

RESTORATION OF THE REGIONAL LYMPHATIC NETWORK BY THE USE OF SORBENTS IN THE TREATMENT OF EXPERIMENTAL GENERALIZED SEPTIC PERITONITIS

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UDC 616.381-002.3:616.423-
085.38.015:615.246.2

The course and outcome of generalized septic peritonitis (GSP) depend largely on the ability of the body to localize the inflammatory process and to counteract microbial aggression. An important role in the formation of the defensive reaction was played by the lymphatic system [4, 5]. A genuine therapeutic effect can be obtained nowadays by acting on the function of the lymphatic system in GSP, and this has inspired research workers to undertake further research in clinical lymphology [7, 8]. Regional and collecting lymph nodes undergo profound morphological changes during inflammation and endotoxemia, and as a result the regional lymphatic network may be blocked. One of the conditions of "rapid" involvement of the lymph nodes in the reaction to aggression is the presence of regional endolymphatic hypertension, which is the result of general endotoxemia [1].

The aim of this investigation was to study the state of the regional lymphatic network in the mesentery of the small intestine in experimental GSP and the possibility of urgent restoration of adequate lymphatic drainage of the tissues following the local use of the carbon-mineral sorbent SUMS-2p in the treatment of experimental GSP.

METHODS

Experiments were carried out on 80 noninbred albino rats. There were two series. In series 1 (40 animals) a model of GSP was created by the method in [6]. Laparotomy was performed under ether anesthesia. To prevent limitation of the pathological process by adhesions, the greater omentum and the fatty formations in the region of the testicles were resected. The appendix was removed. The amputated stump was buried in the free peritoneal cavity. After 24 h, with the development of sepsis in the peritoneal cavity and with increasing evidence of endotoxemia, treatment by the closed laparotomy method was commenced. Relaparotomy was performed under ether anesthesia 1, 2, and 3 days after the creation of peritonitis, and during these operations peritoneal lavage with kanamycin solution (600 $\mu\text{g}/\text{kg}$) was carried out. In the second series of experiments (40 animals) a model of GSP was created by the same method. In this group, treatment was given by the closed laparostomy method with peritoneal sorption. Relaparotomy was performed 1, 2, and 3 days after the creation of GSP under ether anesthesia, and during the operations the carbon-mineral sorbent SUMS-2p, with selective action on the intestinal flora, was introduced into the peritoneal cavity. The mortality in the first group was 80% and in the second group 25%. The regional lymphatic network of the mesentery of the small intestine of the experimental animals was studied after 1, 2, 3, 4, 5, 7, and 10 days. The method of indirect intravital lymphoventerography as described in [3] was used. A 45% solution of the contrast agent collargol, warmed to 38°C, was injected in a volume of 0.2-0.3 ml subserosally into the mesenteric border of the terminal portion of the small intestine. Lymphoventerography was carried out 5, 15, 30, and 60 min later. The REIS-D apparatus with tube voltage of 42 kV, current 80 μA , and exposure 16-20 sec, was used. Electroventerograms with magnification

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Fig. 1



Fig. 2

Fig. 1. Indirect lymphoentgenography. Stage of development of experimental generalized septic peritonitis. Total block of mesenteric lymph node.

Fig. 2. Indirect lymphoentgenography. Third day of treatment of experimental GSP by carbon-mineral sorbent SUMS-2p. Contrasting of mesenteric lymph node. Signs of lymphohypertension remain.

of 6 times were obtained [2]. The animals were withdrawn from the experiment by decapitation under ether anesthesia. To analyze the lymphoentgenograms the roentgenologic parameters of the character of lymph drainage, and the times of appearance and disappearance of signs of disturbance of the lymphatic flow were compared, depending on the method of treatment of the peritonitis. Attention was paid to dilatation of the main collectors, enlargement of the network of collaterals, slow emptying of the vessels, and their increased permeability, a strengthened valvular system with short intervals between valves, and poor filling of the efferent lymphatics or their complete absence at different stages of lymphostasis.

RESULTS

On the 1st day of treatment of GSP dilatation of the main collector and its increased contrast, increased permeability of the vessel wall, and absence of contrasting of the lymph node were observed on the lymphoentgenograms in both series (Fig. 1). This picture of gross disturbances of the lymphatic flow in the first group of animals persisted for 4 days, but in the group of animals on which peritoneal sorption was used, the pattern of a complete block was noted only for 3 days, when a significant decrease was observed in the parameters of endotoxemia and contamination of the peritoneal cavity. On the 3rd day of treatment with the carbon-mineral sorbent SUMS-2p, contrasting of the lymph node was observed on the lymphoentgenograms, but with persistence of signs of lymphohypertension (Fig. 2). A picture of complete recovery of lymphatic drainage, corresponding to restoration of the normal criteria of endotoxemia



Fig. 3. Indirect lymphoentgenography, 4th day of treatment of experimental GSP by carbon-mineralsorbent SUMS-2p. Contrasting of mesenteric lymphatic collector.

and intraperitoneal pH, and inhibition of the microflora in the peritoneal cavity, was not observed in the first group of animals until the 7th-10th day of treatment, but in the second group as early as on the 4th day of treatment. The lymphatic drainage was effected by the main mesenteric collector, the width and degree of contrast of the afferent vessels were reduced, the valvular system was less conspicuous, and the distance between the valves was increased (Fig. 3).

Regional disturbances of the lymphatic flow are one of the leading factors in the pathogenesis of GSP. The appearance of signs of lymphostasis and restoration of the lymphatic drainage correspond to the clinical and paraclinical criteria of the course of GSP. Local use of the carbon-mineral sorbent SUMS-2p reduces the mortality from GSP more than threefold and almost halves the time for adequate lymphatic drainage to be restored.

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