

Patch Esophagoplasty: Esophageal Reconstruction Using Biologic Scaffolds

Alejandro Nieponice, MD, PhD, Franco F. Ciotola, MD, Fabio Nachman, MD, Blair A. Jobe, MD, PhD, Toshitaka Hoppo, MD, PhD, Ricardo Londono, Stephen Badylak, MD, PhD, and Adolfo E. Badaloni, MD

Esophageal Surgery Program, University of Favaloro, Buenos Aires, Argentina, and McGowan Institute for Regenerative Medicine, University of Pittsburgh, Pittsburgh, Pennsylvania

Background. Standard techniques for surgical reconstruction of the esophagus remain suboptimal. Primary closure of diseased or injured esophagus has been associated with high morbidity, primarily due to leak and stricture, and synthetic materials are contraindicated due to the high risk of erosion and infection. Degradable bioscaffolds composed of extracellular matrix (ECM) have recently shown promising results in both pre-clinical and clinical settings to prevent stricture after extended endoscopic mucosal resection. We propose a novel surgical technique that utilizes an ECM scaffold as a reconstructive patch to augment the esophageal diameter during primary repair.

Methods. Four patients requiring esophageal reconstruction underwent a patch esophagoplasty using an ECM scaffold composed of porcine urinary bladder ECM. The full thickness wall of the esophagus was replaced with an ECM patch that was sutured to the edges of the remaining esophagus, similar to the patch angioplasty performed in vascular procedures.

Results. All patients had a favorable clinical outcome with immediate recovery from the procedure and reinstated oral intake after 7 days. One patient

had a micro leak at day 5 that closed spontaneously 2 days after drainage. Follow-up studies including barium swallow and esophagogastroduodenoscopy (EGD) showed adequate esophageal emptying through the surgical segment in all patients. The EGD showed complete mucosal remodeling at 2 months, with approximately 20% area contraction at the patch level. The area of the defect was indistinguishable from surrounding healthy tissue. Biopsy of the patch area showed normal squamous epithelium. One of the patients had a separate intrathoracic stricture that required further surgery. Clinical outcomes were otherwise favorable in all cases.

Conclusions. An alternative for the treatment of esophageal stenosis is presented which uses a biological scaffold and an innovative surgical procedure. Additional work, including prospective studies and long-term follow-up, is required to fully evaluate the potential of this bioscaffold-based regenerative medicine approach for esophageal reconstruction.

(Ann Thorac Surg 2014;97:283–9)

© 2014 by The Society of Thoracic Surgeons

Surgical reconstruction of the esophagus after stricture formation or esophageal damage remains a challenge. Current strategies often include multiple complex procedures to restore partial organ functionality and without exception are associated with morbidity and complication rates as high as 30% to 40% [1–3]. In addition, the need for postsurgical dilations in more than 50% of the cases [4] contributes to a substantial decrease in quality of life [4, 5].

Benign strictures are a common finding after esophageal surgery, and caustic or peptic injuries. Although endoscopic therapies are the first choice of treatment and are successful in the vast majority of cases, refractory strictures are not rare and often need surgical correction

[6]. The alternatives for esophageal reconstruction after failed primary surgeries are scarce and usually involve a new conduit interposition or the use of a pedicled tissue flap to restore the remaining esophagus [7–9]. In fact, extended esophageal damage often requires radical esophagectomy even for benign conditions due to the lack of effective treatment options [10]. Degradable extracellular matrix (ECM) scaffolds have recently shown promising results in both preclinical and clinical settings [11, 12]. Endoluminal deployment of the scaffolds has recently been shown to prevent stricture after extended endomucosal resection for adenocarcinoma allowing for esophageal preservation in patients who would have otherwise undergone an esophagectomy. In preclinical studies, large full thickness esophageal defects have been successfully reconstructed. In other tubular organs such as the urethra, ECM patches have been utilized successfully in patients to reconstruct defects and to augment tissue. The first 4 cases of a patch esophagoplasty in which biologic scaffolds were used to

Accepted for publication Aug 7, 2013.

Address correspondence to Dr Nieponice, Esophageal Surgery Program, University of Favaloro, Av Belgrano 1746, Ciudad Autonoma de Buenos Aires, Bu C1093AAS, Buenos Aires, Argentina; e-mail: anieponi@ffavaloro.org.

augment and restore the damaged esophageal tissue are reported herein.

Patients and Methods

Due to the retrospective nature of the study, the Institutional Review Board waived specific informed consent for publication if confidentiality of patients was maintained. All patients signed individual informed consents prior to the surgery.

Patient 1

A 58-year-old woman was referred after a laparoscopic Nissen with hiatal mesh reinforcement (polypropylene) who had a poor outcome over the course of 2 years with progressive dysphagia and severe weight loss. Barium swallow showed a linear stenosis in the distal esophagus with signs of mesh intrusion into the lumen. Mesh intrusion was corroborated by esophagogastroduodenoscopy (EGD). At reoperation, a massive contained abscess in the mediastinum was found around the mesh that had migrated into the chest. During the take down, and after mesh extraction, a large esophageal defect of 5 cm was present with the lower third of the esophagus being disrupted and devitalized (Fig 1)

Patient 2

A 28-year-old man underwent cervical esophageal exclusion due to esophageal perforation, which was followed by a severe mediastinitis that required 23 days of

respiratory assistance and 60 days in the intensive care unit. After recovery of the acute syndrome, the patient was referred for closure of the lateral esophagostomy. During the reconstruction, a stricture was noticed at the center of the loop leaving a very narrow lumen for primary repair.

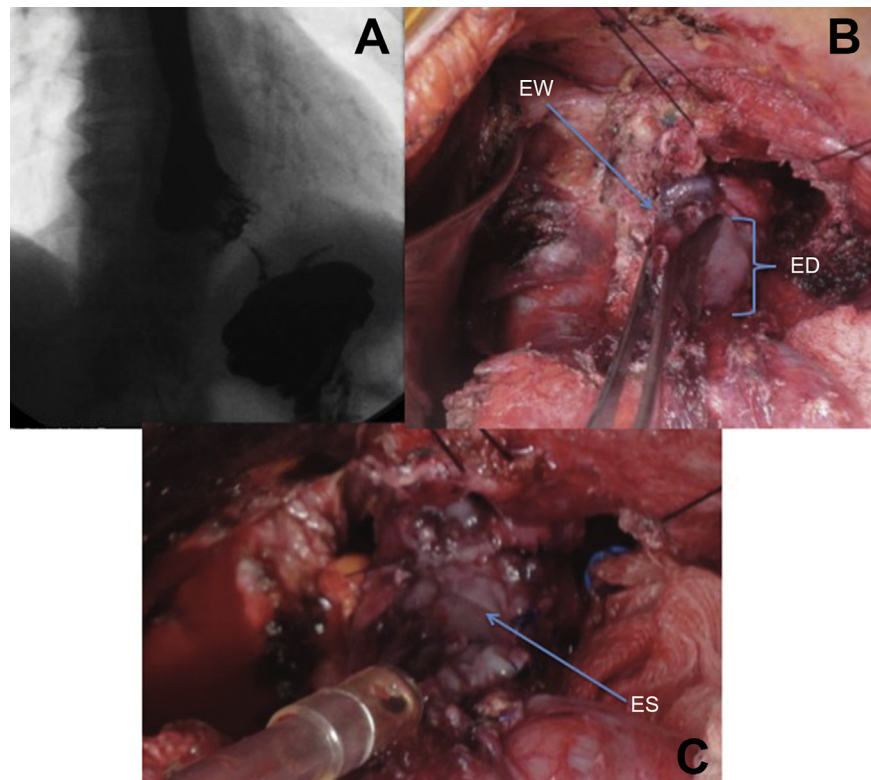
Patient 3

An 8-year-old boy presented with history of caustic ingestion at the age of 3. He had received repeated dilations until a perforation with subsequent mediastinitis occurred. At that time he had a bypass done with a coloplasty that developed ischemia and subsequent fibrosis that led to 2 strictures; 1 stricture at the anastomosis level and 1 intrathoracic. He underwent repeated dilations and stent placing without positive results and was referred for surgical repair. The cervical stricture was approached initially as it appeared short but this became more severe during repeated dilations.

Patient 4

A 57-year-old male had undergone an esophagectomy for adenocarcinoma of the esophagus. He was reconstructed with a gastroplasty and a cervical anastomosis that leaked and led to a postoperative stricture. The stricture was treated conservatively with repeated endoscopic dilations and a cervical stent placement. The outcome of those dilations was consistent recurrence of the stricture 5 days after each dilation or stent removal. After 10 dilations over a 4-month period, surgery was performed.

Fig 1. A 58-year-old patient with a synthetic mesh inclusion after a hiatal hernia repair. (A) Barium swallow showing the mesh inclusion and lack of esophageal transit. (B) Damaged esophagus after mesh take-down at the gastroesophageal junction level. (C) Patch esophagoplasty with urinary bladder matrix-extracellular matrix to augment esophageal tissue and prevent stricture after closure. (EW = esophageal wall; ED = esophageal defect; ES = extracellular matrix scaffold.)



Download English Version:

<https://daneshyari.com/en/article/2873446>

Download Persian Version:

<https://daneshyari.com/article/2873446>

[Daneshyari.com](https://daneshyari.com)