant differences in cystocele or rectocele recurrence
- SSLF: neuropathy produced by massive vaginal dissection, negative effect on pelvic muscle, fascia, and ligament
- There were no differences between LSC and SSLF in apical prolapse, cystocele, rectocele, overall recurrence, or success rate

  -insufficient pulling of the mesh

  -mesh displacement

  -the small number of study included

- SSLF and LSC: both are minimally invasive, better cosmetic outcome
- LSC has a lower febrile rate than SSLF

  → LSC is at least as safe and efficient as SSLF
- Dyspareunia rates: higher in SSLF than ASC

  -Excessive vaginal dissection

  -concurrent with overzealous repairs of cystocele,

  rectocele, or perineoplasty
- ASC: longer operative time, more hemorrhage, wound infection, and GI complications, synthetic mesh erosion and higher costs

- Between-study heterogeneity was significant for success and recurrence.
- Pooling of data using the random-effects model might reduce the effect of heterogeneity but cannot abolish it completely
- Limitation:

1. Different success definition
2. Most patients have various other procedures
3. Most of the studies involved were retrospective
4. non-English language studies were excluded

Strength

1. Adequate follow-up period
2. Includes all studies published in English comparing SSLF and sacrocolpopexy in this area
3. A comprehensive assessment of adverse events

Conclusion

- When anatomical durability and sexual function are priorities, ASC may be the preferred option
- When considering mesh erosion, the cost of mesh, operative time, hemorrhage, wound infection, gastrointestinal complications, and better cosmetic satisfaction, SSLF may be the better option