Anastomotic Strictures: Conservative Treatment

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Recent advances in surgery and neonatal care have provided a better prognosis for esophageal atresia (EA) (1). Indeed, the survival rate of infants born with EA, with or without tracheoeso-phageal fistula, has dramatically improved during the past decade, increasing from 80% to more than 95% (2). However, anastomotic stricture remains a frequent complication, occurring in 18% to 50% of patients with EA that has been surgically repaired (3,4). Several predisposing factors have been identified including nature of the suture materials, anastomotic tension, anastomotic leakage, fistula, gap length, and gastroesophageal reflux. Anastomotic tension, which is highly correlated with gap length, plays probably the most important role in the development of subsequent stricture (4). As gastroesophageal reflux is 1 of the major factors of esophageal anastomotic stenosis; the first-line therapy is proton pump inhibitors. These drugs can be used systematically during the first months of life to prevent anastomotic stenosis even if the efficacy of this strategy has not been evaluated.

INITIAL TREATMENT

Balloon or bougie dilations remain the treatment of choice for symptomatic esophageal strictures. Dilation with a balloon is theoretically more efficient because the expansive force is applied uniformly and radially at the site of the stricture, whereas a bougie exerts a shearing axial force that results in a greater degree of trauma and thereby increases the risk of perforation (5). In a retrospective study, Lang et al (6) showed that balloon esophageal dilation is superior to bougie in terms of safety and efficacy. No prospective study on the efficacy and safety of Savary-Gilliard bougie dilation compared to balloon in a homogenous population of patients with EA has been reported.

The success rate of bougie dilations varies from 58% to 96% depending upon stricture etiology. For uncomplicated esophageal strictures, the perforation rates for balloon dilation and bougienage are 0% to 2.8% and 8% to 9%, respectively.

Data from the literature suggest that, more than the technique (balloon or Savary-Gilliard bougie), a trained operator is required to reduce complications following esophageal dilations (Table 1).

RECURRENT STENOSIS

In some patients, stricture remains without a substantial symptom-free-interval or recurs despite an initial successful dilation. The cause of recurrent stenosis is unknown, but intense fibrogenesis during healing and after the trauma induced by the dilation procedure may be responsible. Persistent gastroesophageal reflux should be considered in these cases because repeated acid exposition at the site of the anastomosis is probably an important factor of recurrent stenosis. Esophageal strictures refractory to conservative treatment (balloon dilation or bouginage) are difficult to manage. Iterative dilations increase the risk of complications such as perforations (perforations occur in 5%–8% of dilations). Repeated dilations may cause psychological problems in children because of repeated anesthesia. Moreover, repeated mechanical irritation at the site of stricture may increase the risk of carcinoma. For recurrent stenosis, conservative treatment is preferable to surgical treatment. When surgery is indicated, esophageal replacement is the usual procedure, but it carries a high risk of morbidity, especially in the long term (7). To avoid repeated dilations, many agents have been used experimentally to inhibit new collagen formation directly or indirectly and to prevent stricture formation (eg, steroids plus antibiotics, vitamin E, vitamin A, pentoxifylline), but only a few have gained acceptance for clinical application (8).

Esophageal stenting, a routine treatment for esophageal strictures caused by neoplasms in adults, was recently used to prevent stricture formation in children (9,10), but the morbidity rate (nausea, vomiting, pain, migration of the stent, perforation of the esophageal wall and eventual injury of arterial vessel, and induction of gastroesophageal reflux) is high. Several issues are raised by this procedure and remain unsolved: requirement for a second stent in some patients after slippage of the first one, prevention of induced gastroesophageal reflux by systematic anti-secretory treatment, retrograde migration of the stent into the larynx, and consequences of stenting in a rapidly growing child.

A therapeutic option recently described is the topical application of mitomycin-C to the stricture's intraluminal surface after dilation. Mitomycin-C is an antibiotic used as an antineoplastic agent that inhibits DNA synthesis and reduces fibroblastic collagen synthesis by inhibiting DNA-dependent RNA synthesis. Mitomycin-C can suppress cellular proliferation during the late G1 and S phases. It has been successfully used as an antifibrotic agent to prevent scar formation when treating childhood glaucoma and lacrimal duct, laryngeal, and tracheal stenosis. A few small series and case reports have reported some effectiveness in the treatment of refractory esophageal strictures (11,12). In our experience of

TABLE 1. Complications following esophageal dilation

Immediate
    Mechanical: fissure, perforation, hemorrhage, intramural
      hematoma
    Infectious: bacteriemia
Secondary
    Recurrence
Risks of iterative dilations
    Increased risk of perforation
    Sociopsychological problems because of repeated anesthesia
      and hospitalization
    Repeated mechanical irritation at the site of stricture may
      increase the risk of carcinoma

6 children with long-term follow-up, local application of mitomy-cin-C to refractory esophageal stenoses was beneficial for 4 years thereafter in terms of digestive symptoms and radiographic and endoscopic findings. However, biopsies revealed a de novo gastric metaplasia at the site of the stenosis in 2 of the 6 cases. This suggests that long-term follow-up with esophageal biopsies is required in these patients.

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