Review Article

Adhesions after Laparoscopic Myomectomy: Incidence, Risk Factors, Complications, and Prevention

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Abstract

Uterine fibroids or uterine myomas are one of the most common benign diseases of the uterus. Symptoms associated with myomas can make surgical removal of myomas necessary. Besides the traditional abdominal route, laparoscopic myomectomy (LM) has gained more acceptances over the last few decades, and it is anticipated that laparoscopy is associated with lower adhesion development. Therefore, we conducted this review to analyze the evidence on adhesions after LM. The PubMed database was searched using the search terms "myomectomy" alone and in combination with "adhesions," "infertility OR fertility outcome," and "laparoscopy" among articles published in English and German. Although the well-known advantages of laparoscopy, for example, less pain, less blood loss, or shorter hospital stay, myomectomy belongs to high-risk operations concerning adhesion formation, with at least every fifth patient developing postsurgical adhesions. In laparoscopic surgery, surgeons´ experience as well tissue trauma, due to desiccation and hypoxia, are the underlying mechanisms leading to adhesion formation. Incisions of the posterior uterus may be associated with a higher rate of adhesions compared to anterior or fundal incisions. Adhesions can be associated with severe complications such as small bowel obstruction, chronic pelvic pain, complications in further operations, or impaired fertility. Tissue trauma and the experience of the surgeon in laparoscopic surgery are most of the influencing factors for adhesion formation after myomectomy. Therefore, every surgeon should adopt strategies to reduce adhesion development in daily routine, especially when it conducted to preserve or restore fertility.

Keywords: Biocompatible materials, myomectomy prevention, surgery-induced tissue adhesions

Introduction

Uterine fibroids or myomas are one of the most common benign diseases of the uterus.[1] Myomas can cause symptoms such as abnormal uterine bleeding, pain, or intra-abdominal pressure symptoms.[2] Moreover, myomas can be a contributing factor to infertility.[3] Indications of surgical management of uterine myomas are as follows: (1) abnormal uterine bleeding not responsive to conservative treatments; (2) high level of suspicion of malignancy; (3) growth after menopause; (4) infertility with distortion of the endometrial cavity or tubal occlusion; (5) pain or pressure that interferes with quality of life; and (6) urinary tract frequency or obstruction or iron-deficiency anemia related to abnormal uterine bleeding.[4,5] In every case where a hysterectomy is not absolutely necessary for treating symptomatic myomas because the woman wants to preserve fertility or has the desire to keep her uterus for other reasons, the gynecologist must decide, together with the patient, which therapy would be the best choice. Besides the surgical removal of myomas, nonsurgical options, such as uterine artery embolization or magnetic resonance-guided focused ultrasound, are available to treat symptomatic myomas.[6,7] However, in case of fertility preservation, nonsurgical therapeutic options are more or less

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experimental and should not generally be used outside of study situations. Furthermore, the experience with and availability of nonsurgical options are limited in most hospitals, and hence, surgical removal of myomas is often the main treatment option. Hysterectomy and abdominal myomectomy (AM) have been the traditional options to treat uterine fibroids. However, laparoscopic uterus-sparing myomectomy has gained more and more acceptance over the last few decades.[8] Laparoscopy has several well-known advantages over laparotomy, such as less pain, less blood loss, and shorter hospital stay.[9-13] Moreover, laparoscopy is regarded as an operation in which adhesion induction is less than in operations where the access route is a laparotomy. However, some operations induce adhesions more often than others, and myomectomy is one such type of operation.[14] It was hoped that the introduction of laparoscopy would solve the problem, but it was shown that even with the use of laparoscopy, a considerable percentage of patients developed adhesions after laparoscopic myomectomy (LM). Therefore, great efforts have been made to find influencing factors for adhesion development in LM and to develop strategies against adhesion formation.

In this review, the incidence of adhesions after LM, the risk factors for adhesion development, and complications and prevention of adhesions are presented.

Methods

The PubMed database was searched using the search terms "myomectomy" alone and in combination with "adhesions," "infertility OR fertility outcome," and "laparoscopy" among articles published in English and German. Articles were included in the review if the title indicated any relevance to the topic. Statements in the articles were scrutinized by searching the corresponding articles listed in the references sections. The reference lists were also searched for any relevant literature.

Incidence of Adhesions After Laparoscopic Myomectomy

Although this review addresses the issue of adhesions after LM, some studies present data for both LM and AM. Hence, it was decided to present both types of data, when available. Furthermore, only a few studies solely investigate the occurrence of adhesions after LM or AM. The major chunk of data about the incidence of adhesions after LM is presented by studies in which the efficiency of adhesion barriers (AB) was actually investigated. Table 1 makes no claim to completeness, but it is intended to give an overview of different studies over the last few decades concerning adhesion development after LM and AM. A few studies on AM alone are added to Table 1

Table 1: Incidence of adhesions after myomectomy

Author Study Year Control group versus treatment group	Number of patients (*n*) with adhesions (%)			
	Control AM, *n* (%)	Treatment AM, *n* (%)	Control LM, *n* (%)	Treatment LM, *n* (%)
Mais *et al*., 1995[55] Surgery alone versus Interceed®			50 (88)	50 (40)
Dubuisson *et al*., 1998[22]			26 (26.9)	NA
Di Gregorio *et al*., 2002[18]			121 (1.6)	NA
Pellicano *et al*., 2003[25] Surgery alone versus Hyalobarrier®			18 (77.8)	18 (27.8)
Takeuchi *et al*., 2005[39] Surgery alone versus fibrin sheet versus fibrin gel			32 (62.5)	Fibrin sheet: 30 (67.7) Fibrin gel: 29 (34.5)
Mais *et al*., 2006[61] Surgery alone versus Hyalobarrier®			22 (59)	21 (38)
Takeuchi *et al*., 2008[17]			372 (37.9)	NA
Trew *et al*., 2011[16] LRS versus Adept®			170 (75.4)	Not specified
Kumakiri *et al*., 2012[27] Interceed®			NA	108 (38)
Tinelli *et al*., 2011[15] Surgery alone versus Interceed®	135 (28.1)	136 (22)	137 (22.6)	138 (15.9)
Tsuji *et al*., 2005[63] Surgery alone versus Seprafilm®	13 (76.9)	21 (14.3)		
Abu-Elhasan *et al*., 2014[62] Intraoperative irrigation versus LRS for 48 h	21 (81)	23 (52.2)		
Cezar *et al*., 2014[60] LRS versus PREVADH™	26 (76)	28 (29)		

AM: Abdominal myomectomy, LM: Laparoscopic myomectomy, LRS: Lactated Ringer's solution, NA: Not applicable

to give a short overview of the incidences of adhesions after this kind of procedure.

The study of Tinelli *et al*.[15] provides a good comparison of AM and LM. They investigated, in a prospective blinded observational study, the effect of an anti-adhesion agent (Interceed®) after both LM and AM. A large number of patients ($n = 546$) with comparable baseline characteristics and no difference in the dimension of the myoma were assessed during a second procedure conducted for several reasons. The incidence of adhesions in the different groups was as follows: AM without AB (28.1%), LM without AB (22.6%), AM with AB (22%), and LM with AB (15.9%).[14] Therefore, it was shown that the occurrence of adhesions was reduced after laparoscopy, but even the use of laparoscopy could not completely prevent adhesion formation completely. However, the incidences of adhesions in their study are lower than the incidences in many other studies. For example, Trew *et al*.[16] investigated the occurrence of *de novo* adhesions in patients undergoing laparoscopy for removal of myomas or endometriotic cysts. They compared the intra-abdominal instillation of an anti-adhesion agent (Adept®) with instillation of the lactated Ringer's solution and found an overall *de novo* adhesion rate of 75.4% in patients who had undergone a myomectomy. The authors stated that they found a very high incidence of adhesions even in specialized centers and explained that this might be in part due to a very strict recording procedure.[16] In another study, adhesions were assessed during a second-look laparoscopy after LM in 372 patients. Surgical wound adhesions were found in 37.9% of the patients.[17] However, there is another study that assessed the occurrence of adhesions after LM during a second procedure and found adhesions in only 1.6% of the patients (2/121).[18]

In conclusion, as shown in Table 1, the incidences of adhesions vary after LM and without the usage of an AB (without the inclusion of the one exception of 1.9%) between 23% and 88%. Therefore, it can be stated that adhesions develop in at least every fifth patient, which is a remarkably high number of patients.

Risk Factors for Adhesion Development in Laparoscopic Myomectomy

Laparoscopy was long regarded as a low-risk procedure concerning adhesion development, and this approach is recommended as a gold standard treatment of uterine fibroids, of course, in settings where resources are available to conduct this type of surgery.[19] However, it is well known that a considerable number of patients develop adhesions even with the use of laparoscopy. The underlying mechanisms leading to adhesion formation – tissue trauma, tissue desiccation, and tissue hypoxia – are also present in laparoscopic surgery. Tissue trauma is an inevitable consequence of most surgeries. It is assumed that adhesions occur when two injured sites stick together for a few days. The peritoneum can also function as the counterpart for an injured site when it was damaged by ungentle tissue handling or desiccation. The experience of the surgeon in laparoscopic surgery is, therefore, an influencing factor, as it must be assumed that less experienced surgeons may cause more damage to the tissue than the experienced ones. However, even with a high level of experience, some operations, such as endometriotic cyst removal, adhesiolysis, or myomectomies, carry a higher risk of adhesion formation irrespective of whether they are conducted by laparoscopy or laparotomy.[14] In laparoscopic surgery, the use of cold and dry insufflation gas can cause tissue desiccation and thereby peritoneal damage, although tissue desiccation is also a problem in laparotomy. Another influencing factor in laparoscopy is the pressure used to maintain the pneumoperitoneum. A high pressure leads to tissue hypoxia and may cause alterations in the fibrinolytic system, which is a key factor in adhesion formation. Therefore, it could be demonstrated that the laparoscopic environment itself functions as a cofactor in adhesion development.[20]

Incision Location

Several studies revealed that the location of a myomectomy is an important influencing factor for adhesion formation. Incisions of the posterior uterus may be associated with a higher rate of adhesions compared to anterior or fundal incisions. Moreover, adhesions after a posterior incision tend to be more severe and dense and involve the adnexa more often. In a study with patients undergoing AM, adnexal adhesions were found in 93.7% of the patients (15/16) after a posterior uterine incision compared to 55.5% of the patients (5/9) after an anterior incision.[21] Dubuisson *et al*. assessed adhesions after LM in a second-look laparoscopy in 45 patients. They found that adhesions were present in 33.3% of the patients after a posterior incision, while adhesions developed in only 4.8% of the patients after an anterior or fundal incision.[22] Other authors also found that adhesion formation was significantly higher in myomas located on the posterior wall.[23,24] However, some researchers, such as Pellicano *et al*., found no influence of the incision location on adhesion development.[25]

Incision Length

The length of the myomectomy incision is another important cofactor in adhesion development. Coddington *et al*. carefully recorded all adhesions by measuring the length and width during a second-look laparoscopy after AM and treatment with placebo or GnRH analog in 20 patients. They calculated that for every additional centimeter of incision length, the total adhesion area over the uterine serosal surface increased by 0.55 cm². This means the total myometrial incision length,

which is defined as "the total length of all incisions made through the uterine visceral peritoneum through which myoma removal occurred."[26] Although this study investigated patients after their AM, it is likely that the results would be similar after LM. In another study, adhesions were also assessed during a second-look laparoscopy in 108 patients after LM, which was combined with the use of an anti-AB (Interceed®). Univariate analysis showed that the total incision length was significantly higher among patients with wound adhesions. Patients with adhesions (n = 41) had a median total incision length of 10 cm (range, 4.6–17.5 cm) compared to 8 cm (range, 2–23.9 cm) in patients without adhesions (n = 67).[27] The abovementioned study of Trew *et al*. defined a cutoff value for the incision length. They find a significant association between an incision length equal to or >50 mm and the development of adhesions.[16]

Suture

Another influencing factor is the suture or the number of knots. Trew *et al*. divided their study population into three groups concerning the number of knots used in myomectomy or endometriotic cyst surgery sites (1–3, 4–5, and ≥ 6 knots). The usage of six or more knots was here significantly associated with the development of *de novo* adhesions.[16] Pellicano *et al*.[25] mainly investigated the efficiency of an anti-AB, but they also compared two types of sutures in terms of adhesion formation. Sutures were made with intracorporeal knots. In each study group (Hyalobarrier® [n = 18] vs. control [n = 18]), patients were alternatively treated with subserous sutures or with interrupted Figure-8-like sutures. The rate of adhesions was significantly higher in patients treated with interrupted Figure-8-like sutures.[25] Another study investigated two different suture materials in a rat model where each rat served as its own control. The median macroscopic adhesion score was significantly higher when a barbed suture material (polyglyconate; V-Loc™) was used compared to the standard suture material (polyglactin-910; Vicryl®).[28]

Further Influencing Factors

In a study with 372 patients after LM, the diameter of the largest myoma and the number of myomas enucleated influenced the incidence of postoperative adhesions at the surgical wound.[17] Kumakiri *et al*. also found an interesting association between the number of removed myomas and the diameter of the myomas with uterine wound protrusion and hence with the development of adhesion. The enucleation of large and multiple subserosal myomas can cause difficulties in achieving smooth wounds because of redundant serosa, which leads to the development of protruding wounds. Although only patients after the use of oxidized regenerated cellulose (Interceed®) were investigated, the underlying mechanisms may be transferable to wound healing without this AB. The authors state that protruding wounds might be in contact with other organs for a longer period, which might be a reason for an increasing degree of adhesion development. Concerning the use of Interceed®, there might be a reduction in stable localization because of the protrusion, and the efficiency might be further reduced by a difference in bleeding between protruding wounds and other types of wounds, as Interceed® prevents adhesions also by reducing bleeding from the wound surface. The authors suggest that appropriate trimming of redundant tissues may help to decrease the degree of wound protrusion and thereby adhesion formation.[27]

Complications of Adhesions

In patient information before surgery, common complications such as any infection, bleeding, or injury of adjacent organs are always named. However, adhesions are often not included in the routine counseling, although they develop in 20%–93% of the patients after abdominopelvic surgeries.[29] One explanation might be that complications associated with adhesions do not occur directly after the surgery. It can take years between the initial surgery and the occurrence of complications. One of these complications that occur often after a long time is small bowel obstruction (SBO).[30] Not all patients with adhesions develop SBO, but adhesions are the cause of this very serious disease in nearly all patients with SBO. A review of 2,000 laparoscopies conducted for the treatment of acute SBO declared that adhesions were accountable for 84.9% of SBOs.[31] A further complication, which is well known by all abdominopelvic surgeons, is the complication relating to surgeries by preexisting adhesions. In this case, the risk for inadvertent bowel,[32] ureteral,[33-35] or vascular injury[29] is considerably increased because the organs and anatomical structures can be located outside their natural anatomical positions due to adhesions and thus may unexpectedly appear in the operation field. Another complication associated with adhesions is the development of chronic pelvic pain, although its real impact remains controversial.[36] The additional costs derived from the attention of these complications constitute a tremendous burden for the health-care system.[37] Depending on the health-care system of a country, this could be a burden for everyone when health insurance costs increase. Concerning myomectomy, one complication, namely the impairment of fertility, is very important as myomectomy is often performed to preserve or restore fertility. Hence, this complication is discussed in more detail in the following paragraph.

Adhesions and Infertility

Women today often postpone pregnancy for different reasons and so the removal of symptomatic myomas by myomectomy

to keep the uterus for fertility preservation has become more common as hysterectomy is no treatment option for these patients. Another reason for myomectomy in women of childbearing age is the otherwise unexplained infertility. Therefore, the complication of adhesion development is very important because adhesions may have an unfavorable influence on future fertility. It is assumed that adhesions can lead to an impaired interaction between the Fallopian tube and the ovary and thus can be accountable for 20%–40% of female infertility.[38,39] However, there are controversial discussions about the real impact of adhesions on fertility. In case of myomectomy, it is assumed that only adhesions that involve the adnexa could be responsible for fertility impairment. A lot of research focuses on fertility impairment by myomas but also on the development of adnexal adhesions after myomectomy and their impact on fertility outcomes. Takeuchi *et al*. found *de novo* adhesion of the uterine adnexa in 8.9% of the patients. In their study, only the diameter of the largest myoma influenced the occurrence of *de novo* adnexal adhesions.[17] In another study that compared three different types of adhesion prevention agents, *de novo* adnexal adhesions were observed in 12.5% of the patients (4/32) in the control group, in 6.8% of the patients (2/29) in the fibrin gel group, and in 16.7% of the patients (5/30) in the fibrin sheet group. None of the patients in the three groups developed bilateral adnexal adhesions.[40] Fauconnier *et al*.[41] identified prognostic factors for conception after LM carried out in 91 infertile patients. They also wanted to test the hypothesis that adnexal adhesions influence fertility after myomectomy as previously described in other studies.[21,22] Although the test for interaction was only close to the threshold for significance, the authors state that, besides uterine suture and tubal pathology factors, tubo-ovarian adhesions before myomectomy adversely affect postoperative fertility. Furthermore, they found that the cumulative probability of conception after myomectomy was lower in the presence of a posterior myoma, an intramural myoma, and/or a sutured hysterotomy. They explained that this supports the hypothesis that adhesions are responsible for a lower rate of postoperative fertility because the described situations were previously recognized as risk factors for adhesions after myomectomy.[41] Another study from Pellicano[42] also supports the relationship between adhesions and an impaired fertility outcome. This study investigated the incidence of the incidence of adhesions after application of an AB (Hyalobarrier® and HB®) and the use of two different types of suture but also the pregnancy rates in different study groups after 6 and 12 months. The pregnancy rate was significantly higher in the treatment group (44.2% after 6 months and 77.8% after 12 months, n = 18) than in the control group (22.2% after 6 months and 38.8% after 12 months, n = 18). Moreover, the use of subserous sutures was also significantly associated with a higher pregnancy rate in both groups: Figure-8-sutures plus HB® (22.2% after 6 months and 55.5% after 12 months, n = 9); subserous sutures plus HB® (66.7% after 6 months and 100% after 12 months, n = 9); Figure-8-sutures without HB® (11.1% after 6 months and 22.2% after 12 months, n = 9); and subserous sutures without HB® (33.3% after 6 months and 55.5% after 12 months, n = 9).[42] Concerning the high rate of adnexal adhesions and the unfavorable impact they may have on fertility, it is suggested by some authors to perform an early second-look laparoscopy to lyse the adhesions and look at the scar.[16] However, this prophylactic option must be carefully considered as adhesions can reform in a high percentage of patients after adhesiolysis.[43-45] Therefore, it is even more important to adopt strategies for adhesion prevention in daily routine.

Prevention of Adhesions

Adhesions are a very common complication relating to a lot of abdominopelvic surgeries and not only after myomectomies. Therefore, tremendous efforts were made during the last few decades to find ways to reduce the incidence of adhesions. The understanding of the principle of adhesion development has steadily improved so that strategies for adhesion prevention could be developed.[46] The Expert Adhesions Working Party of the European Society of Gynaecological Endoscopy has given recommendations for adhesion reduction[47] [Table 2]. These principles should be adopted by every surgeon in every abdominopelvic operation to reduce tissue trauma and thereby adhesion formation. Concerning myomectomy, the reduced number of knots, reduced incision length, use of subserous sutures, use of standard suturing material instead of barbed suture material, and avoidance of protruding wounds may help to reduce the incidence of adhesions. In case of multiple myomas, it may be advisable to remove them, if possible, from one incision to reduce the total incision length and thereby adhesions.[26] However, even if the surgeon takes care of all basic principles, the peritoneal integrity is often destroyed after the operations, and hence, adhesions can easily form. In this case, the use of an anti-adhesion agent would be advisable. Anti-adhesion agents can be broadly divided into pharmacological and nonpharmacological agents. The mechanism for adhesion reduction with pharmacological agents is mostly the reduction of the inflammatory reaction or the prevention of blood clotting. Heparin, steroids, promethazine, and intra-abdominal noxytioline are some of the pharmacological agents tested in humans. At present, no pharmacological agent has been proven to prevent adhesion development in humans, although patients who received steroids were less likely to have a worsening adhesion score.[48,49] Even more pharmacological agents were tested in animals, but they

Table 2: Adhesion-reduction steps

Carefully handle tissue with field enhancement (magnification) techniques
Focus on planned surgery and, if any secondary pathology is identified, question the risk benefit of surgical treatment before proceeding
Perform diligent hemostasis but ensure diligent use of cautery
Reduce cautery time and frequency and aspirate aerosolized tissue following cautery
Excise tissue - reduce fulguration
Reduce duration of surgery
Reduce pressure and duration of pneumoperitoneum in laparoscopic surgery
Reduce risk of infection
Reduce drying of tissues (limit heat and light)
Use frequent irrigation and aspiration in laparoscopic and laparotomic surgery
Limit use of sutures and choose fine nonreactive sutures
Avoid foreign bodies - such as materials with loose fibers
Minimal use of dry towels or sponges in laparotomy
Use starch- and latex-free gloves in laparotomy

Based on: De Wilde and Trew[46]

were either not tested in humans or showed efficiency only in animal models or showed no efficiency at all. These agents include antibiotics, calcium channel blockers, colchicine, crystalloid solutions, nonsteroidal anti-inflammatory drugs, salicylates, progestogens, gonadotropin-releasing hormone agonists, antihistamines, growth factor inhibitors, recombinant plasminogen activator, Vitamin E, and even honey.[48,50-53]

Nonpharmacological agents function by separating injured tissues over a certain time period because it is thought that adhesions develop when two injured sites stick together. Nonpharmacological agents are further divided into barrier and fluid agents. Fluid agents include Adept® (icodextrin), Hyalobarrier® (hyaluronic acid), or SprayGel (synthetic hydrogel).[49] A lot of different barrier agents have been developed over the last few decades, and a few of them have been proven as efficient in some studies.[54] Currently, there is also no nonpharmacological agent that prevents adhesions completely. However, in case of myomectomy, there are a lot of studies demonstrating a considerable reduction of adhesions after the use of a barrier or fluid agent [Table 1]. The results of two such studies were already presented in detail earlier in the text.[15,16] Di Gregorio *et al*.[18] performed LM in 635 patients and had the possibility for a second look in 121 patients (79 during cesarean section and 42 during a second laparoscopy for other indications). They found adhesions in only two among the 121 patients (1.6%), which is a very low incidence compared to other studies. In the first of the two cases, the adhesions were between the site of the myoma and the omentum, while they were between an intestinal loop and the anterior uterine wall in the second case. The authors state that the suture technique in their study (Use of a 5 mm needle holder, use of 2/0 Maxon™ threads to reconstruct the perimetrium; use of catgut or Maxon™ for myometrium suturing with intracorporeal knots), together with the use of Interceed® in every patient and a very limited use of the bipolar coagulator, markedly reduced the risk of interposition of wounded and/or bleeding surfaces.[18] Mais *et al*. also reported that 60% (15/25) of the patients who received the oxidized regenerated cellulose absorbable barrier Interceed showed free of adhesions at second-look laparoscopy. Compared with no treatment (3/25), this difference was significantly ($P < 0.05$).[55] Other ABs tested in patients undergoing myomectomy are as follows: SprayGel (synthetic hydrogel, which is formed when two polyethylene glycol (PEG)-based liquids are sprayed onto the target tissue),[56] SepraSpray (modified hyaluronic acid and carboxymethylcellulose powder),[57] fibrin gel, fibrin sheet,[17,40] SprayShield™ (PEG ester trilysine amine solution and a borate buffer solution)[58] and ADBLOCK (site-specific sprayable barrier gel, based on a dextrin polymer),[59] PREVADHTM™ film, a resorbable dual-sided membrane,[60] and Hyalobarrier™, auto-cross-linked hyaluronan gel.[61] Besides these advances, Abu-Elhasan[62] conducted a pilot study to evaluate the safety and efficacy of postoperative 48-h continuous intraperitoneal wash with lactated Ringer's solution for minimizing postmyomectomy adhesion. They reported significantly differences in their treatment group, with a higher proportion of adhesion-free patients at second-look laparoscopy, a lower total adhesion score, and a lower number of pelvic sites covered by adhesions. Thus, these results should be confirmed in future studies. Concerning the high number of different agents tested, it is very difficult to decide in daily routine which agent should be used. Most new agents are expensive, and the available data about the efficiency are limited and are often only based on one or two studies with a low number of patients and with a limited demonstration of efficiency.[63] The two most recent Cochrane Reviews[49,64] concerning anti-adhesion agents concluded that gels and hydroflotation agents appear to be effective adhesion prevention agents for use during gynecological surgery. They further state that low-quality evidence suggests that oxidized regenerated cellulose (Interceed), expanded polytetrafluoroethylene (Gore-Tex), and sodium hyaluronate with carboxymethylcellulose (Seprafilm) may all be more effective than no treatment in reducing the incidence of adhesion formation following a pelvic surgery. However, the Cochrane Reviews included both studies with the use of laparoscopy and the use of laparotomy as well as different surgical procedures. Hence, not all results can be attributed to LM (e.g., Seprafilm is difficult to use in laparoscopic surgeries; gel barriers must be able to stick to vertical areas). They further advice that future studies should measure outcomes in a uniform manner using the modified American Fertility Society score (mAFS) and the statistical findings should be reported in full.

Conclusion

Adhesion development after LM is a common problem, and every surgeon who conducts this operation should be aware of it. Besides basic influencing factors, such as desiccation or inappropriate tissue handling, several factors induce adhesion development, specifically in case of myomectomy. This includes the incision location, incision length, number of knots, or kind of suture material. As myomectomy is often performed to preserve or restore childbearing potential, adhesion prevention strategies should be used. Besides careful tissue handling, the use of an anti-AB may help to reduce the incidence of adhesions and decrease adhesion-associated complications.

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Conflicts of interest

There are no conflicts of interest.

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