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CLINICAL INFORMATION

Anesthetic management for surgery of esophagus atresia in a newborn with Goldenhar's syndrome

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Difficult airway;
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Abstract
Background and objectives: Goldenhar's syndrome is a polymalformative condition consisting of a craniofacial dysostosis that determines difficult airway in up to 40% of cases. We described a case of a newborn with Goldenhar's syndrome with esophageal atresia and tracheoesophageal fistula who underwent repair surgery.
Case report: We report the case of a 24-h-old newborn with Goldenhar's syndrome. He had esophageal atresia with distal tracheoesophageal fistula. It was decided that an emergency surgery would be performed for repairing it. It was carried out under sedation, intubation with fibrobronchoscope distal to the fistula, to limit the air flow into the esophagus, and possible abdominal distension. Following complete repair of the esophageal atresia and fistula ligation, the patient was transferred to the intensive care unit and intubated under sedation and analgesia.
Conclusions: The finding of a patient with Goldenhar's syndrome and esophageal atresia assumes an exceptional situation and a challenge for anesthesiologists, since the anesthetic management depends on the patient comorbidity, the type of tracheoesophageal fistula, the usual hospital practice and the skills of the anesthesiologist in charge, with the main peculiarity being maintenance of adequate pulmonary ventilation in the presence of a communication between the airway and the esophagus. Intubation with fibrobronchoscope distal to the fistula deals with the management of a probably difficult airway and limits the passage of air to the esophagus through the fistula.

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PALAVRAS-CHAVE
Síndrome de Goldenhar;
Fístula traqueoesofágica;
Atresia de esôfago;
Via respiratória difícil;
Fibrobroncoscópio

Manejo anestésico para cirurgia de atresia de esôfago em um recém-nascido com síndrome de Goldenhar

Resumo
Justificativa e objetivos: A síndrome de Goldenhar é um quadro de polimalformação que consiste em uma disostose craniofacial que determina uma via respiratória difícil em até 40% dos casos. Nós descrevemos um caso de um recém-nascido com síndrome de Goldenhar com atresia de esôfago e fístula traqueoesofágica para a qual foi realizada cirurgia de reparo.
Relato de caso: Apresentamos o caso de um recém-nascido de 24 h de vida com síndrome de Goldenhar. Ele apresentava atresia de esôfago, com fístula traqueoesofágica distal. Decidiu-se por uma cirurgia de emergência para reparo. Ela foi realizada sob sedação, intubação com fibrobroncoscópio distal à fístula, para limitar passagem do ar para o esôfago e possível distensão abdominal. Após o reparo completo da atresia de esôfago e ligadura da fístula, o paciente foi transferido para a unidade de terapia intensiva e intubado com sedoanalgesia.
Conclusões: O achado de um paciente com síndrome de Goldenhar e atresia de esôfago supõe uma situação excepcional e um desafio para os anestesiologistas, pois o manejo anestésico depende da comorbidade do paciente, do tipo de fístula traqueoesofágica, da prática hospitalar habitual e das habilidades do anestesiologista responsável, sendo que a peculiaridade principal é manter uma ventilação pulmonar adequada na presença de uma comunicação entre a via respiratória e o esôfago. A intubação com fibrobroncoscópio distal à fístula resolve o manejo da via respiratória provavelmente difícil e limita a passagem de ar para o esôfago através da fístula.

Introduction

Goldenhar's syndrome (GS) or oculo-auriculo-vertebral dysplasia was first described by von Arlt in 1845.[1] This is a polymalformative condition resulting from defects of the first and second branchial archs[1] consisting of craniofacial dysostosis, where we observe abnormalities of the eyes and cervical vertebrae, malformations of the ears and unilateral microthia, facial asymmetry, micrognathia,[2] epibulbar dermoid cysts[1] and other changes of the oral cavity, such as cleft palate and lingual change.[3,4] Although the incidence of GS is estimated at 1 in 5000 live newborns,[2,4] the association of esophageal atresia (EA) and this condition only occurs in 5% of these patients,[1] and is an exceptional combination.

Clinical case

We present a case of a 24-h-old newborn of 3.2 kg of weight with left unilateral microthia (Fig. 1), bilateral ureterocele and esophageal atresia with distal tracheoesophageal fistula (TEF). An emergency surgery was chosen to repair the EA and associated fistula. On examination of the airways, mild micrognathia and difficult opening of the mouth were found. As supplementary preoperative tests, a chest X-ray with nasogastric tube was performed, which confirmed the diagnosis (Fig. 2), along with blood count, biochemistry and coagulation study, transthoracic echocardiography and electrocardiography, which showed no changes.

In the operating room monitoring was performed with non-invasive blood pressure, pulse oximetry (SpO_2), and electrocardiogram. Under sedation with 2% sevoflurane, 0.1 mg IV atropine through a venous access with epicutaneous catheter was given to reduce oropharyngeal secretions, as well as 10 μg fentanyl. With the patient under spontaneous ventilation the fibrobronchoscope was introduced by mouth up to the opening of the glottis, and a rigid tube of 3.5 mm in diameter was inserted, being positioned distal to the TEF and near the main carina. The proper placement of the endotracheal tube (ETT) was confirmed by capnography and pulmonary auscultation, starting volume-controlled ventilation with a tidal volume of 8 ml kg^{-1} and respiratory rate between 17 and 20. To maintain the anesthetic, the concentration of sevoflurane was increased to 3% and 1 mg cisatracurium in doses of 6–9 μg of fentanyl were given, according to the need for painkillers.

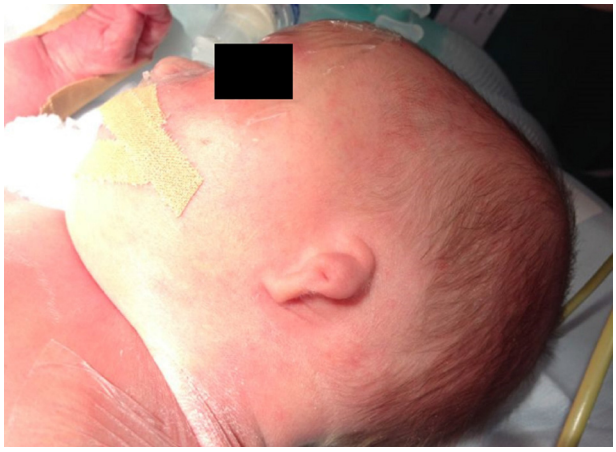

Figure 1 Patient with Goldenhar syndrome that has left unilateral microthia.

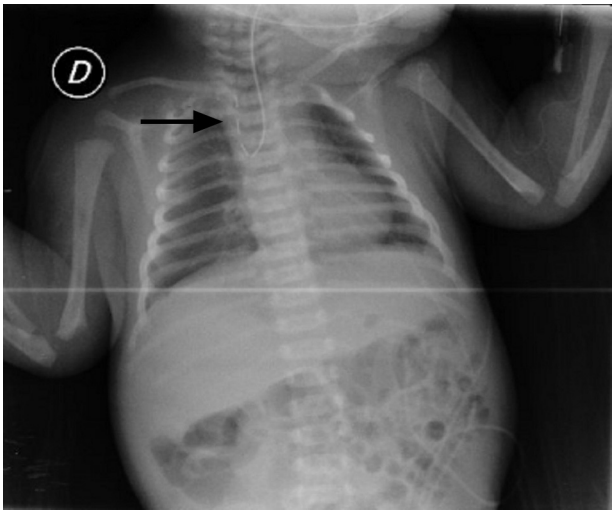

Figure 2 Radiological image showing a turn of nasogastric tube due to impossibility of advancing it in esophageal level.

During surgery the patient remained hemodynamically stable with a heart rate of 140–150 beats per minute and systolic blood pressure between 70 and 75 mmHg. The respiratory system kept SpO_2 at 90–95% which surprisingly reached values close to 100% after complete repair of esophageal atresia and ligation of the fistula. The surgery lasted 170 min with administration of 40 ml of crystalloids with no need for transfusions of blood products. Upon completion of the surgical procedure, he was transferred to the intensive care unit with sedoanalgesia, intubated and mechanically ventilated, with no complications.

Discussion

Craniofacial changes in GS can condition a difficult airway (DAW) in up to 40% of the cases,[5] mainly due to the combination of micrognathia, limitation of cervical joint movement, and tracheal shift.[5,6] This is a challenge for anesthesiologists and may require the use of alternative methods for the direct laryngoscopy to ensure proper airway patency, such as intubation with fibrobronchoscope,[6] the use of laryngeal mask LMA[4] and also the performance of tracheostomy with retrograde intubation.[4,5] A mandibular and craniocervical radiological evaluation before scheduled surgical procedures is recommended.[7] Other medical conditions associated with this syndrome, such as cardiac, tracheoesophageal, genitourinary anomalies, and mental retardment[1,2] should be ruled out.

The EA, with or without TEF, is the most common congenital esophageal anomaly, with an incidence ranging from 1 in 2500–4500 live newborns.[2] The classification of EA is determined by the location of atresia and the presence or absence of associated TEF. Five different types were described, so that EA with distal fistula assumes 85% of the cases.[8] The diagnosis of EA is confirmed by the inability to make a nasogastric tube move to the stomach, abundant oral secretions and coughing or episodes of cyanosis after food ingestion.[8] A chest X-ray with a nasogastric or orogastric tube can provide confirmation of the diagnosis.[8] Although Thomas Gibson had described EA associated with TEF in 1697, it was only in 1941 that Cameron Haight performed the first surgical correction of this problem.[9] Surgery to repair EA and TEF has important anesthetic implications[10] and is a challenge for anesthesiologists. Often, newborns may have respiratory diseases and associated cardiac malformations that, along with a weight of less than 2 kg, are risk factors for postoperative mortality and should be assessed prior to surgery.[10,11]

The main feature of the anesthetic management in this surgery is the maintenance of adequate ventilation in the presence of a communication between the airway and the esophagus, and desaturation episodes may occur during induction and during anesthetic maintenance. On the other hand, the performance of a thoracotomy may determine the presentation of hemodynamic and respiratory changes, and difficult maintenance of an appropriate level of analgesia.[10] The anesthetic management depends on patient comorbidities, the type of EA with or without TEF, the usual hospital practice, and the skills of the anesthesiologist in charge.

Newborns with TEF are at increased risk of gastric distension with potential risk of pneumoperitoneum[11] which can increase with the introduction of mechanical ventilation with positive pressure. During repair of TEF there are several alternatives for the maintenance of mechanical ventilation, such as left bronchial selective intubation,[11] assuming the risk of atelectasis, and intubation with fibrobronchoscope-guided placement of ETT distal to the fistula, which was the technique used in this case.[11] Both forms of ETT placement require close monitoring by the anesthesiologist in charge to detect a bad positioning of the tube during the procedure. Another technique that could be used is the occlusion of the fistula using a Fogarty catheter until its complete ligation.[12]

It is recommended that spontaneous ventilation is maintained through inhalation induction without neuromuscular blockade nor positive pressure ventilation until the correct placement of the ETT is achieved distal to the fistula[8] to avoid gastric hyperinflation. Other authors recommend maintaining spontaneous ventilation to the complete closure of the fistula to minimize gastric distension associated with positive pressure ventilation, with some anesthesiologists even recommending the performance of a gastrostomy before anesthetic induction to decompress the stomach and improve mechanical ventilation.[11,12]

In the case of GS, the finding of a DAW associated with EA with TEF could seriously impair oxygenation in these patients during anesthetic induction, significantly increasing the risk of respiratory complications that are already high due to the surgical procedure itself.

Conflicts of interest

The authors declare no conflicts of interest.

References

1. Ayuso Velasco R, Torres Aguirre A, Enríquez Zarabozo E, et al. Atresia de esófago en el síndrome de Goldenhar. Cir Pediatr. 2010;23:65.
2. Herranz Andrés P, Martínez Ubieto J, Gómez Gómez R, et al. Fibrobroncoscopia a través de mascarilla laríngea en un paciente con síndrome de Goldenhar. Rev Esp Anestesiol Reanim. 2001;48:97.

3. Ortega U, Bejar J, Martínez E. Management of anaesthesia and the airway in a child with Goldenhar syndrome. Rev Esp Anestesiol Reanim. 2012;59:110–2.
4. Sukhupragarn W, Rosenblatt WH. Airway management in a patient with Goldenhar syndrome: a case report. J Clin Anesth. 2008;20:214–7.
5. Ahmed Z, Alalami A, Haupert M, et al. Airway management for rigid bronchoscopy via a freshly performed tracheostomy in a child with Goldenhar syndrome. J Clin Anesth. 2012;24:234–7.
6. Ozlü O, Simşek S, Alaçakir H, et al. Goldenhar syndrome and intubation with the fiberoptic broncoscope. Paediatr Anaesth. 2008;18:793–4.
7. Altintas F, Cakmakkaya OS. General anesthesia for a child with Goldenhar syndrome. Paediatr Anaesth. 2005;15:529–30.
8. Passi Y, Sampathi V, Pierre J, et al. Esophageal atresia with double tracheoesophageal fistula. Anesthesiology. 2013;118:1207.
9. Pinheiro PF, Simões e Silva AC, Pereira RM. Current knowledge on esophageal atresia. World J Gastroenterol. 2012;28:3662–72.
10. Knottenbelt G, Costi D, Stephens P, et al. An audit of anesthetic management and complications of tracheo-esophageal fistula and esophageal atresia repair. Paediatr Anaesth. 2012;22:268–74.
11. Broemling N, Campbell F. Anesthetic management of congenital tracheoesophageal fistula. Paediatr Anaesth. 2011;21:1092–9.
12. Goswami D, Kachru N, Pant N. Difficult ventilation in a wide congenital tracheoesophageal fistula. Can J Anaesth. 2012;59:118–9.