

B.Tsutskiridze, S.Jaiani, D.Chakhunashvili, G.Chakhunashvili, N.Kvitsiani (Tbilisi, Georgia)

Usage of endoscopy in diagnostics and treatment of critical patients

Abstract:

The article describes the usage of endoscopy methods for diagnosis and treatment. The information on complications linked to such interventions is provided. The conclusion suggests more frequent use of endoscopic methods in Critical Care Medicine.

Keywords: Endoscopy, diagnostics, treatment

Introduction:

By widening the capabilities of the modern endoscopic apparatuses and methods in treating and diagnostics of patients in critical condition, the new opportunities of early diagnosing, prevention and improvement of healing results have opened up [1, 2, 6, 10, 12].

One of the most important problems in the modern medicine is the prevention and treatment of the broncho-pulmonary complications in the patients with critical condition. The most important place among those belongs to the ventilator-associated pneumonia (VAP). Because of rising of the resistant microflora, lowering of effectiveness of antibiotics, increase of the allergic reactions on them and lack of efficiency of other resources, the problem of treating these diseases in the modern conditions are extremely actual. VAP frequently occurs in patients who are on the artificial lung ventilation, at the same time, after the 3rd day of intubation, the risk of developing this disease rises by 1% each day. According to the data of various authors, the development of the above mentioned disease is observed in the 70-90% of the patients. They most frequently occur in the critically ill patients, especially in the patients with stroke, heart and respiratory failures, polytraumas and endotoxic shock. The necessity of improving the methods of treatment of VAP, especially those with serious concomitant pathologies, is caused by the unsatisfying data of treatment, high cases of mortality [2, 3, 5, 6, 8, 11, 14].

Another important problem is the development of the acute stress symptomatic ulcers, which also occur in the critically ill patients which was caused by serious traumas, acute diseases of different organs, serious surgical interventions. In these cases, the stroke, collapse, oxygen starvation of the organ tissues, acute failures of liver and kidneys. The risks of development of stress ulcers abruptly rise if these factors occur collectively [1, 4, 7, 9, 12, 13, 16].

The lethality level of bleeding from upper gastrointestinal tract vary from 5% to 10%, although in some developed countries it has tendencies of diminishing, in our country it still has high rates. The elderly people die mostly from bleeding with serious accompanying illnesses who are in critical condition. Herewith, the lethality while the relapse bleeding occurs stays high and does not have tendencies of decreasing: its average level is 30-40%. The main role in successful treatment of patients with gastrointestinal bleeding plays early and exact diagnostics of the cause of bleeding [1, 4, 7, 9, 10, 14, 15].

The modern endoscopy technologies make it possible to execute the perfect diagnostics and treatment both for patients with lung diseases and gastroduodenal and coloproctologic complications.

These technologies give the opportunity not only to execute the temporary local hemostasis but the final hemostasis as well, and also the preventive actions which would cause renewing of bleeding.

All these above mentioned methods and technologies make it possible to evade from urgent surgery or if necessary conducting the operation in more satisfying conditions. We have used the diagnostic and fibrobronchoscopy in all patients who had clinically or roentgenologically confirmed pathological processes in the lungs, in order to lower the characteristics of the changes and their expressions in the bronchial tree, as well as to provide with healing manipulations.

But many methods of endoscopic hemostasis are technically hard and expensive, relating to high risk for patients and therefore are not so widely spread in the world practice [1, 2, 4, 6, 11, 12, 14, 16].

Materials and Methods:

The researches were executed in the department of intensive therapy of Critical Medicine Institute. The <<Olympus>> Gif Q-30 and Gif P-20 gastroscope apparatuses were used for diseases of the stomach and duodenum. Local anesthesia was accomplished with the irrigation of 10% Lidocaine solution aerosol on the mouth cavity, also the additional sedation was used if necessary. In the cases of coloproctologic complications, the fibrocolonoscopy was executed with the <<Olympus>> CF type 30L apparatus and the premedications and local anesthesia was not required.

The solution of Caprofer was used to irrigate the bleeding surface of the surfaces of the gastro-intestinal tract, which included the carbon complex of three chloral gland and the acid of epsylonaminocapron, which possesses the perceptible hemostatical particularities. Caprofer caused the instant coagulation of blood. The method of irrigating the bleeding surface with the solution of Caprofer was the most widely spread because of its high efficiency and simplicity between all methods of endoscopic hemostasis. Furthermore, in several cases, the iced 10% solution of epsylonaminocapron acid and/or <<Tranestat>> (solution of traneksam acid) was used locally. The singular injectors of the <<Wieser>> were also used for the injectional hemostasis.

For the monopolar method of diameter coagulation, with the <<Olympus>> CD11L, CD-3L, we used electrodes with high frequency current to stop bleeding. The electrode with cylindrical top was used in all occasions, if the diameter of the ulcer was not more than 5mm, blob electrode – if the diameter of ulcer was less than 5 mm. The electrode was conducted through the channel of biopsy and delivered to the bleeding area. The electro surgical apparatus <<EN-57M>> was used as the source of current. The power of source of current, which caused the coagulation, was 50Vt. The bipolar method of diameter coagulation was not used due to lack of technical issues.

The contradictions for the use of gastroscopy were a number of acute conditions, when the procedure could cause to make the health of a patient get worse.

Treating bronchoscopy was executed in the department of intensive therapy of the institute with the “Olympus” BF-1T 20 and JIOMO Б-BO-3 devices along with electronic sputum aspirator. Local anesthesia of the upper respiratory tract and larynx was accomplished with the irrigation of 10% Lidocaine solution aerosol. The anesthesia of glottis, bifurcation of trachea and segments of bronchus was accomplished with the irrigation of 8-10 ml of 2% Lidocaine solution.

The contradictions of executing the researches were the number or acute and chronic conditions, when diagnosing and treating manipulations might have brought us to the expressed worsening of the condition of the patient. An absolute contradiction of using endoscopy was an agonal condition of the patient. Also, the list of other contradictions include acute myocardial infarction, acute stroke, respiratory and heart failure stage III, paroxysmal tachycardia, atrioventricular block, asthmatic status, bronchospasm.

Fibrobronchoscopy:

1. **Injectional hemostasis.** It relates to the direct injection of the active substance into the bleeding area. The mixture of adrenaline solution and hypertonic solution with a 1:5 interaction and quantity from 5 to 15 ml was used for injection. We achieved hemostasis only with 75% of the patients with the injectional method.

2. **Irrigation with Caprofer.** The mechanical action of the preparation is based on the chemical coagulation of the proteins of the plasma and antifibrinolytic action. The standard solution of Caprofer (1-3 ml) was used for treating the single source of bleeding (erosion, ulcer, splitting of the mucous tissue in the gastrointestinal tract) with the endoscopic stoppage of the gastro-duodenal bleeding. The 10-15 ml of the preparation was used with the 1:5 interaction with 10% solution of epsylonaminocaprone acid, when the diffused bleeding from the plural erosions, ulcers or disbanding tumors occurred. In the 95% of the cases were designated the final hemostasis when the bleeding from acute erosions or ulcers, splitting of the mucous tissue in the gastrointestinal tract and disbanding tumors of the stomach occurred. Caprofer was less effective and caused the temporary stoppage of bleeding in 85% of the cases when the hemorrhages were from chronic ulcers.

3. **Electro coagulation.** Electro coagulation was not recommended for the slimy walls of the organ (deep ulcers of stomach and duodenum, bleeding from diverticula) because of its perforation risk. The method of electro coagulation was not effective because of big vessels (3-5mm). The effect of “welding” was executed at the disbanding malignant tumors which would have made the bleeding more frequent. While using electro coagulation, it is necessary to have a clear sight of the source of bleeding and it should not be overlaid with the blood. The probe was delivered to the edge of the ulcer or tumor and directly next to the bleeding vessel. On the bleeding areas, which were adequate to Forrest 1a, the hemostasis was started with the 4,5-5,5 power with the “fulguration” regime, which caused sparkling which led to the strict scorch of the bleeding vessel and the cease of pulsing bleeding. After primary cease of bleeding, the regime of the apparatus was changed to “coagulation” with the power of 3,5-4,5. The electrode touched the surface for 1-2 seconds, and the floor space of coagulation was 1,5-2,0 mm², starting from the source of bleeding. We cultivated the whole surface of ulcer defect and formed a dense coagulated tape of white color. On the bleeding areas, which were adequate to the Forrest 1b, hemostasis was executed with “coagulation” regime with 4,5-5,5 power.

For stopping of the bleeding from the disbanding tumor, the spherical or cylindrical electrodes were used. Hemostasis was accomplished with the “coagulation” regime, 4,5-5,5 power. The efficiency and safety of the method can be equaled to the injection therapy; efficiency of electro coagulation was 80-85%.

4. Combined methods of treating endoscopy. The combined method of treating endoscopy was the most frequent method that we used, which combined the irrigation with Caprofer and thermo coagulation in different options, especially when we were treating the patients with the serious active ulcer bleeding. Using combined method, it was possible for us to achieve the final hemostasis with more than 95% of patients with gastro-duodenal bleeding, including critical conditions.

The repeated hemorrhage took place in 15% of endoscopic treatments. It usually developed in the first 24 hours after the treatment was used, especially in the cases with initial profuse bleeding. The repeated bleeding was most often in the Injectional method of hemastasis – in 25% cases. It also took place approximately in 10% of cases when using Caprofer, 15-20% of cases with electro coagulation. The best results were achieved with the combined use of Caprofer and electro coagulation, where the repeated hemorrhage was in 5% of patients.

Fibrobronchoscopy:

Healing bronchoscopy was accomplished by using 0,9% solution of NaCl or 40-100 ml of the solution of Furacilin 1:5000. The sanitation was finished by using 10ml 0,1-0,2% Dioxidine with 2% soda into trachea and bronchus. After 5-10 minutes from using Dioxidine, bronchial secretions were aspirated repeatedly. After finishing the bronchoscopy, Hydrocortisone is infused into trachea (not less than 100-125 mg). All suction solutions were heated up to 36-37° before using. By the end of suction, antibiotics were infused into the bronchial tree. Healing bronchoscopy was used 3-5 times on the course of treatment.

According to our results, healing bronchoscopy should be used daily in patients with necrotic endobronchitis, despite its localization and side, with endoscopically confirmed aspiration and obstructive endobronchitis. If the indications of daily suction are not enough and the productive cough is present, the healing bronchoscopy should be used not more often than once in 3 days, in other cases the rate of suction should be determined individually.

Fibrobronchoscopy also gave us a chance to forsee the stages of the acute processes of the mucous, humidity and obstruction with the bronchial secretion, the rate of the hypotony of the bronchi and the disorder of the caught reflex.

In the most of the patients, we have observed a number of positive changes, namely:

- the use of healing bronchoscopy along with the complex treatment, has lowered the rate of complications by 2,1-2,6 times;
- the course of pneumonia in the patients was with the low degree of display of clinical signs and intoxication, which was confirmed by clinical, laboratorial and roentgenological dynamic tests;
- the decrease of average expenses of daybeds by 60-80 provisory units and decrease of the overall prices of treatment by 25% which is achieved with the decrease of antibiotics, immunomodulators and decrease of daybeds.

The achieved results prove that using endoscopic suction of lungs in critical medicine is very perspective and require further researches and wider use of this method.

Fibrocolonoscopy:

Dating from the year of 2007, when we suspected the intestinal bleeding, we started using the treating and diagnosing endoscopy in order to achieve hemostasis. The methods of electro coagulation, electro excision (for the bleeding polyps) and the combined methods - all of these methods were tested on 16 patients.

Electro coagulation. This method was not recommended only when the walls of the organs (deep defects of large intestines) were diluted because there was the possibility of occurring perforation. The method of coagulation of the stomach and duodenal bleedings were analogous. All of the cases of bleeding were confirmed to be the Forrest-1B and Forrest-2A type, the process of hemostasis was executed in the “coagulation” regime using the power of 4,5-5,5. Disbanding tumors, the effect of “welding” was used. The hemostasis was executed in the regime of “coagulation” with the power of 3,5-4,5. The efficiency of the electro coagulation was 85-90%.

Electro excision. This method was used when, after the electro coagulation of the bleeding polyps, there was no trustworthy hemostasis. The diametral pitches that were used were made by <<Olympus>>. The efficiency of the electro excision was 90-95%.

While using the combined method, we were able to achieve hemostasis in all of the cases.

Perspective:

In the past years by evolving the endoscopic technology, the progresses of new endoscopic methods of treatment have become possible, including treatment of critically ill patients. We think that the most perspective methods of treating critically ill patients are these new methods:

- prophylaxis and treatment of the digestive varicose bleeding using endoscopic ligatures;
- prophylaxis and treatment of the gastro-duodenal bleedings using endoscopic clipping;
- narrow spectral and magnifying endoscopy;
- endosonography;
- endoscopic retrograde cholangiopancreatography (ERCP);

Conclusions:

A positive experience in using various methods of diagnostic and healing endoscopy in critically ill patients is generalized in the research. The research was carried out on the patients with considerable blood loss, nasty forms of pneumonia and who were in critical condition.

The next methods of healing endoscopy were used:

1. Injectional hemostasis. We achieved hemostasis only with 75% of the patients with the injectional method.

2. Irrigation with local hemostatics. The 10% solution of epsylonaminocaprional acid and/or solution of Caprofer were used. In the 90% of the cases the final hemostasis took place, in chronic ulcers – 85%.
3. Electro coagulation. The efficiency and safety of the method can be equaled to the injection therapy; efficiency of electro coagulation was 80-85%.
4. Combined methods of treating endoscopy. The irrigation with local hemostatics and electro coagulation was used in different combinations. Using combined method, it was possible for us to achieve the final hemostasis with more than 95% of patients with gastro-duodenal bleeding, including critical conditions.

The most expressive effect of endoscopic hemostasis was achieved by using Caprofer together with electro coagulation. The risk of developing repeated hemorrhage was lowest in this endoscopic hemostasis.

According to materials, based on experience from treating bronchopulmonary diseases, including ventilator-associated pneumonia, the authors have recommended to use suction fibrobronchoscopy together with different suction mixtures - Furacilin 1:5000 as antiseptic and stimulator of cough reflex 0,1% Dioxidine solution with 2% solution of soda. We also recommend using Hydrocortisone after the manipulation.

The low degree of display of clinical signs and intoxication, truly improved conditions of patients and the decrease of average length of daybeds prove the advantages of this method. Also, an important economic effect is achieved due to the decreased expenses of average daybeds, drugs and diagnostic resources.

Achieved results allow us to recommend the wide use of healing suction fibrobronchoscopy in patients with inflammation of lungs, including ventilator-associated pneumonia. The efficiency, reliability and economic effects are the serious advantages of this method.

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ბ.ცუცკირიძე, ს.ჯაიანი, დ.ჩახუნაშვილი, გ.ჩახუნაშვილი, ნ.კეციანი (თბილისი, საქართველო)

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