腹腔鏡を用いた犬及び猫の肥満診断法の開発に関する研究

(Studies on development of new diagnostic system with laparoscopy for obesity in dogs and cats)

学位論文の内容の要旨（英語）

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Abstract

Feline obesity was defined as “Primary Obesity” and “Secondary Obesity”. The primary obesity was then divided into those with or without health issues, and the former was termed pathological obesity (obesity disease), the later was termed simple obesity. Pathological obesity (obesity disease) was further divided into subcutaneous fat obesity and visceral fat obesity or metabolic syndrome. We studied the efficacy of laparoscopic surgery as a tool for diagnosing metabolic diseases. Previous reports have suggested that the release of adipokines from adipose tissues decreases in laparoscopic surgery compared to an open surgery owing to its low level of surgical stress.

Because the levels of MDA, INS, ADN, and COR were lower in dogs that underwent laparoscopic ovariohysterectomy compared with dogs that had an open surgery, it was suggested that laparoscopic surgery enables the observation of abdominal organs such as the liver and kidney possibly effected by metabolic disease under minimum surgical stress.

By performing a laparoscopic liver biopsy on cats with liver lipidosis and conforming that the M/L ratio was low in such cases, which suggested that the ATP generating ability of feline liver cell with adipose degeneration deteriorates. We performed a laparoscopic surgery and a CT scan in cats with a BCS of 3, 4, or 5, which enabled a direct observation of the state of aberrant peritoneal fat accumulation as well as a biopsy of adipose and liver tissue. As BCS increased, the level of blood serum ADN decreased, while the increase in peritoneal fat accumulation was evident. Seeing that cats with BCS 4 already had aberrant fat accumulation on the liver and other intraperitoneal organs, as well as decreased blood serum ADN level, it was suggested that even in cats with BCS 4, the small fat cells would start to evolve into enlarged fat cells which release insulin resistance hormone.

When managing obesity, it is necessary to build a treatment strategy based upon an accurate evaluation of the current body weight status. This would require development of a biochemical marker and a quantitative scaling system for each corresponding stage of the disease. The metabolome markers deemed appropriate were malate dehydrogenase / lactate dehydrogenase activation ratio which reflects energy metabolism, HDL / LDL ratio reflecting the lipid metabolism, and triglyceride concentration. In addition, the change in blood concentration levels of insulin and adiponectin are also indispensable as a diagnostic marker. Blood concentrations of ALT and AST are useful indication for changes in liver enzymes. High-sensitivity CRP, TNF-α, MCP-1, and interleukin are inflammatory marker, whereas MDA concentration as lipid peroxide marker, SOD and GSHpx acitivities as antioxidant enzyme marker are also effective for diagnosing obesity. By performing more of the same procedure and increasing the number of data, we aim to establish the obesity diagnostic criteria in dogs and cats.