



HELICA* - A Revolutionary New Surgical Treatment for Early Stage Endometriosis

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ABSTRACT

Endometriosis can effect up to 10% of women in the reproductive age group and up to 35% of infertile women.^{1, 2} A novel and revolutionary new treatment now exists for laparoscopic treatment of early stage endometriosis - the Helica Thermal Coagulator. The Helica is safer, more thorough, easier to use, and less expensive than any current laparoscopic modality

available.

INTRODUCTION

Endometriosis has been described since the eighteen hundreds. It may be defined as the condition in which endometrial tissue is found in various extrauterine locations. The most common locations are the ovaries, uterine ligaments (round, broad, uterosacral and pelvic peritoneum) and bowel.^{3, 13} Endometriosis at laparoscopy is found two to three times more often (approximately 35%, more often) in infertility patients than in the normal population.²

Sampson's paper in 1927 "Peritoneal Endometriosis Due to Menstrual Dissemination of Endometrial Tissue Into the Peritoneal Cavity" introduced the term endometriosis. Sampson established the most prevalent theory of development of endometriosis being retrograde flow of endometrial tissue through the fallopian tubes during menstruation.¹

Endometrial lesions can vary in appearance from "typical" powder bum lesions to very "subtle" lesions such as blebs.^{5, 14} A significant finding by Dr. Dan Martin was that microscopic endometriosis was present in normal appearing peritoneum in a high percentage of patients.^{6, 10, 15}

Symptoms of endometriosis are pelvic pain, dysmenorrhea, dyspareunia, dyschezia (pain with defecation) and infertility.^{5, 6} The pain of endometriosis appears to be inversely proportional to the amount of disease found by laparoseopy.³

Pre and post surgical treatment of endometriosis has varied from actual pregnancy to pseudopregnancy with continuous hormonal therapy, progestational agents, birth control pills, danazol and lupron.

Surgical treatment has consisted of excision or ablation with either electrocautery or carbon dioxide laser. These treatments can be very time-consuming, have a high failure rate and can be expensive.

The American Fertility Society Revised Classification of Endometriosis is the currently accepted method for staging endometriosis with stages varying from Stage I (minimal) to Stage IV (severe).⁴

FRONTIERS OF THERAPY

Maurice Howieson, an engineer in Edinburgh, Scotland, developed the Helica Thermal Coagulator with the specific task of solving problems associated with soft tissue coagulation.

The Helica works by combining low-pressure helium gas with low AC electrical power (approximately 4-6 watts) which passes along a single insulated probe.¹² It is used in a non-touch method approximately 3-5 mm away from the tissue.¹⁰ Coagulation is activated at this distance and a temperature of 800 degrees centigrade is achieved. Because the coagulation is in a helium environment there is no smoke, no carbonization and decreased scanning. By using low wattage, tissue coagulation is limited to one millimeter. Depth and width of coagulation in different power settings and distances from tissue has been performed.^{7, 8, 11, 12} All studies performed showed a very controlled depth of coagulation with little chance of damage to the surrounding tissue.^{9, 10} As with any laparoscopic technique

(coagulation or laser) damage can occur if the beam is held in one area for a long period of time. In an in vitro comparison of helium thermal coagulation and argon beam coagulation the depth of burn with the Helica at 6 watts in liver tissue was 0.43mm at 4 seconds and 0.83mm at 10 seconds. With the Helica in muscle tissue at 6 watts and 4 seconds depth of burn was 0.20mm and at 10 seconds 1.03mm.⁸ Since a visual flame is seen through the laparoscope the area to be treated is very easily seen and controlled.

The Helica is now in use to treat endometriosis laparoscopically in Scotland in over fifty hospitals.^{7, 9, 10} There have been no untoward effects to date. The Helica Thermal Coagulator was awarded the John Logie Baird Award for Innovation in 1997, awarded a Millennium Product Award in May 1999, and obtained FDA approval in July 1999.

The Helica was first used in North America at North Florida Regional Medical Center in April of 2000. Since that time eight patients with pain have been successfully treated without side effects. The technique of treatment was learned from Scottish OB-GYNS with five years of Helica experience. The Scottish physicians treat a large area around any endometriosis that is found, sometimes including the entire cul-de-sac and peritoneum over the bladder. This procedure correlates with the studies of Dr. David Redwine who theorized the pain of endometriosis originated from the peritoneum and if one removed the entire peritoneum the pain would resolve.¹⁵ Recent studies using Patient Assisted Laparoscopy has shown that the pain associated with endometriosis extended well beyond the visible lesion.¹¹

INSTRUMENTS

The Helica machine weighs approximately twenty pounds and is smaller than a briefcase. It comes on a self-contained rolling cart. When used it only has to be plugged into AC current, the patient electronically grounded and a physician-activated foot pedal put in place. The machine is already attached to a small tank of helium, which should last approximately two hundred cases. A sterile probe is passed off and is plugged into the machine. The probe is tested against a wet 4x4. The set up time is less than three minutes. For laparoscopic cases the power is set on low and the rheostat on approximately 4-6 watts.

TECHNIQUE

Preoperatively, the patient is given 200-mg celebrex the morning of surgery with a sip of water and each morning for two mornings after surgery. This procedure has been found to decrease postoperative pain.

The patient is put to sleep under general anesthesia and placed in Allen stirrups. The bladder is drained and a manipulator is placed on the cervix. A 10-12mm trocar and sleeve is placed in the umbilicus after infiltrating with 3cc 1-% marcaine with epinephrine. Two interdyne 5mm trocars and sleeves are placed under direct visualization. After infiltration with 2cc 1-% marcaine with epinephrine approximately four finger- breadths above the symphysis pubis and four-cm lateral to the midline. This is higher than the normal location for second and third probes but allows the Helica to be kept at right angles to the tissue being treated because it is easier to use at this angle.

The Helica is placed through the second or third 5mm sleeve and all areas of endometriosis and surrounding tissue are treated. If endometriosis is found in the cul-de-sac then the entire cul-de-sac is treated. An area two to four inches is treated around the area of endometriosis. Since the beam and the tissue treated can be easily visualized a circular technique of increasing size or painting technique going up and down or sideways allows the treatment of a large area rapidly. All patients thus far have been treated in less than twenty minutes.

Once all areas are treated a 20 cc syringe is placed on the veries needle with 0.5% marcaine and the anterior cul-de-sac is sprayed with 10cc and the posterior cul-de-sac with 10cc. This process is thought to decrease the pain associated with coagulation of a large area of peritoneum.

The patients go home within one and one-half hours. There have been no

adverse side effects and all patients thus far have been pleased with the treatment and results.

RESULTS

Endometriosis is present in 30%-40% of women with the complaint of pelvic pain. Pelvic pain and infertility are the two most common complaints of patients with endometriosis⁶ and these two complaints represent a large portion of the indication for diagnostic laparoscopy. The aggressive nature of early stage endometriosis has been shown biochemically.⁵

Wheeler and Malinah found the cumulative three and five-year recurrence rates after surgery to be 13.5% and 40.3% respectively.² After seven years 56% of all treated patients had a recurrence.¹

In a report by Dr. P. Dewart from Scotland, in twenty-four patients with follow-ups of four to twenty-five months there was a 50% decrease in pain and 80% decrease in dyspareunia.⁹ In Cummings and Phillips paper from Scotland, it was reported that 60% of patients had improvement or cure after three months.¹¹ Currently no long-term studies of Helica treatment exist to determine recurrence of endometriosis and or symptoms.

The Helica Thermal Coagulator has been found to be easy to use, very fast because the results are visual and safer than coagulation or laser treatments. Areas of early endometriosis have been treated over bowel, bladder, ureter and major blood vessels without untoward effects. Since a large area of peritoneum was treated in all cases it is hoped improvement will occur in results based on patients perception of pain. A study in this regard is currently underway.

CONCLUSION

The Helica Thermal Coagulator represents a new frontier in the treatment of early endometriosis. It is easy to use, a large amount of tissue can be treated rapidly and the chance of injury to surrounding tissue is minimal. Six years of results from Scotland show good results both initially and in the short-term. Long-term studies are underway to determine the rate of recurrence of symptoms and whether a decrease in infertility occurs.

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