

"SAKAKITA Plasma" as a Novel Hemostatic Technique for Minimally Invasive Surgery

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Recently, plasma medical science has been studied, and medical uses of plasma technologies have also been developed [1-4]. An example device with the atmospheric pressure plasma is an argon plasma coagulator (APC), and is used in an endoscopic submucosal resection (ESD), ablation of residual tumor cells and control bleeding as a medical practice. This plasma is known as a type of arc discharge [5]. Surgical intervention using either APC, electrical coagulator, or laser coagulator causes tissue injury, and scarring problems sometimes are induced. Therefore, a new type of blood coagulator to reduce tissue damages is strongly desired by physicians.

In order to increase the effect of blood coagulation and reduce tissue damages, "Sakakita plasma" (plasma jet based on the dielectric barrier discharge) has been established [6], and tried to treat experimental bleeding of C57BL6 mouse.

1) Helium plasma treatment to the bleeding part by cutting out femoral artery; in this case, coagulation is promptly generated covering on disrupted blood vessel to stop bleeding. Surface temperature is less than 40 deg. during the treatment. Histopathological analysis shows that there is no evidence of either burning or tissue damage by warming.

2) Plasma jet has been applied to adipose tissues on omentum and mesentery near the stomach of a mouse. After two weeks, the abdomen was cut open again. Histopathological analysis showed that no apparent adhesion and scarring tissue was detected.

Taken together, it is suggested that "Sakakita plasma" which has been used in the present experimental series might be promising as a novel hemostatic technique for minimally invasive surgery. In the conference, experimental results of plasma treatment to the mesenteric artery will be also presented. Moreover, we discuss on the assessment of plasma characteristics in the medical equipment using the plasma.

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