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EARLY DIAGNOSIS AND CLINICAL ANALYSIS OF TYPE III CONGENITAL ESOPHAGEAL ATRESIA COMPLICATED WITH TRACHEOMALACIA

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Abstract: To explore the type III congenital esophageal atresia (c ongenital esophageal atresia, CEA) Combined tracheomalacia (tra- cheomalacia, TM) Early diagnosis method and clinical outcome, providing clinical diagnosis and treatment experience for CEA combined with TM. This article collects from November 2019 to 2020 Year In September, Guangzhou Women and Children's Medical Center was admitted to the Neonatal Surgery Intensive Care Unit and underwent electronic bronchial surgery before operation. Clinical data of patients with type III CEA examined by endoscopy, 15 patients who underwent electronic bronchoscopy before and after esophageal repair Airway assessment results and clinical outcomes were retrospectively analyzed. 15 male 12 Example, female 3 example; Gestational age at birth (34 ~ 40.6) weeks, the median gestational age at birth was 38.3 week; 7 Case (46.7%) Esophageal stricture present, 5 example(33.3 %) Imaging studies suggest gastroesophageal reflex stream; 14 cases (93.3%) Combined TM (2 cases were mild, 10 For moderate, 2 For example, severe), 8 Postoperative 1 monthly reassessment tm Comparing More obvious before, 3 cases were moderate TM, 5 cases were severe TM. 4 cases (26.67%) Postoperative asymptomatic; 11 example(73.33%) manifested as phlegm, choking Cough, cyanosis, shortness of breath, milk refusal, suffocation, etc. 2 cases of suffocation after eating were successfully rescued. During the follow-up period, there was no recurrence of esophagotracheal fistula. No anastomotic leak and hiatal hernia occurred. TM is a common complication of CEA and is Occurrence of respiratory tract-related symptoms after CEA surgery An important reason for the high rate, electronic bronchoscopy can diagnose and evaluate TM early to guide clinical treatment. TM can cause life-threatening In case of incidents, long-term respiratory follow-up is recommended for timely treatment.
Keywords: Esophageal atresia; Esophageal atresia; Esophageal Atresia; Tracheomalacia; Treatment outcome

1 CLINICAL DATA

Congenital esophageal atresia (congenital esophageal - atresia, CEA) with or without esophagotracheal fistula is a common congenital Tube deformity, the incidence rate of 1: 4 000 ~ 1:2 500. With recent years Medical Technology Development, CEA The survival rate was significantly increased, reaching 90% Above, but the airway problem still affects the medium and long-term survival of CEA patients of quality host reason element, of which gas Tube soft change(tracheomalacia, TM) is a common respiratory comorbidity in patients with CEA and is also a The main cause of late death in patients [1-7].
TM is due to the tracheal cartilage and (or) Aggravated tracheal collapse caused by structural abnormalities of the posterior membrane, including decreased longitudinal elastic fibers in the membrane and (or) atrophy, or loss of cartilage integrity making the airways softer and more It is easy to collapse with the change of pressure [8]. There are studies reporting 62% ~ 90% of CEA patients are complicated with TM, among which severe TM The prevalence of 11%～33% ; Compared with CEA alone, TM exist CEA combined esophagus Tracheoesophageal fistula, TEF) disease in patients The rate is higher [9,10]. Early identification of TM and targeted treatment can Can help prevent serious complications (such as asphyxia) caused by TM.
Bronchoscopy is DiagnosticTM The gold standard, where the soft The advantage of bronchoscopy is that it can avoid general anesthesia and reduce the need for Interferes with tracheomalacia assessment, direct visualization of airway and dynamic assessment The preferred way of airway [11]. At present, most scholars believe that more than 50% of luminal stenosis with dyspnea is the diagnosis TM standard. big Most TM patients have more than 75% tracheal lumen collapse, of which The proportion of patients with complete tracheal collapse reached 33% [8]. This study retrospectively analyzed the clinical data and preoperative and postoperative data of patients with CEA combined with TM. Post-Bronchoendoscopy Findings to Explore Type III CEA Merger tm Early diagnosis and clinical outcome of CEA MergerTM - supply Clinical diagnosis and treatment experience.
In 2019 11 month to 2020 Year 9 Women and children in Guangzhou Admitted to the Neonatal Surgery Intensive Care Unit of Children's Medical Center and preoperatively Fifteen Cases of Type III CEA Undergoing Electronic Bronchoscopy patient for the research object. Exclusion criteria: body weight <2 kg ; combined serious infection (such as sepsis, etc.); combined with severe congenital heart defects; merge first congenital pulmonary dysplasia.

2 INSTRUMENTS AND METHODS

Using OlympusXP 260F Electronic bronchoscopy, perfected before operation Routine examinations such as blood routine, coagulation four items, and chest X-ray; 1% lidocaine nebulized, midazolam 0.2 intravenously mg/kg sedation. patient Take the supine position, monitor the vital signs routinely, and use an outer diameter of 2.8 mm O- lympus-XP 260F The

electronic bronchoscope enters the mirror from the nostril, evaluates the TM situation gradually from the glottis, and looks for abnormal openings of the airway.

3 TM - ASSESSMENT AND DATA COLLECTION

Airway assessment method: Using criteria based on dynamic airway assessment The chemical TM scoring system determines the preoperative and postoperative TM scores, according to the above (T1), Medium (T2),Down(T3) 3 The degree of airway patency in each region improves Row evaluation (picture 1) [12]. Mild degree of tracheal collapse during exhalation (Collapse 50%～75%), Moderate (75%～90% collapse) and severe (collapse > 90%), see Figure 2 [8]. Airway Assessment by Neonatal Surgical Intensive care unit physicians and surgeons 1 completed together, with The general information of patients, electronic bronchoscopy results, clinical Symptoms and time of onset.

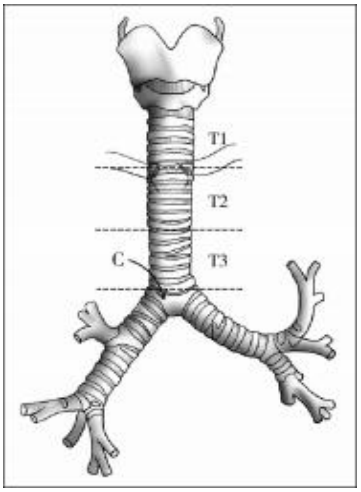

Fig. 1 The trachea was assessed according to to it's anato mic regions

4 STATISTICAL ANALYSIS

Using SPSS 22.0 software for statistical analysis. Measurement data The material is mean ± Standard deviation (x ± s) Indicates that non-normally distributed measurement data are represented by the median (minimum value ~ maximum) [M (min, max)]surface Shown, the count data is represented by composition ratio (%) express.

5 CONCLUSION

5.1 15 Cases of Type III CEA General Condition of the Patient

15 Example male 12 Example, female 3 Example; IIIa type CEA 4 Example, IIIb 11 example; Gestational age at birth (38.0 ± 1.8) week, birth weight (2.80 ± 0.46) kg, premature infant 3 Example, low birth weight infant3 example. 5 Among the cases combined with other deformities, 1 Tetralogy of Fallot and anal atresia in 1 case, horseshoe kidney in 1 case, upper extremity deformity in 1 case, 1 case For example, polydactyly, 1 Absence of left branch of portal vein. The median duration of ventilator-assisted ventilation was 24 h (15 h to 24d), the median length of hospital stay 12 d (9 ~44 d). All patients were asymptomatic when discharged from the hospital, and no fiberoptic bronchoscopy indicated Therefore, fiberoptic bronchoscopic review was not performed when discharged (see Table 1).

5.2 Tracheal Assessment Results and Clinical Outcomes

15 cases of type III CEA Of the patients, 14 example(93.33%) TM exists, where 2 Example for mild TM, 10 Example for moderate TM, 2 Cases of severe TM; 8 Postoperative 1 Months due to phlegm, cough, cyanosis, shortness of breath, milk refusal, suffocation hospitalized, and reassessed, TM All were worse than preoperative, of which 6 cases were severe, and 2 cases were severe. Moderate. 2 Preoperative diagnosis of severe TM Postoperative fiberoptic bronchoscopic examination of the patient is still severe Spend. Postoperative follow-up 2 months to 1 year 7 Case (46.7%) There were esophageal strictures, 5 cases (33.3%) Imaging studies suggested gastroesophageal reflux. During the follow-up period, there was no case of esophagotracheal fistula, anastomotic leak and esophageal fissure. foramen hernia. 4 cases (26.67%) were asymptomatic during postoperative follow-up; 11 cases (73.33%) Phlegm, cough, cyanosis, shortness of breath, milk refusal, choking information, of which 2 example(18.2%) Asphyxia occurred after eating, and both were rescued successfully. The 2 patients had no lung infection, and both had esophageal strictures. Periodically adjust to continuous pumping of food through the gastrostomy to avoid re-choking occur. See Table 2.

Table 1 General data of 15 patients with congenital esophageal atresia

case number	gender	Types of Esophageal Atresia	Combined with other deformities	Gestational age at birth (week)	birth weight (g)	ventilator use time(h)	hospital stay (d)
1	male	IIIb	-	38 + 2	2 350	26	16
2	female	IIIb	-	38 + 2	2 750	19	12
3	male	IIIb	-	39 + 2	3 285	15	12
4	male	IIIb	horseshoe kidney	39 + 1	2 800	19	9
5	male	IIIb	upper limb deformity	39 + 5	2 670	20	12
6	male	IIIb	-	34	2 000	twenty four	12
7	male	IIIb	-	38 + 4	3 700	twenty four	10
8	male	IIIb	-	37 + 6	3 100	16	13
9	male	IIIb	-	39 + 1	3 050	38	11
10	male	IIIb	-	36	2 600	33	11
11	female	IIIb	-	38	2 520	39	10
12	male	IIIa	multi-fingered	40 + 4	3 000	87	14
13	female	IIIa	absence of left portal vein	35 + 1	2 220	twenty three	15
14	male	IIIa	-	38 + 5	2 500	twenty four sky	44
15	male	IIIa	Tetralogy of Fallot, anal atresia	37 + 5	3 400	7 sky	17

Table 2 Assessment of tracheomalacia and clinical outcomes

case number	Preoperative tracheal collapse ratio (%)			Preoperative Evaluate result	Postoperative tracheal collapse ratio (%)			postoperative Evaluate result	esophagus narrow	Gastroesophagus regurgitation	Symptom onset time	symptom
	T1	T2	T3		T1	T2	T3					
1	50	45	90	Moderate					none	have	postoperative 1 week	Intermittent phlegm, coughing
2	85	45	80	Moderate	65	45	45	Moderate	have	none	Postoperative 1 month	Repeated phlegm, coughing
3	85	70	75	mild					none	none		asymptomatic
4	50	55	80	Moderate					none	none	postoperative 4 months	Intermittent phlegm sounds, even during sleep
5	95	95	95	normal					none	none		asymptomatic
6	80	50	75	Moderate	80	45	50	Moderate	have	none	postoperative 1 week	Phlegm sound, cyanosis after breastfeeding
7	80	60	85	Moderate					none	none		asymptomatic
8	80	75	50	Moderate	25	15	45	severe	have	have	Postoperative 1 month	Milk refusal, cyanosis, poor response
9	80	40	40	Moderate					none	none		asymptomatic
10	80	50	75	Moderate					none	none		Intermittent phlegm
11	50	25	70	severe	25	50	65	severe	have	have	postoperative 2 months	Repeated coughing, phlegm, shortness of breath and cyanosis
12	80	70	70	mild	65	45	60	Moderate	none	have	3 weeks after surgery	Intermittent phlegm, shortness of breath
13	90	70	40	Moderate	70	15	10	severe	have	none	postoperative 2 months	Choking after eating, shortness of breath, cyanosis
14	30	10	70	severe	25	10	50	severe	have	have	After weaning	Choking after eating, repeated phlegm, cyanosis
15	80	60	50	Moderate	50	10	20	severe	have	none	postoperative 2 week	Phlegm noise after eating, aggravated when lying down

6 DISCUSSIONS ARGUMENT

TM is the most common of the airway abnormalities associated with CEA, occurring The prevalence rate is 62% to 90% [5-7]. There are literature reports in 158 Example is different In patients with type CEA, the incidence of TM was: Type I is about 67%; Type II is about 67%; Type III approx. 94.9%; Type IV approx. 75% [13]. This study Type III CEA in, TM The incidence rate is as high as 93.3%,by Mostly mild to moderate TM, consistent with the results reported in foreign literature. TM pass Usually refers to the abnormal development of tracheal cartilage and (or) membranous muscle Long, resulting in the lack of normal stiffness of the trachea and easy tracheal cartilage ring curved and (or) Tracheal collapse due to posterior membrane softening. Bronchoscopy Inspection is DiagnosisTM gold standard for CEA Merge™ suffer from For patients, preoperative bronchoscopy can not only assess whether the combined TM, can also rule out laryngotracheal malformations, find tracheoesophageal fistulas side by side Removal of other fistulas, and proper placement of the endotracheal tube into the fistula and carina between. currently about CEA MergerTM - The mechanism of occurrence is as follows Several hypotheses: ① Early research by Emery et al. [14] found that about 80% The membranous part of the trachea of CEA patients contains esophageal muscle and squamous epithelium, only This phenomenon occurs in 2% of normal infants, so it is proposed that TM hair Growth may be caused by misdifferentiation of primitive foregut. ② Davies et al. [15] put forward the view that the expansion of the proximal esophageal sac presses the trachea in the uterus and changes its normal development. ③Wailoo [16] put forward CEA patients may lose normal intratracheal pressure in utero through TEF force, leading to more relaxation of the trachea; the study found that patients with type III CEA have a higher incidence of TM, further confirming this hypothesis. All cases included in this study were type III esophageal atresia, 93.3% of them of patients TM, 2 cases were severe TM. 15 8 of the patients Postoperative 1 month again evaluation times, TM All were significantly worse than before operation. The reason is that the first First, it is related to the relaxation of the primary tracheal membrane leading to TM ; second, CEA Abnormal esophagotracheal septa may form after repair, and intraoperative Abnormal tracheal cartilage rings formed at the repaired tracheal fistula, postoperative invasive TM can be aggravated by high airway pressure under ventilation ; studies have found that more than 91% of TMs occurred after CEA surgery [17] ; the third part CEA Patients with gastroesophageal reflux and esophageal stricture, the size of the esophagus will vary With swallowing, gastroesophageal reflux, and esophageal strictures or obstructive lesions The appearance and enlargement, and then compress the trachea. tm Clinical symptoms are nonspecific, and most patients with TM show Metallic or barking cough and expiratory sounds, and repeated breathing may also occur respiratory distress, wheezing, cyanosis and spontaneous neck hyperextension [18]. Research found that most TM patients until 2 ~3 Symptoms only appear at the age of month symptoms, while coughing, crying, and feeding may be caused by esophagus dilatation and The activity of squeezing the trachea aggravates the symptoms [13]. Second, excessive collapse of the trachea Response after trap leading to ineffective ventilation and obstructed drainage of airway secretions Recurrent lung infection can affect the patient's growth and development. A study followed up CEA patients to 8 years old and found that 27% of patients developed bronchiectasis as a result. Another part of the combined serious TM The patients showed that the endotracheal intubation could not be successfully extubated after CEA repair. The study found 60.7% of CEA Patients with persistent respiratory symptoms, 11% ~ 33% of patients had severe TM symptoms, such as acute life-threatening Events or transiently resolved unexplained events, apnea and asthma-like symptoms shape, about 4% of patients died due to untimely rescue [7,19]. The symptoms of many patients with mild to moderate airway collapse can be improved at the age of 1 or 2 [13]. Acute life-threatening events may occur in some severe patients, May be associated with airway abnormalities, gastroesophageal reflux, esophageal strictures, and cardiovascular Abnormally related. In this group of cases, 2 Sudden choking after feeding recovered after active rescue, the 2 All patients had esophageal strictures, Gastroesophageal reflux and TM, later adjusted to continuous pump through gastrostomy Choking did not occur after breastfeeding.

For CEA, it is necessary to carefully distinguish between TM and recurrent esophagotracheal fistula and severe gastroesophageal reflux. When these three exceptions occur in the same instance When the patient is in the body, it is recommended to repair the recurrent esophagotracheal fistula first, and then correct the Positive TM, anti-reflux drug therapy can be implemented throughout the treatment process, strictly In severe cases, consider anti-reflux surgery. There was no case of food in this group Recurrence of tracheal fistula, no severe gastroesophageal angiography found after operation Reflux, combined with fiberoptic bronchoscopy findings, consider TM cause suffocation likely. Studies have found that in 3 ~28 Month-old TM patients In 70% of cases, gastroesophageal reflux is present, and gastroesophageal reflux may be secondary TM one of the causes of TM, while 26% of TM patient table Gastroesophageal reflux symptoms are now [8]. There are 5 in this group Patient Imaging Results suggestive of gastroesophageal reflux, 1 Cases not performed due to mild symptoms Fiberoptic bronchoscopic evaluation, 4 cases found 2 exacerbations of TM, 2 No change; and otherwise 4 Gastroesophageal regurgitation not indicated by imaging studies Among patients with flow and fiberoptic bronchoscopic review, 3 No exacerbation of TM in one case, exacerbation in one case. Due to the small number of cases in this study, the follow-up time was relatively short short, gastroesophageal reflux with tm The relationship between one step Research.

Studies have suggested that 2% to 36.5% of CEA MergeTM Patients need surgical correction of TM, the common surgical methods are aortic fixation, Posterior tracheal wall fixation, airway stent placement, etc.. aortic fixation The average age of Dingshu is 7 months, and its indications are: ① growth difficulties Difficult, with more than 3 severe respiratory infections requiring hospitalization in one year; ②Bronchoscopic examination shows that the trachea collapses completely when coughing, and the movement is immobile. Tolerance or bronchiectasis occurs ; ③Bronchoscopic examination suggests obstruction In the case of TM, hard and soft endoscopic examinations are required to evaluate the tracheal shape and the degree of TM [17]. Some cases require multiple aortic fixations to treat tracheal collapse.

In recent years, some scholars have proposed preoperative electronic therapy for CEA patients. Bronchoscopy, if there is hypertrophy of the membranous muscles of the trachea For severe TM, it can be performed at the same time as the first CEA esophagotracheal fistula repair. Thoracoscopic posterior tracheal fixation can effectively improve TM of Clinical symptoms and tracheal collapse [12,18-21]. But the method Has not yet been carried out in China, electronic bronchoscopy evaluation TM of The process also needs further step specification. Airway stenting is currently Widely used to treat TM in adults, but for infants and young children, because the size of the inner diameter of the airway will change with growth and development, clinically common stents are rarely used in infants and young children. Recent studies have suggested that biodegradable The solution airway stent is suitable for infants and young children, but it is mainly based on case reports. Gastrostomy prevents food from expanding the esophagus and squeezing the trachea during feeding, And can reduce gastroesophageal reflux, thus can relieve TM symptoms.

This study was limited by its retrospective design, in assessing tracheal collapse There are the following defects when it is trapped: First, when the electronic bronchoscopy is blocked Obstructed airway, increases airway pressure, may reduce detection of TM chance of; Second, it may be subjective when assessing tracheal collapse. This study was conducted by One neonatal surgical intensive care unit doctor and one surgeon each joint assessment to minimize errors ; third, subject to electronic bronchoscopy image distortion caused by instrument effects, lens curvature and orientation can be can affect the evaluation results ; fourth, in the results of electronic bronchoscopy, Effects of left and right branch bronchi and respiratory rate may lead to Tube Collapse Affects Assessment Results. Nevertheless, electronic - Tubeoscopy is still the diagnosisTM The gold standard for guiding clinical The treatment has a certain practical value, and it needs to be more accurate and regular in the later stage. to guide the assessment criteria and measurement methods of CEA MergerTM - of treat.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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