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REVIEW ARTICLE

Minimally Invasive Surgical Techniques *vs* Open Myomectomy for Treatment of Uterine Fibroids

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ABSTRACT

Introduction: Myomectomy is the surgical remedy of preference for women with symptomatic fibroids, who prefer or want uterine conservation. Myomectomy can be finished by using conventional laparotomy, by means of minilaparotomy, or by means of minimal access techniques, such as hysteroscopy and laparoscopy. Since the advent of minimal access surgery, there has been interest in the relative advantages and disadvantages of both surgical modalities.

Objectives: To determine the benefits and harms of laparoscopic myomectomy compared with open myomectomy.

Materials and methods: We used various search engines – PubMed, HighWire Press, Google, and Yahoo – to search for all trials and articles comparing myomectomy via laparotomy, minilaparotomy, or laparoscopically assisted minilaparotomy *vs* laparoscopy. We found several articles of which 10 were used in this review article based on the outcomes studied, date of publication (after 2005), methodology of study, level of evidence, and the journal in which they were published. The results of these trials were then compared.

Conclusion: Laparoscopic myomectomy is a process associated with less subjectively reported postoperative pain, lower postoperative fever, and shorter hospital stay as opposed to all kinds of open myomectomy. No data suggested a difference in recurrence risk between laparoscopic and open myomectomy. Even more studies are needed to determine fertility outcomes, rates of uterine rupture, occurrence of thromboembolism, and need for repeat myomectomy and hysterectomy at a later stage.

Keywords: Blood loss, Laparoscopic, Laparotomy, Myomectomy, Pain, Postoperative.

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INTRODUCTION

Fibroids are common benign tumors of the uterus. They are asymptomatic in most women and warrant treatment only when symptomatic. Symptoms associated with fibroids include abnormal uterine bleeding, infertility, severe pain, and complications in pregnancy.

Traditionally, the treatment of fibroids is surgical, but various medical treatments including progesterones and gonadotropin-releasing hormone (GnRH) analogues have been tried. The surgical treatment of choice in women who prefer to conserve their uterus is myomectomy. The routes to perform myomectomy are conventional laparotomy, minilaparotomy, and minimal access techniques, such as laparoscopy and hysteroscopy.

Laparoscopic myomectomy is suggested to be associated with reduced morbidity compared with open myomectomy. Evidence suggests that laparoscopic myomectomy is associated with reduced morbidity compared with open myomectomy, including reduced blood loss, postoperative pain, and shorter hospital stay. Comparable rates of pregnancy, fibroid recurrence, and operative complications have also been reported. However, due to small sample size in most clinical trials conclusive evidence regarding the preferred surgical approach is still not available.

It is important to know the best surgical approach so as to help surgeons and patients make an informed choice.

OBJECTIVES

The objective behind undertaking this review is to analyze the different studies available and the quality of evidence and study the advantages and disadvantages of different surgical approaches.

MATERIALS AND METHODS

We used various search engines, such as PubMed, HighWire Press, Google, and Yahoo to search for all trials and articles comparing myomectomy via laparotomy, minilaparotomy, or laparoscopically assisted minilaparotomy *vs* laparoscopy. Among the trials found, we chose 10 that had studied similar outcomes. Date of publication, methodology of trial, level of evidence, and the journal in which they were published. The results of these trials were then compared and tried to reach a definitive conclusion regarding the best surgical approach.

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RESULTS

Ten articles were selected for this review. Among these six were randomized control trials, and one of the six was double-blind. One was a retrospective matched control analysis, one was a systematic review, and two articles were prospective nonrandomized trials.

- 4 out of 10 studies reported postoperative pain (within the first 7 days) (Table 1).[1,2,6-10]
- 6 out of 10 studies reported in-hospital adverse events.[1,5,6,7,9,10]

Table 1: Summary of outcomes of various studies comparing laparoscopic vs open myomectomy

Author and year of publication	*Type of study; sample size*	*Outcomes studied*	*Laparoscopy*	*Laparotomy*	*p-value*
Chittawar et al (2014)[1]	Systematic review; 808	• Postoperative pain			MD –2.40
		• In-hospital adverse events			OR 0.44
		• Hospital stay			
Tinelli et al (2014)[2]	Prospective study; 124	• Operating time	95±7.2 min	63±5.6	<0.0001
		• Intraoperative blood loss	65 mL	105±5 mL	<0.0001
		• Postsurgical blood loss	30±5 mL	60±5 mL	<0.0001
		• Postsurgical pain relief requirement	8 patients	17 patents	<0.05
Malzoni et al (2010)[3]	Retrospective, nonrandomized study; 680	• Operative time	63±21 min	57±23 min	95% CI
		• Hospital stay	2.1±0.8	3.1±0.5	95% CI
		• Pregnancy rate	56%	50%	NS
Kalogiannidis et al (2010)[4]	Nonrandomized prospective study; 75	• Blood loss	246±161 mL	351±219 mL	=0.03
		• Operative time	68±21 min	83±24 min	=0.01
		• Days of bowel reactivity	1.04±0.2	1.8±0.5	<0.0001
		• Duration of hospitalization	1.2±0.6	4.2±0.8	<0.0001
Cicinelli et al (2009)[5]	Prospective randomized study; 80	• Mean blood loss	Conversion to laparotomy in one patient		<0.001
		• Mean duration of postoperative ileus			<0.001
		• Mean decrease in hemoglobin			<0.001
		• Mean operative time			NS
		• Duration of hospitalization			<0.001
		• Intraoperative complications			
Tan et al (2008)[6]	Randomized trial; 52	• Mean operating time	96±26.20 min	75.50±25.70	=0.006
		• Intraoperative blood loss	96.34±32.42 mL	71.92±18.98 mL	=0.002
		• Hemoglobin level decrease	1.65±0.61	1.22±0.61	=0.014
		• Hospitalization days	1.81±0.57 days	2.04±0.66 days	=0.183
		• Postoperative ileus	23.20±4.37	22.80±3.94	=0.738
Sesti et al (2008)[7]	Randomized trial; 100	• Mean discharge time	98.4±1.4 hr	52.8±1.6 hr	<0.001
		• Operation time	79.5±25.1 min	103.5±24.9 min	<0.001
		• Intraoperative blood loss	154.2±1.2 mL	188.6±1.3 mL	<0.001
Palomba et al (2007)[8]	Randomized controlled trial; 136	• Pregnancy rate per cycle	36/556 (6.5)	26/669 (3.9)	0.040
		• Cumulative pregnancy rate	36/68 (52.9)	26/68 (38.2)	0.090
		• Live-birth rate per cycle	32/556 (5.8)	22/669 (3.1)	0.036
		• Cumulative live-birth rate	32/36 (88.9)	22/26 (84.6)	0.620
		• Time to first pregnancy (month)	5 (3), 1–9	6 (2.5), 4–11	0.008
		• Time to first live-birth (month)	14 (3), 10–18	15 (3), 13–20	0.003
		• Abortion rate	4/32 (12.5)	4/26 (15.4)	0.751
		• Preterm delivery	1/32 (3.1)	1/22 (4.5)	0.786
		• Vaginal delivery	9/32 (28.1)	8/22 (36.4)	0.522
		• Cesarean delivery	23/32 (71.9)	14/22 (63.6)	0.522
Holzer et al (2006)[9]	Prospective, double-blind; 40	• VAS pain	2.28±1.38	4.03±1.63	<0.01
Alessandri et al (2006)[10]	Randomized study; 148	• Operation time (min)	98±13	85±14	0.001
		• Decline of hemoglobin concentration	1.1±0.5	2.2±0.5	0.001
		• Pain intensity 6 hr	4.1±1.5	6.5±1.5	0.001
		• Pain intensity 24 hr	3.1±1.5	2.8±1.8	0.519
		• Request of analgesic	25 (34.7%)	54 (73.0%)	0.001
		• Time of postoperative ileus (hr)	28±6	45±6	0.001
		• Time to discharge	38±12	48±12	0.001
		• Patient recuperated on day 15	65 (90.3%)	55 (74.3%)	0.012

NS: Non significant

- 7 out of 10 studies reported length of hospital stay.[1,2-6,10]
- 8 out of 10 studies reported operating time.[1-8,10]
- 2 out of 10 studies studied the fertility outcomes.[3,8]

There have been two types of trials to compare laparoscopy and laparotomy. The first type compares the short- and long-term intra- and postoperative parameters. The second type compares the fertility outcomes of both the surgical approaches.

Operating time has been one parameter considered. There has been a consistent finding of decreased operating time in minimal access approach except one study.[10] This study had compared laparoscopy-assisted myomectomy with minilaparotomy.

Intraoperative blood loss has been analyzed by 5 of the 10 studies. There has been found to be a significant difference between the two surgical approaches as far as blood loss is concerned with the minimal access approach resulting in significantly less blood loss. Decrease in hemoglobin concentration is another way of measuring blood loss and has been used by three studies. All three studies found a significant difference.

Postsurgery pain perception and pain relief requirement have also been measured by 4 out of 10 studies, and here also the laparoscopic approach was found to be significantly better, as the patients perceived less pain and required less amount of analgesia.

Days of bowel reactivity/postoperative paralytic ileus was measured by 3 of the 10 studies considered in this review. While two of these found a significant difference with the laparoscopic approach, Tan et al failed to find a significant difference.[6]

Duration of hospitalization is another important aspect which is different for both surgical approaches. The time to discharge was found to be significantly less by all studies which analyzes this parameter, except by Tan et al.[6]

Two of the 10 studies considered in this review have reported about fertility outcomes post myomectomy and whether the surgical approach makes a difference to the same. Palomba et al[8] did not find any significant difference in any of the outcomes except the time to first pregnancy, while Malzoni et al[3] did not find any difference in the pregnancy rate.

DISCUSSION

Operating time has been found to be consistently less with laparoscopic approach, except in an earlier study.[10] This could also be due to the learning curve of minimal access surgery. The availability of better instruments and energy sources may also have contributed to decrease in operative time over the course of last 10 years.

Articles in this review have been consistent in the finding of less intraoperative blood loss in the laparoscopic approach. This is undoubtedly due to the energy sources available which reduce blood loss in the same.

Laparoscopic myomectomy is a less painful procedure compared to open myomectomy, as indicated by lower visual analog scale (VAS) pain scores at 6 and at 48 hours. However, no proof of a big difference in pain scores was noted at 24 hours by VAS after surgery between laparoscopic myomectomy and all types of open myomectomy. Moderate heterogeneity (43%) for this assessment could be explained by Tan et al in 2008, which included laparoscopically assisted minilaparotomy myomectomy in which laparoscopy is employed for fibroid enucleation and rapport, and specimen removal and suturing are carried out through small abdominal incision. This might reduce tissue damage and operating time compared with open myomectomy and may skew the results of pain scores. The overall level of evidence for postoperative pain is modest, which means that further research is more likely to have an important impact on our confidence in the estimate of effect of minimal access surgery.

The minimal access approach also involves less bowel handling, which invariably results in less postoperative paralytic ileus and a shorter time of return to normal bowel reactivity. This finding, however, has been refuted by Tan et al.

All the above factors also are contributory toward early discharge of the patient from the health care facility and better patient acceptance of the procedure.

Myomas have been considered a contributory factor for infertility, and a lot of patients undergo myomectomy in order to conceive. Not many studies have compared the fertility outcomes of myomectomy surgery vis-à-vis the surgical approach. However, the limited data available does not indicate any significant difference in the results in patients of infertility problem.

Laparoscopy is a technically challenging procedure that requires both specialized instruments and advanced intracorporeal suturing capability of the surgeon. Clearly, laparoscopic myomectomy is not feasible to all patients, and even skilled operative laparoscopists choose laparotomy in patients with large multiple myomas.

Many women choose minimally invasive surgery because of obvious advantages, such as shorter postoperative recovery time and a reduced risk of infection for laparoscopic hysterectomy or myomectomy compared with abdominal hysterectomy or myomectomy.[11] Nevertheless an important aspect of safety associated with laparoscopic hysterectomy or myomectomy is discussed in the recently published US Food and Drug Administration (FDA) safety communication about

laparoscopic uterine power morcellation in hysterectomy and myomectomy. Authors of this report suggest that occurrence of unsuspected uterine sarcoma among patients undergoing hysterectomy or myomectomy for assumed benign leiomyoma is 1 in 352, and the prevalence of unsuspected uterine leiomyosarcoma is 1 in 498. Therefore, FDA concludes that when "using power morcellation in women with unsuspected uterine sarcoma, there would be a risk of spread of the cancerous tissue within the abdomen and pelvis, significantly worsening the patient's likelihood of survival. For this reason, and because there is absolutely no reliable method for predicting if the woman with fibroids may have an uterine sarcoma, the FDA attempts the use of laparoscopic power morcellation during hysterectomy or myomectomy for uterine fibroids."[12-15]

CONCLUSION

The popularity of minimal access surgery has been rising over the past two decades. Some of it may be contributed to its increased accessibility to patients. Though there do not appear to be considerable long-term benefits of the laparoscopic approach, there seem to be little doubt regarding immediate intra- and postoperative benefits of the same.

More studies are needed to evaluate laparoscopically assisted minilaparotomy myomectomy compared with open and laparoscopic myomectomy. This procedure is less challenging technically, and it avoids endosuturing and morcellation. Also more studies are needed to evaluate whether surgical approach affects future fertility outcomes.

In conclusion, data suggests that when compared with minilaparotomic myomectomy, laparoscopic myomectomy may offer several benefits and faster postoperative recovery. Minimal access surgery is the way of future and, though more research is needed, it definitely scores a point over open approach in several important aspects.

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