




Comparing functional outcomes between transanal total mesorectal excision (TaTME) and laparoscopic total mesorectal excision (LaTME) for rectal cancer: a systematic review and meta-analysis

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Accepted: 13 January 2021 / Published online: 13 February 2021

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Abstract

Background There is concern that transanal total mesorectal excision (TaTME) may result in poorer functional outcomes as compared to laparoscopic TME (LaTME). These concerns arise from the fact that TaTME entails both a low anastomosis and prolonged dilatation of the anal sphincter from the transanal platform.

Objectives This paper aimed to assess the comparative functional outcomes following TaTME and LaTME, with a focus on anorectal and genitourinary outcomes.

Data sources A meta-analysis and systematic review was performed on available literature between 2000 and 2020 from the PubMed, EMBASE, Medline, and Cochrane Library databases.

Study selection All comparative studies assessing the functional outcomes following taTME versus LaTME in adults were included.

Main outcome measure Functional anorectal and genitourinary outcomes were evaluated using validated scoring systems.

Results A total of seven studies were included, consisting of one randomised controlled trial and six non-randomised studies. There were 242 (52.0%) and 233 (48.0%) patients in the TaTME and LaTME groups respectively. Anorectal functional outcomes were similar in both groups with regard to LARS scores (30.6 in the TaTME group and 28.3 in the LaTME group), Jorge-Wexner incontinence scores, and EORTC QLQ C30/29 scores. Genitourinary function was similar in both groups with IPSS scores of 5.5 to 8.0 in the TaTME group, and 3.5 to 10.1 in the LaTME group. ($p = 0.835$).

Conclusion This review corroborates findings from previous studies in showing that the transanal approach is not associated with increased anal sphincter damage. Further prospective clinical trials are needed in this field of research.

Kay T. Choy and Tze Wei Wilson Yang are co-first authors and have contributed to this study equally.

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Keywords Transanal TME · Laparoscopic TME · Functional outcomes · Scoring system

Introduction

The quality of life following rectal surgery is often overlooked in the provision of surgical care. Total mesorectal excision (TME) has become the standard of care in the surgical treatment of rectal cancer with excellent long-term local recurrence-free and overall survival rates [1]. With technological advances in surgery, there has been a gradual shift over time from an open approach to laparoscopic and robotic approaches, and more recently, to a transanal approach with transanal total mesorectal excision (TaTME) [2]. First described by Sylla in 2010, TaTME was developed as a novel technique to overcome difficulties encountered in distal pelvic dissection in other approaches to TME, especially when

operating on patients with a high BMI, on men with a narrow android pelvis, and on low-lying tumours [3].

While there is an ongoing debate regarding the long-term oncological safety of TaTME, little has been reported about functional sequelae post-TaTME and their impact on patients' quality of life (QoL). Patients often report disordered bowel function following rectal resection, which can have a significant impact on their QoL, and is termed as low anterior resection syndrome (LARS). In addition to anorectal dysfunction, urethral injuries following TME have also been reported, given the proximity of the dissection planes to pelvic nerves and urogenital structures. The burden of urogenital dysfunction following TME has been increasingly acknowledged in recent years, from both laparoscopic and transanal approaches [5, 6].

This paper therefore aimed to assess the comparative functional outcomes following TaTME and LaTME, with a focus on anorectal and genitourinary outcomes, while accounting for previously reported confounders [7].

Methods

Search strategy

All relevant published studies were identified through a computer-assisted search of PubMed, EMBASE, Medline, and Cochrane Library databases between 2000 and 2020. The following medical subject heading (MeSH) terms and text words were used for the search in all possible combinations: “(rectal neoplasm OR cancer)” AND “(transanal TME OR laparoscopic TME)” AND “function” OR “functional outcomes”. The cited references in each retrieved paper were also checked for relevance. The last date for this search was 31 August 2020.

Selection of studies

The retrieved titles and abstracts of all studies were evaluated for their eligibility for inclusion according to the preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines. All articles comparing afunctional outcomes following TaTME and LaTME in adult populations were included. All non-English studies, letters, perspectives, conference abstracts, or studies focusing on paediatric patients were excluded.

Definitions

The functional outcome assessments encountered in this meta-analysis included the low anterior resection syndrome (LARS) score, the Jorge-Wexner scale, the international prostate syndrome score (IPSS), and the European Organisation for

Research and Treatment of Cancer (EORTC) Quality of Life Questionnaire (QLQ C-29/30).

Low anterior resection syndrome score

The LARS score is a symptom-based scoring system which measures bowel dysfunction following low anterior resection for rectal cancer. Major markers of incontinence include incontinence for flatus or liquid stools, frequency of bowel motions, stool clustering, and urgency. Overall scores are broken down into three groups corresponding to the severity of LARS: no LARS (0–20), minor LARS (21–29), and major LARS (30–42).

Jorge-Wexner scale

The Jorge-Wexner scale is a five-item scoring system which aims to measure the severity of faecal incontinence. Patients allocate a score between 0 (never) and 4 (always) to five symptoms (solid incontinence, liquid incontinence, flatus incontinence, pad wearing, and lifestyle alteration) to a maximum of 20.

International prostate syndrome score

The IPSS measures the quality of urinary function in male patients. It is based on seven symptoms related to urinary function—incomplete emptying, frequency, intermittency, urgency, weak stream, straining, and nocturia. Patients allocate a score of 0 (none) to 5 (almost always) to each symptom, to a maximum score of 35.

European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire (QLQ-C30 and QLQ-C29)

The QLQ-C30 questionnaire measures the QoL of cancer patients by asking a total of 30 questions with regard to five functional aspects (physical, role, emotional, cognitive, and social), eight symptoms (fatigue, nausea, pain, dyspnoea, loss of appetite, insomnia, constipation, and diarrhoea), financial strain, and global health status. The complementary QLQ-29 assesses QoL especially in colorectal cancer patients, with a total of 29 questions asked in four scales (body image, urinary frequency, blood and mucus in stool, and stool frequency).

Data extraction

Two reviewers (KTC and TWWY) independently extracted the data from the included studies using a standard data extraction form. Any discrepancies were resolved by consensus and discussion between the two reviewers and the supervising author (JCK).

Statistical analysis

All categorical data was collected as absolute numbers. Any data which reported zero events was replaced with 0.5 to allow for the computation of statistical calculations. A pooled odds ratio (OR) was calculated based on the Cochran-Mantel-Haenszel test. When reported as a median value with an associated range, this was converted to mean and SD. I^2 statistics were performed to assess for inter-study heterogeneity. The Newcastle-Ottawa and Jadad scales were used to assess the quality of non-randomised studies and randomised controlled trials (RCTs) respectively. Egger's test was performed to assess for publication bias. A p value of < 0.05 was considered significant. All data analysis was performed in R Studio Team (2015). RStudio: Integrated Development for R Studio, Inc., Boston, MA, using the metaphor package for meta-analysis.

Results

Search results and included studies

There were a total of 303 citations identified in the initial search. After removing duplicates and screening with full-text reviews, a total of seven studies were included in the study (Table 1) [8–14]. There were a total of 465 patients, with 242 (52.0%) patients in the TaTME group and 223 (48.0%) patients in the LaTME group.

Study design and quality

There were RCT [14] and six non-randomised studies, with three retrospective [8, 11, 13] and three prospective observational studies [9, 10, 12]. All non-randomised studies scored 6 or more on the Newcastle-Ottawa scale, and the RCT scored 3 points in the Jadad scoring system. All studies were therefore deemed to be good quality studies.

Patient characteristics and functional outcome assessments tools

The mean age for patients ranged between 57.5 and 68 years in the TaTME group and 59.9 and 68 years in the LaTME group. There were more male patients in both groups, accounting for 67.9% and 62.2% of the TaTME and LaTME groups respectively. All studies included patients who underwent neoadjuvant chemoradiotherapy (CRTx), with a slightly lower proportion of 44.2% (107 patients) in the TaTME group as compared to 50.2% (112 patients) in the LaTME group. Four studies reported on tumour staging [9, 10, 12, 14]. There were 46 (36.5%) patients in the TaTME group and 58 (53.7%) patients in the LaTME group, who had at least stage IIIa or Dukes C colorectal cancer. There were

various functional outcome assessment tools utilised across the seven studies, with all studies including LARS scores. Three studies utilised the Jorge-Wexner scale [8, 10, 14], three studies used IPSS [9, 13, 14], and three studies utilised EORTC QLQ-C29 and QLC-C30 scores [9, 12, 13].

Functional outcome assessments

LARS

Five studies reported on LARS score [8–10, 13, 14], with a mean LARS score of 30.6 in the TaTME group and 28.3 in the LaTME group. One hundred twenty-nine (53.3%) patients in the TaTME group and 107 (47.9%) patients in the LaTME group had major or severe LARS (OR: 1.28, 95% CI: 0.88–1.87, $p = 0.235$) (Table 2, Fig. 1). No significant difference was identified between the two groups, with the standard mean difference (SMD) favouring the TaTME group (SMD: 0.42, 95% CI: -0.10 – 0.93 , $p = 0.115$) (Fig. 2).

Jorge-Wexner scale

Three studies reported on Jorge-Wexner scores. These scores ranged from 7 to 9 in the TaTME group and 7 to 10 in the LaTME group [8, 10, 14]. There was no significant difference identified between the two groups with the SMD favouring the TaTME group (SMD: 0.09, 95% CI: -0.26 – 0.43 , $p = 0.623$) (Fig. 3).

IPSS

Three studies reported IPSS, with scores ranging from 5.5 to 8.0 in the TaTME group and 3.5 to 10.1 in the LaTME group [9, 13, 14]. No significant differences were identified between the two groups with the SMD favouring the TaTME group (SMD: 0.07, 95% CI: -0.56 – 0.69 , $p = 0.835$) (Fig. 4). Thirty-two (28.1%) patients in the TaTME group and 25 (25.8%) patients in the LaTME group had moderate or severe IPSS symptoms (OR: 1.11, 95% CI: 0.60–2.06, $p = 0.851$) (Table 3, Fig. 5).

EORTC QLQ-C29

The QLQ-C29 assessment found that buttock pain, changes to taste, hair loss, faecal incontinence, and sore skin were significantly more common in the TaTME group ($p = 0.011$, 0.047, 0.010, 0.032, and 0.023 respectively) (Table 4). Conversely, abdominal pain and bloating symptoms were significantly more common in the LaTME group ($p = 0.044$ and 0.042 respectively) (Table 4). No statistically significant differences were identified with regard to any of the functional scales [9, 12, 13].

Table 1 Study characteristics, quality assessment, and patient characteristics

Author and year	Study period	No. of centres, country	Study design	Quality assessment			Functional outcome assessment			No. of patients	
				S	C	O	Range	LaTME	Range	TaTME	LaTME
Foo et al. [8], 2020	2016–2018	1, Hong Kong	R,O	3	2	3	LARS, Jorge-Wexner scale	35	35	35	35
Bjoern et al. [9], 2019	2010–2017	1, Denmark	R,D	3	2	2	LARS, IPSS, EORTC QLQ-C30, EORTC QLQ-C29	49	49	49	36
Rubinkiewicz [10] et al., 2019	2013–2017	1, Poland	R,D	3	2	1	LARS, Jorge-Wexner scale	23	23	23	23
Dou et al. [11], 2019	2016–2017	1, China	R,O	3	2	2	LARS	54	54	54	53
Mora et al. [12], 2018	2011–2014	1, Spain	R,D	3	2	1	LARS, EORTC QLQ-C30, EORTC QLQ C-29	16	16	16	15
Velcamp Helbach et al. [13], 2018	2012	1, Netherlands	R,O	3	2	2	LARS, EORTC QLQ-C30, EORTC QLQ C-29, IPSS	27	27	27	27
Pontallier et al. [14], 2016	2008–2012	1, France	RCT	3	Jadad (2,0,1)		LARS, Jorge-Wexner scale, IPSS	38	38	38	34

Author and year	Age			Male			Neoadjuvant CRTx			
	TaTME	Range	LaTME	Range	TaTME	Range	LaTME	Range	TaTME	Range
Foo et al. [8], 2020	67	50–85	68	51–88	24	68.57%	23	65.71%	14	40.00%
Bjoern et al. [9], 2019	64.88	9.645	62.42	10.146	37	75.50%	16	44.40%	8	16.30%
Rubinkiewicz [10] et al., 2019	60	51–67	64	58–67	13	56.50%	13	56.50%	18	78.30%
Dou et al. [11], 2019	57.5	26–77	62	33–73	35	64.81%	35	66.04%	12	22.20%
Mora et al. [12], 2018	64	NR	59.9	NR	12	75.00%	10	66.67%	7	43.75%
Velcamp Helbach et al. [13], 2018	68	64.4–71.6	62.7	59.6–65.7	18	66.67%	20	74.07%	18	66.67%
Pontallier et al. [14], 2016	62	39–81	62	35–82	26	68.42%	21	61.76%	30	78.95%

R retrospective, P prospective, O observational, D prospective database, RCT randomised controlled trial, S selection, C comparability, Ou outcome, LARS low anterior resection syndrome, IPSS International prostate symptom score, EORTC QLQ European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire, TaTME transanal total mesorectal excision, LaTME laparoscopic total mesorectal excision, NR not reported, CRTx chemoradiotherapy, A/CC American Joint Committee on Cancer

Table 2 LARS, Jorge-Wexner scale, and complications

Author and year	LARS						Jorge-Wexner scale						Complications requiring surgery					
	LARS			LARS score			LARS score			LARS score			LARS score					
	None	Minor	Major	None	Minor	Major	TaTME	Range	LaTME	Range	TaTME	Range	LaTME	Range	TaTME	Range	LaTME	Range
Foo et al. [8], 2020	8	6	21	12	5	18	34	0–42	30	0–42	7	0–20	7	0–19	NR			
Bjoern et al. [9], 2019	17	15	17	16	8	12	26.18	10.32	20.61	14.51	NR				NR			
Rubinkiewicz [10] et al., 2019	3	12	8	2	9	12	29	24–34	30	21–34	8	4–12	7	3–11	3	13%	4	17.4%
Dou et al. [11], 2019	11	17	26	16	15	22	NR				NR				NR			
Mora et al. [12], 2018	3	3	10	4	2	9	NR				NR				NR			
Velcamp Helbach et al. [13], 2018	7	4	16	11	8	8	27.7	22.3–32.8	24	19.9–28.2	NR				3	11.10%	7	25.90%
Pontallier et al. [14], 2016	NR	NR	31	NR	NR	26	36	12–42	37	12–42	9	2–20	10	3–20	3	7.90%	3	8.80%

LARS low anterior resection syndrome, TaTME transanal total mesorectal excision, LaTME laparoscopic total mesorectal excision, NR not reported

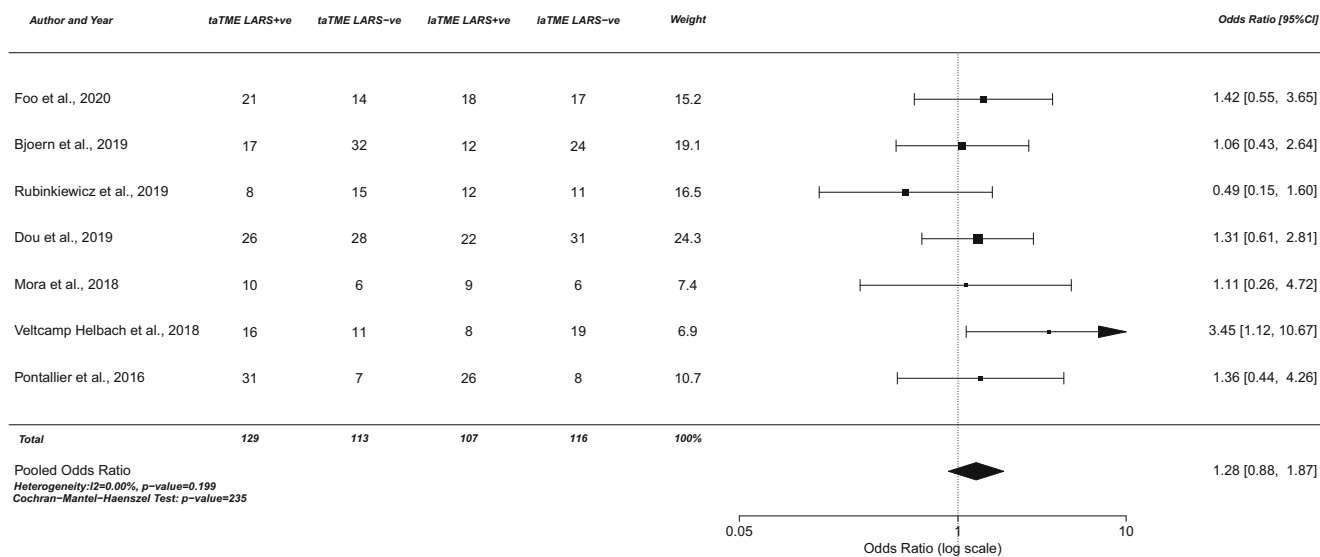


Fig. 1 Forest plot of all studies included for this meta-analysis with pooled odds ratio for major LARS

EORTC QLQ-C30

When comparing functional outcomes using the QLQ-C30 questionnaire (Table 5), diarrhoea, fatigue, and financial difficulties were significantly more likely to occur in the LaTME group ($p = 0.009, 0.021, \text{ and } 0.032$ respectively) [9, 12, 13]. Role functioning was found to be significantly affected in favour of the LaTME group ($p = 0.042$) [13]. Two contradictorily significant differences were identified in two studies with regard to emotional function, with Bjoern et al. favouring LaTME ($p = 0.041$) and Mora et al. favouring taTME ($p = 0.031$) [9, 12]. There were no statistically significant differences in global health status scores across all studies.

Complications requiring surgery

Three studies reported on complication rates, with 9 (10.2%) and 14 (16.7%) patients affected in the TaTME and LaTME groups respectively. No statistically significant differences were identified between the two groups (OR: 0.58, 95% CI: 0.23–1.42, $p = 0.332$) (Fig. 6) [10, 13, 14].

Discussion

This systematic review and meta-analysis compared functional outcomes following LaTME and TaTME, finding that overall functional outcomes are similar with both surgical techniques.

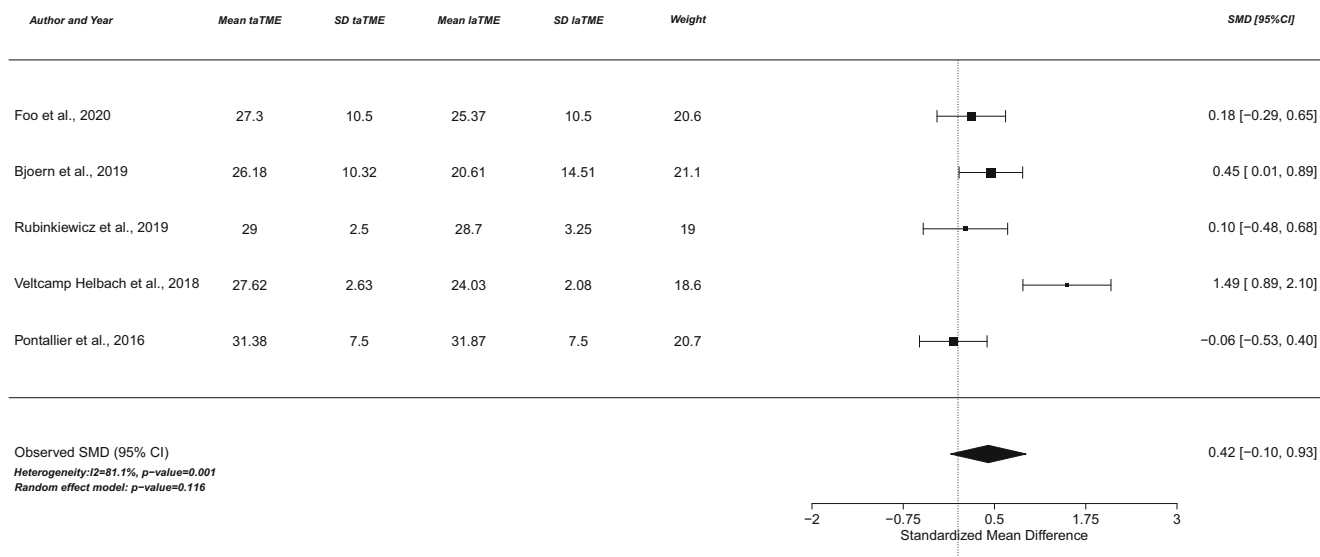


Fig. 2 Forest plot of all studies included for this meta-analysis with pooled standardised mean difference for LARS score

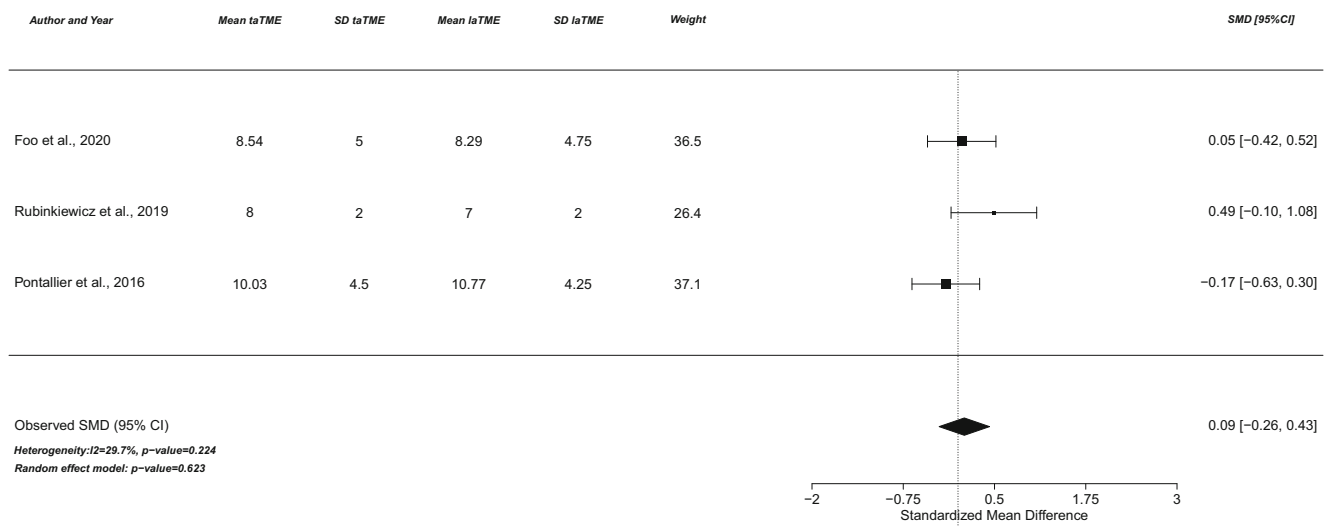


Fig. 3 Forest plot of all studies included for this meta-analysis with pooled standardised mean difference for Jorge-Wexner score

TaTME was developed as a novel surgical technique to facilitate dissection of the lower third mesorectum, and transection of rectal cancers, particularly in the narrow android pelvis [15]. Apart from improved accessibility, TaTME allows for the construction of a low anastomosis in patients who would have otherwise required an abdominoperineal resection [16]. However, ongoing concerns persist about poor post-operative functional outcomes due to the low anastomosis, and prolonged stretch/dilatation of anal sphincter from the transanal platform intra-operatively [16, 17]. This issue is especially pertinent given the already significant prevalence of low anterior resection syndrome (LARS) following rectal surgery [4].

From our review, TaTME and LaTME have been shown to have similar anorectal functional outcomes across three different scoring modalities. The LARS score, a widely validated scoring system [4, 18] for anorectal dysfunction following rectal surgery, was utilised by all studies in this review. The mean LARS score following TaTME was 30.6, correlating to severe LARS, but no significant difference was found

between the incidence of major LARS in the TaTME and LaTME groups. Both the TaTME and LaTME groups performed poorly on the Jorge-Wexner scale, the most widely applied faecal incontinence instrument to date [19]. Patients in both groups had scores ranging from 7 to 10, with no significant differences identified between the two groups. Despite the severity of faecal incontinence exhibited by patients in both groups, it was reassuring to note that only a few patients required complete disconnection of the anastomosis and construction of a colostomy due to persisting faecal incontinence [20].

Similarly, functional outcomes were again comparable between the two groups when utilising the QoL-related questionnaires EORTC QLQ-C30 and EORTC QLQ-C29 designed specifically for colorectal cancer patients. Both cohorts had higher functional burden for specific symptoms such as hair loss and abdominal pain, but contradictory findings were noted with regard to emotional function, and its incidence in the TaTME and LaTME groups. Such findings suggest that there is significant

Table 3 IPSS

IPSS	Bjoern et al. [9] (2019)		Veltecamp Helbach et al. [13] (2018)		Pontallier et al. [14] (2016)		
	TaTME (n=49)	LaTME (n=36)	TaTME (n=27)	LaTME (n=27)	TaTME (n=38)	LaTME (n=34)	
Score	Mean	6.73	10.05	8.00	6.70	5.50	3.50
	Range	7.42	8.15	4.2–11.8	3.6–9.9	0–23	0–27
Symptom (%)	None	6 (16.2)	1 (5)	NR	NR	26 (68.4)	26 (76.5)
	Mild	17 (45.9)	9 (45)	12 (66.7)	7 (50)		
	Moderate	12 (32.4)	8 (40)	5 (27.8)	7 (50)	12 (31.6)	8 (23.5)
	Severe	2 (5.4)	2 (10)	1 (5.6)	0		

IPSS International prostate symptom score, TaTME transanal total mesorectal excision, LaTME laparoscopic total mesorectal excision, NR not reported

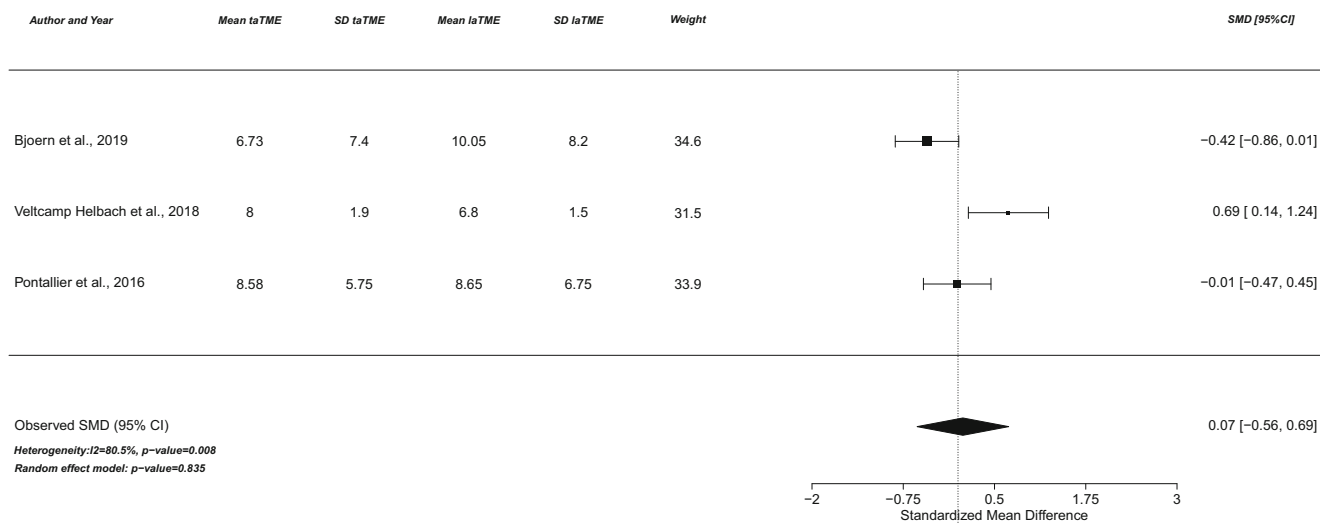


Fig. 4 Forest plot of all studies included for this meta-analysis with pooled standardised mean difference for IPSS score

difficulty inherent in the interpretation of results of these QoL questionnaires.

The quality of functional outcome assessment lies primarily in the questionnaire used [4]. Being extensively validated, these three scoring systems provide insight into symptoms of anorectal and urogenital dysfunction following surgery. Expectedly, these scoring systems are not without their individual criticisms. The recent Delphi consensus suggested that the linear LARS score may significantly underestimate the impact of evacuatory dysfunction and may overestimate the impact on an individual patient’s quality of life in some patients [21]. The inclusion of functional QoL instruments allows for crucial assessment of the impact of these symptoms on a patient’s life [22]. The inclusion of three different scoring systems in this review is a strength that allows for careful and

comprehensive evaluation of both symptoms, and their impact on the quality of life, with regard to anorectal dysfunction [4].

No significant differences between the TaTME and LaTME groups were identified with regard to urogenital function, in comparing the results from the IPSS questionnaire. While there was no considerable data on sexual function, a study by Pontallier et al. [14] found that erectile function was better in patients who underwent TaTME as compared to those who underwent LaTME, and was associated with a higher rate of sexual activity. It has therefore been hypothesised that TaTME allows for better preservation of pelvic nerves intra-operatively.

The main limitation of this review is the lack of data from RCTs. Most of the studies were heterogeneous comparative studies. Furthermore, while the use of subjective questionnaires

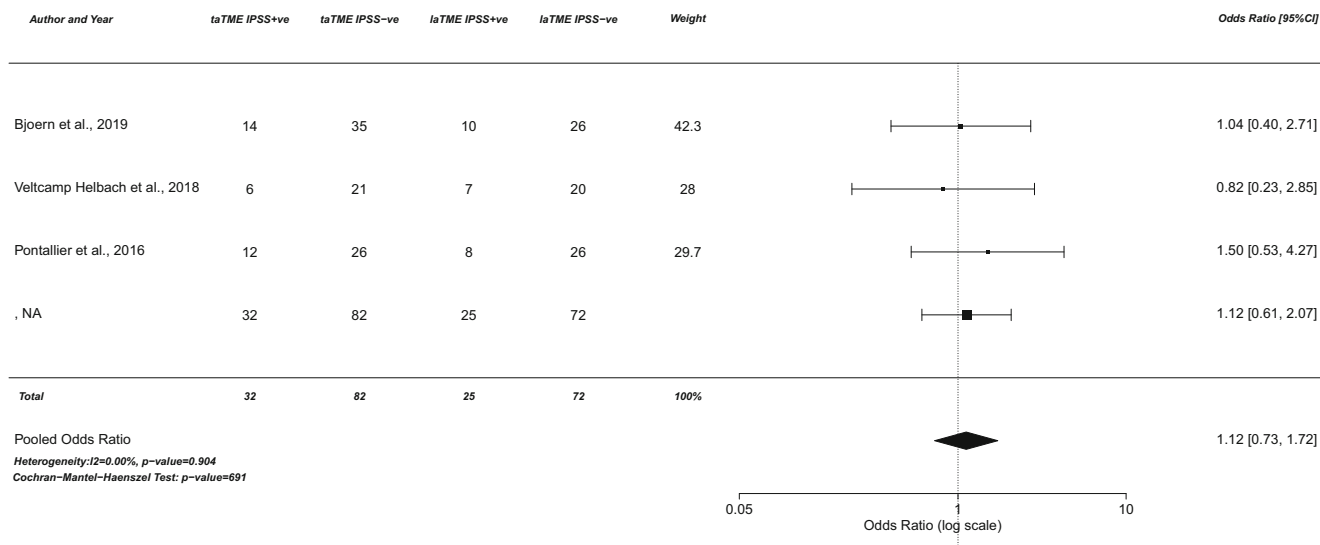


Fig. 5 Forest plot of all studies included for this meta-analysis with pooled odds ratio for moderate to severe IPSS

Table 4 EORTC QLQ-C29

EORTC QLQ-C29	Bjoern et al. [9] (2019)			Mora et al. [12] (2018)			Velcamp Helbach et al. [13] (2018)		
	TaTME (n =49)	LaTME (n =36)	p value	TaTME (n =16)	TME (n =15)	p value	TaTME (n =27)	LaTME (n =27)	p value
Functional scales									
Body image	89.34	88.58	0.647	90.97	85.19	0.432	88.40	90.90	0.325
Anxiety	79.59	81.48	0.954	72.92	64.44	0.489	74.40	75.30	0.715
Weight	84.35	86.11	0.605	66.67	77.78	0.361	87.20	84.10	0.493
Sexual interest (men)	50.45 (37)	50 (20)	0.959	53.33 (12)	44.44 (10)	0.629	68.9 (15)	63.3 (20)	0.564
Sexual interest (women)	5.55 (12)	20.83 (16)	0.053	83.33 (4)	88.89 (5)	0.715	83.3 (6)	73.3 (5)	0.662
Urinary frequency	11.90	19.44	0.516	NR	NR	NR	38.90	28.40	0.101
Blood+mucus stool	4.76	0.92	0.183	NR	NR	NR	3.70	3.70	1.000
Stool frequency	19.79	17.12	0.440	25.64	36.11	0.327	36.50	30.70	0.556
Urinary incontinence	2.04	3.70	0.674	8.33	8.89	0.919	7.40	9.90	0.886
Dysuria	2.04	1.85	0.771	4.44	6.67	0.765	2.50	1.20	0.556
Abdo pain	8.16	11.11	0.329	11.11	28.89	0.044*	10.30	7.40	0.643
Buttock pain	14.28	2.77	0.011*	18.75	28.89	0.335	24.70	12.30	0.114
Bloating	17.68	12.96	0.362	14.58	37.78	0.042*	14.80	14.80	1.000
Dry mouth	18.36	10.18	0.387	NR	NR	NR	29.80	8.60	0.156
Hair loss	2.72	1.85	0.896	NR	NR	NR	9.90	0.00	0.010*
Taste	4.16	0.00	0.047*	NR	NR	NR	17.30	6.20	0.083
Flatulence	32.65	26.85	0.392	51.28	47.22	0.788	41.00	39.70	0.975
Faecal incontinence	20.40	13.88	0.133	28.20	33.33	0.688	33.30	16.70	0.032*
Sore skin	14.96	7.40	0.128	20.51	13.89	0.527	26.90	7.70	0.023*
Embarrassment	10.20	8.33	0.318	NR	NR	NR	38.50	28.20	0.180
Impotence	50.45 (37)	48.33 (20)	0.767	51.85 (12)	66.67 (10)	0.472	41.0 (13)	51.0 (17)	0.483
Dyspareunia	0 (12)	2.08 (16)	0.802	8.33 (4)	13.33 (5)	0.761	7.4 (9)	8.3 (5)	0.905

EORTC QLQ European Organization for Research and Treatment of Cancer quality of life questionnaire, TaTME transanal total mesorectal excision, LaTME laparoscopic total mesorectal excision, NR not reported

*Statistically significant

Table 5 EORTC QLQ-C30

EORTC QLQ-C30		Bjoern et al. [9] (2019)			Mora et al. [12] (2018)			Veltcamp Helbach et al. [13] (2018)		
		TaTME (n=49)	LaTME (n=36)	p value	TaTME (n=16)	TME (n=15)	p value	TaTME (n=27)	LaTME (n=27)	p value
Global health status		77.72	79.86	0.625	73.96	72.62	0.874	79.60	83.60	0.208
Functional scales	Physical	88.29	89.81	0.688	92.50	86.67	0.273	83.20	88.10	0.128
	Role	84.69	85.18	0.772	91.67	79.76	0.255	80.20	89.50	0.042*
	Emotional	87.07	93.51	0.041*	89.58	77.38	0.031*	89.40	90.10	0.887
	Cognitive	90.47	95.83	0.069	85.42	83.33	0.775	89.40	90.10	0.860
	Social	88.43	93.51	0.272	91.67	86.90	0.604	87.70	92.60	0.093
Symptom scales	Fatigue	48.63	44.44	0.392	15.97	22.61	0.462	26.50	14.00	0.021*
	N&V	2.04	1.38	0.978	1.04	0.00	0.359	3.10	2.50	0.987
	Pain	10.20	8.79	0.645	5.20	13.09	0.235	12.80	3.70	0.051
	Dyspnoea	12.24	4.62	0.063	16.67	14.28	0.814	23.50	9.90	0.214
	Insomnia	18.36	14.81	0.449	14.58	21.42	0.426	18.00	14.80	0.385
	Appetite Loss	10.88	2.77	0.052	12.50	2.38	0.190	7.40	2.50	0.358
	Constipation	10.88	6.48	0.549	22.92	33.33	0.381	8.60	9.90	0.763
	Diarrhoea	17.68	4.62	0.009*	14.60	23.80	0.372	16.00	3.70	0.070
	Financial difficulties	1.36	0.00	0.223	NR	NR	NR	14.80	2.40	0.032*

EORTC QLQ European Organisation for Research and Treatment of Cancer quality of life questionnaire, TaTME transanal total mesorectal excision, LaTME laparoscopic total mesorectal excision, NR not reported

*Statistically significant

is promising, the results should be further corroborated with objective measurements such as electromyography or sphincter manometry, which could aid in the detection of sphincter insufficiency. However, the patient’s own subjective rating should always be considered the gold standard measurement, as only they can truly perceive the implications of their anorectal or urogenital dysfunction within the context of their own life [19].

Conclusion

In this non-randomised review of current evidence, no functional differences in outcomes were identified between LaTME and TaTME. This finding supports those from previous studies showing that the transanal approach is not associated with increased anal sphincter damage. Looking ahead, further large-scale prospective clinical trials corroborating

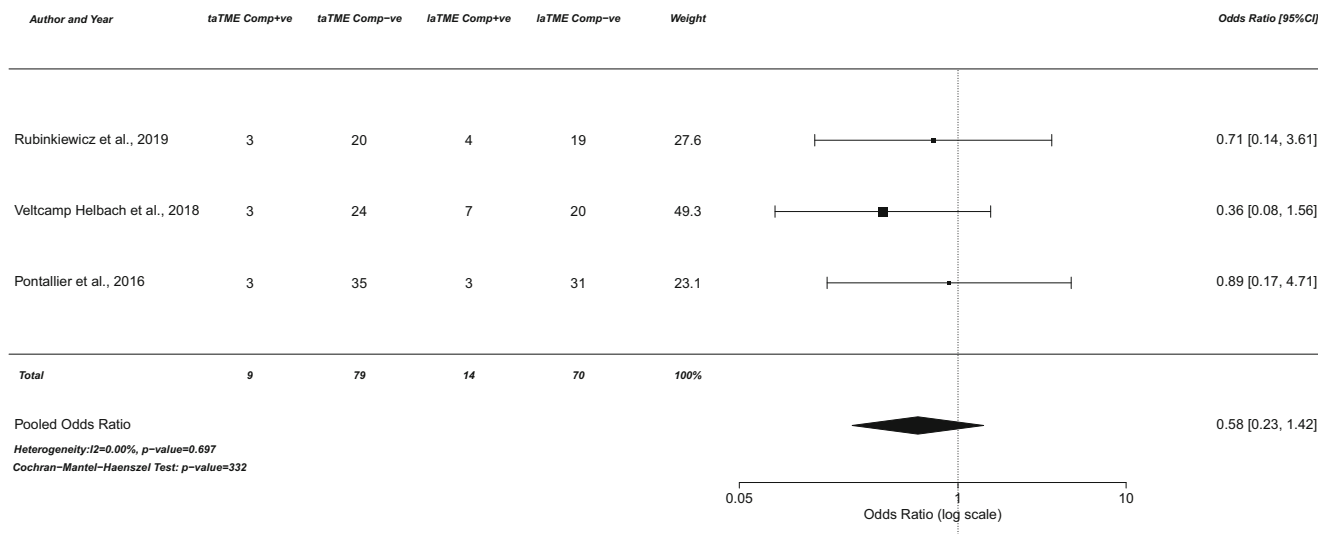
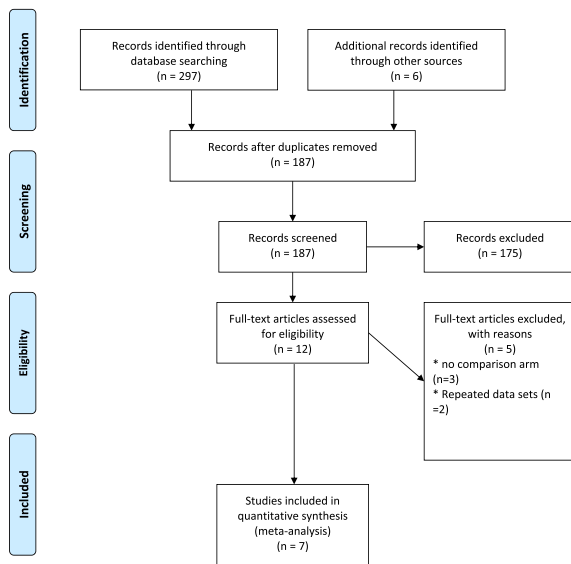


Fig. 6 Forest plot of all studies included for this meta-analysis with pooled odds ratio for complications requiring surgery

subjective functional outcomes with objective measurements are required to further support this finding.



Authors' contribution Substantial contributions to the conception and design, acquisition of data, or analysis and interpretation of data: All authors

Drafting and revising the article: All authors

Final approval of the version to be published: All authors

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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