Partial Sternotomy Technique Allows Use of Intraoperative Flexible Bronchoscope for Tracheomalacia Diagnosis

Parsiyel Sternotomi Tekniği Trakeomalazinin Tanısı için İntraoperatif Fleksibl Bronkoskopun Kullanımına Olanak Sağlar

Zafer Turkyilmaz[1], Ramazan Karabulut[1], Ebru Ergenekon[2], Gokcen Emmez[3], Berrin Isik[3], Ibrahim Hirfanoglu[2]
Teymursah Muradi[1], Melda Tas[2], Aysegul Simsek[3], Kaan Sonmez[1]

[1]Gazi University, Faculty of Medicine, Department of Pediatric Surgery, Ankara, Turkey
[2]Gazi University, Faculty of Medicine, Department of Neonatology, Ankara, Turkey
[3]Gazi University, Faculty of Medicine, Department of Anesthesiology and Reanimation, Ankara, Turkey

ABSTRACT

Tracheomalacia(TM) is a structural abnormality of the tracheal cartilage causing collapse of its walls and airway obstruction. We describe herein a 4 month–old case of TM associated with operated esophageal atresia with tracheoesophageal fistula. Intraoperative flexible bronchoscope was performed for diagnosis for TM during aortopexy operation via partial sternotomy .

Key Words: Tracheomalacia, flexible bronchoscope, esophageal atresia, aortopexy,

Received: 01.28.2019 **Accepted:**09.18.2019

ÖZET

Trakeomalazi (TM) trakeal kıkırdakta yapısal bir anormallik olup trakeal lümenin kollapsına ve hava yolu tıkanıklığına neden olur. Biz trakeaözofageal fistüllü özofagus atrezisi onarımı sonrası gelişen bir TM olgusunu tanımladık. TM tanısı için intraoperatif fleksibl bronkoskopi parsiyel sternotomi ile aortopeksi operasyonu sırasında yapıldı.

Anahtar Sözcükler: Trakeomalazi, fleksibl bronkoskop, özofagus atrezisi, aortopeksi

Geliş Tarihi: 28.01.2019 **Kabul Tarihi:**18.09.2019

INTRODUCTION

Tracheomalacia (TM) is a located or generalized weakness of the tracheal wall resulting in anteroposterior collapse during expiration or coughing. It is most frequently associated with oesophageal atresia(EA) with tracheo-oesophageal fistula (TOF)(1,2). This 4 months- old - infant was the first case of successfull aortopexy and using flexible bronchoscope via partial sternotomy(PS) and for TM in Turkey.

CASE REPORT

A 4-month-old male baby was operated our pediatric surgical clinic at first day of age for EA +TOF repair and multiple trials to extubate the child failed and became ventilator dependent. Computed tomographic scan of the thorax showed lower trachea above the carina was oblitared. We were decided to perform flexible bronchoscopy(FB) after weaning in the operation theater for dynamic assessment of TM. Oxygen was connected to the FB.

Address for Correspondence / Yazışma Adresi: Ramazan Karabulut, M.D. Gazi University Faculty of Medicine Department of Pediatric Surgery Besevler,06550 Ankara, Turkey E-mail: karabulutr@yahoo.com
©Telif Hakkı 2019 Gazi Üniversitesi Tıp Fakültesi - Makale metnine http://medicaljournal.gazi.edu.tr/ web adresinden ulaşılabilir.
©Copyright 2019 by Gazi University Medical Faculty - Available on-line at web site http://medicaljournal.gazi.edu.tr/
doi:http://dx.doi.org/10.12996/gmj.2019.106

The tracheal tube was then withdrawn over the bronchoscope to allow for assessment of trachea. The anterior tracheal wall near carina was seen to collapse with exhalation(Video 1). FB revealed significant TM. The tracheal tube was reinserted and aortopexy was performed via partial sternotomy(PS) technique. A final evaluation of the airway was made by FB for for the control of the adequacy of aortopexy. Trachea was seen not to collapse(Video 2). He was extubated first post-operative day. There was no problem in 3 months follow-up period.

DISCUSSION

In the literature, more than 90% of children with EA and TOF have some form of tracheomalacia(TM) of which 2–25% require aortopexy(3). The airway collapse may be attributable to congenital weakness and malformation of the cartilage rings causing anterior collapse, and with increase in the length of the posterior membranous muscle contributing to posterior airway intrusion. There was a decrease in the normal 4.5:1 circumference ratio of cartilage to membranous trachea and loss of normal "C" shape of the cartilages into more "U" shaped(4). Dilated upper esophageal pouch compressed the trachea *in utero* and altered its normal development(5).

Contrast-enhanced multidetector computed tomography can provide accurate axial, as well as reconstructions showing two and three-dimensional imaging of airway(4). Direct visual examination and dynamic assessment of the airway with FB has the advantages of detecting TM located in the upper one-third of trachea with improved diagnostic accuracy and identifying vocal cord dysfunction, laryngeal clefts and TEF. Additionally, FB results in less mechanical distortion of the airway than rigid bronchoscopy or endotracheal intubation(2,4, 6).

If symptomps are serious,TM is treated surgically. The most common surgical treatment method is aortopexy where the shared fascial investments of trachea and aorta and great vessels are utilised by transposing the aorta anteriorly to open and stabilize the trachea(6,7). Aortopexy was first published by Köylüoğlu et al. in Turkey. But they were performed pericardial flap aortopexy(8). Our aortopexy case is first done via PS technique for ventilator dependent infant in Turkey. In addition, PS is performed in the supine position. It allows direct visualization of the aorta, more accurate placement and directional pull of the sutures can be made with more effective elevation(7).

Tracheomalacia is diagnosed in all patients breathing spontaneously by means of flexible bronchoscopy and it shows the adequacy of the aortopexy or distortion of the trachea during intraoperetive period.

Conflict of interest

No conflict of interest was declared by the authors.

REFERENCES

1. Rijnberg FM, Butler CR, Bieli C, et al. Aortopexy for the treatment of tracheobronchomalacia in 100 children: a 10-year single-centre experience. Eur J Cardiothorac Surg 2018;54:585-92.
2. Torre M, Carlucci M, Speggiorin S, Elliott MJ. Aortopexy for the treatment of tracheomalacia in children: review of the literature. Ital J Pediatr 2012;38:62.
3. Ngerncham M, Lee EY, Zurakowski D, Tracy DA, Jennings R. Tracheobronchomalacia in pediatric patients with esophageal atresia: comparison of diagnostic laryngoscopy/bronchoscopy and dynamic airway multidetector computed tomography. J Pediatr Surg 2015;50:402-7.
4. Fraga JC, Jennings RW, Kim PC. Pediatric tracheomalacia. Semin Pediatr Surg 2016; 25:156-64.
5. Corbally MT, Spitz L, Kiely E, Brereton RJ, Drake DP. Aortopexy for tracheomalacia in oesophageal anomalies. Eur J Pediatr Surg 1993;3:264–6.
6. Abdel-Rahman U, Simon A, Ahrens P, Heller K, Moritz A, Fieguth HG. Aortopexy in infants and children--long-term follow-up in twenty patients. World J Surg 2007;31:2255-9.
7. Jennings RW, Hamilton TE, Smithers CJ, Ngerncham M, Feins N, Foker JE. Surgical approaches to aortopexy for severe tracheomalacia. J Pediatr Surg 2014;49:66-70; discussion 70-1.
8. Köylüoğlu G, Günay I, Ceran C, Berkan O. Pericardial flap aortopexy: an easy and safe technique in the treatment of tracheomalacia. J Cardiovasc Surg (Torino) 2002;43:295-7.

Links:

Video 1: The tracheal wall was seen to collapse with exhalation during preoperative flexible bronchoscope in supine position in operation theatre.

Video 2: The tracheal wall was seen not to collapse after the aortopexy prosedure via flexible bronchoscope.