Minimally Invasive Surgery and Chronic Pelvic Pain

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Abstract: Objective: The minimally invasive surgical treatment options for many chronic pelvic pain disorders are reviewed, including treatments for endometriosis, ovarian remnant syndrome, pelvic congestion, post-ablation pain, pelvic adhesions, and uterine retroversion.

Design: A systematic review of the literature referring to surgical treatments of chronic pelvic pain, with emphasis on articles published after 1990.

Data Sources: Medline searches for terms including the specific chronic pain syndromes and “surgery,” “treatment,” or “management.”

Eligibility Criteria: Trials, prospective and observational studies, and reviews assessing the treatment efficacy of surgical modalities employed in the treatment of chronic pelvic pain conditions were considered. Only English-language articles were included.

Results: The indications, efficacy, risks, and benefits of minimally invasive treatments for each chronic pelvic pain condition are discussed.

Conclusion: There are well-defined minimally invasive surgical treatment options for each chronic pelvic pain condition reviewed. There are limitations of available literature, both in level of evidence and quantity. Most studies are confounded by the multifactorial nature of chronic pelvic pain.

Keywords: Minimally invasive surgery, chronic pelvic pain, laparoscopy, endometriosis, adhesions, pelvic congestion.

1. INTRODUCTION

Chronic pelvic pain, defined as noncyclic pain present for at least 6 months duration, is a common disorder among gynecologic populations, accounting for up to 10% of referrals, 20% of hysterectomies, and 40% of laparoscopies annually [1]. While most pelvic pain conditions are treated medically or with other non-surgical interventions (e.g. physical therapy, psychotherapy), there are several conditions which can be treated successfully with surgery. The decision to perform surgery for pain should be made only after a thorough history and physical exam, and extensive counseling of the patient. Success of a surgical treatment is most likely when a firm diagnosis is made prior to surgery. When able, a minimally-invasive approach should be employed, so as to decrease the risk of post-operative pain (or a new chronic pelvic pain) by lowering the risk of complications, decreasing incision size, diminishing physiologic impact, and allowing the patient to return to normal activities quickly. Outlined below are several chronic pelvic pain conditions which have surgical treatment options. Included in each discussion are the indications, effectiveness rates, and cautions for each surgical approach.

2. METHODS

A systematic review of PubMed, EMBASE, and Web of Science databases was performed between the years of 1995-2016. Search included the following search words or phrases: pelvic pain, minimally invasive surgery, laparoscopy, female, endometriosis, pelvic adhesions. Titles and abstracts were reviewed by the primary author. Papers were included if the material was applicable to the review and published in English. The reference list of each included paper was then also reviewed for additional source material.

3. DIAGNOSTIC LAPAROSCOPY

One of the most common procedures performed for chronic pelvic pain in females is a diagnostic laparoscopy. It is estimated that 40% of all laparoscopies are done for CPP, and it is very likely that this number has increased since publication [1]. The technique itself has advanced considerably over the last three decades, with the aid of improved endoscopic technology, and the adoption of laparoscopy by almost all gynecologic practitioners.

The diagnostic laparoscopy is appealing for several reasons. Firstly, it allows the practitioner to actually visualize the area of pain (beyond the limitations of pelvic imaging with ultrasound or MRI) with the goal of identifying the source of pain. Secondly, it also allows the practitioner to then possibly treat any disease found at the same time,
changing the surgery from diagnostic to operative with minimal increased risk. Thirdly, for many patients, the laparoscopy is comforting in that it can “rule out” serious diagnoses, such as malignancy or tumor, and they can move on with less invasive treatment options. And lastly, the diagnostic laparoscopy, when compared with other surgical modalities, is fairly low risk. It is usually performed in an outpatient setting, with as few as one operative (trocar) site, usually 5-10mm in diameter, and an overall low risk of complication. In addition to complications associated with general anesthesia, the next greatest risk of diagnostic laparoscopy is associated with initial abdominal entry. That risk includes entry failure (12%), extraperitoneal insufflation (2.7%), bowel injury (0.18%), and large vessel injury (0.09%) [2].

There will be positive findings in approximately two-thirds of patients undergoing diagnostic laparoscopy for chronic pelvic pain, based on one large series: endometriosis (33%), adhesions (24%), chronic pelvic inflammatory disease (5%), and ovarian cysts (3%) [3].

Conscious pain mapping combines diagnostic laparoscopy with real-time patient feedback. It is performed under conscious sedation, with smaller trocars, absolute local anesthetics, a lower peritoneal pressure, and limited Trendelenburg [4]. The success of the procedure (defined by most studies as patient tolerance and confirmation of diagnosis of the pain source) is heavily dependent on proper patient selection and a thorough preoperative history and physical exam. Studies estimate that between 27-70% of patients’ pain improves based on findings from conscious pain mapping and the subsequent treatments [5, 6].

4. ENDOMETRIOSIS

Endometriosis is the presence of endometrial glands and stroma outside the uterus, usually diagnosed in the peritoneal cavity, on the ovary and tubes, or present in the bowel and appendix. The prevalence in women of reproductive age is approximately 10-15%, and the most common presenting symptoms are chronic pelvic pain and infertility [7]. It is estimated to be found in 70-80% of women with chronic pelvic pain [8].

Prior to surgical treatment or diagnosis, most patients undergo some form of medical therapy or suppression in the form of hormonal medications or anti-inflammatory drugs. Indications for surgical treatment include failed medical management or contraindications to medical therapy, fertility desires, negative effect on adjacent peritoneal organs (e.g. ureteral obstruction), desired definitive diagnosis, and exclusion of malignancy in a pelvic mass (e.g. endometrioma). Surgical treatment should be avoided in patients who are poor surgical candidates (based on co-morbidities), have a known underlying malignancy (refer to Gynecologic Oncology), or have had previous surgical treatments for endometriosis with no change in pain severity. Patients who are perimenopausal may consider surgical treatment, with careful balance of the risks and benefits of waiting until menopause vs surgical complications.

Minimally invasive surgical treatment options for endometriosis include conservative surgery with excision or ablation of implants while preserving the reproductive organs, laparoscopic cystectomy of an endometrioma vs. drainage and cyst wall coagulation, and definitive surgery in the form of laparoscopic hysterectomy with or without bilateral salpingo-oophorectomy. Often, the choice for one type of surgical treatment vs another is patient-dependent, and is influenced by several factors: degree of symptomatology, number of prior surgeries, severity of endometriosis, fertility desires, success of medical therapy, and co-morbid status. Success rates (defined by pain relief and/or time to reoperation) are dependent on stage of disease at time of surgery and type of surgery.

The benefits of conservative surgery (usually the first step) are less surgical risk, maintaining fertility, and acceptable efficacy for symptom control. The downside is, overtime, conservative surgery is less efficacious and most patients require a repeat procedure for recurring symptoms [9]. Laparoscopic conservative treatment of endometriosis implies either coagulation/ablation of the implants with either laser or electrosurgery, or excision of the implants. In general, deeper lesions require full ablation or excision, as compared to superficial bipolar destruction. For mild disease burden, two RCTs have shown no difference in relief of pelvic pain when comparing ablation/coagulation and excision [10, 11]. The ability to send the implant for histologic confirmation is an added benefit of excision. Ovarian endometrioma treatment involves either excision of the cyst and cyst wall vs. cyst drainage and wall coagulation. Recurrence rates are higher with the latter technique [12, 13].

Definitive surgery with laparoscopic hysterectomy is associated with improved pain control and less risk of reoperation [14]. Removal of both ovaries during hysterectomy, compared with hysterectomy alone, appears to be associated with greater pain resolution and less reoperation. However, this decision must be balanced with the risk of long-term effects of early menopause.

Adjunctive surgical treatments previously combined with laparoscopy for endometriosis for the treatment of pain, included LUNA (laparoscopic uterine nerve ablation) and PSN (presacral neurectomy). Recent large RCTs have clearly shown that LUNA is no more effective than placebo for the treatment of chronic pelvic pain, and thus it has fallen out of favor [15, 16]. PSN is still indicated for patients with midline pain, especially dysmenorrhea; however, the treatment effects are minimal, and must be weighed against a risk of chronic constipation and bladder dysfunction [17].

5. OVARIAN REMNANT SYNDROME

An ovarian remnant is the (suspected) presence of ovarian tissue in the pelvis after the patient has already undergone oophorectomy on that side. Patients are at increased risk of developing ovarian remnant syndrome if they had extensive adhesions or endometriosis involving the ovary at the time of original oophorectomy. The overall incidence is difficult to estimate given the paucity of literature on this topic, and is felt to be somewhat rare. It is most commonly diagnosed in premenopausal patients.

Patients most often present with complaints of unilateral pelvic pain, onset within the first 5 years after oophorectomy
A portion of patients will also have a pelvic mass on imaging, and patients may report an absence of climacteric symptoms, even when expected [18]. The pain can result from multiple causes: ovulation/cyst formation from a trapped ovary, stimulation of endometriosis from residual hormone production, or mass effect of the ovarian tissue on adjacent pelvic structures (e.g. ureter, bowel). The diagnosis of ovarian remnant syndrome is made using a combination of clinical suspicion, laboratory evaluation of FSH and estradiol levels, and pelvic imaging with either ultrasound or CT. The suspected ovarian tissue can be stimulated with a trial of clomiphene citrate with follow-up imaging [19].

Treatment options include medical suppression, irradiation, and surgical therapy. Indications for surgical treatment include failed treatment by the other modalities and suspicious appearance of pelvic mass, concerning for malignancy. Surgical treatment via laparoscopy allows for more complete excision of the ovarian tissue and the confirmation of histologic diagnosis. It is associated with improved relief of symptoms, compared to medical therapy [20]. This surgery is inherently complex, given the predisposing conditions that allowed for an ovarian remnant initially. Often, for full excision, retropertitoneal dissection is needed, which may involve ureterolysis and adhesiolysis/enterolysis [20]. Uncommonly, bowel resection may also be indicated [21].

Contraindications to surgical management of ovarian remnants include patients who respond well to medical therapy and those who are poor surgical candidates. Patients with symptoms related to an ovarian remnant, who are nearing menopause, may consider delaying surgery to allow for menopause-induced resolution.

6. PELVIC CONGESTION SYNDROME

Pelvic congestion syndrome is defined as dilated pelvic veins, either ovarian or internal iliac, and associated pelvic pain. The incidence has not been defined, likely due to lack of standardized diagnostic criteria. It is a disorder of premenopausal women, and there is a increased prevalence in multiparous patients [22]. Often the diagnosis is made based on a combination of clinical presentation (progressively painful menses and pelvic heaviness) and radiologically (ultrasound, CT, venography) diagnosed dilated pelvic veins [23].

Some practitioners employ a diagnostic laparoscopy to visualize the veins in the pelvis, but this is considered less sensitive than venography and is associated with surgical risk. Thus, this method is recommended only if laparoscopy is planned for other indications, and the surgeon must be mindful of the changes on venous distention from pneumoperitoneum and Trendelenburg position [23].

Options for treatment of pelvic congestion syndrome include medical management with hormonal therapies and/or anti-inflammatory medications, radiologic treatments with vein embolization or sclerotherapy, and minimally invasive surgery with laparoscopic vein ligation or hysterectomy with bilateral oophorectomy. Most practitioners advocate a trial of medical therapy before attempting a procedural treatment. Indications for surgical management include failure of medical management and completion of child-bearing, or if surgical treatment (laparoscopy, hysterectomy) is indicated for another unrelated diagnosis. Laparoscopic ovarian vein ligation is associated with resolution of pain in up to 74% of patients [24]. Hysterectomy with bilateral oophorectomy is associated with conflicting results in the literature [25]. It is still considered an option for those women who have completed child-bearing and accept the risk of early menopause, but they should be adequately counseled of the possible lack of pain control.

7. PELVIC ADHESIONS

Pelvic adhesions, typically the result of prior surgery, pelvic infection, or endometriosis, can result in chronic pelvic pain. In addition to chronic pain, they can also lead to acute-onset pain in the setting of bowel obstruction. However, the connection between chronic pelvic pain and adhesions is weakly defined. The underlying cause is felt to be an obstruction in visceral organ mobility, thus causing pain [26]. It is estimated that up to 95% of patients who have undergone surgery will develop adhesions [27].

Risk factors for pelvic adhesions include multiple prior surgeries, larger incisions, surgeries complicated by infection, and retained foreign bodies. In gynecologic patients, the most common associated presenting complaints are pelvic pain and infertility. Peritoneal inclusion cysts, often seen on ultrasound imaging, are indicative of pelvic adhesions. Other than the presence of peritoneal inclusion cysts or overt bowel obstruction on imaging, the diagnosis is suspected from clinical presentation, and then confirmed surgically. Pelvic pain that is suspected to be the result of pelvic adhesions may be a strong indication for conscious pain mapping [28].

Adhesiolysis for pelvic pain is considered to be most appropriate via laparoscopy, as opposed to a laparotomy approach. The likelihood of pain relief seems to be associated with the density of adhesions. The majority of research on adhesiolysis for pelvic pain demonstrates no effect. Two RCTs showed no differences in long-term pain improvement between patients who underwent adhesiolysis versus those who underwent diagnostic laparoscopy alone [29, 30]. However, subgroup analysis in one of the studies did show that patients with more dense adhesions had treatment effect. Thus, adhesiolysis for pelvic pain is considered a treatment that should be individualized; and with understanding that most patients do not get improvement in pain, adhesions are often not the source of pain, and adhesiolysis itself carries inherent surgical risks of visceral organ injury.

If adhesiolysis by laparoscopy is planned, due to likelihood of pelvic adhesions, an ultrasound slide-by-test is indicated as a part of pre-operative planning. An ultrasound slide-by-test is a simple, bed-side test performed by the surgeon prior to going to the OR. It involves placing an abdominal probe on the abdomen, asking the patient to take several large breaths while in supine position, and monitoring the “slide by” of the peritoneal contents under the abdominal wall [31]. Those locations with several centimeters of visceral slide are considered to be safer for laparoscopic entry.
8. POST-ABLATIVE TUBAL STERILIZATION SYNDROME (PATSS)

PATSS is defined as pelvic pain onset after endometrial ablation, most commonly in patients who have also undergone tubal sterilization. It typically presents as progressive cyclic pelvic pain, noncyclic pain, and dyspareunia. Often these patients have no or very little menstrual bleeding. The etiology is felt to be extensive intra-uterine scarring which traps menstrual endometrium, allowing no exit through either tube or cervix. Studies have demonstrated in these patients dilated hematosalpinges, cornual or central hematomata, and normal appearing gynecologic anatomy [32]. It is estimated that 20-25% of patients who have undergone endometrial ablation will develop PATSS [33, 34].

Depending on the location of the trapped menstrual endometrium, multiple treatment options have been proposed. Hormonal suppression of menses has been effective in a small subset of patients [34]. Surgical treatments include hysterectomy (which is the definitive treatment), salpingectomy, and repeat hysteroscopy with either repeat ablation or lysis of intra-uterine synechiae. To date, there are no studies comparing the three surgical treatments. Salpingectomy is effective if the majority of trapped menstrual endometrium involves the fallopian tubes [32]. Reoperative hysteroscopy for central hematomata with lysis of adhesions has been associated with high patient satisfaction and 80% reporting continued resolution of pain at 18 months of follow up [35].

The patients who are most likely to fail conservative management are those who were at increased risk of endometrial ablation failure initially: age <40, presence of adenomyosis, concomitant endometriosis, history of dysmenorrhea, and multiparity [34, 36]. Repeat hysteroscopy is associated with increased risk of uterine perforation and incomplete treatment effect, and should be reserved for those surgeons who are adept at operative hysteroscopy.

9. UTERINE RETROVERSION

A retroverted or retroflexed (posteriorly tilted) uterus is a normal variant of female anatomy and occurs in approximately 30% of women. However, in some patients it has been shown to increase the risk of pelvic pain. In a population study, it was found that women with a retroverted uterus had significantly higher percentage of dysmenorrhea and dyspareunia compared to their anteverted counterparts [37]. Some authors have speculated that the pain is possibly due to pressure of the uterus on the sacrum/rectum, direct contact of the fundus during intercourse, extra ligamentous stretch of the parametrium, congestion of the pelvic veins, and inability of the menstrual flow to exit easily [38].

The surgical treatment for this condition involves “suspending” the uterus into a more neutral or mid-position. There are several laparoscopic techniques that have been described. One involves suturing the midpoint of the round ligament to the anterior abdominal wall with a delayed absorbable suture [39]. Another involves plicating the round ligament, from the cornua to the side wall, with a permanent suture and attaching it also to the anterior abdominal wall [40].

There are very few studies evaluating the effectiveness of this surgery for pain. Most of the data is from observational studies, with one trial contributing. In that trial, up to 87% of patients may experience relief of their pain symptoms with uterine suspension; however, there was no long-term follow up data given [41]. In one observational study, there was long-term follow up reported, with most patients reporting pain improvement, less so in those with concomitant endometriosis [39]. Most authors recommend a careful approach in offering this treatment option to patients because data on efficacy is limited, and most patients with a retroverted uterus do not have pain.

CONCLUSION

Though chronic pelvic pain is a diagnosis with multiple contributors and a large differential, it can be treated surgically in many situations. Most surgeons initially employ a diagnostic laparoscopy to aid in diagnosis of endometriosis, adhesions, hernia, and pelvic congestion. A diagnostic laparoscopy can then be converted into an operative laparoscopy to treat the condition found. There are well-defined minimally invasive surgical treatment options for each chronic pelvic pain condition reviewed. Surgical excision has been found to be effective for treating pain associated with endometriosis, ovarian remnants, and pelvic adhesions. Hysterectomy (via laparoscopic approach) is the definitive treatment for pelvic congestion syndrome and post-ablation tubal sterilization syndrome. Laparoscopic uterine suspension can be effective in treating pain related to a retroverted uterus.

While many of the studies quoted here demonstrate significant improvements in pelvic pain with a surgical approach, more data is needed. There are limitations of available literature, both in level of evidence and quantity. Most studies are confounded by the multifactorial nature of chronic pelvic pain.

LIST OF ABBREVIATIONS

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<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tr>
<td>CPP</td>
<td>Chronic pelvic pain</td>
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<td>RCT</td>
<td>Randomized controlled trial</td>
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<td>LUNA</td>
<td>Laparoscopic uterine nerve ablation</td>
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<td>PSN</td>
<td>Presacral neurectomy</td>
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<td>FHS</td>
<td>Follicle stimulating hormone</td>
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<td>CT</td>
<td>Computed tomography</td>
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<td>OR</td>
<td>Operating room</td>
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<td>PATSS</td>
<td>Post-ablative tubal sterilization syndrome</td>
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CONSENT FOR PUBLICATION

Not applicable.

CONFLICT OF INTEREST

The author declares no conflict of interest, financial or otherwise.

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REFERENCES


