REVIEW ARTICLE

Adhesion Prevention in Myomectomy

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ABSTRACT

Adhesions are abnormal fibrous connections, joining tissue surfaces in abnormal locations. Adhesions form after any trauma involving the peritoneum and the injured tissue surface or directly between the injured tissue surfaces. The ideal anti-adhesion agent should be safe, efficacious, easy to use in all types of surgery, and economical. It should prevent adhesions at the site of surgery as well as throughout the peritoneal cavity. Needless to say, the ideal agent is still elusive.

Key words: Physical barriers, oxidized regenerated cellulose, icodextrin

Adhesions are abnormal fibrous connections, joining tissue surfaces in abnormal locations.[1] Adhesions form after any trauma involving the peritoneum and the injured tissue surface or directly between the injured tissue surfaces. Adhesion formation after surgery is common, but greatly underestimated. Fortunately in a majority of women, adhesions following gynecological surgeries do not pose any problem; but a considerable proportion lead to serious short-term and long-term complications, such as, abdominal or pelvic pain, subfertility, and intestinal obstruction.[2] Adhesions following myomectomy are common; while open or laparoscopic myomectomy may lead to intra-abdominal adhesions, hysteroscopic myomectomy may cause intra-uterine adhesions.

LAPAROSCOPY VERSUS LAPAROTOMY

Any operation by the laparoscopic route has the potential advantage of reducing adhesion formation. Laparoscopic surgery follows the principles of microsurgery, with careful and minimal tissue handling, magnification provided by the laparoscope, irrigation to avoid tissue desiccation and meticulous hemostasis. All these minimize the extent of tissue trauma. In addition, during laparoscopy there is less chance of infection or of the abdominal cavity getting exposed to air and foreign reactive materials.

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STRATEGIES TO PREVENT ADHESIONS

Good surgical technique

Good surgical technique is the cornerstone of adhesion prevention. This includes gentle tissue handling, meticulous hemostasis, irrigation to prevent serosal drying, avoiding intraperitoneal infection, use of fine nonreactive sutures, and minimal use of cautery to prevent tissue ischemia.

Anti-adhesion agents

The ideal anti-adhesion agent should be safe, efficacious, easy to use in all types of surgery, and economical. It should prevent adhesions at the site of surgery as well as throughout the peritoneal cavity. Needless to say, the ideal agent is still elusive.

Anti-adhesion agents can be divided into three broad categories: drugs, physical barriers, and solutions. Physical barriers act as site-specific, anti-adhesion agents, while solutions act on the peritoneum as a whole.

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DRUGS

Non-steroidal anti-inlammatory drugs

They have been used in animal studies with success, but there is no significant evidence from any published study to recommend their use in humans.[3]

Fibrinolytic agents

These have been suggested for prevention of adhesions, as they act directly by reducing the fibrinous mass. Thrombolytic agents have been seen to be useful in animal and clinical studies.[4] There are potential risks of bleeding and delayed wound healing. The use in humans await further evaluation of their safety and side-effects, and there is a paucity of evidence regarding their use in laparoscopic surgery.

Anticoagulants

Heparin by different routes, alone or in conjunction with other agents, has been widely used and investigated for adhesion prevention. However, its efficacy has not been demonstrated in clinical trials, and it was found to have no therapeutic advantage over Ringer Lactate solution in gynecological laparoscopic surgery.[5]

Corticosteroids

Show poor efficacy and cause immunosuppression and poor wound healing, resulting in infection, wound dehiscence, and incisional hernia.

PHYSICAL BARRIERS

Omental grafts

The orginal barrier adhesion agents consisted of omental grafts or patches placed over traumatized surfaces and sutured. The practice of putting a devascularized piece of omentum may actually increase adhesion formation; although there are no human trials, there is convincing animal data that has led to this practice being abandoned.[6] There are no trials of using vascularized omental grafts to prevent adhesions.

Oxidized regenerated cellulose (Interceed®)

This is the most widely used adhesion prevention agent and has been shown to reduce adhesion formation in both animal[7] and human studies.[8] It works by transforming into a gelatinous mass covering the damaged peritoneal surfaces and forming a barrier, physically separating the adjacent raw peritoneal surfaces. Oxidized regenerated cellulose (ORC) has been used after open as well as laparoscopic myomectomy. However, the efficacy of ORC is reduced in the presence of blood, hence, meticulous hemostasis has to be achieved before it is placed on the traumatized surface. Moreover, it has a potential to migrate after application, which may reduce its effectiveness. ORC has been seen to act in synergy with heparin; although adhesion reduction was observed in human studies, it did not reach statistical significance.[9]

Seprafilm®

Is composed of modified hyaluronic acid and carboxymethylcellulose, and has been shown in gynecological studies, and specifically in myomectomy, to be effective in reducing postoperative adhesions.[10] However, it is rather difficult to use in laparoscopy as the sheets are firm and non-compliant.

The expanded polytetrafluoroethylene non-absorbable barrier

Gore-tex surgical membrane® has also undergone evaluation in a clinical trial.[11] This must be sutured in place and is usually removed during a second surgical procedure. It has been shown to reduce the severity, extent, and incidence of adhesions following myomectomy and other gynecological procedures. It is also very difficult to apply at laparoscopy.

Hydrogel spraygel®

Consists of two synthetic liquid precursors, which, when mixed, rapidly cross-link to form a solid, flexible, absorbable hydrogel. The solid polymer acts as an adhesion barrier and can be easily applied at laparoscopy. However, the current clinical evidence does not support the use of Spraygel to reduce adhesions.[12]

SOLUTIONS

Crystalloids

The instillation of large volumes of normal saline or Ringer Lactate at the end of a procedure, to produce a hydrofloatation effect, has been used for long as an economical anti-adhesion strategy. However, meta-analysis of clinical trials has shown that crystalloids do not reduce postoperative adhesions.[13] This is possibly due to the rapid absorption rate of the peritoneum (30 – 60 ml/hour),

which causes a complete assimilation of the fluid in 24 – 48 hours, which is too soon to prevent the formation of fibrinous adhesions.

Icodextrin

Four percent Icodextrin (Adept®) is a glucose polymer of high molecular weight, which has been extensively used in peritoneal dialysis. It is absorbed slowly from the peritoneal cavity, with a peritoneal residence time of ≥4 days[14] and reduces adhesion formation by prolonged hydrofloatation. Lavage and instillation with 4% Icodextrin has been shown to be effective and safe in reducing post-operative adhesions following laparoscopy in clinical trials,[15,16] but as yet there is insufficient evidence to recommend its use to prevent adhesions in gynecological laparoscopic surgery.[3]

Hyaluronic acid gels (ACP gel, Hyalobarrier gel)

These have shown promise as anti-adhesion agents following laparoscopic myomectomy in early reports.

Intrauterine adhesions following hysteroscopic myomectomy Intrauterine adhesions are a potential complication following hysteroscopic myomectomy. The various strategies to prevent or reduce intrauterine adhesions are:

Surgical technique

Avoiding trauma to the healthy endometrium and myometrium, reducing the usage of electrosurgery wherever possible, and avoiding forced cervical manipulation.

Early second-look hysteroscopy has not been seen to be beneficial.

Preoperative GnRH administration

The evidence of benefit in terms of reduction of adhesions is lacking.

Postoperative hormonal treatment

Postoperative estrogen and progesterone administered cyclically seem to stimulate the endometrium, leading to re-epithelialization of scarred surfaces. However, the benefit of this method to reduce adhesions has to be validated by more robust evidence.

Intrauterine device

Traditionally, placement of an intrauterine contraceptive device in the uterine cavity for three months, following an intrauterine procedure, has been regarded as an effective method for prevention of uterine synechiae. Although this practice is not backed by evidence from randomized trials, it has been associated with complications like infection, perforation, and device misplacement. There is no evidence to recommend this practice.

CONCLUSION

Postoperative adhesions are a significant problem, and adhesions following myomectomy often have implications on the reproductive outcome. Good surgical technique is the mainstay of adhesion prevention, along with the use of anti-adhesion agents.

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