BRIEF COMMUNICATIONS

POSTINTUBATION TRACHEOESOPHAGEAL FISTULA: SURGICAL TREATMENT OF THREE CASES

Paolo Santini, MD, Alberto Dragotto, MS, Paolo Maria Gigli, MD, Tommaso Notaristefano, MD, Graziano Salani, MD, Salvatore Regio, MD, Alfredo Palmimiello, MD, *Firenze, Italy*

Postintubation tracheoesophageal fistula (TEF) is a relatively uncommon event, notwithstanding the increased use of prolonged artificial ventilation. TEF can develop any time from 12 to 200 days after intubation, with a mean of 40 days.¹ The main cause is hyperinflation of the tracheal cuff. In these cases the location of the TEF is in the zone of the cuff, but other causative agents cannot be excluded, especially when the prone part of the distal zone of the tube is found at the bottom of the cuff. Another possibility is that TEF forms during tracheotomy as a result of a technical error, but this is a rare occurrence. In these cases its site is rather high and over the cuff.

The injury is usually verified during intensive care when gastric material is aspirated from the airways or when an unexplainable gastric hyperdistention is seen during thoracic radiography. The most secure diagnostic method of TEF is the double fiberoptic tracheoesophagoscopy examination. The TEF is directly visible, with or without dyes. Computed tomography can also play an important role.²

Patient and methods. This study was approved by the ethical committee of our hospital and by informed consent of the patient or his or her family.

In the past 2 years we have successfully treated three patients who had prolonged postintubation TEF as a consequence of tracheotomy. Two patients were men, 69 and 32 years of age, and had been intubated for 25 and 20 days, respectively. The one woman, 47 years old, had been intubated for 60 days. In all three patients the TEF was 2 to 3 cm in diameter. In the first patient, who had respiratory insufficiency after a cerebral stroke, the TEF was localized about 2 cm under the level of the tracheotomy. The tracheal axis was not stenotic, but a conspicuous malacia of the perioral tract was present.

The second patient had a long tracheal stenosis, 1.5 cm under the vocal cords, as a result of polytrauma. As in the first case, the TEF was rather high, leading to suspicion of an iatrogenic cause.

The third patient, in a vegetative coma as a result of a head injury but otherwise in good general condition, did not have other tracheal abnormalities. The endoscopic examination indicated that the TEF was low, and during the operation it was found at the base of the neck.

In all patients, simple closure of the TEF was considered with esophageal reconstruction and repair of the tracheal membrane. Although the access route was through a cervical incision in all cases, it was longitudinal in the first patient and lateral, along the anterior edge of the left sternocleidomastoid muscle (staying outside the perivascular sheath but dividing the lower thyroid artery), in the other two. The esophagus was sutured by marginal myotomy³ in double layers with separate, inflected Maxon 3-0 sutures (Sherwood—Davis & Geck, St. Louis, Mo.). The trachea was closed in its membranacea portion with the use of the residual wall of the TEF. Between the two viscera a muscular flap was always placed, constructed from the left subhyoid muscle pedunculated on the sternum (cases 1 and 3) and from the left omohyoid muscle pedunculated on the hyoid bone (case 2). In this last case, we had to create an omohyoid flap, notwithstanding its thinness, because of atrophy of other ipsilateral subhyoid muscles.

Results. Radiologic examination, using water-soluble contrast medium, in cases 1 and 3 after 10 days, indicated perfect continence of the suture line. The concomitant presence of psychic disturbances in the first patient made positioning of a Montgomery stent unfeasible. In the female patient, the absence of a tracheal stenosis permitted closure of the tracheotomy 30 days after release from our ward.

The second patient had a partial relapse of the TEF 8 days after treatment, but this was easily treated with conservative therapy. After 17 days a repeat radiograph with contrast medium was performed, which indicated perfect restoration of the esophagus. After an additional 30 days, after laser treatment of a diaphragmatic stenosis below the vocal cords and successive dilations of a long tracheal "bottleneck" stenosis, a Montgomery endoprosthesis was put in place, resulting in satisfactory recovery of phonation.

All three patients are alive today without signs of TEF relapse after 28, 13, and 11 months. The young patient with the Montgomery prosthesis, who regained complete phonation, has returned to work. We were able to remove the tracheal stent after 12 months. A check-up 30 days later showed that the airways had stabilized for now.

Discussion. We believe that the patient should be operated on when spontaneously breathing (cannula without the tubal cuff), after having recovered nutritionally

From the Thoracic and Cardiovascular Surgical Unit, Careggi Hospital, University of Florence, Firenze, Italy.

Received for publication Feb. 2, 1998; accepted for publication March 25, 1998.

Address for reprints: Paolo Santini, MD, Viale Ariosto 713, 50019 Sesto Fiorentino (FI), Italy.

J Thorac Cardiovasc Surg 1998;116:518-9

Copyright © 1998 by Mosby, Inc.

0022-5223/98 \$5.00 + 0 12/54/90671

and regained normal immunity to ensure success. In agreement with other authors,¹ we never found that cervicothoracic access was not needed for simple repair of a TEF. Thus the risks of postoperative assisted ventilation (which constitute the main cause of relapse) are greatly reduced, resulting in an acceptable rate of mortality (about 10% according to Marzelle and associates¹).

A left lateral cervical incision gives very satisfactory access for simple closure of a TEF, with better visibility and adequate operative space compared with the median approach, and has the advantage of being able to be transformed to a cervical incision at the neck if necessary. Placement of a muscular flap between the two viscera is another indispensable element for success. The partial relapse in our second patient was due, in our opinion, to the insertion of a muscular flap that was too thin (omohyoid muscle).

In cases of associated tracheal stenosis, which occurs in about 22% of patients with a TEF,¹ the possible

anastomotic resection of even a small segment (a rare event) greatly increases the surgical risk. For this reason, in two of our patients with associated tracheal lesions, we opted for treatment with a dilating endoprosthesis.

REFERENCES

1. Marzelle J, Darteville P, Khalife J, Rojas Miranda A, Chapelier A, Levasseur P. Surgical management of acquired post-intubation tracheo-oesophageal fistulas: 27 patients. *Eur J Cardiothoracic Surg* 1989;3:499-502.
2. Leeds WM, Morley TF, Zappasodi SJ, Giudice JC. Computed tomography for diagnosis of tracheoesophageal fistula. *Crit Care Med* 1986;14:591-2.
3. White RE, Ianettoni MD, Orringer MB. Thoracic esophageal perforation. *J Interthorac Cardiovasc Surg* 1995;109:140-6.

SURGICAL CORRECTION OF THE HYPOPLASTIC AORTIC ARCH BY THE SUBCLAVIAN FREE FLAP METHOD IN THE NEONATE

Hiroshi Kubota, MD, Lionel Camilleri, MD, Benoît Legault, MD, Bruno Miguel, MD, Ahmed Tahir El Youssoufi, MD, Patrick Bailly, MD, Isabelle Brazzalotto, MD, Stéphane Helfter, MD, Jean-René Lussion, MD, and Charles de Riberolles, MD, *Clermont-Ferrand, France*

Although several surgical techniques for treatment of aortic arch hypoplasia associated with coarctation of the aorta have been described, the most appropriate method is still controversial. Here we report a technique using a subclavian free flap to enlarge the hypoplastic transverse aorta.

Clinical summary. A female infant, in the thirty-eighth gestational week, was found by predelivery echocardiography to have a hypoplastic left heart and aortic coarctation. On the first day, the infant, weighing 3440 g, was confirmed to have this condition along with tubular hypoplasia of the transverse aortic arch. On the third day,

she underwent surgical treatment through a left posterolateral thoracotomy.

The upper half of the descending thoracic aorta and the transverse aortic arch were dissected and exposed. The left common carotid artery and the left subclavian artery were then mobilized along their entire intrathoracic course. The distance between the origin of the brachiocephalic artery and the origin of the left common carotid artery was longer than normal. The origins of the carotid artery and the left subclavian artery were also rather distant. The diameters of the ascending aorta just proximal to the brachiocephalic artery, transverse aortic arch, and descending aorta were 6.5 mm, 3 mm, and 7 mm, respectively. The transverse arch/ascending aorta diameter ratio was 0.46, and the transverse arch/descending aorta diameter ratio was 0.43. A proximal vascular occlusive clamp was placed at the origin of the brachiocephalic artery as far to the right side as possible, and the appropriate arterial perfusion was judged from the right radial arterial pressure. The left carotid artery was snared, and the isthmus of the aorta was clamped proximal to the patent ductus. After two branches had been treated, the left subclavian artery was ligated as distally as possible and excised from its origin. The distal arch was then cut proximal to the left subclavian artery, and the inferior side of the transverse aortic arch was incised as proximally as possible (Fig. 1, A). The longitudinally opened subclavian

From the Department of Cardiovascular Surgery, Department of Anesthesia, Department of Cardiology, University of Clermont-Ferrand, Clermont-Ferrand, France.

Received for publication Feb. 12, 1998; accepted for publication March 18, 1998.

Address for reprints: Charles de Riberolles, MD, Department of Cardiovascular Surgery, Hôpital Gabriel Montpied, University of Clermont-Ferrand, B.P. 69, 63003, Clermont-Ferrand, Cedex 1, France.

J Thorac Cardiovasc Surg 1998;116:519-21

Copyright © 1998 by Mosby, Inc.

0022-5223/98 \$5.00 + 0 12/54/90506