

## **Total Laparoscopic Hysterectomy with Harmonic Ultracision**

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## **INTRODUCTION:**

Total laparoscopic hysterectomy (TLH) has become the standard of care in the management of symptomatic uterine pathology. Considerable technical advances in this procedure has occurred during the last few years. Despite these advantages, total laparoscopic hysterectomy (TLH) has not become a part of the therapeutic options for many gynecologists. Resistance originates from the required additional technical skills, established practice patterns, and legal issues.

Today, LH is a safe and feasible technique to manage benign uterine pathology as it offers minimal postoperative discomfort, shorter hospital stay, rapid convalescence, and early return to the activities of daily living. This procedure while technically demanding relies heavily on technology and instrumentation for its performance.

The contribution of the Ultracision Harmonic ACE scalpel to this procedure cannot be under estimated as it possesses virtually all the features one would consider in the ideal electromagnetic energy form. Its use facilitates dissection, minimizes tissue trauma and has reduced blood loss, enabling TLH to become a day care procedure.

## **OPERATIVE PROCEDURE:**

Under general anesthesia, the patient is placed in modified lithotomy position and catheterization of the urinary bladder is done. The cervix is grasped with tenaculum and a simple uterine manipulator is introduced to manipulate the uterus. The 10-mm port is inserted under vision at the supraumbilical site or higher depending on the size of the uterus. Entry under vision avoids damage to major vessels directly beneath the insertion site. Two additional 5-mm ports are introduced. One 5-mm port is inserted at the right

midquadrant of the abdomen lateral to the inferior epigastric vessels and another 5-mm port at the left lower quadrant. A 5mm Harmonic ACE is used throughout for the performance of the procedure. The ultrasonic scalpel was originally devised as an instrument which could incise tissues while concomitantly achieving haemostasis; and is based on conversion of electricity into sound waves of very high frequency. Rapid motion of the ultrasonic scalpel (55,000 times /sec), disrupts hydrogen bonds in the tissues and denatures proteins to form a coagulum, which seals off blood vessels.

The major advantages of this instrument are less smoke generation than with traditional electrocautery; the ability to function as a grasper, dissector, coagulator, and cutter minimizing need for instrument exchange; no transfer of electrical energy through the patient; and minimal lateral thermal tissue injury with coagulation occurring at lower temperatures than with electrosurgery. The instrument can seal blood vessels at relatively low temperatures (less than 80° C) by a process of “coaptive coagulation,” by which formation of a protein coagulum occurs from the transfer of mechanical energy from the moving blade to the tissue protein. As described above, the harmonic shears is effective in both tissue cutting and coagulation depending on the technique used. We prefer a low power setting, relaxed grip pressure, and low tension when coagulating tissue; and a high power setting, increased grip pressure, and application of tension when cutting tissue.

The procedure begins with lysis of peritoneal adhesions if any with the LCS or Laparoscopic Coagulating Shears or the recent version of the same; the Harmonic ACE, a version which has two jaws, akin to a bipolar cautery used in electro surgery. The round ligament is first desiccated and cut; and the incision extended into the uterovesical fold of peritoneum. Desiccation is not associated with the formation of smoke or the generation

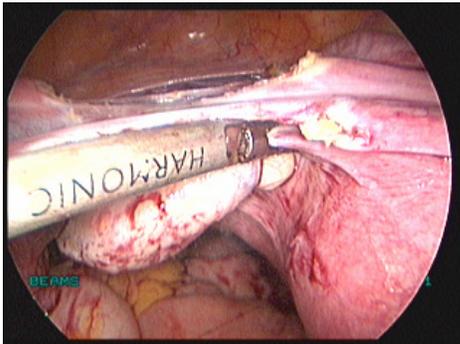
of volatile toxins and hence visualization is better compared to other forms of electromagnetic energy such as laser or electro surgery. Dissection of the uterovesical fold of peritoneum is facilitated by a phenomenon called 'cavitation', wherein tissue pressure drops at the leading edge of the instrument resulting in vaporization of intracellular water and separation of tissues. The scalpel is useful for bluntly dissecting the bladder away too since the tip is relatively cold due to minimal heat production and there is no danger of delivering current to the tissues, even accidentally. The uterine arteries are then coagulated and transected, a procedure which is safe, and associated with the saving of a considerable amount of time.

Several options for securing the pedicles were open to the laparoscopic surgeon until now, including bipolar diathermy, harmonic ultracision, vessel-sealing device, endoscopic suturing techniques, or staples. Complications such as hemorrhage, bladder injuries, and ureteric injuries are directly or indirectly related to the method of securing the vascular pedicles. We always prefer to ligate the uterine arteries in addition to the use of any form of electromagnetic energy. Minimal lateral thermal damage as evinced by minimal charring enables one to use the scalpel with impunity in the vicinity of vital structures such as the ureter. Division of uterosacral ligaments and opening of the vaginal vault with the Harmonic ACE completes the procedure. Rapid motion of the blade avoids sticking of tissue.

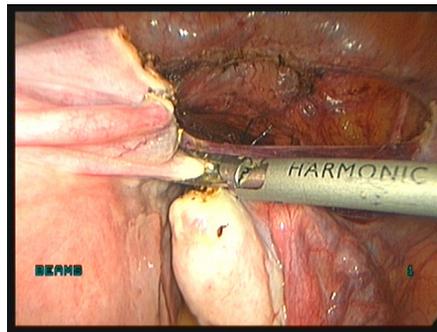
Multifunctional property of the harmonic scalpel obviates the need for accessory ports with their attendant crowding, reduces instrument changes, adds to the overall efficiency and reduces the time frame of the procedure.

A real time thermographic study done in a porcine model evaluated the vessel sealing system, bipolar electrocautery and harmonic scalpel for lateral thermal spread. Harmonic scalpel resulted in least peripheral tissue damage (0-1mm).

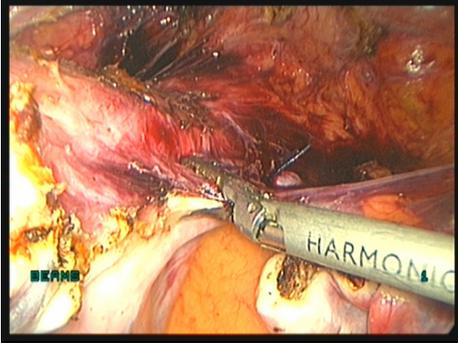
**Conclusion:** The Ultracision Harmonic scalpel is an indispensable part of the laparoscopic surgeons' armamentarium. The safety and versatility of the instrument has been adequately validated both in the field of general surgery and gynaecologic surgery. Its applications will continue to expand in the years to come, especially in fields such as the surgery of infertility and its place is assured in modern laparoscopic surgery.



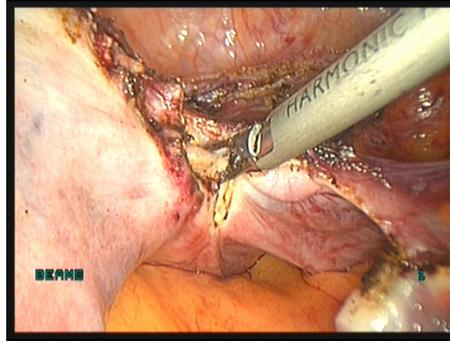
Left cornuals cut with Harmonic



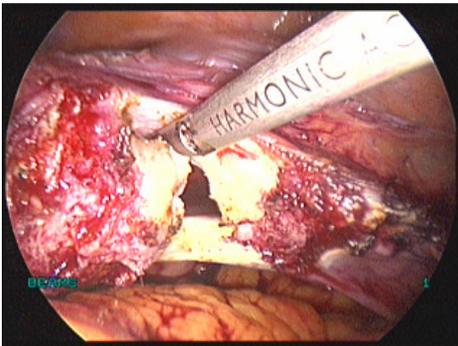
Right cornuals cut with Harmonic



Right uterine artery cut with Harmonic



Right uterosacrals cut with Harmonic



Vaginal vault opened