

MORPHOLOGICAL AND FUNCTIONAL ANALYSIS OF THE MEDIAN SLIDING APPROACH IN ABDOMINAL SURGERY

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Under modern conditions, with the availability of general anesthesia and muscle relaxation, real opportunities have been created for the introduction of new or hitherto unused operative approaches into abdominal surgical practice [1, 2, 4, 6, 7]. One such approach is the median sliding version. This approach, modified and introduced into planned surgery of the extrahepatic biliary tract, after comprehensive topographic-anatomical and clinical-physiological evaluation, has become widely used for operations on other abdominal organs also [3].

EXPERIMENTAL METHOD

Operations were carried out under endotracheal anesthesia only. Under these circumstances muscle relaxation was maintained until the final suturing of the posterior wall of the rectus abdominis sheath. The skin and superficial and deep fascia were divided paramedially from the costal arch to the umbilicus and, if necessary, even lower. The anterior wall of the rectus sheath was also divided in this same plane. Its medial border was grasped by two pairs of forceps. Using curved scissors as a raspatory, the medial edge of the muscle was separated mainly by blunt dissection from the linea alba. Only in the region of the tendinous intersections was the separation done by sharp dissection, with ligation of small branches of blood vessels. The rectus abdominis muscle was parted from the posterior wall with the fingers, and retracted laterally by means of large abdominal hooks to expose the "portae musculares." At a distance of 2.5-3 cm medially to them the posterior wall of the rectus sheath was divided vertically and the abdomen opened. This incision is best made not strictly vertically, but in the form of a "flattened" letter S. This provides a more extensive access, reduces trauma to the muscular-aponeurotic structures of the internal oblique and transversus abdominis muscles, and prevents hernia formation in the lower corner of the wound. When the laparotomy wound was sutured, a continuous running suture was applied to the posterior wall of the rectus sheath, and interrupted knotted sutures, made from nonabsorbed thread (silk, Lavan, Kapron) to the anterior wall. The skin and superficial and deep fascia were sutured in the usual way.

Experimental operations were performed on 60 rabbits. Data from 423 patients undergoing cholecystectomy and operations for cirrhosis of the liver and for tumors of the pancreas and large intestine also were analyzed.

For an objective evaluation of the median-sliding approach in surgery of the biliary tract, we undertook comparative topographic-anatomical, morphological, and clinical-physiological investigations. Of the many different approaches to the biliary system in clinical and experimental surgery, we chose for comparison those most frequently used, namely median and a combined oblique and transverse laparotomy of Kocher and S. P. Fedorov type.

EXPERIMENTAL RESULTS

The results of measurements made by A. Yu. Sozon-Yaroshevich's method [8] during the operations are given in Table 1. Statistical analysis of the parameters obtained shows that the medial-sliding approach does not differ essentially in its topographic-anatomical characteristics from the combined oblique-transverse laparotomy, but is superior to the upper median in-

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TABLE 1. Parameters of Different Approaches to the Extra-hepatic Biliary System

Parameter	Access		
	oblique-transverse (n = 81)	upper median (n = 98)	median sliding (n = 190)
Length of wound	17.6±0.29	14.7±0.15	14.56±0.13
Width of wound	12.3±0.22	10.98±0.13	13.35±0.07
Depth to fundus of gall bladder, cm	3.67±0.16	5.85±0.13	3.92±0.1
Depth to neck of gall bladder, cm	9.91±0.19	9.76±0.15	8.6±0.12
ASI to fundus of gall bladder	83.91±0.74	73.6±0.86	85.53±0.51
ASI to neck of gall bladder	69.44±0.76	59.03±0.70	73.96±0.53
ASBOP to fundus of gall bladder	83.78±0.73	63.36±0.82	83.76±0.41
ASBOP to neck of gall bladder	83.2±0.66	74.2±0.8	83.81±0.63

Legend. ASI) angle of surgical intervention, ASBOP) angle of slope of basic operative procedure.

cision. Meanwhile, the time taken to perform laparotomy followed by suture of the abdominal wall is only half as long, when the median sliding and upper median approaches are used, as for the oblique transverse approach: 17, 15, and 33 min on average respectively.

The degree of trauma associated with the different forms of access is shown by the results of comparative experimental morphological studies of the anatomical formations of the abdominal wall.

Morphological study of biopsy material from the abdominal muscles taken at different times after the oblique-transverse approach in the experimental animals revealed destructive changes in the muscle fibers with damage to their trophic and contractile systems. Pathomorphological changes also spread to neurovascular formations. In the late stages atrophy and destruction of muscle fibers were observed, with their replacement by connective and adipose tissue (Fig. 1). After the upper median and median-sliding approaches the pathomorphological changes were transient in character, and were followed by restoration of the anatomical structures (Fig. 2).

In the majority of patients after an oblique-transverse laparotomy, disturbances of tactile and pain sensitivity, and a varied degree of paresthesia are noted below and medially to the scar. In some patients zones of local intensive pain are found along the course of the scar, evidently as a result of the formation of terminal neuromas. After the medial sliding approach these phenomena were observed in a mild degree in only 16 (10%) of 156 patients examined. They were completely absent after the upper median laparotomy. It was shown by rheoparietography that after an upper medial laparotomy the blood supply to the abdominal wall remains symmetrical, after median-sliding laparotomy the rheographic index on the right side is about 90% of its level on the contralateral side, and after oblique-transverse laparotomy the blood volume in the tissues of the abdominal wall does not exceed 47%. This is evidence of preservation of the main sources of blood supply of the abdominal wall with the median sliding approach, and significant damage to them by the oblique-transverse approach.

The results of our investigations with the use of the median-sliding approach to surgery of the biliary tract, indicating significant advantages of this approach compared with the traditional methods, led us to apply its basic principles to operative procedures on other abdominal organs.

We performed splenectomy and operations on the cardioesophageal region by a similar incision, but this time on the left side.

The median-sliding approach was found to be very convenient for operations on the colon and uterine adnexa. In these cases we shift the incision downward, using what is known as the middle or lower median sliding approach. In the last version, the possibility of damaging the inferior epigastric vessels must be remembered.

The median-sliding laparotomy has demonstrated great advantages during operation for cirrhosis of the liver with portal hypertension. First, the portocaval anastomoses in the preperitoneal cellular tissue; second, if the posterior wall of the rectus abdominis sheath is not sutured completely or if the greater omentum is sutured to it, the conditions will be created for resorption of ascites fluid in the early postoperative period, as in the case of Kalb's operation, and for the development of additional portocaval omentomuscular venous communications thereafter; third, a break in the course of the wound canal is a quite reliable method of preventing eventration and the leakage of ascites fluid.

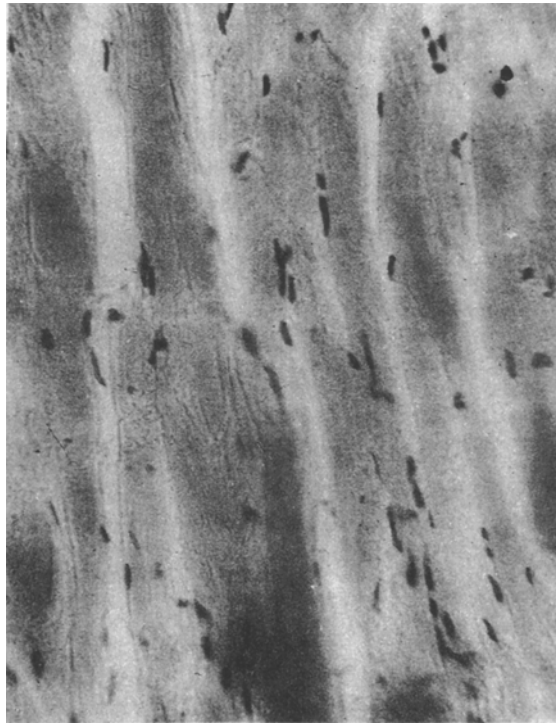


Fig. 1. Longitudinal sections through rectus abdominis muscle of a rabbit on 30th day after incision by S.P. Fedorov's method. Proliferation of connective tissue. Interstitial edema of muscle tissue. Atrophy and destruction of muscle fibers. Van Gieson's stain. 200 \times .

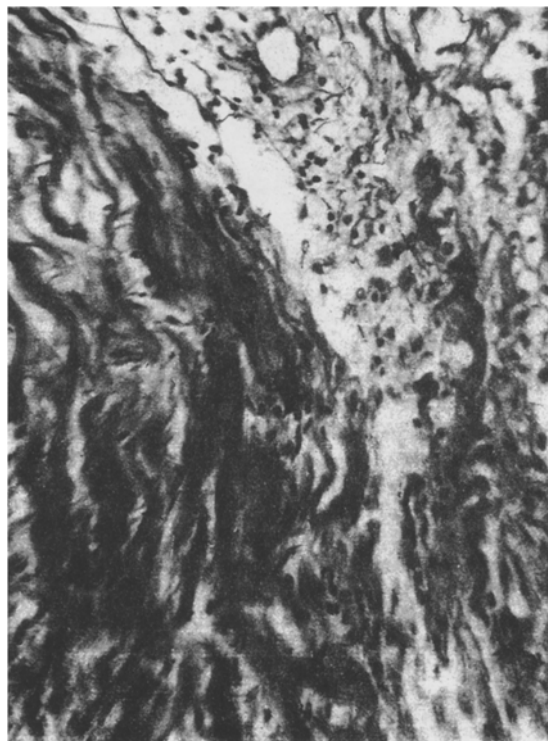


Fig. 2. Longitudinal section through rectus abdominis muscle of rabbit on 30th day after median-sliding approach. Absence of connective tissue elements. Diffuse staining of muscle fibers and hypotrophy of their nuclei. Van Gieson's stain. 500 \times .

The character and frequency of postoperative complications are largely determined by the degree of surgical aggressiveness of the operative approach. According to our data, in a series of 423 quite difficult operations in which the median sliding approach was used, complications in the early postoperative period developed in 6 (1.6%) patients undergoing the operation, including hematomas into the wound in 2 (0.5%), suppuration of the wound in 3 (0.7%), and separation of aponeurotic sutures with subcutaneous eventration in 1 (0.2%), and pneumonia in 1 (0.2%). Three of these patients (0.7%) later developed paraumbilical (1) and epigastric (2) hernias. Meanwhile, in a series of 136 operations performed in our clinic for biliary pathology, using oblique and transverse subcostal incisions, three (2.2%) developed pneumonia, five (3.9%) suppuration of the wound, and two (1.5%) eventration, and 17 (12.5%) of these patients developed postoperative hernias.

These experimental and clinical investigations of the use of the median sliding approach in abdominal surgery thus demonstrate its definite advantages over traditional forms of laparotomy, and they enable this approach to be recommended, if suitably indicated, for use in abdominal surgery.

LITERATURE CITED

1. G. A. Bairov, Surgery of the Pancreas in Children [in Russian], Moscow (1978), pp. 38-39.
2. R. I. Venglovskii, Operative Surgery [in Russian], Moscow (1915), pp. 334-338.
3. N. N. Volobuev, Klin. Khir., No. 9, 65 (1981).
4. A. P. Gubaev, Zh. Akush. Zhen. Bol., No. 7-8, 1385 (1910).
5. A. G. Zemlyanoi, Diverticula of the Gastrointestinal Tract [in Russian], Leningrad (1970), pp. 108-110.
6. V. N. Krylov, Akush. Gin., No. 4, 38 (1948).
7. N. A. Telkov, Klin. Khir., No. 3, 16 (1967).
8. A. Yu. Sozon-Yaroshevich, Anatomico-Clinical Bases of Surgical Approaches to the Internal Organs [in Russian], Moscow (1954).

ACCUMULATION OF ABNORMAL GLYCOPOLYMERS IN THE WALL OF THE MAIN LYMPHATICS OF THE HUMAN LIMBS IN CHRONIC LYMPHEDEMA

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The pathogenesis of chronic lymphedema (elephantiasis) and the mechanisms transforming the walls of the main lymphatics (ML), leading to subsequent lymphostasis are still far from being fully understood [1, 2, 7, 11]. To study the etiology, pathogenesis, and morphogenesis of the different forms of pathology of ML in the limbs, biopsy of the vessels during microsurgical operations and lymphography have been used [1, 11, 13]. In lymphostasis marked fibrosis of the wall of ML in the limbs has been found [9, 10, 11, 13]. Despite the fact that some mechanisms of this process have been studied in considerable detail, the histochemical manifestations of injury to the structural components of the wall of ML in lymphostasis have not been completely investigated.

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