Our patient was a 71-year-old man who presented with lower abdominal pain, and bloody and white mucosal stools. He purchased by mail-order an electrical muscle stimulation (EMS) device, which he strapped onto his lower abdomen, and for 2 consecutive days he underwent muscle stimulation comprising 600 contractions at 2.40 mA and 1.20 V over a 10 minute period. He experienced the onset of lower abdominal pain immediately following muscle stimulation on the second day, and then passed stools containing blood and white mucus. The cause was thought to be electrical and mechanical stimulation of the lower abdomen by the EMS equipment, either inducing colonic or vascular spasm, or dislodging thrombi associated with atrial fibrillation or atherosclerosis. This is the first known report of ischemic colitis associated with the use of EMS exercise equipment. We report this case in the belief that this condition is likely to become more common with increasing use of such devices.

**Case Report**

A 71-year-old man was admitted to our hospital with abdominal pain, and stools containing blood and white mucus. His past history included hypertension from age 58, angina pectoris from age 61, and atrial fibrillation from age 66. He purchased by mail-order an electrical muscle stimulation (EMS) device, which he strapped onto his lower abdomen. The EMS device had 5 fixed settings: pattern 1, current 1.75 mA, voltage 0.88 V; pattern 2, 2.40 mA and 1.20 V; pattern 3, 2.80 mA and 1.40 V; pattern 4, 2.60 mA and 1.30 V; pattern 5, 3.25 mA and 1.63 V. Our patient underwent muscle stimulation for a 10 minute period, comprising 600 contractions, at the pattern 2 setting on April 13 and 14, 2002 (Fig. 1). He experienced the onset of lower abdominal pain immediately after using the device on the second day. On 15 April, he passed stools containing white mucus (Fig. 2) and blood. Histological examination of the dissected mucosa revealed that dissection had occurred from the muscle layers, resulting in necrosis (Fig. 3). At the time of admission, his temperature was 36.4°C, blood pressure was 120/60 mmHg. The pulse was 104/minute, in atrial fibrillation. His conjunctivae were not suggestive of anemia or jaundice. Tenderness of the lower abdomen was noted.

Laboratory data on admission revealed a mild anemia, with red blood cell count (RBC) 395×10^12/l and hemoglobin (Hb) 12.0 g/dl. The tumour markers carcinoembryonic antigen (CEA) and carbohydrate antigen 19-9 (CA19-9) were both within the normal range. He was not on a weight loss diet, and was not dehydrated. Abdominal ultrasonography showed thickening of all layers of the bowel wall from the rectum to the sigmoid colon. Colonoscopy revealed circumferential mucosal dissection from the rectum to the sigmoid colon. Colonoscopy revealed circumferential mucosal dissection from the rectum to the sigmoid colon.
sigmoid colon. Edema and erythema were seen where there was any mucosa remaining (Fig. 4). Histopathological examination of colorectal mucosal biopsies taken at colonoscopy revealed shedding and disappearance of colonic glands, mucosal necrosis and hemosiderin deposition.

From the above findings, a diagnosis of ischemic colitis was made, the likely cause being the use of EMS exercise equipment. With conservative treatment with intravenous fluids and keeping the patient fasted, follow-up colonoscopy on April 22 demonstrated mucosal regeneration. The patient’s subsequent progress has also been favourable.

**Discussion**

Ischemic colitis was first reported by Boley et al (1) in 1963 as “reversible vascular occlusion of the colon”, and later by Marston et al (2) using the term “ischemic colitis”, and became known as a cause of an acute abdomen presenting with bloody stools and abdominal pain. With conservative treatment with intravenous fluids and keeping the patient fasted, follow-up colonoscopy on April 22 demonstrated mucosal regeneration. The patient’s subsequent progress has also been favourable.

Ischemic colitis was first reported by Boley et al (1) in 1963 as “reversible vascular occlusion of the colon”, and later by Marston et al (2) using the term “ischemic colitis”, and became known as a cause of an acute abdomen presenting with bloody stools and abdominal pain. A number of subsequent studies have identified the clinical picture and causes of ischemic colitis, occurring most commonly in the 7th and 8th decades of life, often associated with underlying conditions such as hypertension, heart disease, arteriosclerosis, cerebrovascular disease and diabetes mellitus (3, 4). Dissection of the mucosa of the gastrointestinal tract is rare, and usually involves the esophageal mucosa. We have previously reported a case of esophageal mucosal dissection, along with the results of a search of the literature on this subject (5). Reported causes of esophageal mucosal dissection include pemphigus vulgaris, pemphigoid, mechanical irritation from endoscopes or foreign bodies, and raised intra-esophageal pressure. Dissection of the colorectal mucosa has been reported in cases of ischemic colitis (6–8).

Our patient has a past history of hypertension, angina pectoris and atrial fibrillation. He has a high risk of atherosclerosis and thrombosis, and therefore the possibility of a spontaneous ischemic colitis cannot be excluded. In this case, the onset of ischemic colitis immediately followed the use of an EMS device, although the causal relationship is uncertain. The effect of one muscular contraction at a voltage of 1.20 V and current of 2.40 mA on the colorectal mucosa is small (9). Electrical and mechanical stimulation of the sigmoid colon. Edema and erythema were seen where there was any mucosa remaining (Fig. 4). Histopathological examination of colorectal mucosal biopsies taken at colonoscopy revealed shedding and disappearance of colonic glands, mucosal necrosis and hemosiderin deposition.

From the above findings, a diagnosis of ischemic colitis was made, the likely cause being the use of EMS exercise equipment. With conservative treatment with intravenous fluids and keeping the patient fasted, follow-up colonoscopy on April 22 demonstrated mucosal regeneration. The patient’s subsequent progress has also been favourable.
lower abdomen by the EMS equipment was thought to either induce colonic or vascular spasm, leading to ischemia, or dislodge thrombi associated with atrial fibrillation or atherosclerosis, causing embolisation and ischemia.

Health and diet booms in recent years have seen a rise in the popularity of EMS exercise equipment, that passively exercises muscles through electrical stimulation, as sold through mail-order and television shopping. The use of such devices to stimulate to muscles of the lower abdomen by the elderly, people with heart conditions or advanced arteriosclerosis, or even by people with a tendency toward constipation, is considered dangerous. We were unable to identify any previous reports of ischemic colitis thought to be caused by the use of EMS exercise equipment. We present this report in the consideration that similar cases may be encountered in the future with increasing use of EMS devices.

References