

### **An Improved Method for Laparoscopic Cholecystectomy Using Thermal Welding Technology**

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#### **Clinical Background**

Cholecystectomy is one of the most common surgical procedures performed. The advent of laparoscopic cholecystectomy greatly reduced the morbidity of the procedure, but has also altered the surgeon's approach to dissection of the gallbladder. When performing an open cholecystectomy, the surgeon normally begins the dissection at the dome or fundus of the gallbladder. But during a laparoscopic cholecystectomy the surgeon will usually begin dissection at the base of the gallbladder, near the triangle of Calot. This change of established technique has resulted in an increased incidence of injury to biliary anatomy. We present a laparoscopic approach to cholecystectomy facilitated by the use of Thermal Welding technology that employs the traditional method of dissection beginning at the dome of the gallbladder.

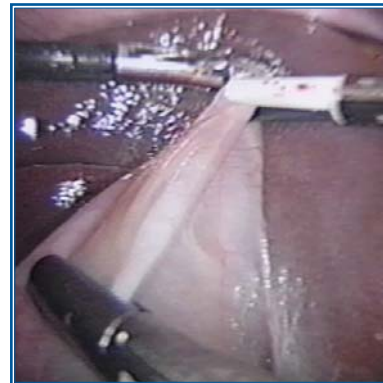
#### **Technical Background**

The Starion Thermal Ligating Shears (Starion Instruments Corp., Saratoga CA) uses an innovative technology called Thermal Welding that combines heat and pressure to simultaneously coagulate and divide tissue. Thermal Welding provides minimal collateral thermal damage to surrounding tissue while providing a hemostatic field.

#### **Laparoscopic Cholecystectomy Dome Down Technique**

Using the dome down technique, our standard port placement includes two 5mm ports in the midline area. One port is inserted near the epigastrium and the other a few centimeters below this. We use a 10mm periumbilical port for our camera site and a 5mm right upper quadrant port in order to retract the dome of the gallbladder.

The surgeon stands on the left side of the patient with the assistant on the right side. The assistant



**Figure 1.**

provides exposure by lifting the liver and grasping the peritoneum at the interface of the dome of the gallbladder and the liver. The surgeon's left hand provides counter traction by pulling downward on the gallbladder. It is important to keep proper counter traction using the surgeon's left hand, by doing this we expose the area that needs to be dissected. We begin dissection with the Thermal Ligating Shears at the very top of the gallbladder by simply incising the peritoneum with the device (Figure 1). We then score the peritoneum along both sides of the gallbladder, and then begin dissecting the gallbladder out of the liver bed. One of the major advantages of the Thermal Ligating Shears is that most of the energy is being contained within the field of the shears themselves. This results in minimal collateral damage to any tissues surrounding the gallbladder.

The main advantage of using the Starion Thermal Ligating Shears is an appropriate amount of energy, well contained within the jaws of the instrument, minimizing collateral thermal damage to gallbladder. By keeping proper counter traction, the tissue comes down easily. We slide one limb of the shears behind the peritoneum of the gallbladder (Figure 2). This allows us to take the peritoneum down in a bloodless fashion and stay in a correct plane throughout our dissection with excellent visualization. Once the gallbladder is dissected completely out of its bed, we then dissect out the neck of the gallbladder and the adjacent structures.



**Figure 2.**



Figure 3.

One of the advantages of the Dome Down technique is the ability to adequately expose the structure at the neck of the gallbladder, making the dissection both easier and safer. After the gallbladder has been dissected from its bed, we are

able to see in a 360-degree fashion around the neck of the gallbladder, which is a great advantage in proper identification of anatomy.

At the neck of the gallbladder, we clearly identify the cystic artery and cystic duct (Figure 3). Once we have adequately separated them, we are able to ligate and divide them. First, we ligate and divide the cystic artery. Then we ligate the cystic duct and divide it just distal to the ligature. The gallbladder is completely excised at this point. In order to remove the gallbladder we simply grasp the gallbladder at the neck and bring it out through the periumbilical port site. As we push the gallbladder up through the periumbilical port site, we remove the port and grasp it and then "work" it out. This leaves us with the gallbladder excised and an extraordinarily dry field (Figure 4).

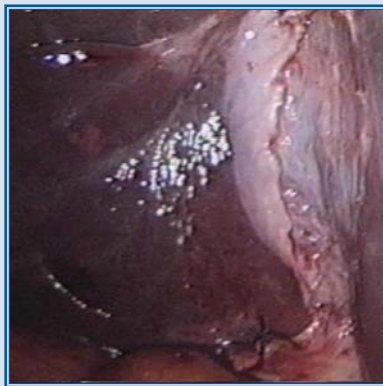


Figure 4.

### Clinical Experience

We have performed laparoscopic cholecystectomy with the traditional technique of starting at the base of the gallbladder. When using this technique, anatomical identification is sometimes difficult, especially when there is associated gross infection. The Dome Down Technique allows for clear

visualization of ductal anatomy. We have used various energy sources including electrocautery and ultrasonic energy for dissection while performing the Dome Down Technique. We now prefer Thermal Welding because of its precise delivery of contained energy.

### Conclusion

Although laparoscopic cholecystectomy is associated with much less morbidity than open cholecystectomy, it also yields a higher incidence of biliary injury. The Dome Down Technique for laparoscopic cholecystectomy mimics the open approach by starting the dissection at the dome of the gallbladder and proceeding down toward the angle of Calot. This allows for better visualization of the biliary structures as well as the cystic artery and cystic duct. The introduction of Thermal Welding Technology has allowed the Dome Down Technique to be performed in a virtually bloodless manner without inadvertent injury to the liver or entry into the lumen of the gallbladder causing bile to spill into the peritoneal cavity. With the Dome Down Technique and the Thermal Ligating Shears we have not seen an increase in operative time. This is now our preferred technique for laparoscopic cholecystectomy.