Fungal colonization of intragastric balloons

Fig. 1 Intragastric air balloon retrieved from a 35-year-old woman (patient 1) 6 months after placement. The balloon was covered with multiple gray-white and brownish-black plaques.

Fig. 2 Endoscopic view of the infected intragastric air balloon in a 45-year-old man (patient 2) 6 months after placement.

Fig. 3 Intragastric air balloon retrieved from patient 2, 6 months after placement. The balloon was deflated and covered in brownish-black plaques.

Fig. 4 Intragastric air balloon retrieved from a 45-year-old woman (patient 3) 6 months after placement. The balloon was covered with multiple necrotic, greenish-yellow plaques.

Intragastric balloon therapy is used for weight reduction as a short-term intervention in obese patients. The procedure is usually well tolerated, however, some complications including intolerance, vomiting, gastroesophageal reflux, gastric erosions and esophagitis, gastric ulcers, and spontaneous deflation of the balloon have been observed. In addition, gastric perforation, dilatation, and small-intestinal obstructions are occasionally reported [1,2]. Different types of intragastric

balloon may be used for weight reduction [3]. Herein, we present three asymptomatic patients with intragastric balloons infected by *Candida albicans* yeast colonies.

In all three patients, a Heliosphere BAG intragastric air balloon (Helioscopie, Vienne, France) was inserted under propofol sedation for weight reduction. The balloons were removed after 6 months. We used a Heliosphere Newtech extraction kit (Helioscopie) to retrieve the bal-

loons. The kit consists of a needle catheter to deflate and air aspirate the balloon, and a foreign body grasper to remove the balloon gently.

The first patient was a 35-year-old woman, 126 kg in weight and with body mass index (BMI) 45.2 kg/m². During retrieval of the balloon, endoscopic findings were unremarkable, but the surface of the balloon was covered with necrotic gray-white and brownish-black plaques (● Fig. 1). The second patient was a 45-year-old man. His weight was 127 kg and BMI was 43.9 kg/m². After 6 months, we observed, while retrieving the balloon, that it was deflated and covered in brownish-black plaques (● Fig. 2 and ● Fig. 3). The third patient was a 45-year-old woman, 130 kg in weight and BMI 48.3 kg/m². Upon removal, we observed multiple yellowish-green plaques on the surface of the balloon (● Fig. 4). The patients were all asymptomatic. There were no remarkable findings in the gastric mucosa of the latter two patients. Microbiological examination of these plaques revealed *Candida albicans* colonization (● Fig. 5 and ● Fig. 6).

Fungal and bacterial colonization can occur on the surface of intragastric balloons. Various predisposing factors such as gastric stasis, antacid drugs, and smoking may play a role in opportunistic infections in patients with intragastric balloons [4]. Spontaneous deflation of the balloon may be a risk factor as in the second patient discussed above. This should be taken

Fig. 5 The infected layer was wiped with a sterile swab and the material examined microscopically ($\times 40$) in a wet mount preparation. The material was inoculated onto blood agar, eosin methylene blue agar, and Sabouraud dextrose agar. After incubation for 24 hours at 37 °C, small gray-white colonies grew on the blood agar. *Candida albicans* was identified with a BD Phoenix 100 instrument (Becton-Dickinson, Sparks, Maryland, United States).

Fig. 6 Gram staining of the plaques revealed *Candida* species yeast colonies. Antimicrobial susceptibility testing was performed with a Fungitest Microplate (Bio-Rad, Marnes-la-Coquette, France) and *Candida albicans* species were detected as susceptible to miconazole, ketoconazole, amphotericin B, fluconazole, flucytosine, and itraconazole.

into consideration, especially in immunosuppressed patients, and these patients should be monitored. If any asymptomatic balloon infection occurs, the patient should be treated, especially those with damaged gastrointestinal system mucosa.

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