Minimizing the complications of laparoscopic myomectomies: Which technique should stay in the loop?

Because of technological advances in the realm of female reproductive health, more patients are able to choose organ-sparing surgeries in response to uterine myomas. Several techniques have been employed to minimize some complications that occur during laparoscopic myomectomies, including the use of loop ligation, vasopressin injection, uterine artery occlusion, and preoperative hormonal treatment. Although the mentioned approaches enhance the success of this procedure in terms of operation time, blood loss, and blood transfusion, each technique has clearly delineated advantages and disadvantages that should be taken into consideration—which techniques should stay in the loop?

First and foremost, the loop ligation of a myoma pseudocapsule combined with vasopressin administration has contributed greatly toward successful laparoscopic myomectomies (1). In this procedure, vasopressin diluted with saline solution is injected between the myometrium and myoma. Many studies have shown that the intramyometrial injection of vasopressin significantly decreases the intraoperative and postoperative blood loss associated with laparoscopic myomectomies compared with myomectomies performed without the use of vasopressin. This includes a lower need for blood transfusion perioperatively (1). Vasopressin causes vasoconstriction through its action on the V1 receptors, which stimulates the uterine contractions and reduces the blood loss during surgery.

After most of the myoma is enucleated, the pseudocapsule is ligated with a loop at the base of the myoma. The loop is tightened until the whole myoma is removed completely, leaving a tightly ligated pseudocapsule, which completely occludes the blood vessels that typically cause significant bleeding during myomectomy (1). This technique is associated with significantly reduced blood loss, short postoperative stays, reduced risk of blood transfusion, and is less likely to require conversion to laparotomy (1). Whether or not loop ligation was used, operating times were shorter during laparoscopic myomectomies using vasopressin (1).

However, vasopressin cannot be used in every case. The disadvantage of using vasopressin during surgery is that its mechanism of action causes transient hypertension and bradycardia, which may lead to significant morbidity if not managed appropriately. There are case reports detailing pulmonary edema, atrioventricular blockages, and cardiac arrest after the administration of vasopressin. Studies have shown that cardiovascular complications may be minimized by avoiding the use of vasopressin in patients with heart disease, diluting the dose appropriately with saline, avoiding the accidental injection of vasopressin intravascularly, and carefully monitoring vitals on administration (1). Therefore, the surgeon must have alternative techniques in mind to reduce the intraoperative blood loss and improve the ease of myomectomy when vasopressin use is contraindicated.

Similar to laparoscopic myomectomies using loop ligation, myomectomies using preventive uterine artery occlusion have been shown to reduce intraoperative and postoperative blood loss (2). The uterine artery can be occluded permanently, using bipolar coagulation or vascular clips. It can also be occluded transiently, using clamps, removable clips, or silk ties. Studies tend to attribute the reduction in blood loss during surgery to the procedures that permanently occlude the uterine arteries during myomectomy. Permanent occlusion has also been associated with reduced recurrence of the myomas; however, it may have implications for future pregnancies (2).

A major concern with uterine artery occlusion during laparoscopic myomectomy is the ongoing concern regarding the effects of uterine devascularization on future fertility (2). The belief is that collateral vasculature and anastomoses would revascularize and supplement healthy uterine tissue because the occlusion of the uterine arteries is only responsible for a decrease of 40% in the uterine vascularization (2). However, more information is necessary regarding the impact on ovarian reserve, course of pregnancy, and delivery complications (2). These concerns are associated less with procedures involving transient uterine artery occlusions during laparoscopic myomectomies. Both the loop ligation and uterine artery occlusion procedures have been associated with better quality of uterine suturing because of the reduced intraoperative blood loss (1).

Although the loop ligation technique focuses on removing the myoma during laparoscopic surgery, some studies explore shrinking the myomas before the surgery (3). There is increasing interest in the preoperative hormonal treatment of myomas, most commonly using gonadotropin releasing hormone (GnRH) analogs or selective progesterone receptor modulators such as ulipristal acetate (UPA). Typically, GnRH analogs and selective progesterone receptor modulators reduce the serum levels of estrogen and progesterone, respectively. Thus, both hormonal therapies have been shown to decrease abnormal uterine bleeding related to the presence of fibroids, correct preoperative anemia, reduce fibroid volume, and decrease intraoperative blood loss (3).

Although GnRH analogs are associated with a greater reduction in fibroid size, 1 disadvantage is that they may cause severe estrogen withdrawal and menopausal symptoms, including hot flashes, sleep disturbances, vaginal dryness, and irritability. Patients may be less likely to adhere to this therapy because of its adverse effects. Although UPA is associated with a milder side-effect profile, 1 drawback is that there have been reported cases of associated liver toxicity (3). Another concern regarding UPA and GnRH analogs is that they may change fibroid integrity in such a way that it complicates traction maneuvers during myomectomy and lessens the differentiation from the surrounding tissues (3).

Moreover, both hormonal treatments have been associated with excessive costs. Further studies are required to determine the efficacy of preoperative hormonal treatment in comparison to other approaches used during laparoscopic myomectomies (3).

So where are we in the loop? Of the procedures reviewed, the loop ligation of a myoma pseudocapsule combined with vasopressin appears quite successful in minimizing surgical complications (1). However, there are situations where vasopressin cannot be used and the uterine arteries are difficult to access for temporary ligation. In those occurrences, the loop ligation technique can be optimized to include 2 different approaches. Shengke et al (4) propose a novel technique where the loop ligation technique is used to ligate both the pedicle and pseudocapsule of the same fibroid. This technique is helpful especially in cases of large broad ligament fibroids. Given the close proximity of broad ligament fibroids to the ureter and uterine vessels, access to the uterine vessels may be limited. In addition, if a loop ligation technique of the pedicle were to be performed, the ureters may become trapped in the loop, causing unnecessary injury. Therefore, combining the 2 approaches to remove 1 fibroid may allow the surgeon to ligate the capsule with the loop technique where the ureter and other retroperitoneal structures are in close proximity, while simultaneously ligating the pedicle with the same loop in areas where the tissue appears to be a safe distance away from the fibroid. Once the fibroid is detached completely from the myometrium, loop ligation of the pedicle may be performed again to secure any bleeding vessels after confirming the location of the ureter and uterine vessels. This technique is associated with reduced blood loss, decreased transfusion risk, and improved recovery and is unlikely to require conversion to laparotomy. Additionally, underlying structures such as the ureters are spared from injury. Loop ligation is neither associated with the questionable fertility outcomes noted in the uterine artery occlusion procedures nor with the side effects caused by the preoperative hormonal therapies. Perhaps when it comes to laparoscopic myomectomies, staying in the loop is the best option.

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