Introduction

Eosinophilic esophagitis (EoE) is defined as an immune and allergic chronic inflammatory disease characterized by symptoms of esophageal dysfunction. Symptoms in children are not specific and include gastroesophageal reflux (GERD), dysphagia, vomiting or dietary blockages. Chronic inflammation of the mucosa may lead to narrowing of the esophageal lumen responsible for impactions. Extraction procedures can be complicated by dissection and perforation. Rare spontaneous ruptures of the esophagus known as Boerhaave syndrome are also possible. We report five cases of esophageal perforation in children with EoE, three with spontaneous rupture and two after an endoscopic procedure. The evolution was favorable under medical treatment.

Patients and results

Five cases of esophageal perforation with an EoE were identified in various French pediatric departments including three boys and two girls aged 2 to 17. No children had been diagnosed with EoE prior to perforation. A history of atopy (asthma, allergic rhinitis) occurred in three children. One child had a history of atresia of the esophagus. A second child had complicated cirrhosis with esophageal varices secondary to histiocytosis X with liver injury. Three cases were spontaneous perforations follow-
ing food impaction and two cases were perforations during an endoscopic process. The three children with spontaneous perforation consulted the emergency department for sudden thoracic pain with vomiting, following a food blockage. One child also had hematemesis with fever. The other two cases of perforation occurred during gastroduodenal fibroscopy programmed for control and dilation of esophageal stenosis in esophageal atresia and for control of esophageal varices in cirrhosis.

These two perforations occurred during the overpass of an esophageal stenosis. One child presented a respiratory distress syndrome secondary to endoscopic procedure (Fig. 1, Fig. 2). A chest scan was performed for four children. The only child who did not have chest computed tomography (CT) was one of the cases of perforation that occurred during endoscopy and had a simple chest x-ray. In all cases, chest CT showed pneumomediastinum associated with cervicothoracic effusion (Fig. 3). Fibroscopy performed at or near the episode showed signs of suggestive EoE (linear streaks, whitish deposits, trachealized appearance of the esophagus) and the biopsy confirmed the diagnosis with more than 15 eosinophilic polynuclear per field at high magnification. The treatment was conservative for all five children with intravenous antibiotic therapy combined with a proton pump inhibitor. Enteral feeding was performed for a few days with a short period of fasting. The evolution was simple for the five children. Treatment of the EoE established after confirmation of the diagnosis was variable. Some children were treated with corticosteroids (budesonide), others were on an eviction diet.

Data for the five cases are summarized in Table 1.

**Discussion**

EoE is an immune and allergic chronic disease responsible for functional disorders of the esophagus such as dysphagia, GERD, and oral disorders. The main complications are food im-
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In our case series, esophageal perforation revealed EoE in all five cases. The other cases of spontaneous perforations described in the literature also support the diagnosis. This points out the delayed diagnosis that still exists in EoE, partly explained by lack of knowledge of the disease but also by the adaptive mechanisms initiated by dysphagic children.

Our series also describes two cases of esophageal perforation that occurred during or immediately after gastroduodenal fibroscopy. The literature reports few perforations induced by an endoscopic process. Straumann et al. [8] described only 2 cases of perforation in 134 endoscopic extractions of food impactions. These two cases, however, corresponded to 20% (2/10) of the cases having benefited from a rigid tube extraction. These descriptions, although rare, therefore require great caution when performing endoscopies and preferential use of a flexible fibroscope. Complications secondary to dilatation of esophageal stenosis in EoE are also very rare. In one study [1], the perforation rate was evaluated at 0.8% with only three perforations in 404 patients out of a total of 839 esophageal dilatations. In EoE, dilatation can result in a long and immediate improvement in symptoms of dysphagia in an adult [11]. On the other hand, it has been demonstrated in children that esophageal stenoses are often reversible with treatment (corticosteroid or diet eviction), which would limit indications for dilatation [9].

In our series, the case of perforation during dilatation for stenosis is described in a child with a history of esophageal atresia. Several publications report cases of EoE in patients with esophageal atresia [12]. Dysphagia is a common symptom in these patients and is often credited to recurrent stenosis, esophageal motility disorders or presence of GERD. The different observations all suggest that diagnosis of EoE should be

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**Table 1** Data on five cases of esophageal perforation in eosinophilic esophagitis.

| Case | Sex/age (years) | Prior diagnosis of eosinophilic esophagitis | Clinical symptoms | Complication | Chest CT | Endoscopic data | Treatment |
|------|-----------------|--------------------------------------------|------------------|-------------|---------|----------------|-----------|
| Case 1 | Male/14 yr | No | Retrosternal pain, vomiting, hematemesis | Impaction and spontaneous perforation | Pneumomediastinum, pneumoperiton, esophageal fissure | Trachealized appearance, longitudinal streaks, whitish deposits | Conservative management |
| Case 2 | Female/19 yr | No | Chest pain, gastro-esophageal reflux, fever | Impaction and spontaneous perforation | Esophageal perforation, peri-esophageal fluid collection | Normal mucosa, resistance to passage of endoscopy | Conservative management |
| Case 3 | Male/12 yr | No | Retrosternal pain, vomiting, dysphagia, fever | Impaction and spontaneous perforation | Pneumomediastinum, cervico-thoracic effusion | Trachealized appearance, longitudinal streaks, whitish deposits | Conservative management |
| Case 4 | Female/2 yr | No | Acute respiratory distress | Perforation during endoscopic dilation of stenosis | Pneumomediastinum | Esophageal stenosis, whitish granulations | Conservative management |
| Case 5 | Male/17 yr | No | Dissection during endoscopic crossing of a stenosis | | Endoscopic diagnosis | Trachealized appearance, esophageal stenosis | Conservative management |

CT, computed tomography
suggested and investigated in patients with esophageal atresia and GERD or dysphagia, especially if the symptoms persist despite well-managed treatment [13].

An interesting topic raised by our series is the immediate positive evolution of the five cases without any endoscopic or surgical treatment. Digestive rest associated with antibiotic therapy was sufficient even in cases with a mediastinal collection. In the two other pediatric cases reported in the literature, one patient underwent the same treatment with a good evolution [5]; the second presented a false mucous pathway 20 days after the dissection treated by endoscopic section [4]. In adults, care is quite variable. Transient prostheses or clips [14], surgical treatments with mediastinal drainage or laparotomy with perforation suture or even partial esophagectomy have been reported [15]. No deaths were reported following a perforation complication.

Conclusion
The main complications of EoE are food impactions. Ruptures and perforation of the esophagus in children with EoE are rare. They can be caused by an endoscopic procedure or spontaneously during food impaction. The evolution is generally favorable under medical treatment.

Competing interests
The authors declare that they have no conflict of interest.

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