

How we take a countermeasure for intra-operative hypothermia

Hisashi Usuki

Surgical Center of Kagawa University Hospital

## **1. Introduction**

There are many patients undergoing surgical therapy have hypothermic condition during operating periods. Perioperative hypothermia cause peripheral circulatory insufficiency and delayed awakening from anesthesia. It also raises risk of myocardial ischemia and surgical site infection. The number of cases undergoing laparoscopic surgery in the last twenty years increased dramatically. And many anesthesiologists have experiences that the patients have hypothermic condition in the laparoscopic surgery. Some countermeasures were taken for this problem by anesthesiologists and nurses. But, the patients have broad base position in many kinds of surgical therapy. Then, it is difficult to warm the patient's body. Especially the patients undergoing laparoscopic colectomy have lithotomy position using magic bed. So, the area of body surface warmed by electric blanket is very narrow. Then, the new countermeasure should be used for the patients undergoing laparoscopic surgery. In Kagawa University Hospital a new surgical theater was built in the last year and the new air conditioning system was adopted in every operating rooms. In this study the results of the experiment performed before the surgical theater construction and the results of the measurement of thermal condition of new operating rooms are described.

## **2. Study in Experimental Room**

### **Objects and Methods**

The experimental room used for this study has almost same structure as a real operating room with the air conditioner in the ceiling. But, there are two different points from the previous operating rooms. The first point is that the air conditioner is divided two parts. One is central area, which exist over the operating table. The air from this part falls down over the operating table, on which the patients undergoing surgical therapy lie. Another part is lateral area beside the operating table. The air from this part falls down on the surgeons performing surgical therapy. The air conditioner has an ability to set the air from the central part warmer than that from the lateral part. The second point different from the previous operating room is that there are cooling panels at the corner between the ceiling and the walls behind the standing point of surgeons. The temperature of the panels can be set about 10 centigrade. They can cool the

surgeons' backs. Then, the operating table can be warmed by the air from the central part of the air conditioner and the standing points of surgeons can be cooled by the air from the lateral part of the air conditioner or the cooling panels.

In the experimental room the temperature of 170cm high beside the operating table, which means the position of surgeon's head, and that on the operating table, on which patients lie, are measured in some conditions. The conditions are "A: the temperature of the air for the operating table and that for the surgeons: 26 centigrade", "B: the temperature of the air for the table: 26 centigrade & the temperature of the air for surgeon: 21 centigrade" and "C: the temperature of the air for table: 26 centigrade & the temperature of the cooling panel behind surgeon: 12 centigrade". The temperatures of two points are measured 10 times every 1 minute after the adaptive time more than 10 minutes from the changes of the conditions.

#### Results

The temperatures of the surgeon's position were  $25.4 \pm 0.4$  in "A" condition,  $25.2 \pm 0.3$  in "B" condition and  $26.0 \pm 0.1$  in "C" condition. The temperature on the operating table is  $24.6 \pm 0.2$  in "A" condition,  $22.2 \pm 0.2$  in "B" condition and  $21.9 \pm 1.9$  in "C" condition. The temperature of surgeon's head position in "B" condition is cooler than that in "A" condition and that in "C" condition. And the temperature on the operating table in "B" condition is colder than that in "A" condition, but warmer than that in "C" condition.

### **3. Study in New Operating room**

#### Objects and Methods

The new operation rooms built in Kagawa University Hospitals have a new air conditioner system, which is able to set the temperature of the air falling down to the operative table differ from the temperature of the air falling down to the surgeons' positions. There are 8 rooms. The temperatures of the 21 points in every room are measured. Seven of them are the central area over the operating table and the fourteen of them are the both lateral area beside the operating table. The height of the measurement points are 150 cm high over the floor. Then, the number of the measurement points over the table is 56 and that of the lateral points is 112. The temperature of the air from the central area of the air conditioner is set to be 25.0 centigrade and that from the lateral area is set to be 21.0 centigrade more than 10 minutes before the start of measurement.

#### Results

The temperatures of the both surgeon's positions are 21.9±1.5 centigrade and 21.8±1.1 centigrade. The temperature over the operating table is 23.7±1.0 centigrade. The surgeon's positions are cooler than the patient's position.

#### **4. Discussion**

It is well known that the most comfortable temperature for the patients undergoing surgical therapy is different from the temperature which is most comfortable for the surgeons. The most comfortable temperature of the operating room for the patients is 28 centigrade and the most comfortable temperature of the operating room for the surgeons is 21 centigrade. This difference is a serious problem for controlling the body temperature of the patients undergoing surgical therapy. Then, the temperature of the operating room is controlled comfortable temperature when the patients enter the operating room and it is controlled cooler after the patients sleep by the anesthesia. And it may be lowered more if the surgeons hope a cooler condition of the operating room. There are many kinds of warmer for such patients. The warmed air blanket is used mainly in surgical theaters in many hospitals. But, the area been able to warm in the laparoscopic surgery is very narrow. It is one more problem to use the cold carbon dioxide gas for pneumoperitoneum in the laparoscopic surgery. Then, it is necessary to introduce a new technique for warming the patients. The air conditioning system seems to be useful for solving the problem. Moreover, the surgeons have erect posture or mild reflection posture in laparoscopic surgery, instead of having stoop posture in open surgery. Then, the warmed air fall down to the patients straightly and the cool air fall down to the surgeons. Therefore, the new air conditioning system is more useful for the laparoscopic surgery than open surgery.

#### **5. Acknowledgment**

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