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Extrathoracic Elongation in Esophageal Atresia with Very Distanced Cabes

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Summary

Esophageal atresia is one of the most frequent congenital malformations of surgical resolution in the neonatal care unit, in which the treatment consists of restoring the continuity of the esophageal lumen, but when this is not possible due to the distance between both ends, the Treatment becomes a real challenge for which various surgical techniques have been developed as an alternative. The results obtained when treating a patient with this pathology using the Kimura technique are exposed. This technique consists of an initial cutaneous esophagostomy, followed by extra thoracic elongation of the esophagus and finally the final esophageal anastomosis. Esophageal lengthening and definitive esophagoplasty were achieved in the patient.

Keywords: Kimura; Atresia; Esophagus; Long-gap; Extrathoracic elongation

Abstract

Atresia of the esophagus is one of the most frequent congenital malformations of surgical resolution in the neonatal care unit, in which the treatment consists in restoring the esophageal lumen continuity, but when this is not possible due to the distance between both ends, the treatment becomes a real challenge for which various surgical techniques have been developed as an alternative. We present the results obtained when treating a patient with this pathology using the Kimura technique. This technique consists of an initial cutaneous esophagostomy, followed by the extra thoracic elongation of the esophagus and finally the definitive esophageal anastomosis. The elongation of the esophagus and the definitive esophagoplasty were achieved in the patient.

Introduction

Of the surgical diseases of the newborn due to digestive congenital malformations, esophageal atresia (AE) is one of the most frequent in neonatal intensive care units. It is defined as a congenital malformation in which there is a disruption of the digestive tract at the level of the esophagus [1,2]. The survival of these patients has improved since 1941, where the first successful surgical correction of this pathology was given by Cameron Haight [3]. Esophageal atresias with a wide gap are those that are more than 5 cm apart between their atresic segments and whose treatment, in addition to being complex, is still highly controversial due to the different results and complications that they may have [4-7].

Anatomical Shapes

Type A Atresia of the esophagus with both blind esophageal ends without tracheoesophageal fistula 5–8%.

Type B Atresia of the esophagus with superior tracheoesophageal fistula and inferior blind end 0.5–1%.

Type C Atresia of the esophagus with lower tracheoesophageal fistula and upper blind esophageal line 80–85%.

Type D Atresia of the esophagus with tracheoesophageal fistula in both ends of the esophagus 0.5–1%.

Type E Fistula in H. It is a tracheoesophageal fistula without esophageal atresia 3–5% [2,3].

Waterston Forecast Classification

Class A Birth weight> 2500 g, without pneumonia and without associated malformations.

Class B 1. Birth weight between 1800 and 2500 g, without pneumonia and without associated malformations [2]. Birth weight> 2500 g, moderate pneumonia and congenital malformations.

Class C 1. Birth weight <1,800 2. Birth weight> 1,800 g, severe pneumonia and severe congenital malformations [3].

Treatment

Esophageal atresia is one of the pathologies in which its treatment has had the greatest evolution in pediatric surgery [8]. Regarding treatment, the objective of all pediatric surgeons is that the patient affected by this pathology has a permanently functional esophagus, trying to unite their atresic segments in the first instance [9], but when this cannot be done, treatment becomes highly controversial [4-7]. Elongation of the esophageal segments such as the Focker technique or spiral myotomy are one of the options to avoid using the native esophagus, which is ideal, and not replacements to decrease complications [3,5,9,10]. Kimura extrathoracic elongation consists of an initial cutaneous esophagostomy, followed by extraoracic elongation of the esophagus and definitive esophageal anastomosis [4-7]. The initial esophagostomy is performed at the level of the right anterior chest below the clavicle, extra thoracic elongations can be performed every 2 to 3 months. The patient is fed through a gastrostomy tube and simulated oral feeding is also performed until the final restoration of the esophagus continuity is made [11,12].

The original surgical technique consists of 3 steps:

Initial Cutaneous Esophagostomy

A transverse skin incision was made in the right anterior neck, immediately above the clavicle. The medial aspect of the sternocleidomastoid muscle was dissected, and the proximal esophagus was mobilized and exteriorized. A spiral myotomy of 2% revolutions was performed on the proximal esophagus, which yielded 2 cm of elongation.' A second skin incision was made in the right part of the anterior chest, 1.0 cm below the clavicle. A subcutaneous tunnel was created between the cervical and anterior chest wounds. The spirally myotomized esophagus was passed through this subcutaneous tunnel, with its distal end forming a cutaneous esophagostomy stoma. The distal posterior wail of the esophagus was anchored to the pectoralis fascia using 3-O silk sutures. The end of esophagus was sutured to the skin to form a cutaneous esophageal fistula. After this procedure, a tube gastrostomy was created for feeding. Two days after surgery, the baby was orally fed with regular formula, which was collected in a stoma1 bag and refed through the gastrostomy tube. The parents easily managed this feeding program at home.

Extrathoracic Esophageal Elongation

Six months after the initial operation, the first extrathoracic esophageal elongation procedure was performed. An 8F Foley catheter was placed into the esophagus via the cutaneous esophagostomy stoma, its balloon was inflated, and the esophagostomy was closed around the catheter by a purse-string suture. Through an elyptical skin incision around the esophagostomy. the esophagus was dissected and freed from the soft tissue of the anterior chest and neck, up to the cricoid cartilage level. The esophagus was tractioned downward, obtaining 2.0 cm of elongation. A skin incision was made 2 cm below the previous esophagostomy, and a subcutaneous tunnel was created between these two incisions. through which the esophagus was passed. The esophagus was affixed to the pectoralis fascia and skin, as before, to form a new cutaneous esophagostomy. The patient was fed 6 hours after surgery, and was discharged the next day. The identical procedure was repeated 2 months later, obtaining an additional 2.5 cm of elongation: this relocated the cutaneous esophagostomy 2 cm above the xyphoid process.

Definitive Esophageal Reconstruction

When the child was I year old, the esophagus was reconstructed. With the patient in the supine position, a Z-shaped skin incision was made in the anterior chest to expose the entire elongated proximal esophagus; under direct vision, the esophagus was mobilized up to the level of the cricoid cartilage. Attention was paid to preserve the esophageal branch of the inferior thyroid artery and to avoid injury to the recurrent laryngeal nerve. A space was developed bluntly between the trachea and the vertebral column, through which the esophagus was brought into the upper part of the posterior mediastinum. The wound in the anterior chest and neck was closed temporarily. The patient was then placed in the left lateral decubitus position. Under fluoroscopy, a no. 5 Hegar dilator was introduced via the gastrostomy into the distal esophageal segment and was secured to the skin with adhesive tape. A transpleural right thoracotomy was made in the fifth intercostal space. A channel was bluntly developed between the trachea and the vertebral column, through which the proximal esophagus was drawn into the mediastinum. The distal esophagus was easily identified with the aid of the Hegar dilator. The distal 2 cm of the elongated proximal esophagus was discarded because of marked scarring. The esophagus was reconstructed without tension by end-to-end anastomosis with interrupted 4-O Vicryl sutures. One week postoperatively. a fundoplication was performed because of severe gastroesophageal reflux complicated by esophageal anastomotic leakage. Three weeks later, oral feeding was begun. However, the anastomosis developed a stricture that did not respond to dilatation: it required segmental resection 6 months later. In the 3 years since this procedure, the child has been eating regular table food without any difficulty.

Clinical Case

Two-hour-old male newborn, 2400 gr, with no prenatal history or associated malformations, who arrived transferred from another health facility due to respiratory distress and difficulty in passing the orogastric tube.

An interconsultation was made to the surgery service, which at the time of the evaluation found a poorly perfused neonate, respiratory distress, subcostal, tachypneic drainage, saturating 89% with oxygen support by helmet; depressible soft abdomen, not excavated.

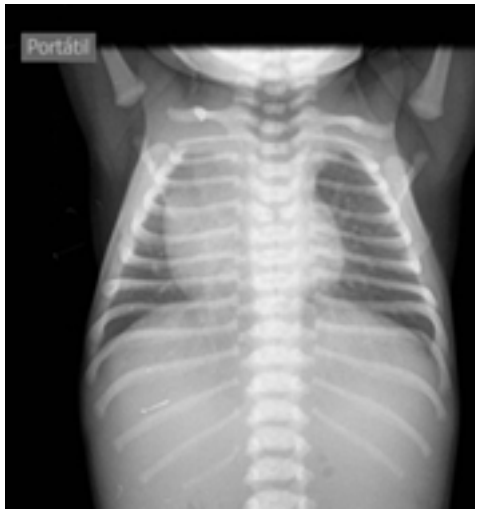

Figure 1: Portable chest x-ray showing the blind sac fundus at the level of 1-2 thoracic segment.

In this newborn child we was included in the routine evaluation of the chest and abdomen, echocardiogram with cardiological evaluation, pre-surgical blood tests and blood chemistry, blood gases that were with acceptable parameters so it is scheduled by the surgical service to perform the Kimura technique (It is suspected in type 1 atresia since there is no evidence of air in the stomach or intestine and at the time there was no bronchoscopy), which this time consists of an anterior right thoracic esophagostomy at the level of the 2nd intercostal space + gastrostomy. He is fed on the 2nd post-surgical day but on the 6th day of life he presents bilious vomiting, so he is scheduled for a diagnostic bronchoscopy on suspicion of a lower tracheoesophageal fistula, which is confirmed to be found 5cm from the carina; therefore it is reprogrammed to perform an enlarged right thoracotomy + ligation of the lower tracheoesophageal fistula. With this, the patient is fed 24 hours after surgery through a gastrostomy tube and is discharged on the 28th day of life.

The first extrathoracic elongation is scheduled by outpatient consultation and is performed successfully at 3 months of age, being discharged within 24 hours after surgery.

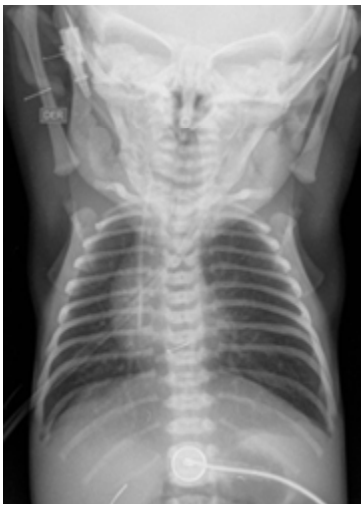

Figure 2: Portable chest x-ray after surgery of thoracotomy in which the lower tracheoesophageal fistula has already been linked.

It is proposed to perform another extrathoracic elongation in 3 months but the patient re-enters the 5th month of life due to a respiratory process needing support in the pediatric intensive care unit, during its evolution milk leakage is observed through esophagostomy, so it is programmed again for a Diagnostic bronchoscopy, in which it is possible to visualize recanalization of the tracheoesophageal fistula, therefore performing an enlarged right thoracotomy + removal of the esophagostomy + double ligation of the FTE (silk 2/0) + esophagoplasty with transanastomotic ngs (reabsorbable monofilament 4/0) + tube pleural drainage.

Saliva output was evidenced through an esophagostomy wound during its postoperative evolution in the PICU area, which later proved to be an upper esophageal fistula when tolerating the oral route, the same that decreases its secretion, so after evaluating Esophagogram is discharged by surgery and controls were performed by outpatient consultation.

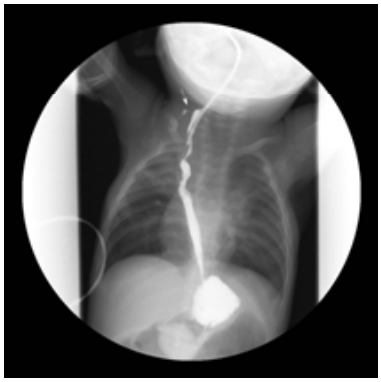

Figure 3: Esophageal transit showing esophageal patency and small upper esophageal fistula that does not coincide with the anastomosis site.

Discussion

The Kimura technique for esophageal atresia with widely spaced ends is a viable form of surgical treatment that offers the expected results when compared with the experience of Tamburri N. et al.

Conclusion

On this occasion, our experience with the presentation of a clinical case of an esophageal atresia with very distant ends in which it was impossible to perform an end-to-end anastomosis is shown, so the use of the technique developed by Kimura was taken as an alternative, resulting in a successful canalization of the esophagus that is patent and without stenosis, confirming as viable the extrathoracic elongation of the esophagus so that the end-to-end anastomosis of the esophagus can be performed at a later surgical time.

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