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Long-Term Results of Treatment of Esophageal Burns in Children

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Abstract Burns of the esophagus with chemical compounds in children are the most common type of traumatic injury to the esophagus. Burns occur after swallowing concentrated solutions of alkalis and acids. The most often affected are children aged 1 to 3 years, who, due to adult oversight, taste everything.

Keywords Burns, Solutions, Acids, Kids, Esophagus, Traumatic injury

1. Introduction

It was noted that when a chemical burn was confirmed, complaints of anxiety and hypersalivation prevailed (in 42.9% of cases) ($p<0.05$), the absence of complaints was observed in 27.1% of cases. complaints about the child's anxiety and hypersalivation in 53.5% of cases ($p<0.05$). Poisoning with salt-forming agents ("medium" degree aggressiveness) was manifested by anxiety, hypersalivation, pain in the oropharynx and abdomen in 22.3%. When exposed to substances with a "high" degree of aggressiveness (dehydrators and corrosives), combined symptoms prevailed in 70.3% ($p<0.05$) all patients remained relatively satisfactory. At the same time, an increase in its peristalsis, local spasms and swelling, a short-term retention of food in the expanded, tortuous loops of the intestine and their slow emptying into the stomach, and diarrhea were periodically observed.

All patients did housework and light work, but the cosmetic effect of the operation always caused a depressed mood. To restore the patency of the esophagus we used the following tools methods: bougienage of the esophagus and dilatation. In order to influence the tissues of stenosis, methods of endoscopic chipping with glucocorticosteroids, endoscopic dissection were used scar tissue. All these methods assume the absence of surgical intervention on the esophagus. Esophageal bougienage is the most common treatment for strictures esophagus. We used bougienage under direct esophagoscopy along the guide.

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The children under observation underwent bougienage of the esophagus along the guide 192 children. In 135 (70.3%) children, recovery was noted, without the formation of stenosis of the esophagus, 41 (21.35%) children developed cicatricial narrowing of the esophagus. Complications during bougienage were noted in 16 (8.33%) children (parents did not adhere to the treatment regimen). 35-45 years after the operation, 3 patients went to the clinic due to dysphagia and the presence of a fistula in the area of the esophago-intestinal anastomosis on the neck. During the examination, cancer was diagnosed. One of them had a jejunostomy on the chest below the esophago-intestinal anastomosis, the other had a gastrostomy. The case history of the third patient is given in detail.

Morphological changes in the esophagus depend on the depth of damage. It is generally accepted to distinguish between three degrees of chemical burns. The first degree (mild) is noted when the surface layers of the epithelium are damaged and is characterized by desquamative esophagitis. In this case, only hyperemia and swelling of the mucous membrane is observed over a greater or lesser extent. There are no fibrinous overlays on the mucous membrane. The second degree (moderate) is characterized by damage to the mucous membrane and partially to the submucosal layer. There is a pronounced edema, fibrinous deposits covering the necrosis of the epithelial lining of the mucous membrane. The third degree (severe) is characterized by damage to all layers of the esophagus. Necrosis also captures the muscle wall, edema can spread to paraesophageal tissue. Deeper (than with second degree burns) ulcers are covered with dense fibrinous overlays. With such degrees of burns, the development of complications is possible - perforation of the esophagus, mediastinitis and pleurisy. Morphological

changes have a certain dynamics over time, different depending on the degree of burn.

During fresh burns of the esophagus, four stages are distinguished:

1) hyperemia and edema of the mucous membrane;
2) ulcers, both superficial and deep;
3) granulation;
4) scarring.

With first-degree burns, there is only one stage. Within 7-10 days, acute inflammatory changes subside, the epithelium is restored; scarring and narrowing does not occur. Two stages are characteristic of second-degree burns. Starting from the 2nd week, superficial ulcerations and erosions of the esophageal mucosa are cleared of fibrin deposits, and by the end of the 3rd week, the epithelial layer is completely restored. Only in isolated cases is it possible to form tender superficial scars that do not narrow the lumen of the esophagus.

With third-degree burns, all stages are observed. Unlike burns of the second degree, the cleansing of the bottom of deep ulcers is delayed and, starting from the 3rd week, ulcers begin to fill with granulations. At first, the granulations are lush, loose, bleed easily, from the 4-5th week they begin to be replaced by connective tissue. The terms of scarring have individual characteristics, but in most cases, scars are formed by the 6-8th week. Sometimes the process of scarring is delayed for 3-4 months.

Experimental and clinical studies have shown the high efficiency of the medicinal mixture based on the polymer-reencounter in the treatment of severe chemical burns of the esophagus in children. In a comparative assessment of the results of the treatment of chemical burns in the experiment and the clinic, a significant acceleration of regeneration processes was noted when using a new drug mixture based on the polymer-reencounter in relation to the fat-hormonal mixture. When using medicinal mixtures in the treatment of chemical burns of the esophagus II-III degree, it was possible to avoid the formation of cicatricial stenosis in 85.5% of children, and in 32 children treated with a new composition of the mixture based on reencounter, stenosis occurred only in one case, and the rest 31 (96.9%) the child recovered.

The most formidable complication of conservative treatment of post-burn cicatricial stenosis of the esophagus (PORSP) is its perforation or rupture with the development of mediastinitis. In esophageal perforation, emergency dissection of the esophagus with gastrostomy and cervical esophagostomy is the operation of choice. Treatment of PORSP by endoscopic bougienage and dilations should not be performed for more than two years. Shunt esophagocoloplasty is the operation of choice in patients with PRRS.

The dynamics of the endoscopic picture in the treatment of chemical burns of the esophagus II - III degree in children with a new mixture based on the polymer-reencounter showed a faster subsidence of the inflammatory process in the damaged organ and an acceleration of the epithelization of the burn surface.

Where cicatricial stenosis of the esophagus is formed, which is not amenable to conservative methods of treatment (14 patients), the method of indirect bougienage was effectively used after the application of a gastrostomy according to Witzel-Yudin-Ternovsky in combination with the use of medicinal mixtures.

Bougienage of the esophagus along a metal guide wire with hollow elastic bougie was developed and introduced into surgical practice in 1965. Bougienage along a guide wire is widely used in Russia, especially if the procedure is performed for the first time. The technique consists in smoothly lowering a hollow bougie through a stricture along a metal string passed into the stomach under X-ray control.

Burns of the esophagus in children occur due to accidental ingestion caustic chemicals that are stored in places accessible to the child.If adults are more likely to experience poisoning due to deliberate ingestion large amounts of a caustic chemical, then children are dominated by local changes in the oral cavity, pharynx and esophagus. All caustic liquids are unpleasant taste, so children swallow a small amount and the combination of burn and poisoning is quite rare.

Chemical burns in children can be caused by caustic soda (caustic soda or substances containing it, such as office glue); acetic essence, ammonia, technical acids (sulphuric, hydrochloric, nitric acids, as well as battery fluid); potassium permanganate crystals, etc.

The depth and severity of the burn of the esophagus depend on the concentration, nature chemical substance, its quantity and time of contact with the mucosa shell. The last two factors determine the extent of the burn of the esophagus. When the esophagus is damaged by acids that have a coagulating action, absorption of water from tissues occurs with the formation of coagulation necrosis. The resulting scab prevents further penetration of acid deep into tissues. The depth of the lesion depends mainly on the concentration and acid exposure time. When taking a significant number of acids, especially inorganic, a burn of the stomach wall is possible, since, getting into stomach, concentrated acid is not neutralized. We observed cases of perforation and cicatricial changes in the stomach when taking technical acids.

The metal conductor prevents the tip of the bougie from deviating to the side, which reduces the likelihood of perforation of the esophageal wall and bleeding. In 89% of cases, this method allows dilatation of the esophagus. Modern hollow thermoplastic bougies from various manufacturers are equipped with slippery and super-slippery guide wires with atraumatic ends, which reduce the percentage of unsuccessful procedures for inserting a guidewire beyond the stricture site, and generally reducing the number of palliative operations.

Passing the string into the stomach is possible under the control of a laryngoscope and through the biopsy channel of the endoscope, which allows you to bring the string directly to the narrowing zone under visual control with an objective

assessment of the stricture zone and the esophagus immediately after the bougienage session, consider string bougienage with endoscopic control to be safe in 98.9% of cases, while the manipulation does not require X-ray control and has a minimal complication rate. to create and widely introduce the method of balloon dilatation for the prevention and treatment of PRSP. Balloon pneumo- and hydro dilation are distinguished depending on the state of aggregation of the substance used to create compression in the balloon.

When performing balloon dilatation, 88.5% of patients had a good effect, and the remaining 11.5% had a satisfactory effect; no complications and unsatisfactory results were noted. The preventive effectiveness of balloon dilatation, according to different authors, varies from 11.6 to 96.15%. According to E.A. Godzhello et al. (2013), balloon dilatation is inferior to bougienage, as it is effective only for short cicatricial strictures, ineffective for rigid strictures, requires balloon exposure in the esophagus, but is recommended for piroplasm and cicatricial strictures of colorectal anastomoses. Stenting is a modern direction in the treatment of PRSP, however its effectiveness is estimated differently by the authors and is limited by a small number of observations. The high frequency of severe complications (exacerbation of esophagitis, decubitus ulcer with perforation, bleeding) hinders the development of this method. With the advent of new self-expanding metal esophageal stents in the early 1990s, as they are simpler and safer to use, the possibilities of stenting have expanded.

Clinical and experimental studies using self-expanding stents partially or completely covered with various materials have shown a decrease in dysphagia in 48-100% of patients with PRSP, as well as a decrease in the likelihood of pressure ulcers of the esophagus and periesophageal reaction. To date, metal (nitinol) stents, resorbable stents are most widely used polydioxanone and silicone stents. Stents installed in the esophagus exert continuous, uniform and dosed pressure on granulations and young connective tissue, thereby preventing the development of coarse fibrous tissue that narrows the lumen. A.V. Klimashevich (2014) indicates an increase in good long-term results of PRSP treatment by stenting by 35.9% compared with bougienage and a decrease in unsatisfactory results by 27.1%.

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