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Review article

Single-incision laparoscopic myomectomy: A review of the literature and available evidence

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ABSTRACT

Single-incision laparoscopic surgery (SILS) has become more feasible and safer for the patient by improvement in conventional laparoscopic techniques and availability of more advanced instruments. To date, there are many publications regarding having applied this technique to most benign gynecologic disorders. However, with regard to single-incision laparoscopic myomectomy, there are only a handful of publications. Researchers in the literature show that single-incision laparoscopic myomectomy is a safe and effective alternative to conventional laparoscopic myomectomy in a selected group of women. However, all researchers have emphasized the difficulty of intracorporeal suturing through a single port. In the future, a barbed suture and the use of a culdoscope may be useful to perform single-incision laparoscopic myomectomy. The integration of SILS and natural orifice transluminal endoscopic surgery will certainly contribute to a wider application of this approach.

Introduction

Uterine fibroids (also called leiomyomas or myomas) are the most common disorder of the uterus among women of reproductive age. The majority of uterine fibroids are symptomless. However, the symptoms of uterine fibroids can be sometimes manifested and disturb women. The problem for women of reproductive age is that uterine fibroids can cause sterility.

The most radical treatment for uterine fibroids is hysterectomy, which is performed only to women who will not give birth from now on. However, as a modern trend, women seeking the possibility of treatment that preserve the uterus have emerged because the uterus came to be regarded as a regulator and controller of important physiological functions, a sexual organ, a source of energy and vitality, and a maintainer of youth and attractiveness psychologically. Therefore, for women who wish to preserve fertility, expectant management, medical therapy,[1] surgical intervention,[2] uterine artery embolization,[3] uterine artery ligation,[4] uterine vessel occlusion,[5] ablative techniques,[6] or magnetic resonance-guided focused ultrasound surgery,[3] etc. are potential alternatives to hysterectomy. However, differential diagnosis of malignant-type leiomyosarcoma should be made carefully if conservative treatment is planned.

In past years, the management of uterine fibroids has increased dramatically by progress of medical technology, and a multidisciplinary approach is frequently applied. In addition, relatively less invasive procedures are designed to preserve the uterus regardless of future fertility. In general, the choice of treatment of uterine fibroids is performed in consideration of the patient's age and preference, the reason for treatment, and the issue of fertility preservation. Myomectomy is still a standard treatment for women with symptomatic uterine fibroids seeking fertility preservation.[7] At present, laparoscopic myomectomy has several advantages over abdominal myomectomy and even over myomectomy by minilaparotomy.[8] This review is limited to discussing laparoscopic myomectomy in the management of symptomatic uterine fibroids.

Advances in technology over the past several decades have created more surgical options for gynecologists and their patients. Surgeries that were performed with laparotomy in the past can now be performed with minimally invasive procedures such as minilaparotomy and laparoscopy. Laparoscopic surgery has

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occupied a central position in the management of benign and malignant conditions in gynecology. In recent years, various efforts such as reducing the port size and/or number have been made to further minimize the invasiveness of conventional laparoscopy. As a result of these efforts, single-incision laparoscopic surgery (SILS) has been created as a further development of conventional laparoscopy.[9–15] This procedure is performed through a single incision at the umbilicus, reducing the morbidity of additional incisions and improving the final cosmetic outcome. When there is more than one reasonable surgical approach, it is necessary to consider the patient's interest on cosmetic aspects. Therefore, in this review, it is discussed with a focus on single-incision laparoscopic myomectomy, which is superior in cosmesis.

Development of SILS

With the success of laparoscopic surgery, most surgeons would agree that minimally invasive surgery in appropriately selected patients provides a clear advantage in terms of both patient outcome and cost. One of the recent remarkable developments in the field of minimally invasive surgery includes advances in SILS. This minimally invasive procedure is performed through a single incision at the umbilicus. SILS has an advantage to further enhance the cosmetic benefits of minimally invasive surgery while minimizing the potential risks and morbidity associated with multiple ports. Although there are technically difficult points such as complex intracorporeal maneuvers, lack of instrument triangulation, limited traction of tissue, and external crowding and clashing, SILS has been successfully performed. In addition, SILS has developed rapidly as an alternative to scarless natural orifice transluminal endoscopic surgery (NOTES), which still remains experimental.

Devices used for SILS

Specialized equipment for SILS is divided into three broad categories: access ports, operating instruments, and optics.

Access ports

SILS may be typically performed by means of three approaches. The first is to make a single incision in the skin and multiple incisions in the fascia, with small bridges cut between the fascial incisions to enable organ retrieval. With this approach, multiple 5- to 12-mm trocars are inserted next to each other to access the abdominal cavity. The second is called “home-made single-port system”; it consists of a wound retractor and a surgical glove. The wound retractor is composed of a distal ring, a proximal ring, and a cylindrical connecting sleeve. The outer ring of the wound retractor is wrapped around the wrist portion of the glove, and the digit parts of the glove are used as working channels for laparoscopic instruments and camera. The elastic nature of the glove allows it to obtain a good position on the ring, create an airtight seal, and maintain pneumoperitoneum. The third approach uses a specialized access port with multiple channels, through which multiple instruments and optics can be introduced. These commercially available specialized access ports are described below.:

SILS port

SILS port (Covidien, Mansfield, MA, USA; Figure 1) is a multichannel access port that allows up to three laparoscopic instruments (three 5-mm cannulas or two 5-mm and one 12-mm cannula) to be used simultaneously through separate flexible channels.

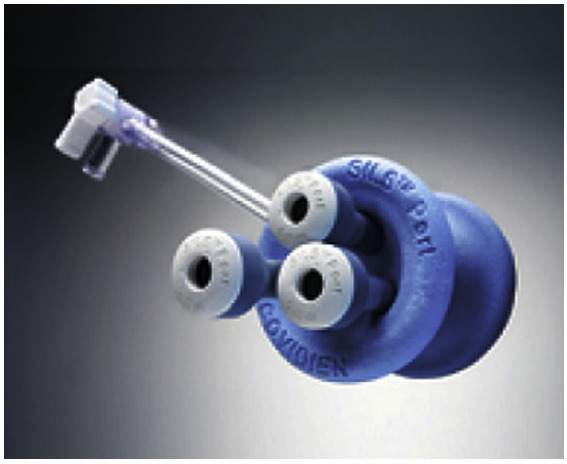

Figure 1. SILS port (Covidien, Mansfield, MA, USA).

GelPort and GelPOINT systems

The GelPort and newer generation GelPOINT systems (Applied Medical, Rancho Santa Margarita, CA, USA; Figure 2) consist of a combination of the rigid ring of the Alexis wound retractor with a GelSeal cap that maintains pneumoperitoneum during multiple instruments exchange. The GelPOINT platform is a dedicated modification of the GelPort system available for single-port laparoscopy in which, along with the GelSeal cap, four small cannulas are provided by the manufacturer for easier insertion of laparoscopic instruments through the gel interface.

AirSeal dynamic pressure system

AirSeal ports (SurgiQuest, Orange, CT, USA) use air pressure to create pneumoperitoneum. The new AirSeal port oval design is advantageous for single-port laparoscopy because it enables better access for multiple instruments.

Single-site laparoscopy access system

The single-site laparoscopy access system (Ethicon Endo-Surgery, Cincinnati, OH, USA) is an abdominal access system

Figure 2. GelPort and GelPOINT systems (Applied Medical, Rancho Santa Margarita, CA, USA).