

Visualization of Abdominal Cavity Filled with Artificial Ascites by Irrigating Apparatus

Introduction and Objective: RFA using artificial ascites has been succeeding in surgical field with advantage of effective use of ultrasound. We developed novel method of surgery that is carried out under isotonic liquid aiming to add advantages of water pressure and buoyancy (Water-Filled Laparo-Endoscopic Surgery: WAFLES, Laparoendosc Adv Surg Tech A 22, 70-5, 2012). To cover the drawbacks of the WAFLES, interruption of endoscopic view by bleeding, we tried to set irrigating condition.

Materials and Methods: Several prototypes of irrigation apparatuses equipped with several pumps with controlled irrigation velocity were prepared. Saline or sorbitol solution was used as irrigants. To examine adequate condition of rinsing out blood, hydrodynamic simulation, and *in vitro* test was performed using aquarium and bovine blood infused at 5 ml/minutes. Animal experiment was carried out using two pigs.

Results: Hydrodynamic simulation indicated current crossing the bleeding point, and dispersed drainage with set behind it was critical for maintaining constant view of the endoscope. In animal experiment, resection of the liver and the bladder was tested successfully using electronic cautery coupled with sorbitol irrigant or sealing device coupled with saline. Less than 800 ml/minutes of irrigation speed was found to be sufficient for continuing the surgical maneuvering to control vision in bleeding from the resecting organs.

Conclusions: Surgery using isotonic liquid filling abdominal cavity was feasible with acceptable irrigating velocity. Drainage site, shape and trocars bundling irrigation channel should be developed further to boost safety of the new method.