

# J Case Report *Volume 7*

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Utilizing Ultravision in Laparoscopic Liver Resection and analyzing the positive effects associated with ionization of the peritoneal.

Professor

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*Kido Masahiro*

Specialty

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Hepato-Biliary-Pancreatic Surgery

Facility • Division

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*Graduate School of Medicine Kobe University*  
*Division of Minimally Invasive Surgery*  
*Hepato-Biliary-Pancreatic Surgery*

Education

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1994 Kobe University (Japan)



Ultravision System



Ionwand



Access Device



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Youtube channel. Don't forget to  
like and subscribe!



## unlike a smoke evacuator

Profile **KIDO MASAHIRO**



### Licenses / Certifications

- Japanese Society of Hepatobiliary and Pancreatic Surgery Advanced Skills Instructor
- Japan Society for Endoscopic Surgery Technically Certified Doctor
- Japanese Society for Transplantation Certified Transplant Doctor
- Japanese Society of Hepatology Appointed Specialist
- Japan Surgical Society Specialist / Instructor
- Japanese Society of Gastroenterology Specialist / Instructor
- Japan Cancer Treatment Certified Medical Doctor
- Japan Gastroenterological Surgery Society Specialist / Instructor /Gastroenterological Cancer Surgical Treatment Certified Physician

## Clinical Review

### [Our department started offering Laparoscopic hepatectomy as a form of treatment from February, 2011](#)

in the field of liver surgery, laparoscopic hepatectomy (LLR) has advanced and evolved rapidly in the last 20 years. In recent years, technological innovation and accumulated experience has made LLR a much safer and more effective approach than previously thought. However, the issue of poor visibility due to surgical plume, the health risks associated with venting into the OR, and the effects of aggressive circulation of dry CO<sub>2</sub> in the peritoneal on the patient are important issues that need to be addressed.

### [Surgical Plume](#)

Surgical plume (hereinafter abbr. as "plume") contain particles (aerosols) suspended in the air such as fine dust, pathogens, mist, and viruses. Viruses, together with these particles, can be contagious. In addition to viruses, the plume generated during surgery are said to contain harmful chemicals such as acrylonitrile and hydrogen cyanide. Acrylonitrile is a volatile and colorless chemical that is absorbed through the skin and lungs. Being highly carcinogenic, this compound will cause neurological, respiratory and digestive disorders over prolonged exposure. Hydrogen cyanide is a colorless toxic substance that is also absorbed through the lungs, skin, and digestive tract. Acute poisoning causes headaches, dizziness, tinnitus, vomiting, etc. In severe cases, it causes loss of consciousness and death. With chronic poisoning, symptoms such as headache and weakness are exhibited.

\* According to AORN guidelines, plume formed from coagulating 1g of muscle tissue is equivalent to the effects of chain smoking 6 unfiltered cigarettes has on your body.

### [Measures to counter surgical plume](#)

Until now, liver dissection was mainly performed using the CUSA device, but by using multiple devices, the area around the surgical site became cluttered, leading to a more complicated and less efficient procedure. In order to simplify the procedure and maintain a clutter free surgical field, from January 2018, I started utilizing the "Clamp & Crush method" with the ultrasonic scalpel to efficiently dissect the liver and surrounding tissue. The dense plume created with these energy devices impaired visualization, which we mitigated by suctioning and releasing the plume into the OR. However, this act itself is thought to be directly linked to contamination of the entire operating room and also greatly increases CO<sub>2</sub> usage. Therefore, in April 2020, we introduced "Ultravision" manufactured by Aesculap Surgical, to not only avoid contamination of the OR, but to also improve visualization and mitigate stress on the patient by decreasing CO<sub>2</sub> expenditure.

Ultravision is very different from a common smoke evacuator. By ionizing the peritoneal using free electrons, smoke and mist particulate matter are precipitated within the body cavity. Firstly, a relative clear visual field is maintained throughout the operation even during high concentrations of surgical plume. Second, unlike a smoke evacuator, it is no longer necessary to evacuate insufflation gas, therefore there are no major fluctuations in abdominal pressure and CO2 gas usage decreases substantially.



Positioning of the lonwand

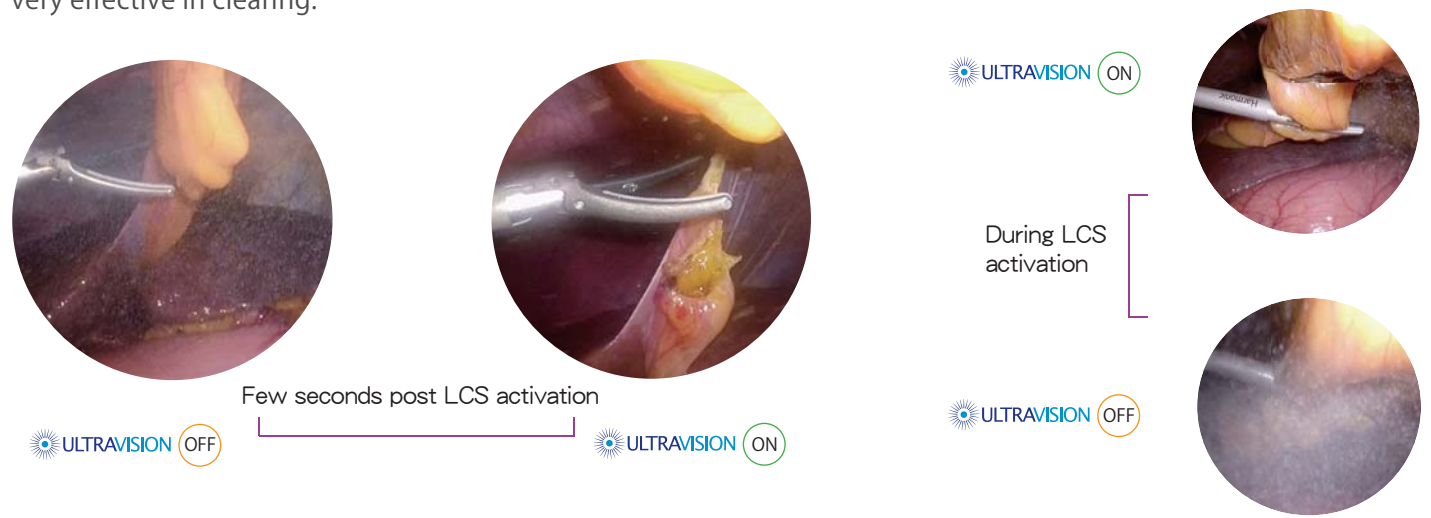
In order to ionize the intraperitoneal efficiently, inserting the lonwand 4~5cm is recommended if possible. Fixing the lonwand with surgical tape is recommended.

The positive effects associated with reducing CO2

Because of CO2 gases' high solubility, the burden on the patient is lower than other methods to insufflate the peritoneal. Typically insufflation gas temperature is close to that of the temperature of the operating room (22-26 ° C). The cold and dry nature of this gas is a major contributing factor of intraoperative hypothermia. When a patient is anesthetized, the patient's core body temperature drops by an average of 0.5 to 1.5 ° C one hour after administration of the anesthesia. Therefore it is vital to maintain the patient's core temperature, as it is said that a 1 ° C decrease in body temperature reduces the function of platelets and increases the amount of bleeding by about 16%. Reducing CO2 expenditure decreases the amount of cold dry CO2 gas being introduced into the peritoneal, in-turn decreasing the risk of hypothermia and overall patient stress.

Visualization

In the conventional smoke evacuation method, the plume generated by the use of energy devices is suctioned and evacuated which causes a reduction in the working space and a vicious cycle in which the amount of CO2 used increases to clear the site. Ultravision on the other hand, does not require smoke evacuation, therefore reduction in pneumo pressure due to smoke evaction, reduces the stress of us surgeons. I think Ultravision is especially effective because the plume that occurs during liver dissection using LCS makes the field of vision particularly ineffective. In recent years, I have been involved in performing more reoccurring LAR procedures in which the dissection of adhesions can cause excess plume. Dissection of the omentum also causes very dense plume which Ultravision has been very effective in clearing.



## Surgeon's Tip

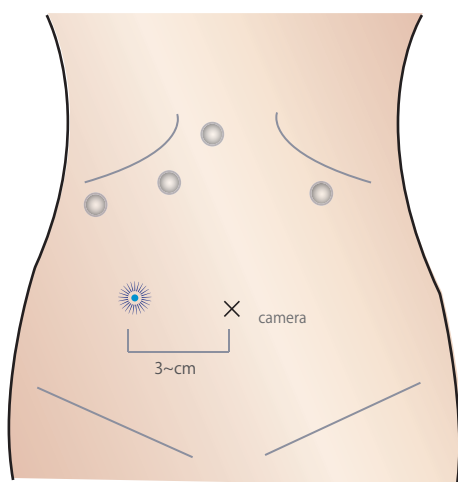
During long procedures, the tip of the lonwand can accumulate mist or other fine particles. Wiping the tip with a damp gauze after a few hours is recommended to recover Ultravision's baseline performance. Please turn OFF the Ultravision unit before removal of the lonwand.

## Positioning

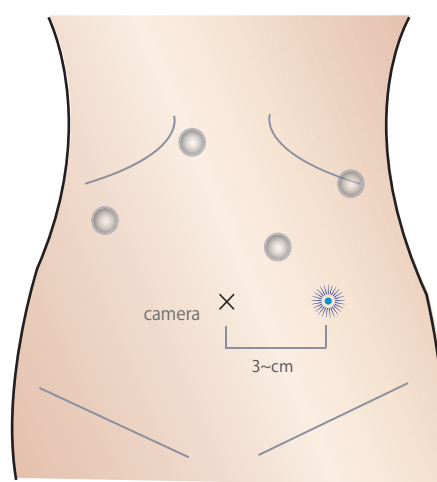
For LAR procedures utilizing the below trocar placement, placing the lonwand further from the liver to avoid contact with instruments and camera is recommended. In some cases, I will position the lonwand closer to the surgical site, but the lonwand is effective even when placed further as long as there are no barriers between the lonwand and the site of surgery.



Right Hepatic Lobe



Left Hepatic Lobe



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