Summary of Surgical Treatment for Chronic Pelvic Pain

The source of chronic pelvic pain may be reproductive organ, urological, musculoskeletal - neurological, gastrointestinal, or myofascial. A psychological component almost always is a factor whether as an antecedent event or presenting as depression as result of the pain.

Surgical interventions for chronic pelvic pain include: 1) resection or vaporization of vulvar/vestibular tissue for HPV induced or chronic vulvodynia/vestibulitis; 2) cervical dilation for cervix stenosis; 3) hysteroscopic resection for intracavitary or submucous myomas or intracavitary polyps; 4) myomectomy or myolysis for symptomatic intramural, subserosal or pedunculated myomas; 5) adhesiolysis for peritubular and periovarian adhesions, and enterolysis for bowel adhesions, adhesiolysis for all thick adhesions in areas of pain as well as thin adhesions affecting critical structures such as ovaries and tubes; 6) salpingectomy or neosalpingostomy for symptomatic hydrosalpinx; 7) ovarian treatment for symptomatic ovarian pain; 8) uterosacral nerve vaporization for dysmenorrhea; 9) presacral neurectomy for disabling central pain primarily of uterine but also of bladder origin; 10) resection of endometriosis from all surfaces including removal from bladder and bowel as well as from the rectovaginal septal space. Complete resection of all disease in a debulking operation is essential; 11) appendectomy for symptoms of chronic appendicitis, and chronic right lower quadrant pain; 12) uterine suspension for symptoms of collision dyspareunia, pelvic congestion, severe dysmenorrhea, cul-de-sac endometriosis; 13) repair of all hernia defects whether inguinal, femoral, spigelian, ventral or incisional; 14) hysterectomy if relief has not been achieved by organ preserving surgery such as resection of all endometriosis and presacral neurectomy, or the central pain continues to be disabling. Before such a radical step is taken, MRI of the uterus to confirm presence of adenomyosis may be helpful; 15) trigger point injection therapy for myofascial pain and dysfunction in pelvic and abdominal muscles.

With application of all currently available laparoscopic modalities, 80% of women with chronic pelvic pain will report a decrease of pain to tolerable levels, a significant average reduction which is maintained in 3 year follow up.

Individual factors contributing to pain cannot be determined, although the frequency of endometriosis dictates that its complete treatment be attempted. The beneficial effect of uterosacral nerve ablation may be as much due to treatment of occult endometriosis in the uterosacral ligaments as to transection of the nerve fibers themselves. The benefit of the presacral neurectomy appears to be definite but strictly limited to midline pain. Appendectomy, herniorraphy, and even hysterectomy are all appropriate therapies for patients with chronic pelvic pain.

Even with all laparoscopic procedures employed, fully 20% of patients experience unsatisfactory results. In addition, these patients are often depressed. Whether the pain contributes to the depression or the depression to the pain is irrelevant to them. Selected referrals to an integrated pain center with psychologic assistance together with judicious prescription of antidepressant drugs will likely benefit both women who respond to surgical intervention and those who do not.

A maximum surgical effort must be expended to resect all endometriosis, restore normal pelvic anatomy, resect nerve fibers, and treat surgically accessible disease. In addition, it is important to provide patients with chronic pelvic pain sufficient psychologic support to overcome the effects of the condition, and to assist them with underlying psychologic disorders.

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Introduction

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In a review of 500 patients treated between 1990 and 1996, who presented with chronic pelvic pain, 70% were found to have reproductive organ disease, 8% musculoskeletal - neurological, 7% myofascial, 5% urologic, and 10% gastrointestinal. Psychological issues were present in 80% of these patients, 25% of whom had antecedent events and the remainder of whom were experiencing depression as result of the pain. Fifty six percent of the total patient population were found to have endometriosis and 14% other gynecologic pathology. Thus 30-40% of patients who present with chronic pelvic pain will be diagnosed by careful history and physical to have disease that is not of reproductive organ source and appropriate studies and consultation will result in treatment of approximately 30% of patients with chronic pelvic pain without resorting to laparoscopic surgery.

In order to properly plan surgical intervention an appropriate diagnosis must be made by careful history and physical. Sources of chronic pelvic pain in the REPRODUCTIVE ORGANS include dysmenorrhea, infection, cysts, myomas, polyps, structural abnormalities, prior surgeries, endometriosis/endosalpingiosis, adenomyosis, and pelvic congestion.

Dysmenorrhea may be primary or secondary. Infectious sources of reproductive organ pain include vestibulitis/vulvodynia, vaginitis, cervicitis, endometritis, salpingitis, oophoritis, and post infection adhesions. Primary cystic structures includes ovarian cysts and hydrosalpinx. Myomas may be pedunculated, subserosal, intramural, submucosal, or intracavitary. Polyps may be intracavitary or cervical. Structural problems include cervical stenosis, uterine retroflexion, uterine retroversion, collision dyspareunia, and pelvic congestion. Prior surgery results in adhesions and scar formation. Endometriosis occurs in the vagina, cervix, uterus, serosa, uterosacral ligaments, ovary or tubes, peritoneum, bladder, and bowel as well as other more distant sites.

Proper surgical therapy requires a proper diagnosis. Errors in diagnosis result from the presumption that the source of chronic pelvic pain is GYNECOLOGICAL/REPRODUCTIVE ORGAN when in fact it is arising from one of the other five categories. To effect a proper diagnosis the clinician must consider at minimum in the GASTROINTESTINAL system: irritable bowel syndrome, inflammatory bowel disease, diverticular disease, chronic appendicitis, adhesions, and endometriosis of the bowel; in the UROLOGIC SYSTEM: urethral syndrome, trigonitis, interstitial cystitis, stones, peritoneal scars from previous surgery or infection, peritoneal endometriosis overlying the urological system, and bladder endometriosis; in the MYOFASCIAL SYSTEM: hernias - incisional, inguinal, femoral, ventral or spigelian; fasciitis, scar formation, fascial tears, and myofascial dysfunction including trigger points of the obturator internus, iliopsoas, levator ani, piriformis, quadratus lumbaricus, and adductor muscle group; SKELETAL DISORDERS: scoliosis, degenerative disk disease, pelvic trauma, osteitis, spondylolisthesis, spondylosis, coccydynia, as well as structural disorders such as short leg syndrome and skeletal abnormalities from previous hip, knee, leg, and back surgery; PSYCHOLOGICAL DISORDERS: depression, somatization, and panic attacks.

Only with an accurate diagnosis can surgical therapy be appropriately planned. Therefore a complete history and physical spans all of the systems which are sources of chronic pelvic pain and involves diagnostic skills from the specialties which deal with these individual disorders. The most common flaws in diagnosis result from too narrow a view of the pelvis resulting in reproductive organ "tunnel vision." The muscles, ligaments, tendons, fascia, and bony portions of the pelvis are examined before performing the routine bimanual examination for reproductive organ pathology. The lower abdomen and pelvis is examined for hernias, trigger points, osteitis pubis, and fasciitis. The back must be examined for scoliosis and leg lengths measured to ensure skeletal structural problems do not exist.

Vulvodynia and vestibulitis is evaluated by history, physical, colposcopy and biopsies, especially to rule of human papilloma virus. Dyspareunia may result from these conditions but can also result from trigger points of the obturator internus, levator ani and adductor muscle groups. Right lower quadrant pain may result from ovarian or peritoneal endometriosis or scarring and adhesions, but also may be the result of inguinal or femoral hernia, iliopsoas trigger points, or chronic appendicitis.

If there is doubt whether the appendix or a hernia is involved and surgery is planned for cases of pain which involve the right lower quadrant, the patient should be consented for the appropriate therapy depending on the findings at laparoscopy so that the surgeon has the opportunity to treat the condition that is found.

Surgical Intervention

Surgical interventions for chronic pelvic pain include: 1) resection or vaporization of vulvar/vestibular tissue for HPV induced or chronic vulvodynia/vestibulitis; 2) trigger point injection therapy for myofascial pain in pelvic and abdominal muscles; 3) cervical dilation for cervix stenosis; 4) hysteroscopic resection for intracavitary or submucous myomas or intracavitary polyps; 5) myomectomy or myolysis for symptomatic intramural, subserosal or pedunculated myomas; 6) adhesiolysis for peritubular and periovarian adhesions, enterolysis for bowel adhesions, adhesiolysis for all thick adhesions in areas of pain as well as thin adhesions affecting critical structures such as ovaries and tubes; 7) salpingectomy or neosalpingostomy for symptomatic hydrosalpinx; 8) ovarian treatment for symptomatic ovarian pain; 9) uterosacral nerve vaporization for dysmenorrhea; 10) presacral neurectomy for disabling central pain primarily of uterine but also of bladder origin; 11) resection of endometriosis from all surfaces including removal from bladder and bowel as well as from the rectovaginal septal space - complete resection of all disease in a debulking operation is essential; 12) appendectomy for symptoms of chronic appendicitis, and chronic right lower quadrant pain; 13) uterine suspension for symptoms of collision dyspareunia, pelvic congestion, severe dysmenorrhea, cul-de-sac endometriosis; 14) repair of all hernia defects whether inguinal, femoral, spigelian, ventral or incisional; 15) hysterectomy if relief has not been achieved by organ preserving surgery such as resection of all endometriosis and presacral neurectomy, or the central pain continues to be disabling - before such a radical step is taken, MRI of the uterus to confirm presence of adenomyosis may be helpful.

If the clinician restricts surgical intervention and avoids operating on individuals whose pain is derived from sources not amenable to surgery, pain can be reduced from an average of 8.4 on a scale of 0 to 10, where 10 is the worst pain the patient has experienced, to an average of 2.2 at three years. When a patient fails a complete surgical therapeutic intervention, the first step for the surgeon is to review all other possible sources of pain from the gastrointestinal, myofascial, musculoskeletal, neurologic, and urologic systems, while continuing to treat the depression the patient will be experiencing from failed therapy and from the chronic pain that she is experiencing. Somatization should not be a presumed diagnosis until all other sources of pain have been evaluated.

If the clinician is unable to arrive at a proper diagnosis, patient assisted or conscious laparoscopy is of great benefit. With the patient conscious and interactive with the surgeon, laparoscopy can be performed and physical examination repeated with a clear view of the inner and outer surfaces, muscles and organs and the source of pain delineated by stimulus - response techniques.

Effectiveness of Surgical Interventions

1. Partial vulvectomy and vestibulectomy for chronic vulvodynia and vestibulitis. Treatment of the vulva and vestibule by laser vaporization or resection is a last resort after all attempts at medical therapy have failed to resolve chronic pain in this area. The technique involves excision of all clinically involved tissues as identified by pain mapping followed by reconstruction of the excised area. If laser is used it is frequently possible to vaporize affected superficial layers, thereby avoiding disfigurement. Successful outcomes by surgical therapy for vulvodynia/vestibulitis ranges from 50-80%. Surgical intervention is most appropriate when a biopsy or viral culture of human papilloma virus is present, but should be employed if medical and physical therapy regimens have failed to provide relief and spontaneous regression has not occurred over a period of six months to one year.

Vulvar pain is characterized by introital dyspareunia, painful erythema and tenderness with gentle palpation. Vulvar vestibulitis can be treated successfully (with perineoplasty) in 60-90% of cases. This involves removing the vulvar vestibule and advancing the vaginal mucosa to cover the defect. For surface pain characterized by hypervascularity, the flashlamp excited dye laser at 585 nanometers results in a 60% complete response and 30% partial response. For deep pain which involves the Bartholin gland fossa, gland removal plus FEDL treatment results in 80% response rate. Persistent deep pain after Bartholin gland removal is usually levator ani fibromyalgia which can be treated with myofascial release and trigger point therapy. Prior to excision of the Bartholin gland for presumed involvement in deep vulvar pain, trigger point injection and myofascial release in the affected pelvic muscles should be attempted. The patient is examined for trigger points in the levator ani, obturator internus, piriformis and adductor muscle groups.

2. Trigger point injection and physical therapy. Trigger point injections are appropriate for myofascial pain with presence of a tender point, muscle twitch reaction with palpation of the trigger point, and presence of a thickened band-like structure in the muscle tissue. Injection of the trigger point with a dry needle or 1-10ml of 1% Lidocaine brings immediate relief. Repeat treatments may be necessary. Physical therapy techniques of soft tissue mobilization, spray and stretch, contraction/relaxation, reciprocal inhibition, and post isometric relaxation are also helpful. In cases of superficial dyspareunia trigger points should be sought in the deep transverse perineal, obturator internus, levator ani, and adductor muscle groups. In cases of deep dyspareunia, trigger points should be sought in the levator ani, obturator internus, piriformis and iliacus-psoas muscle groups. For pelvic pain expressing itself in the right and left lower quadrants, trigger points are sought in the rectus abdominus, external and internal obliques, iliacus, psoas, and quadratus lumbaricus. For central low pelvic pain, trigger points are sought in the rectus abdominus and pyramidalis. A careful internal exam of the fascial attachments to the pubic bone and all myofascial structures of the pelvis is conducted. A careful examination of the muscle, fascia, and bony structures of the pelvis for trigger points for myofascial pain and dysfunction prior to conducting physical examination of the reproductive organs is essential. Biofeedback assisted pelvic floor rehabilitation exercises for 16 weeks decreased subjective reports of pain by 83%, an improvement that was maintained for the entire six month follow up. Physical therapy treatment for myofascial pain will resolve 20-30% of cases without any other intervention.

3. Hernia repair. Patients with pelvic pain may have a hernia. To diagnose a hernia the patient must be examined in a standing position after she has been on her feet for a prolonged period of time. Hernia repair may be performed laparoscopically or by open procedures.

Spigelian hernias are spontaneous lateral ventral hernias and consist of a protrusion through the transverse abdominal aponeurosis lateral to the edge of the rectus muscle but medial to the Spigelian line. The Spigelian line is the point of transition of the transverse abdominal muscle to its aponeurotic tendon. This fascia begins at the level of the ninth costal cartilage and extends to

the pubic tubercle. Most Spigelian hernias tend to occur just below the umbilicus. It is possible to diagnose and repair this hernia surgically through laparoscopy.

Inguinal, incisional and ventral hernia repairs may require the placement of mesh either laparoscopically or by open technique. Femoral hernias may require open technique. Hernias are repaired by reduction and excision of the herniated peritoneal sac and closure of the fascial defect by suture or mesh technique. It is also acceptable for certain hernias to leave the peritoneal sac and obstruct the hernia with a plug of mesh. The objective of proper hernia repair is to reestablish proper anatomical relationships and strengthen the fascial covering. To be repaired hernias must be anticipated and recognized and proper techniques for their repair learned.

Sciatic hernia was found in 1.8% of 1100 patients who required laparoscopic surgery for chronic pelvic pain in one series.

Abdominal wall hernias include umbilical, inguinal, femoral, epigastric, spigelian, ventral and incisional hernias. A hernia can result in incarceration or strangulation of intestinal contents. Patients with abdominal wall hernias can present with symptoms even if no abdominal mass is detected.

Incisional hernias are usually iatrogenic and can occur in any abdominal incision. Transverse incisions are associated with a lower incidence of incisional hernias than are vertical incisions. Incisional hernias can occur after laparoscopic surgery especially at trocar sites 10mm or larger. To prevent hernias at laparoscopy use mass closure techniques.

4. Vaginal vault hernias. Hernias that occur due to breaks in the vaginal fascia result in cystoceles, enteroceles and rectoceles.

Cystocele, rectocele and enterocele can cause lower abdominal or perineal pain in women. This pain is usually not severe and will usually respond to surgery. Cystocele can be repaired by the technique of paravaginal repair as performed laparoscopically by Liu. Central defects can be repaired by reattaching the pubocervical to the rectovaginal fascia at the vaginal apex as taught by Saye and Richardson. The posterior repair is best performed vaginally according to the principles of Richardson.

Vaginal vault prolapse can be corrected laparoscopically by high McColl procedure or by the Richardson/Saye procedure. The pubocervical fascia is reattached to the rectovaginal fascia at the apex of the vagina and this fascia reattached on each side to the plicated sacral segment of the uterosacral ligament which has been plicated. The goal of the paravaginal repair for correction of a cystocele is to reattach the paracervical fascia to the arcus tendineus fascia pelvis as well as to the fascial overlying the obturator internis muscle. Paravaginal repair is accomplished by suturing the arcus tendineus fascia pelvis to the paravaginal fascia thus reestablishing the integrity of the lateral fascia support of the lateral wall of the vaginal tube to the levator ani and obturator internus.

The repair of a rectocele is best accomplished by a vaginal approach with the objective to reestablish the integrity of the rectovaginal fascia. The rectovaginal fascia is reattached to the pubocervical fascia and then reattached to the fascia of the perineal body. This is accomplished by repairing the transverse and longitudinal breaks in the rectovaginal fascia.

5. Uterine stabilization, repositioning and suspension procedures and cervical dilation for cervical stenosis. Uterine suspension is used for pelvic congestion syndrome, collision dyspareunia, severe disabling dysmenorrhea, and after extensive surgery in the cul-de-sac resulting in raw surfaces. The objective of the uterine suspension is to position and stabilize the uterus in a

neutral position correcting the retroversion. The uterus is then in a position to more easily discharge its contents at menses. Venous drainage is promoted and congestion does not occur, and the cervix is no longer rotated about the uterosacral ligaments when struck during intercourse, instead the cervix and uterus move as a unit along a normal physiologic arc. Patients who experience severe cramping for one or two days prior to the beginning of the discharge of menstrual blood frequently have a retroverted uterus. As the uterus fills with menstrual blood because of its retroverted position, it must cramp the blood upward to discharge it through the cervix. This process results in the filling of the uterus with menstrual blood until severe cramping can occur to discharge the excess fluid. A uterus which is in a neutral position or anteverted is assisted by gravity in the process of menstrual discharge.

A simplified procedure for uterine suspension under laparoscopic visualization is to use a needle-point suture passer of 2mm diameter to pass permanent suture subcutaneously through a tiny skin incision near the exit point of the round ligament through the inguinal canal. The suture is then passed through the fascia and within the peritoneum surrounding the round ligament and into the round ligament itself at an exit point created near the uterus. The second pass of the instrument creates a fascial bridge and allows the suture to be retrieved again along and in the round ligament so that the tying of the ligature shortens, thickens, and strengthens the round ligament and supports the uterus in a more neutral position. The term uterine stabilization and repositioning operation is an accurate description because the round ligaments position and stabilize the uterus while the cardinal and uterosacral ligaments are the primary support/suspension structures. A stenotic cervix will also result in severe dysmenorrhea because of the outflow obstruction to the menstrual flow. Uterine suspension and cervical dilation assist with easing the passage of the menstrual flow. Dilation of a stenotic cervix contributing to central dysmenorrhea is easily accomplished by placement of laminaria prior to mechanical dilation.

6. Resection of intracavitary and submucous myomas and intracavitary polyps. Intrauterine structures such as intracavitary and submucous myomas and intracavitary polyps are a source of significant pain of a cramping nature throughout the cycle. Hysteroscopic resection of polyps can be performed by resectoscope or simple mechanical retrieval with polyp or ring forceps. Intracavitary myomas can be removed by resectoscopic or mechanical means by use of ring forceps. Submucous myomas usually require resectoscopic approach after preparation and shrinkage with GnRH agonists. Take care to avoid the complications of perforation, hemorrhage, and hyponatraemic encephalopathy. For myomas greater than two centimeters, the use of intraoperative ultrasound guidance provides the surgeon with an increased margin of safety as the procedure is being performed.

7. Laparoscopic uterosacral nerve ablation (LUNA). The uterosacral ligaments carry many of the afferent sensory nerve fibers to the lower parts of the uterus by way of the Lee-Frankenhauer plexus, which lies in and around the uterosacral ligaments as they insert into the posterior aspect of the cervix. The destruction of these sensory nerve fibers provides pain relief for a period of three months for 80% of patients, and 12 months for 50%. The division of these ligaments relieved pain in several studies.

The efficacy of laparoscopic laser uterine nerve ablation (LUNA) for dysmenorrhea was demonstrated in a series of 14 women with dysmenorrhea and menorrhagia who had the procedure combined with transcervical resection of the endometrium. At 16- to 18-month follow-up, 93% of patients reported light or absent menses and improvement or absence of pain. Laparoscopic laser treatment of endometriosis with the Nd:YAG sapphire probe combined with LUNA was also effective in reducing or eliminating pain in 80% of patients. Conservative resection of the uterosacral nerves was carried out in 15 women with a history of endometriosis and recurrent pelvic pain, whether or not involvement of the ligaments was suspected; 80% of the patients also underwent presacral neurectomy. Histologic evaluation disclosed involvement of endometriosis in the uterosacral nerves in 54% of patients. Dysmenorrhea was relieved in 80% of patients, but in the subset who had histologic endometriosis of the uterosacral ligaments, all had

relief of symptoms. Finally, destruction of endometriosis by electrocoagulation was effective in the management of chronic pelvic pain.

LUNA is an appropriate procedure for dysmenorrhea and central uterine pain. Central pain which is also associated with nodularity and tenderness of the uterosacral ligaments requires resection of the uterosacral nerves because of the frequent finding of endometriosis impregnating the uterosacral ligament. Resection and treatment of the uterosacral nerves may be more effective if accompanied by treatment of the connective fiber tissues bridging the posterior aspect of the cervix and lower isthmic region where the nerve fibers coalesce. This creates an arch of ablated nerve tissue from left uterosacral ligament across the posterior cervical attachment and progressing down along the right uterosacral ligament. If endometriosis is suspected the excision of tissue is preferable to ablation for histologic confirmation of the presence of the disease. The LUNA, in skilled hands, is a safe procedure. In less experienced hands it can result in perforation of uterine vessels and injury to the ureter. It is not as efficacious as presacral neurectomy for central pain.

8. Presacral neurectomy. For patients with severe disabling central dysmenorrhea and central pain, presacral neurectomy is an effective procedure. Significant constipation and urinary retention can occur following presacral neurectomy. As the operative field is in close proximity to the aortic bifurcation, left common iliac vein, right common iliac artery, inferior mesentery artery, superior hemorrhoidal vessels, uterosacral vein and artery, and right ureter, the opportunity for significant complications is anatomically present. The success rate for treatment of central dysmenorrhea and pelvic pain approximates 80% at one year, a significant improvement over the uterosacral nerve ablation procedure.

The presacral neurectomy is performed by elevating and incising the peritoneum overlying the sacral promontory one cm caudad to the aortic bifurcation. The underlying adipose tissues are bluntly dissected, cauterized and cut and the nerve plexus is identified and freed from the underlying tissue and elevated, clipped or cauterized, and resected for histological evaluation. In the region near the aortic bifurcation, two or three large contiguous nerve bundles will constitute the superior hypogastric plexus. If the dissection is carried out caudad along the sacral promontory, the nerve fibers are less distinct and 12-15 individual fibers will be present, requiring complete resection of the underlying tissue with the nerve fibers to accomplish the transection of the superior hypogastric plexus. The presacral neurectomy requires more time, more skill, and carries a higher risk of significant complication than the LUNA procedure but results in a higher rate of success for the treatment of central pelvic pain. It may be offered as a follow up procedure if other therapies have failed or as a primary procedure if the surgeon has sufficient skill and the patient understands the risks involved.

In a study of 68 patients with primary dysmenorrhea and poor response to medical treatment randomized into two groups, one group of 33 patients had laparoscopic presacral neurectomy and the other group of 35 patients had laparoscopic uterine nerve ablation. There were no complications and patients left the hospital less than 24 hours after surgery. At the three month postoperative follow up, the efficacy of both surgical methods was almost equal (87.9% versus 82.9%) but the efficacy of the laparoscopic presacral neurectomy was significantly better than that of the LUNA (81.8% versus 51.4%) at the 12 month visit.

For patients with severe disabling central dysmenorrhea, presacral neurectomy was effective in a well-controlled prospective study. The effectiveness of laparoscopic presacral neurectomy in relieving pain has been demonstrated, including when the pain is due to endometriosis. However, an evaluation was undertaken of preoperative and postoperative pain assessments by patients who underwent laparoscopic ablation or excision of endometriosis, 76 of whom also underwent presacral neurectomy. Although significant improvement (by Wilcoxon signed rank test) over preoperative pain levels was found in both groups, degrees of pain relief were comparable. Presacral neurectomy has been associated with a significant improvement in both dysmenorrhea

and dyspareunia over other procedures. The procedure was performed only for women with severe dysmenorrhea or dyspareunia.

Success rates of 73% in relieving dysmenorrhea, 77% in relieving dyspareunia, and 63% in relieving other pelvic pains were achieved by presacral neurectomy in 50 patients treated for chronic pelvic pain after failing to respond to oral contraceptives and non steroidal anti-inflammatory medications. Uterosacral ligament resection did not increase the success rate over presacral neurectomy alone. A 70% mean reduction in chronic cancer related pelvic pain was achieved with neurolytic blockade of the superior hypogastric nerve plexus, confirming a role for presacral neurectomy in the treatment of pelvic pain.

9. Adhesiolysis. The goal of pelvic pain surgical intervention is 1) restoration of normal anatomy, 2) resection of abnormal tissue, and 3) prevention of recurrence of the conditions that resulted in the pain. The effect of adhesions on pain is controversial and will likely be resolved with laparoscopic pain mapping performed under local anesthesia. From early experience with the technique of Patient Assisted Laparoscopy under local anesthesia, it appears that traction even on filmy adhesions creates a sensation of significant pain and that thickened, more mature adhesions which do not cause twisting or entrapment of intra-abdominal structures such as bowel, frequently are not precursors of pain.

Adhesions overlying the ovary may result in pain at ovulation by restricting the proper growth of the follicular cyst and discharge of the oocyte. Adhesions resulting from infection or endometriosis are sources of noxious stimulation which accompanies the adhesions formation process. Adhesions which have formed or are forming in the cul-de-sac create the opportunity for pain with movement of the uterus and hold of the uterus in retroversion which can then result in increased dysmenorrhea, pelvic congestion, and collision dyspareunia. Complete excisional treatment of pelvic adhesions is recommended as part of the process of re-establishment of normal anatomy. After creation of a completely hemostatic area, the placement of Interceed™ (TC7, Johnson & Johnson Medical, Inc., Arlington, TX) will assist in decreasing recurrence of adhesions. The uterine suspension will stabilize the uterus away from the raw structures to prevent recurrence. Thick adhesions in areas where there is a report of pain should be treated by transection and resection. Thick adhesions in areas far distant to any reported pain are best left untreated unless the possibility of internal herniation or of torsion or obstruction of an organ exists. Again, pain mapping with Patient Assisted Laparoscopy under local anesthesia will assist in identifying those mature adhesions which require treatment.

Adhesions of the bowel resulting in symptoms of intermittent obstruction should be treated by highly skilled laparoscopic surgeons with the capability to repair an inadvertent bowel injury. The principle of adhesiolysis is traction and counter traction with great care taken during coagulation of vessels to avoid dissemination of electrical or heat energy to a focal point which can be injured such as bowel, ureter, or vessels.

Treatment of pelvic adhesions by laparoscopy was effective in relieving symptoms in patients with chronic pelvic pain. Cure or improvement was reported by 65% of patients whose chief complaint was chronic abdominal pain, and by 47% of those whose chief complaint was dysmenorrhea. In a similar study, 40% of patients with chronic pelvic pain or dyspareunia reported continued improvement or resolution of pain during daily activities, and of those without chronic pain syndrome, 75% were better. Another study reported that 84% of 65 patients with chronic lower abdominal pain who underwent laser laparoscopic adhesiolysis experienced symptomatic relief. In women with previous abdominal operations with significant pain, enterolysis and adhesiolysis resulted in improvement in 67%. Of 35 patients undergoing adhesiolysis for chronic abdominal pain, 18 were asymptomatic and 10 had their symptoms lessened. In a prospective study of 58 patients treated for abdominal pain with adhesiolysis, 45% had complete remission of symptoms, 35% had substantial improvement, and 20% had persistence of the complaint.

The role of adhesions in chronic pelvic pain has been questioned, however. A retrospective study comparing asymptomatic infertile patients with women with chronic pelvic pain did not reveal a significant difference in the density or location of adhesions. A randomized clinical trial on the benefits of adhesiolysis by laparotomy showed no benefit in patients with light or moderate pelvic adhesions. Patients with severe adhesions involving the intestinal tract benefited from this procedure.

10. Laparoscopic appendectomy. Appendicopathy does exist and can be the cause of chronic right lower quadrant pain. In 55 laparoscopic appendectomies performed for chronic right lower quadrant abdominal and pelvic pain the pathologic conditions included entrapping adhesions in 38, chronic appendicitis in 12, and endometriosis in 5. Forty-four of these patients had complete relief, nine satisfactory improvement, and two no relief. Sixty-three patients had appendectomy for chronic lower abdominal pain, 79% of whom had pain localized to the right lower quadrant. All of these women had had previous surgery for pain without relief, and 54% had sought psychologic intervention or pain clinic treatment to no avail. Histologically, 92% of the removed appendixes revealed abnormality, and 95% of these patients were completely cured.

Of 348 patients treated laparoscopically for generalized chronic pelvic pain, 72% reported complete or significant relief of pain for at least six months. 103 of these patients had chronic right lower quadrant pain and appendiceal abnormality was noted laparoscopically in 62 (60%). These appendixes were removed. Histology was abnormal in 30 of them (48%). After pelvic reconstructive surgery and appendectomy, 60 (97%) of 62 of these women reported complete relief of symptoms.

Visible pathology of the appendix may be less than histopathology. In 85 women undergoing laparoscopy for pelvic pain, pelvic adhesions, and endometriosis, pathology of the appendix was visible in 16.8%, and histopathologic examination revealed pathology in 42.4%. Because of the high frequency of pathology in patients with these conditions, appendectomy at the time of laparoscopy may be both a preventive and a therapeutic measure.

In these five recent reports appendectomy resulted in relief of symptoms of right lower quadrant pain. In addition, there does not appear to be a correlation between visible pathology, histopathology, and complaints of pain relieved by appendectomy. Appendectomy should be performed if right lower quadrant pain is a significant part of the patient's pain profile or if the appendix appears abnormal, that is involved in adhesions, thickened or discolored, or stiff when grasped. Appendectomy can be easily performed according to the technique first described by Semm, modified by the use of bipolar coagulation on the appendiceal artery where Semm uses needle suturing if that is the preference of the surgeon.

11. Ovarian and tubal surgery. The role of ovarian and tubal surgery for treatment of chronic pelvic pain has not been clearly delineated. Torsion and tubo-ovarian abscesses will cause pain although generally not of a chronic nature. A tubo-ovarian abscess encountered must be appropriately drained and affected nonviable tissues resected. While the presentation of these conditions is usually acute the underlying condition may be of a chronic nature, as in rupture of an endometrioma. In the case of the tubo-ovarian abscess, antibiotic treatment can frequently be followed by CT scan guided aspiration of the pus, followed by continued antibiotic therapy, allowing the tissues to recover from acute inflammatory response. Then laparoscopic excision of the affected tissues can be performed with less danger of injury and more likelihood of successful therapy with the removal of the organs localized to the infection. Hematosalpinx or hydrosalpinx may result in chronic pelvic pain and should be drained or excised. Most ovarian cysts may be removed laparoscopically.

Fifty-five benign ovarian cysts were identified in 35 patients treated laparoscopically for chronic pelvic pain. Sixteen women had bilateral polycystic ovarian disease, 12 endometriomas (4 bilateral), 5 simple cysts of the ovary, and 2 benign teratomas. Because of the chronicity of the

pain and previous attempts at surgical therapy, 13 patient elected to have the ovary on the side of the pain removed. Polycystic ovaries were treated with laser drilling. Endometriotic cysts were resected from the ovary. The ovarian bed from which the cyst was resected was treated to establish hemostasis. Adhesions overlying the ovary or tubes are treated to re-establish normal anatomy and provide free movement of the fallopian tubes and ovaries as well as unimpeded discharge of the oocyte at the time of ovulation.

12. Laparoscopic myomectomy. The role of leiomyomas in chronic pelvic pain is also unclear. An infarcting leiomyoma will result in an acute episode of pain which if ignored may produce a chronic pain picture. Intramural and subserosal myomas may create pain by compression and distortion of the vasculature as well as lower back pain from pressure. Pedunculated leiomyoma may cause pain with infarction, torsion, pressure on adjacent structures and nerves.

In a study of 100 women with chronic pelvic pain, leiomyomata were found in 11 patients, of whom seven underwent laparoscopic myomectomy. In these patients the myomas were subserosal and intramural and 2-4cm in diameter. Four of the eleven women underwent laparoscopic assisted vaginal hysterectomy, the largest uterus being 321 grams. Two of the patients also had stage II endometriosis which was treated at the time of surgery. Laparoscopic myomectomy for large myomas greater than 5cm, infarcted leiomyomas and pedunculated leiomyomas is an appropriate therapy for patients with chronic pelvic pain. At the same time, all other pelvic pathology should be excised and normal pelvic anatomy re-established. Leiomyomas are the most common pelvic masses, but they are rarely the single cause of chronic pelvic pain. Pelvic pressure may be due to large myomas, especially those compressing the bladder or the rectum. Pain can also be explained by degenerating myomas.

In women in whom myomas are symptomatic, hysterectomy has always been considered the definitive procedure. However, many women with or without reproductive plans do opt for uterine preservation. For them several surgical options may be considered. Other myomas are removed at laparotomy, laparoscopy, hysteroscopy, or destroyed by myolysis. They may be shrunk and devascularized by the use of GnRH analogs. Especially with intramural myomectomies, the risk of uterine rupture during subsequent pregnancy should be considered.

13. Hysterectomy. Hysterectomy with bilateral oophorectomy was effective in women who failed to obtain long-term relief of pain with medical therapy. These women were diagnosed with pelvic congestion syndrome, although pathology revealed that 25% had adenomyosis.

Of 99 women who underwent hysterectomy for chronic pelvic pain of at least 6 months' duration, and whose disease by symptoms and examination was confined to the uterus, 77.8% had significant improvement and 22.2% had persistent pain. For women requiring hysterectomy that cannot be performed vaginally, LAVH is preferable to TAH. Patients return to normal activity in two weeks rather than eight and their stay in the hospital is reduced 1.5 days. Patients whose pain was intractable to conservative therapies and who rated their pain as a 9 out of 10 underwent LAVH. The source of pain was primarily endometriosis and adenomyosis as well as adhesions and myomas. Six weeks after surgery pain was rated at 1.3 on average.

14. Laparoscopic treatment for endometriosis. When pain is persistent, a thorough examination is required and all potential causes of pain should be investigated. However, endometriosis often is the sole finding in women with incapacitating pelvic pain. A review of the role of laparoscopic surgery in the treatment of endometriosis concluded that laser laparoscopic cytoreduction of ectopic endometrial implants offers a reasonable degree of pain relief in mild, minimal, and moderate disease. Twelve percent of patients who suffered from recurrent disease required repeat laparoscopic surgery. The recurrences arose de novo and rarely occurred at previously treated sites unless the surgeon failed to remove deeply infiltrating disease completely in the uterosacral ligaments or the rectovaginal septum. These implants can infiltrate up to 15mm in depth. Complete surgical eradication of the disease resulted in pain relief in 81% of patients

whose pain was due to endometriosis. However, 19% experienced recurrence of new disease in five years.

Ovarian endometriomas are a source of severe chronic pain and their removal by stripping techniques or laser photovaporization of the capsule provides gratifying results in terms of relief.

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Conclusion

With application of all currently available laparoscopic modalities, 80% of women with chronic pelvic pain will report a significant reduction in pain which is maintained for up to 3 years.

Individual factors contributing to pain cannot be determined, although the frequency of endometriosis dictates that its complete treatment be attempted. The beneficial effect of uterosacral nerve ablation may be as much due to treatment of occult endometriosis in the uterosacral ligaments as to transection of the nerve fibers themselves. The benefit of the presacral neurectomy appears to be definite but strictly limited to midline pain. Appendectomy, herniorraphy, and even hysterectomy are all appropriate therapies for patients with chronic pelvic pain.

Even with all laparoscopic procedures employed, fully 20% of patients experience unsatisfactory results. In addition, these patients are often depressed. Whether the pain contributes to the depression or the depression to the pain is irrelevant to them. Selected referrals to an integrated pain center with psychologic assistance together with judicious prescription of antidepressant drugs will likely benefit both women who respond to surgical intervention and those who do not.

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Recommendation

A maximum surgical effort must be expended to resect all endometriosis, restore normal pelvic anatomy, resect nerve fibers, and treat surgically accessible disease. In addition, it is important to provide patients with chronic pelvic pain sufficient psychologic support to overcome the effects of the condition, and to assist them with underlying psychologic disorders.

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