Journal of Reproductive Health and Medicine 2 (2016) 67–73

Contents lists available at ScienceDirect

Journal of Reproductive Health and Medicine

journal homepage: www.elsevier.com/locate/jrhm

Review article

Laparoscopic myomectomy with simultaneous uterine artery ligation: A literature review of prospective studies

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ARTICLE INFO

Article history:
Received 19 February 2015
Received in revised form 29 January 2016
Accepted 16 February 2016
Available online 23 February 2016

Keywords:
Laparoscopy
Myomectomy
Leiomyoma
Uterine artery
Ligation
Occlusion

ABSTRACT

This review article has comprehensively covered the benefits of uterine ligation simultaneous laparoscopic myomectomy in the views of operative time, operative blood loss, hospital stay, recurrent rate and symptoms relief in recent articles. The information has been derived from medical database such as SprinkerLink, DOAJ, CINAHL, EBSCO delivery system, PubMed-NCBI, Sciencedirect, HighWire, Web of Science and ProQuest. There were only 3 articles which met my research criteria. The positive result of combined operation was reduction of operative blood loss for all studies. But 2 articles showed the operative time in combined operation more than single procedure. One study had a better percentage of symptom relief in a group of combined operation and tendency to decline in recurrent rate. However other articles revealed no difference in recurrent rate and pregnancy rate in both groups. Nowadays we still need more information from further randomized controlled trial studies to prove the hypothesis of benefits and risks of this add-on procedure.

1. Introduction

"Myoma uteri" or "Uterine leiomyomas" or "Uterine fibroids" are the common female genital tract tumors which are highest in incidence in reproductive age (most commonly appearing during the 4th or 5th decade)[1–3] and affecting African-American women three times as usual as Caucasian women.[1] The incidence varies from 5% to 77% depending on the diagnostic criteria.[2] Most of them do not cause clinical symptoms, grow slowly and do not need any treatment. But they may present with menorrhagia, pelvic pain with or without dysmenorrhea or pressure symptoms, infertility and recurrent abortion.[2]

The cause of leiomyoma is unknown[2,4] but it may be related to sex steroid hormone, insulin-like growth factor, epidermal-like growth factor and transforming growth factor. There are various modalities of treatments from non-invasive to invasive techniques. But the most effective of treatment is hysterectomy for women who have completed childbearing. Hysterectomy can be done by laparotomy or laparoscopy or even transvagina depending on these factors; number, location, size, weight of myoma uteri.

Now myomectomy is the alternative way of treatment in women who need to maintain their fertility or do not need to remove their uterus with any reasons by social, religion or private opinions. Myomectomy can also be done by open surgery or laparoscopy/hysteroscopy or transvagina. Ten years after Semm and Mettler first reported the laparoscopic myomectomy in late 1970s,[5] the laparoscopic myomectomy was performed and in the last few decades laparoscopic myomectomy has been done more and studied until nowadays this procedure has good results, for example; less pain, shorter hospital stay, fast recovery, rapid returning to work and cosmetic wound looking.[6,7]

The most serious complication of laparoscopic myomectomy is bleeding especially intraoperative period,[8–10] so there had been many studies which concentrated on this complication in various modalities of treatments, for instance; medical treatment for reduction of myoma size and control symptoms (i.e. gonadotropin releasing hormone agonist/antagonist, progestin/anti-progestin, anti-fibrinolysis, non-steroidal anti-inflammatory drugs, danazol, aromatase inhibitors, etc.),[11–13] non-invasive procedure treatments without myomectomy (i.e. uterine artery embolization, uterine artery ligation), intraoperative procedures (i.e. uterine artery ligation/dissection, temporary uterine artery occlusion, vasopressin injection).[4,13–23]

The uterine artery ligation during laparoscopic myomectomy is one of surgical techniques to control operative blood loss. Most of experts in laparoscopy usually mention about this procedure in the medical conferences. But there were a few evidences of this surgical effects and complications and there were controversies for

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http://dx.doi.org/10.1016/j.jrhm.2016.02.002
2214-420X/

risks and benefits of this procedures for example, operative time, operative blood loss, recurrent rate and future fertility.[8,20,24–26]

This article reviewed about the intraoperative uterine artery ligation/occlusion during laparoscopic myomectomy (LUAO + LM) by comparing the operative time, operative blood loss, length of hospital stay and recurrence rate between LUAO + LM and LM alone.

2. Materials and methods

A literature search was performed in database of SprinkerLink, DOAJ, CINAHL, and EBSCO delivery system, PubMed-NCBI, Sciencedirect, HighWire and Web of Science from year 2000 to 2015. Other than the mentioned data sources, I also used the ProQuest database to find out the related dissertations. The inclusion criteria were randomized controlled trial study which compared between the LUAO + LM and LM alone, temporary or permanent uterine artery occlusion technique by surgery, pre-menopausal subjects, and had the aims to assess operative bleeding complications, length of hospital stay, operation time and other related complications. The exclusion criteria were malignancy, severe medical illness problems and psychiatric problems which may disturb participation.

2.1. Data searching and results

All the database lists were used to search, limited by only peer-review articles from year 2000 to 2015 and only articles in English language at December, 28, 2015.

	Database sources	Outputs of searching keyword as the follows				
		Myomectomy	+Laparoscopy	+"uterine artery"	+(Occlusion OR ligation OR dissection)	+Randomi*
1.	SprinkerLink	1052	441	153	122	110
2.	DOAJ	105	17	1	1	0
3.	CINAHL	1371	359	47	26	2
4.	EBSCO delivery system	15,623	4962	1215	705	217
5.	Pubmed	1777	619	77	35	5
6.	Sciencedirect	4802	2375	719	415	211
7.	HighWire	40	1	0	0	0
8.	Web of Science	1444	293	37	19	3
9.	ProQuest	10	1	0	0	0

* A technique that broadens your search to include various word endings and spellings.

Referring to the setting criteria we found nothing to meet the complete criteria as above. The most relevant research which nearly approached to criteria was only one paper that had the unrestricted allocation of subjects of multicenter study. From this finding, I and my consultant changed some criteria for study design from "randomized control trial" to "prospective study" to gain more information, so that we can get more information that could be learnt and shared something in laparoscopy surgery. After we changed the inclusion criteria from "randomized controlled trial" to "prospective study", we got the most relevant 3 articles which have the interesting same results and met the objectives of this study.

From the data flow, there were only 3 articles which were matched to the criteria. The excluded articles were two retrospective studies; the others were case-series.

3. Results

3.1. Anatomy considerations

The uterus is supplied by many channels from pelvic arteries. The main supply comes from uterine arteries, which are branches from the anterior division of the internal iliac arteries. The 2nd supply comes from the ovarian arteries which come through the infundibulopelvic ligament to the ovaries. The ovarian arteries have anastomosis with uterine vessel by offering the medial or uterine branch to supply uterus. The uterine artery may originate directly from the internal iliac artery as an independent branch or it may have a common origin with the internal pudendal artery or with the vaginal artery. Uterine arteries also have the collateral circulation with vaginal arteries, too. The other arteries come from unnamed small branches which originate from inferior mesenteric, lumbar, vertebral, middle sacral, deep inguinal circumflex, inferior epigastric, medial circumflex and lateral femoral circumflex arteries.[28,29]

Uterine arteries move toward the uterus at uterine isthmus. This is the region, where the ureter goes under the uterine artery and receives blood supply from small branches of it. In this area, there also has the uterine veins go along with the arteries and are variable found around the ureter. The uterine artery divides into large ascending part to supply the upper part of uterus and small descending part to supply cervix and vagina.[29]

3.2. What happened after uterine artery occlusion?

After the uterine arteries are occluded, blood clots will occur in the myometrium and uterus will become ischemic and necrosis. The metabolism in myometrium will shift from oxidative pathway to anaerobic glycolysis. But an hour later, the clot formation in myometrium will slow down and get lyses, and then uterus will be received blood supply again from the collateral circulations of the adjacent arteries.[28]

There was a study on the effect of uterine artery ligation in cases of uterine fibroids, they found that there was necrosis and ischemia changes in fibroids but not in myometrium by the pathological and magnetic resonance imaging (MRI).[30]

4. Operative technique approach

4.1. Intraoperative methods

4.1.1. Myomectomy

The subserous type or pedunculated myoma is not difficult to be done by laparoscopic myomectomy. It can be coagulated with bipolar forceps and cut by laparoscopic scissors or cut after loops, staplers or clip applications.[31] Most of submucous type usually underwent resection by hysteroscopy. Intramural type can be removed by laparoscopic method but depending on anatomical site of myoma, number and size.[6,32] The indications for laparoscopic myomectomy were based on symptoms and signs i.e., pelvic mass, abnormal uterine bleeding, pelvic pain and infertility.[31]

Problems other than intraoperative or postoperative bleeding are uterine rupture during delivery. The incidence of uterine rupture during delivery was 1% (95% CI: 0–5.5%). For this reason, if