Bladder and sexual dysfunction following laparoscopic and open mesorectal excision for rectal cancer

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Abstract

The objective of this review is to analyze the bladder and sexual dysfunction after laparoscopic (LTME) and open total mesorectal excision (OTME) for rectal cancer. Electronic databases were searched to find relevant randomized controlled trials and their data were analyzed to generate a summative outcome. Three studies on LTME and OTME encompassing 258 patients were retrieved from the electronic databases. Two studies on 108 patients qualified for this review. There were 53 and 55 patients in LTME and OTME groups respectively. In the both fixed and random effects models, statistically there was no difference in bladder dysfunction, overall sexual dysfunction, overall male sexual dysfunction, overall female sexual dysfunction, male erectile dysfunction and male ejaculatory dysfunction between LTME and OTME. Both LTME and OTME are associated with equal risk of bladder and sexual dysfunction in both genders following resections for rectal cancer.

Introduction

As in open surgery, the primary aim of laparoscopic rectal cancer surgery is to achieve oncologic clearance, minimize local recurrence of the tumour and to improve overall survival. Optimum preoperative staging of the rectal cancer, appropriate neoadjuvant and adjuvant modalities like radiotherapy, chemoradiation and chemotherapy, and precise surgical technique using the principles of total mesorectal excision (TME) are instrumental in achieving this goal.[1-3] However, health-related quality of life (HR-QOL) measurement, being an important tool in any modern healthcare system to evaluate the efficacy of an operation[4] must not be ignored in the quest for oncological excellence. Bladder and sexual dysfunction measurement following rectal cancer surgery are important parameters to assess the HR-QOL. The reported incidence of 8-54% bladder dysfunction[5-7] and 18-59 % sexual dysfunction[8-12] following rectal cancer surgery can significantly influence the HR-QOL. Before the introduction of TME, the incidence of bladder and sexual dysfunction has been reported high[5,9] due to neuropraxia of the sympathetic and parasympathetic nerves that course along lateral and posterior pelvic walls. Inadvertent damage to hypogastric and splanchnic nerve plexus is responsible for bladder and sexual dysfunction. Laparoscopic resection of the rectum has been shown to achieve oncological tumour clearance equivalent to that of conventional open operation, with the potential benefits of reduced pain, shorter hospital stay and early return to normal daily activities.[13-15] Even with the incorporation of nerve-preserving techniques in TME, bladder and sexual dysfunction remain recognized complications in 0-12% and 10-35% of patients undergoing anterior resection or abdominoperineal resections.[8,16,17]

Although technically more demanding and potentially longer learning curve, the magnified view of the pelvis afforded by laparoscope may facilitate identification of autonomic nerve plexus and thus reduce the inadvertent injury. The objective of this review is to analyze the incidence of bladder and sexual dysfunction after laparoscopic (LTME) versus open mesorectal excision (OTME) for rectal cancers.

Materials and Methods

All studies on LTME versus OTME for rectal cancers published between January 1980 and August 2008 were identified through searches of MEDLINE, EMBASE, CINAHL, Cochrane library and Pubmed databases. The t*erms bladder dysfunction, sexual dysfunction, anterior resection, abdominoperineal resection, total mesorectal excision for rectal cancer* and *pelvic surgery* were used in combination with the medical subject headings *laparoscopic/open surgery* and *colorectal cancer*. Relevant articles referenced in these publications were also downloaded from databases. The *related article* function was also used to widen the search results. Authors of those articles with inadequate data were contacted. All abstracts, comparative studies, non-randomized trials and citations scanned were searched comprehensively. A flow chart of the literature search is shown in Figure1. Each article was critically reviewed by two researchers for eligibility in our review (Table 1). Only studies using standard and recognized questionnaires comparing bladder and sexual dysfunction after LTME and OTME for rectal cancers were analyzed. Two researchers extracted data separately and it was confirmed by a third researcher. Statistical analyses were performed by a senior statistician using Microsoft Excel 2007® for Windows XP (Microsoft Corp., Redmond, WA, USA). Binary data were summarized as risk ratios (RR) and combined using the Mantel-Haenszel method under the fixed effects model and the DerSimonian and Laird method under the random effects model.[18] In each case a heterogeneity test was carried out to see whether the fixed effects model was appropriate. In a sensitivity analysis, 0.5 was added to each cell frequency for trials in which no event occurred in either the LTME or OTME group, according to the method recommended by Deeks *et al*.[19] Forest plots were used for the graphical display of results from the meta-analyses where horizontal line represented 95% confidence interval and central square represented summative outcome. Sub-group and sensitivity analyses were not feasible due to the limited number of studies. Publication bias was also difficult to assess due to fewer patients the small number of studies in this review.

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Results

Three studies[20-22] on LTME and OTME encompassing 258 patients were retrieved

Table 1. Inclusion criteria.

Inclusion criteria
Studies examining the extent of bladder and sexual dysfunction after open and laparoscopic total mesorectal excision for rectal cancer
Trials on patients of any age and sex.
Trials in all languages

Table 2. Characteristics of trials included in this review.

Trials	Type	Year	Laparoscopic group= n	Open Group=n	Standardized questionnaire	Follow-up
Asoglu *et al.*[20]	Retrospective	2007	32	27	IPSS*, IIEF°	22 months
Quah *et al.*[21]	Retrospective	2002	21	28	IPSS*, IIEF°	12months

*International prostatic symptom score; °International index for erectile function.

Table 3. Outcome variables.

Trial	Type	Bladder dysfunction	Overall sexual dysfunction	Male sexual dysfunction	Female sexual dysfunction	Male erectile dysfunction	Ejaculatory dysfunction
Asoglu *et al*[20]	Lap	3/34	2/32	1/18	1/14	1/18	1/18
	Open	1/29	11/27	6/17	5/10	6/17	5/17
Quah *et al.*[21]	Lap	2/34	7/21	7/15	0/6	6/15	6/15
	Open	0/34	2/28	1/22	1/6	3/22	1/22

from the electronic databases. Only two studies[20,21] on 108 patients qualified for the review according to our inclusion criteria (Table 1). One study[22] was excluded because there was no data on sexual or bladder dysfunction in the original published article and authors refused to disclose their data. Characteristics of each study are given in Table 2. There were 53 patients in LTME group and 55 patients in OTME. The outcome variables extracted from these studies are shown in Table 3.

Bladder dysfunction

In the fixed effects model, statistically there was no difference in bladder dysfunction [RR 3.01, 95% CI (0.50-17.93), z=1.21, P<0.22; Figure 2] between LTME and OTME groups. This difference was not calculable on the random effects model. There was minimal heterogeneity (Q=0.05, df = 1, P<0.81) between trials.

Overall sexual dysfunction

In the both fixed and random effects models, statistically there was no difference in overall sexual dysfunction [fixed effects RR 0.72, 95% CI (0.34-1.50), z = -0.86, P<0.38 and random effects RR 0.84, 95% CI (0.02-23.90), z = -0.10, P<0.91; Figure 3] between LTME and OTME groups. There was significant heterogeneity (Q=10.81, df = 1, P<0.001) between trials.

Overall male sexual dysfunction

In the both fixed and random effects models, statistically there was no difference in overall male sexual dysfunction [fixed effects RR 1.33, 95% CI (0.54-3.22), z = 0.63, P<0.52 and random effects RR 1.27, 95% CI (0.02-76.46), z=0.11, P<0.90; Figure 4] between LTME and OTME groups. There was significant heterogeneity (Q=8.38, df = 1, P<0.003) between trials.

Male erectile dysfunction

In the both fixed and random effects models, statistically there was no difference in overall

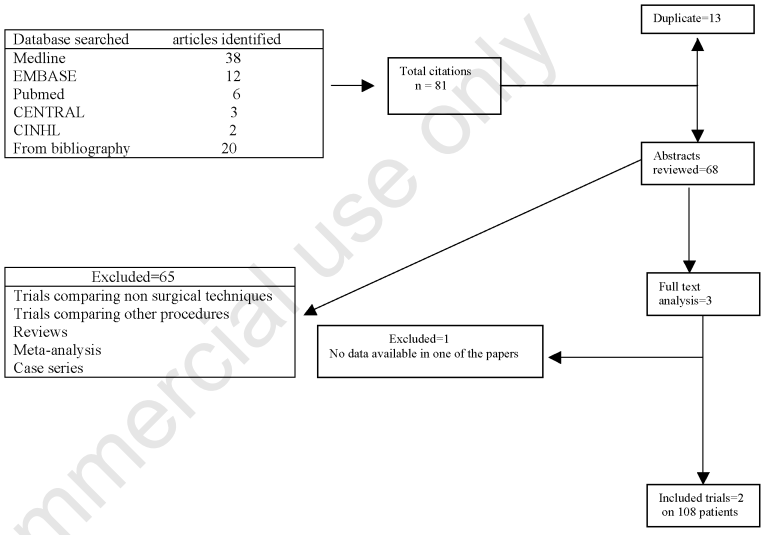

Figure 1. Flow chart of literature search.

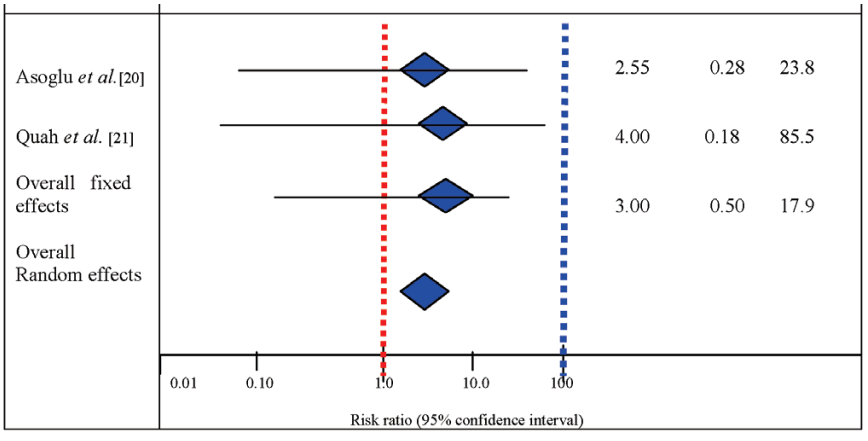

Figure 2. Bladder dysfunction.

male erectile dysfunction [fixed effects RR 0.94, 95% CI (0.40-2.1), z=-0.13, P<0.89 and random effects RR 0.76, 95% CI (0.04-13.26), z=-0.18, P<0.85; Figure 5] between LTME and OTME groups. There was significant heterogeneity (Q=6.36, df=1, P<0.01) between trials.

Male ejaculatory dysfunction

In the both fixed and random effects models, statistically there was no difference in overall male erectile dysfunction [fixed effects RR 1.36, 95% CI (0.52-3.54), z=0.63, P < 0.52 and random effects RR 1.29, 95% CI (0.03-55.84), z=0.13, P<0.89; Figure 6] between LTME and OTME groups. There was significant heterogeneity (Q=6.89, df = 1, P<0.008) between trials.

Overall female sexual dysfunction

In the fixed effects model, statistically there was no difference in overall female sexual dysfunction [RR 0.19, 95% CI (0.03-1.0), z=-1.96, P<0.06; Figure 7] between LTME and OTME groups. This difference was not calculable on the random effects model. There was no heterogeneity (Q=0.42, df = 1, P<0.51) between trials.

Discussion

Normal bladder and sexual function is regulated by complex reflex mechanism involving both sympathetic and parasympathetic nerve plexuses in the pelvis. It is the pelvic side walls and anteriorly where these nerves enter in their end organs. Dissection along these planes during rectal surgery makes them susceptible to injury. Severity of injury to nerves will determine the eventual bladder and sexual dysfunction. In addition, damage to parasympathetic nerves will impair bladder contractility and erection resulting in detrusor areflexia and impotence while sympathetic nerve damage will impair bladder relaxation and ejaculation resulting in bladder instability and retrograde ejaculation.

Whether it is laparoscopic or open, dissection around rectum inevitably will damage the nerve supply to urogenital organs. Based on this review, LTME is as effective as OTME in nerve preservation during rectal cancer surgery. There is still insufficient evidence to say that better visualization offered by magnification of laparoscope may reduce the incidence of nerve injury and subsequent bladder and sexual dysfunction. LTME may be preferred for the resection of colorectal cancer as it does not pose an additional risk for bladder and sexual dysfunction and it should not affect the HR-QOL.

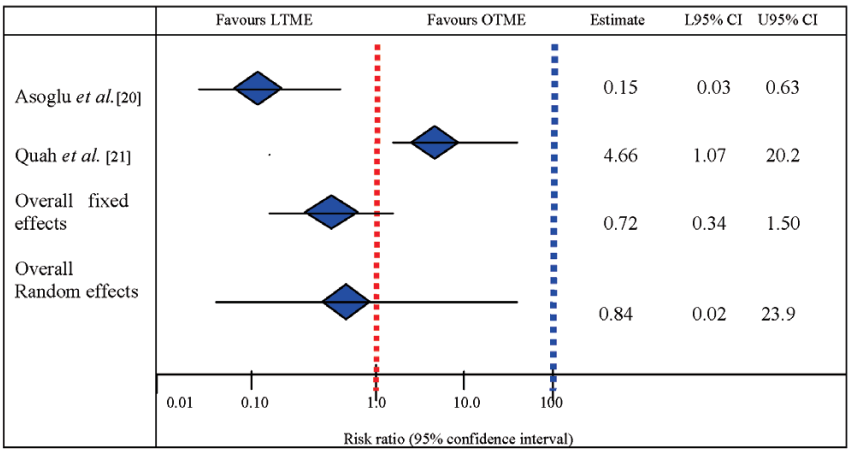

Figure 3. Overall sexual dysfunction.

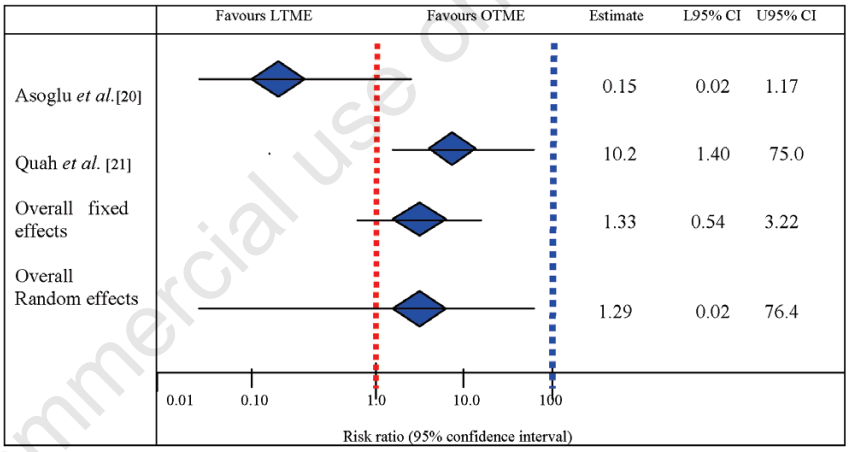

Figure 4. Overall male sexual dysfunction.

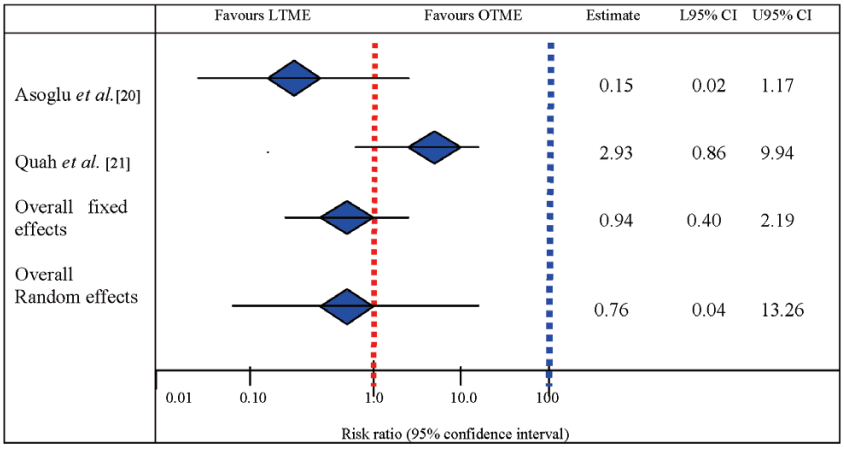

Figure 5. Male erectile dysfunction.

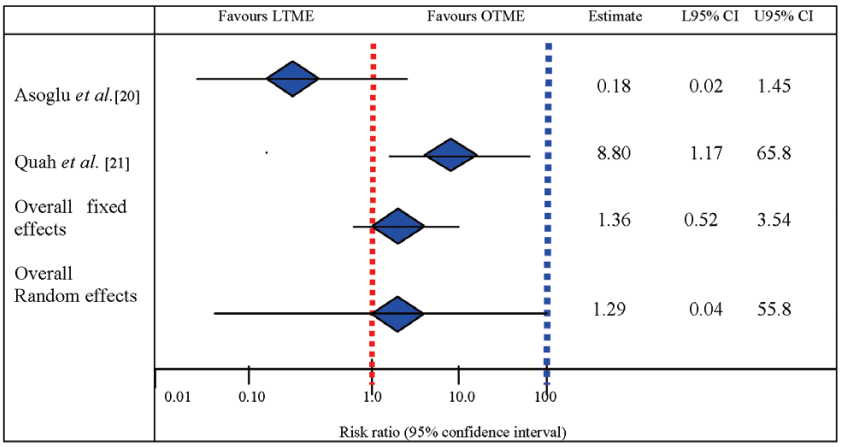

Figure 6. Male ejaculatory dysfunction.

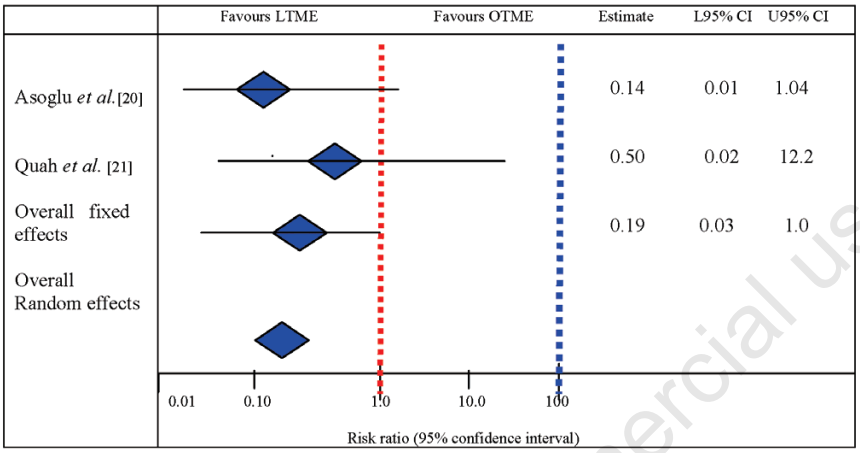

Figure 7. Overall female sexual dysfunction.

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