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Review Article

SUTURE TECHNIQUE IN LAPAROSCOPIC MYOMECTOMY FOR LEIOMYOMA

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ABSTRACT

Myomectomy is one of the commonest gynecological operations. Laparoscopic myomectomy has emerged over the last two decades as a possible alternative to the traditional laparotomy. Most studies have revealed that the laparoscopic procedure is at least as safe as the open procedure as to the rate of complications and may retain relevant advantages in terms of shorter admission and recovery times and could avoid unnecessary hysterectomy and simultaneously preserve fertility. However, it involves the repair of myometrium and removal of myoma from the abdomen and thus it requires more technical skill. Hence, it is challenging surgical procedure and relatively time consuming that could result in greater blood loss than traditional open procedure. The repair of the uterine incision is important not only because it is a method of hemostasis but also it decides the integrity of the myometrium. Moreover, it also influences the postoperative adhesion formation. The key of Laparoscopic myomectomy of large uterine fibroids is the speed with which the uterine incision is sutured without leaving the dead space. In this study, based on the improved study of the new suture method, evaluation of different suture technique most commonly used in patients undergoing laparoscopic myomectomy for leiomyoma is done.

Keywords: Fibroid, Laparoscopy, Myomectomy, Suture technique

BACKGROUND

Uterine fibroids are the most common benign tumors of female genital tract, accounting for 20% to 25% in reproductive age women and causes menorrhagia, abdominal pain, abdominal discomfort, and subfertility. The prevalence of uterine leiomyomas increases during reproductive age and decreases after menopause [1, 2]. Leiomyomas range in size from microscopic to bulky masses that can distort and enlarge the uterus. Most patients choose myomectomy because this surgical approach maintains not only fertility, but also the physiological function of uterus and the integrity pelvic floor. Currently, there are 3 ways to implement myomectomy: transabdominal surgery, vaginal surgery and laparoscopic surgery[3]. Laparoscopic myomectomy (LM) is more advantageous than traditional abdominal myomectomy (AM) in terms of operative blood loss, postoperative pain, recovery time, and overall complications[4-6]. Therefore, in recent years, LM has become a common procedure in numerous institutions throughout the world. The use of a laparoscopic approach for treating large myomas is controversial due to the increased difficultly of excision, cleavage removal and repair of the myometrial defect, the increased operative time, and the increased risk of perioperative bleeding and conversion to laparotomy compared with that of smaller myomas[7]. There are a few reports in the literature describing the laparoscopic removal of large myomas[8, 9].

In the process of traditional LM, surgeons often confront with several major problems. First, long-time surgery may lead to more bleeding. Second, the difficulty and duration of operation is positively related with the size of fibroids due to the limited abdominal space. With the increase of size and number, surgeons prefer transabdominal way to laparoscopic one, even convert to open during LM[10].

Uterine rupture during pregnancy or labor is a rare but serious complication associated with myomectomy. There have been only a few studies on the risk of uterine rupture after laparoscopic myomectomy. Several factors that might be related to uterine rupture after LM have been reported. Cobellis et al. suggested that the imperfect healing process observed following LM might be related to thermal damage with bipolar coagulation[11]. An animal study showed that carbon dioxide pneumoperitoneum might be related to wound healing[12]. A review of previous reports on uterine rupture after LM recommended a multilayer closure, as well as limited use of electrosurgery[13].

The relationship between suturing methods and wound healing has been more intensively studied for Cesarean sections. Single-layer closure was previously reported to be related to shorter operative time[14] and larger scar defects[15] , and have a four-fold increase in the risk of uterine rupture to a double-layer closure[16]. Ceci et al. compared 2 types of single-layer sutures used for cesarean sections and reported that continuous sutures seem to cause larger defects than interrupted sutures[17]. Sumigama et al. reported that continuous sutures are related to increased incidence of placenta accreta for subsequent pregnancies[18].

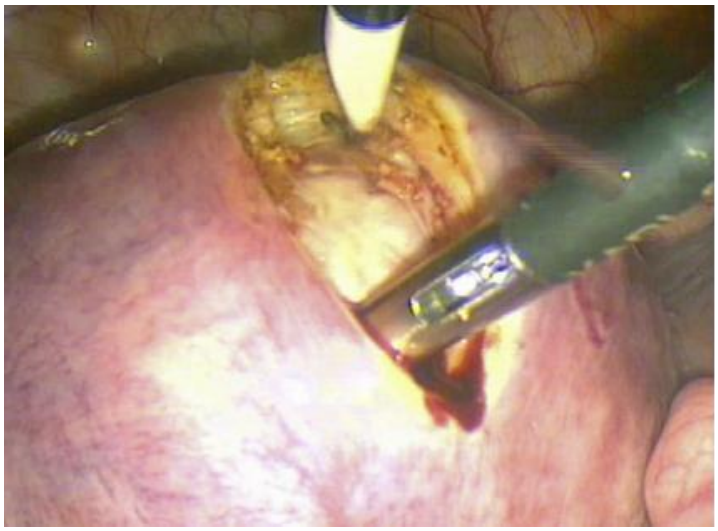


Figure 1: After the incision of myometrium, the myoma is clearly recognizable for its pearly white appearance.

In order to reduce the surgery time and bleeding, while increasing the success probability of LM, there are many surgical techniques expect to explore and accumulate in the process of LM, such as the incision design of abdomen and uterine, selection of hemostasis method, morcellation, and suture method.

SUTURE

The aim of uterine suture is to obtain a strong scar and minimize the risk of haematoma, so avoiding a number of complications, ranging from post-operative bleeding to uterine rupture in the next pregnancy, relies on this surgical step. Also, since laparoscopic suturing is a time-consuming procedure that requires high skills, this surgical step still stands as the main limiting factor for the widespread use of laparoscopic myomectomy.

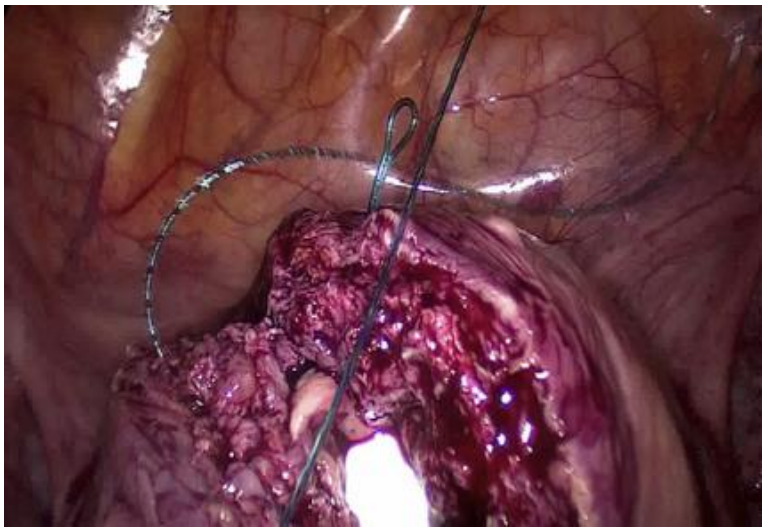


Figure 2: After the removal of a deep myoma, the manipulator can be seen in the open uterine cavity. As for open myomectomy, the endometrial layer can be sutured separately and then simple or cross stitches are made to close the deep myometrial layer.

Depending on the depth, a one- or two-layer suture may be required. Like in open myomectomy, simple or cross stitches are first given to close the deep myometrial layer (Figure 2); then a running suture is used to close the superficial myometrium and introflect the serosa. The same result can be obtained with a running suture applied first in the deeper plane following the appropriate direction and then in the superficial plane in the opposite direction[19].

Sutures and surgery have been tied together since the first operations were performed. Throughout the history of surgery, the variety of materials used to close wounds has included wires of gold, silver, iron, and steel; dried gut; silk; animal hairs; tree bark and other plant fibers; and, more recently, a wide selection of synthetic compositions.

A new kind of suture, bidirectional barbed thread (Quill Self-Retaining System; Angiotech Pharmaceuticals, Vancou-ver, BC) has been recently made available to surgeons; this suture consists of standard material with tiny barbs cut into the length of the thread facing in opposite directions from the midpoint and with a needle at each end. The current study centre has tested this suture in a limited series of laparoscopic myomectomies, with very encouraging results. An advantage of this suture is to distribute tension regularly along the whole wound length rather than concentrating it at the site of knotting; but an even greater advantage, especially in laparoscopic surgery, is that this kind of suture does not require knots, thus making laparoscopic myomectomy a potentially shorter and simpler procedure (Figure 3). These synthetic sutures eschew the traditional, smooth, knot-requiring characteristic of sutures in favor of barbs that serve to anchor the sutures to tissue without knots[20].

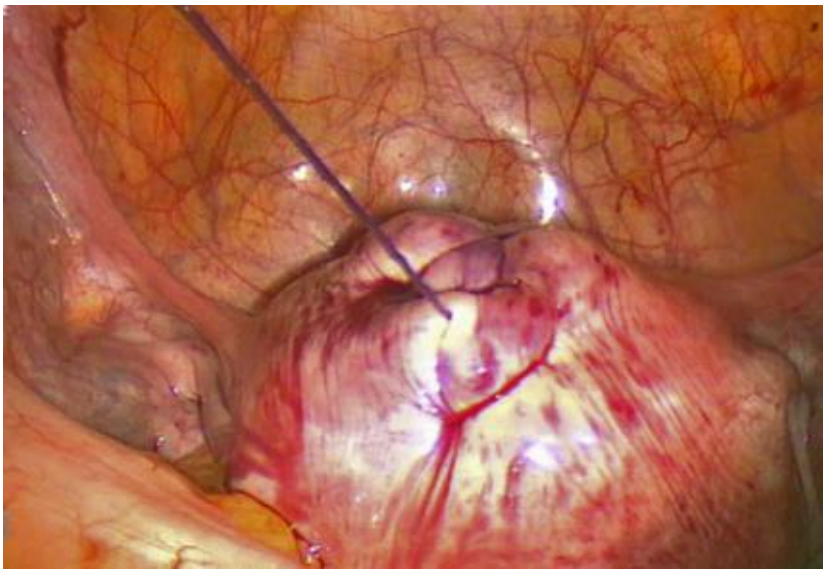


Figure 3: The knot-free suture made possible by a new kind of suture, the bidirectional barbed thread. At the end of suture, the thread is cut at the level of the serosa.

Different suture techniques:

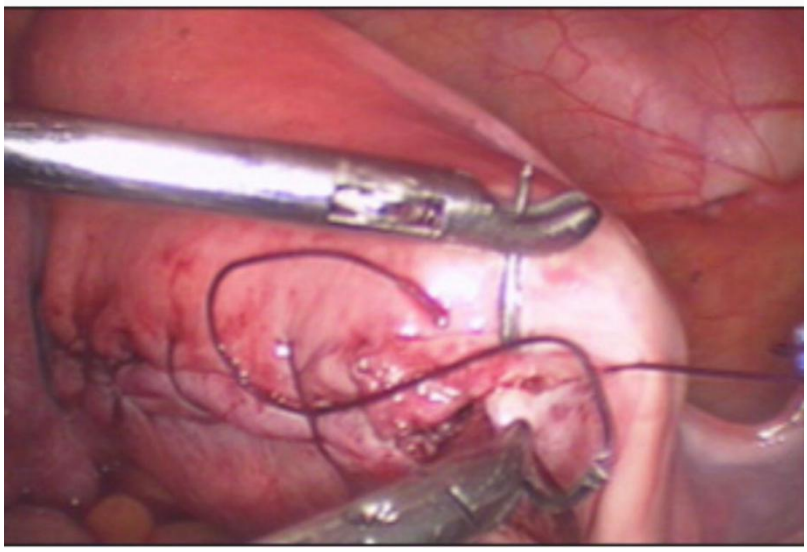
Despite the multitude of different procedures performed with a host of different wound closure biomaterials, no study or surgeon has yet identified the perfect suture for all situations. There are different suture technique used to close the uterine incision after enucleating uterine myoma during laparoscopic myomectomy and the most commonly used are the continuous suture, simple interrupted suture and baseball suture.

Simple interrupted, or frequently cross-stiches tied intracorporeally, or a running suture can be applied. The running suture applied first in the deeper plane starting from the apex of myomectomy scar to the base, continuing along the more superficial plane from base to apex and finally tying the suture intra-corporeally with the tail of the running suture. In a study done by Sizzi et al, the running suture allowed a 30% reduction of surgery time compared with traditional suture[21]. The surgeon has to deal with very long suture, however, which can be cumbersome and disorienting a narrow field. Good team coordination is necessary because the assistant has to hold the running suture without being in the way of the operator.

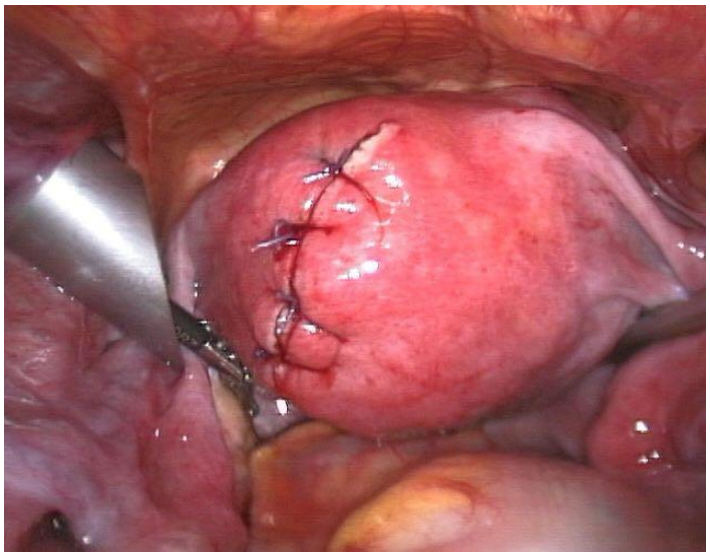
CONTINUOUS SUTURE

When making continuous sutures, we use the threads which were cut into half, and kept them intracorporeally until the end of one layer suturing. Regarding the effect of suturing methods on the wound healing of uterine tissue, Ceci et al. reported that in a cesarean section, continuous sutures seem to cause a larger defect than do interrupted sutures, probably because a greater ischemic effect is exerted on the uterine

tissue[17]. Most recently use of barbed suture while performing continuous suturing is being practiced in many institution. Currently, continuous sutures are generally used in LM in many institutions throughout the world because they are associated with fewer knots, low foreign body content, shorter suturing time, and faster hemostasis compared to interrupted sutures. However, they might cause excessive ischemia on the myometrium and delayed vascularization after surgery.



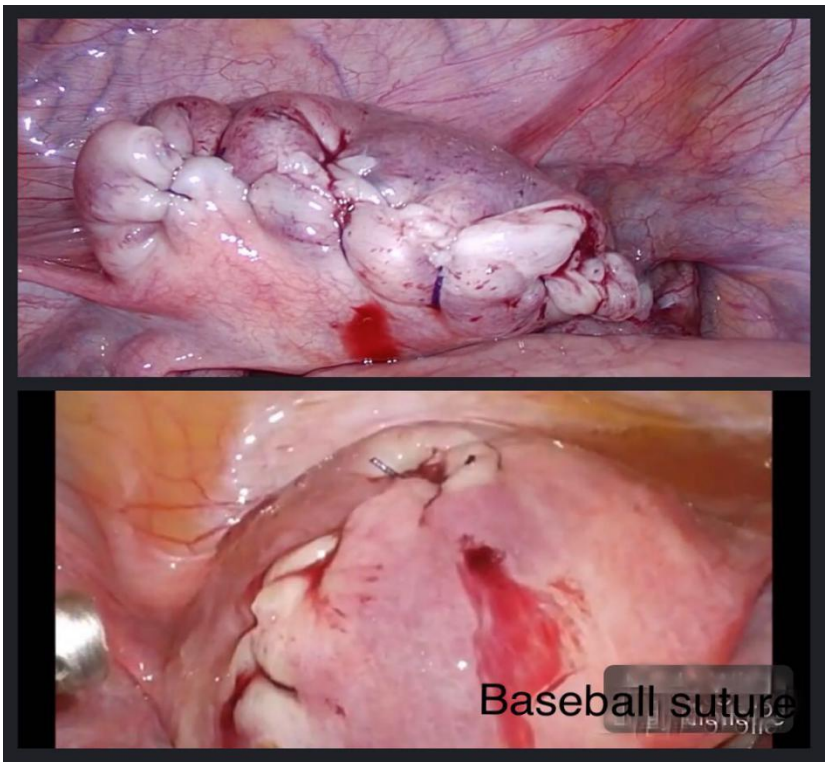
SIMPLE INTERRUPTED SUTURE



When making interrupted sutures, the threads are used without cutting. After suturing the myometrium, the needle is pulled through the port until the short tail became suitable for handling, and made slip knots intracorporeally. We can choose extracorporeal suturing or intracorporeal suturing and we can

either use multifilament threads or barbed sutures, the latter one exclusively used for continuous sutures and not for interrupted ones.

BASEBALL SUTURE



The baseball suture method is a relatively special suture being increasingly used recently. Baseball suturing because of its needle into the needle from the bottom of the tumor cavity to serosal layer in one side then again needle from bottom of the cavity to serosal layer of opposite side technique, therefore, baseball stitching in the stitching process is easy to expose the tip, and effectively shorten the suture time. Baseball suture can accurately locate the needlepoint in the bottom of the tumor cavity, which is more accurate than simple suturing, so it can better suture the bottom of the tumor cavity and prevent the formation of the dead space in the tumor cavity and reduce intraoperative and postoperative bleeding. At the same time, baseball stitching each time in the bottom of the tumor cavity into the needle to the side of the serosal layer of the needle are tightly joint , and a simple continuous suture need to side of the serosa into the needle to the tumor cavity, and then sew to contralateral serosal layer to tighten the suture, the time required to perform baseball suture to the simple continuous suture takes about half, so on tightening the suture there is more uniform force and compression, which is related to reduced amount of bleeding, effective uterine contraction , to achieve good hemostatic effect, while the simple continuous suture due to uneven suture tightening, may lead to improper compression ,may result in relatively more bleeding . In some patients after the completion of suture, on wound or needle bleeding, if necessary, figure “8” suture can be done which can prolong the

operation time. The traditional method of continuous buckle lock suturing needs to cross the wound on both sides, the distance is too large, if not paid attention to suture pulling direction and too much force is applied, it is prone to muscle cutting and needle eye oozing.

RESULT

There are many suture methods that can be used while closing uterine defect in laparoscopic myomectomy such as continuous suture, simple interrupted suture and baseball suture. Regarding the effect of suturing methods on the wound healing of uterine tissue, continuous sutures seem to cause a larger defect than do interrupted sutures, probably because a greater ischemic effect is exerted on the uterine tissue. Currently, continuous sutures are generally used in LM in many institutions throughout the world because they are associated with fewer knots, low foreign body content, shorter suturing time, and faster hemostasis compared to interrupted sutures. However, they might cause excessive ischemia on the myometrium and delayed vascularization after surgery. Beside continuous suture and simple interrupted suture, baseball suture has made its way in laparoscopic myomectomy to close uterine defect leading to less dead space formation, shorter suturing time, less chance of postoperative adhesions, especially in case of large myoma. Most recently use of barbed suture while suturing is being practiced in many institution throughout the world. Hence, among different suture technique, the surgeons can choose which one to use depending upon different case selected in different situations.

DISCUSSION

Despite the multitude of different procedures performed with a host of different wound closure biomaterials, no study or surgeon has yet identified the perfect suture for all situations. While innovation of barbed suture has helped in performing continuous suture technique and baseball suture technique more easily and efficiently, the discussion still lies in which suture technique is a better choice for all cases of uterine myoma in laparoscopic myomectomy. Kim(1979) and other studies also believe that in addition to laparoscopic myomectomy for uterine fibroids being safe and effective surgery, secured suture method is the key to prevent uterine rupture. According to Sizzi et al, the running suture allowed a 30% reduction of surgery time compared with traditional suture[21]. The surgeon has to deal with very long suture, however, which can be cumbersome and disorienting a narrow field. Good team coordination is necessary because the assistant has to hold the running suture without being in the way of the operator. For serosal myoma any suture technique seems to be of same value and in other types like deep and large type of myoma, there are not many studies proving one is better than the other. In some situation single layer baseball suture is enough while in some two-layer suture is better, continuous or interrupted suture in the first layer then baseball suture or continuous the second layer. Sometimes three-layer suturing is also required depending upon the size of myoma and the depth of tumor cavity.According to Wang Yizi (2016), the baseball suture technique

shows better result than simple continuous suture method in terms of less operation time, less intraoperative bleeding, postoperative drainage amount and time of drainage tube removal. Hence, no single technique has yet been identified which can be applied in all situations giving equal outcome. Also, since laparoscopic suturing is a time-consuming procedure that requires high skills, this surgical step still stands as the main limiting factor for the widespread use of laparoscopic myomectomy.

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