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RESULTS OF TREATMENT OF BILATERAL DESTRUCTIVE PULMONARY TUBERCULOSIS PATIENTS USING MINI-INVASIVE SURGICAL INTERVENTIONS

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Ключевые слова: *двусторонний деструктивный туберкулез легких, хирургическое лечение, мини-инвазивные хирургические вмешательства*

Abstract. Results of treatment of bilateral destructive pulmonary tuberculosis patients using mini-invasive surgical interventions. Korpusenko I.V., Savenkov Yu.F. *There were analyzed case-histories of patients operated on bilateral destructive pulmonary tuberculosis who underwent treatment at pulmonary-surgical unit of CI "DRCCTPA" Phthisiatria" from 2010 to 2018. Case histories of 259 patients were included in the study, in complex treatment of which, surgical stage of treatment was used. Analyzing direct results in 2 months after surgery, the estimation based on clinical, roentgenologic and laboratory studies by criteria of destruction cavities closure, bacteria excretion termination and clinical stabilization of the tuberculosis process was used. In carrying out a research patients were divided into 2 groups: the main group consisted of 129 patients, who underwent mini-invasive methods of surgical treatment with mini-access under the control of video-thoracoscopy (one-step or staging bilateral video-assisted lung resection – 58 patients, collapse-surgical video-assisted one-step or staging interventions – 53, staging mini-invasive pleuropneumonectomy – 18). The comparison group included 130 patients operated according to standard accesses with conventional methods. Comparison groups did not differ reliably (p>0,05) by the gender and the age, by tuberculosis forms, by disease duration, by functional parameters, by main prevalence and severity of tuberculosis. The biggest number of complications in both groups was noted after pleura-pneumonectomies, lobectomies and thoracoplasty. In the comparison group postoperative complications were observed in 32 (24.6%) patients, that is 2.2 more often (p=0.002). In the main group, bronchopleural complications occurred in 8 cases (6.2%), and in the comparison group – in 16 (12.3%), that is 2 times less frequently, exacerbation of tuberculosis process was noted 3.8 times more often in patients of comparison group. Performed analysis of the nature of postoperative complications in both groups confirms the effect of traumatism of access not only on the course of the wound process, but also on the frequency of pleural, pulmonary and functional complications. A complete clinical effect in the patients of comparison group was achieved in 82 cases (63%), that is by 1.4 times less than in the main group (p<0.001). Abacillation, in preservation of destruction in one of the lungs, occurred at the time of discharge from the hospital in 12 (9.3%) patients of the main group and in 21 (16.5%) – of the comparison one. There were 3 (2.3%) patients excreting bacteria in the main group and 20 (15.4%) patients in the comparison group.*

Реферат. Результаты лечения больных двусторонним деструктивным туберкулезом легких с использованием мини-инвазивных оперативных вмешательств. Корпусенко И.В, Савенков Ю.Ф. *Проанализированы истории болезни пациентов, оперированных по поводу двустороннего деструктивного туберкулеза легких, находившихся на лечении в легочно-хирургическом отделении КУ «ДОКЛПО «Фтизиатрия» ДОС» в период с 2010 по 2018 год. В исследование было включено 259 историй болезни пациентов, в комплексном лечении которых применялся хирургический этап лечения. При анализе непосредственных результатов через 2 месяца после операции использовали оценку на основании клинико-рентгенологических и лабораторных исследований по критериям закрытия полостей деструкции, прекращения бактериовыделения и клинической стабилизации туберкулезного процесса. При проведении исследования больные были разделены на 2 группы: основную группу составили 129 пациентов, у которых были применены мини-инвазивные методы хирургического лечения с использованием мини-доступов под контролем видеоторакоскопии (одномоментные или этапные двусторонние видеоассистированные резекции легких – 58 больных, коллапсохирургические видеоассистированные одно- или двусторонние вмешательства – 53, этапные мини-инвазивные плевропневмонэктомии – 18). В группу сравнения вошли 130 пациентов, оперированных из стандартных доступов по общепринятым методикам. Группы сравнения достоверно не отличались между собой (p>0,05) по полу и возрасту, по формам туберкулеза, длительности заболевания, функциональным показателям, основным критериям распространенности и тяжести туберкулеза. Наибольшее количество осложнений в обеих группах отмечалась после плевропневмонэктомий, лобэктомий, торакопластики. Но в группе сравнения послеоперационные осложнения наблюдались у 32 (24,6%) больных, то есть в 2,2 раза чаще (p=0,002). В основной группе бронхоплевральные осложнения встречались в 8 случаях (6,2%), а в группе сравнения - у 16 больных (12,3%), то есть в 2 раза реже, обострение туберкулезного процесса отмечалось в 3,8 раза чаще у больных группы сравнения. Проведенный нами анализ характера послеоперационных осложнений в обеих группах подтверждает влияние травматичности доступа не только на течение раневого процесса, но и на частоту плевро-легочных и функциональных осложнений. Полный клинический эффект у пациентов группы сравнения был достигнут в 82 случаях (63%), то есть в 1,4 раза меньше, чем в основной группе (p<0,001). Абациллирование при сохранении в одном из легких деструкции наступило на момент выписки из стационара у 12 (9,3%) больных основной и у 21 (16,5%) - группы сравнения. Остались бактериовыделителями 3 (2,3%) пациентов основной группы и 20 (15,4%) больных группы сравнения.*

Performed assessment of the current state of the system of anti-tuberculosis measures testified to significant difficulties existing in treatment of patients with chemically resistant tuberculosis though there has been progress [7]. The effectiveness of treatment of chemically resistant tuberculosis is insufficient; its proportion grows among all its forms, being an unfavorable trend [6].

Destructive forms of tuberculosis present the greatest challenge, effectiveness of conservative treatment is unsatisfactory and the unfavorable impact on the epidemiological situation is the most substantial [1]. Herewith surgical treatment of destructive pulmonary tuberculosis leads to the improvement of the general results but insufficient level of surgical activity makes it impossible to provide significant impact of surgical methods on the general epidemiological situation [3].

Surgical treatment of pulmonary tuberculosis restores its relevance, concerning predominantly surgery of multidrug-resistant tuberculosis [2]. But there exist significant differences as for effectiveness of the results of surgical interventions in pulmonary tuberculosis, which are due to actual differences in the treated contingents and surgeries performed [4]. Herewith, predominantly resections of the lungs of various volumes in demarcated lesions are performed. Currently researches concerning thoracoplasty application when radical resection is impossible are being restored [5].

Accordingly, significant discrepancies as for surgical approaches in pulmonary tuberculosis require their systematization, because generalization of surgery results present big difficulties.

Phthisio surgery – treatment of patients with bilateral pulmonary tuberculosis deserves special attention. This contingent of patients is big enough among all patients with pulmonary tuberculosis, but surgery of bilateral pulmonary tuberculosis has significant limitations due to functional and traumatic factors. According to the studied literature, no convincing studies on the systematization of surgical tactics in bilateral pulmonary tuberculosis have been found.

Considering functional and traumatic limitations in the treatment of patients with bilateral pulmonary tuberculosis, a special attention was paid to the use of mini-invasive technologies in thoracic surgery [9, 10]. Although their use is becoming more widespread [18] and performance parameters suggest their effective use [12] in the treatment of patients with bilateral pulmonary tuberculosis, information on the use of mini-invasive surgery for pulmonary tuberculosis is one-sided [13, 15].

The purpose of the study is to increase the effectiveness of treatment of patients with bilateral

destructive pulmonary tuberculosis by justifying the introduction of mini-invasive surgical technologies.

MATERIALS AND METHODS OF RESEARCH

To solve the set tasks, the case histories of patients operated on for bilateral destructive pulmonary tuberculosis treated at pulmonary-surgical unit of CI "DRCCTPA" Phthisiatria" from 2010 to 2018 were studied. Criteria for inclusion to the study were: age from 18 to 55 years; sex – both sexes; clinical and radiological confirmation of fibro-cavernous form of pulmonary tuberculosis or pulmonary tuberculosis in patients of the 1st clinical category of registration of a patient with tuberculosis (FDTB - first diagnosed tuberculosis), 2nd clinical category (FDTB TG – first diagnosed tuberculosis, treatment gap; FDTB TF – first diagnosed tuberculosis, treatment failure; RTB – recurrence of tuberculosis), 4th clinical category (HRTB – chemo-resistant tuberculosis, MRTB – multidrug-resistant tuberculosis and ARTB – advanced-resistant tuberculosis); bilateral forms of destructive pulmonary tuberculosis; the presence of destructive pulmonary tuberculosis in combination with chronic pleural empyema; 0 – II degree of pulmonary insufficiency.

According to the above criteria, 259 case histories were included in this study, in the complex treatment of which the surgical stage of treatment was used.

Taking into account the immediate results after 2 months of surgical treatment, the following assessment was used on the basis of clinical, radiological and laboratory studies on the criteria of closure of destruction cavities, cessation of bacterial excretion and clinical stabilization of the tuberculosis process:

- significant improvement: no cavities of destruction, cavities of empyema and cessation of bacterial excretion, clinical stabilization of the tuberculosis process, complete lung spread, no residual pleural cavity, no postoperative complications, including pleuro-pulmonary, complications;
- improvement: cessation of bacterial excretion, but preservation of destruction, empyema cavity with moderate activity, reduction of clinical signs of tuberculosis intoxication;
- deterioration: postoperative progression of the process in the form of bacterial excretion and the formation of new destructions, the activity of pleural empyema, severe signs of tuberculosis intoxication, the presence of postoperative, including pleuropulmonary and bronchopulmonary complications;
- death

The formation and editing of the primary database of the studied data was performed on a personal computer "Pentium 5 Intel PC" in the environment "Windows XP Professional" (product number 42310-789-55779002-675209).

All types of statistical processing were performed using the software product STATISTICA 6.1 (StatSoftInc., Serial N AGAR909E415822FA) and Excel-2010.

The main statistical characteristics given in the description of research results include: number of observations (n), arithmetic mean (M), error of average value (m), relative values (P), average error of relative value (m_p), level of statistical significance (p). The critical value of the significance level (p) was taken as ≤5% ($p \leq 0.05$). When obtaining the value of $p>0.05$, the difference between the indicators was considered insignificant.

The main group consisted of 129 patients who underwent mini-invasive methods of surgical treatment using mini-access under the control of videothoracoscopy.

The comparison group included 130 patients operated from standard accesse according to generally accepted methods.

The majority of operated patients in both groups were men – 67.5±1.8% in the main and 70.7±2.7% in comparison group. By age persons aged 30 to 39 years: 58.9±3.4% and 50.7±2.6% dominated in the main and comparison group, respectively ($p>0.05$).

The majority of patients in both groups underwent surgery for tuberculoma with decay (40.3% in the main and 36.9% in the comparison group), as well as for fibrous-cavernous tuberculosis (36.4% and 37.7%, respectively). Chronic pleural empyema in combination with destructive pulmonary tuberculosis was observed in 13.9% of patients in the main and 14.6% in the comparison group. Thus, no discrepancies were found in the operated forms of pulmonary tuberculosis ($p>0.05$).

In the main group of patients, changes in the contralateral lung were more common in the form of tuberculomas (45.7%) and fibrous cavities (29.4%). The combination of bilateral pulmonary tuberculomas was observed in 78.8% of patients, and the combination of bilateral fibrous cavities – in 70.2% of cases.

In unilateral lesions with the destructive process of the lung in combination with perforated pleural empyema, the most common type of tuberculosis lesion of the contralateral lung was the dissemination of foci which occurred in 72.2% of operated patients.

In the comparison group, bilateral pulmonary tuberculomas were observed in 42 of 48 patients (87.5%) and bilateral fibrous-cavernous tuberculosis in 45 of 49 patients (91.8%). In other cases, the contralateral lung had tuberculomas (2), conglomerates of caseous foci (1) or their dissemination (1).

As in the main group, pleural empyema the most often was combined with the dissemination of foci (78.9%).

The prevalence of pulmonary lesions, taking into account focal dissemination was slightly higher in the comparison group, in the main group the number of patients with final lesions up to 5 segments was 19.3±2.4%, while in the comparison group – 16.9±2.3% of patients, however, no significant differences were found (p=0.608). At the same time, the lesion of more than 7 segments in the main group was 61.2±4.0%, and in the comparison group – 47.6±2.9% (p=0.029).

Among patients of the main group, bacterial excretion was observed in 69.8±2.77% of cases, and in the comparison group – in 64.6±2.09%. Multiple drug resistance was observed in 20.3±1.32% and 37.2±0.72%, respectively. The number of patients with widespread resistance was 11.9±0.69% and 8.4±0.42% (p=0.642).

In general, the analysis of differences in gender and age did not reveal significant differences in the study groups (p>0.05). Also, the comparison groups did not differ significantly (p>0.05) in the forms of tuberculosis, disease duration, functional parameters, the presence of concomitant pathology, main criteria for the prevalence and severity of tuberculosis (Table 1).

Performed analysis of differences enabled to correctly compare the main and the comparison group during the dissertation research.

Table 1

Comparative characterization of patients of main groups under study (P±m_p), A%

Criteria of comparison	Main group (n=129)	Comparison group (n=130)	p by Pearson χ^2 criterion
Age 30-39 years	58.9±1.4%	50.7±6.7%	0.188
Generalization of process up to 5 segments	11.6±2.7%	13.8±4.6%	0.592
Generalization of process up to7 segments	13.9±3.5%	20.7±5.3%	0.148
Frequency of fibrous-cavernous tuberculosis	36.4±3.2%	37.6±2.3%	0.834
Disease duration 1-2 years	34.8±3.8%	32.3±2.7%	0.661
Frequency of multi-resistant strains of MRTB	42.2±2.1%	57.5±3.8%	0.757
MRTB+ at the moment of surgery	69.7±6.7%	64.6±1.5%	0.377
Frequency of concomitant diseases	51.2±2.4%	40.0±2.7%	0.071
Presence of respiratory failure of 2 degree	27.1±4.8%	23.8±4.7%	0.544
Frequency of pleural empyema	13.9±2.4%	19.6±1.7%	0.254

Depending on the nature of the interventions. the degree of their radicalism and the stages of implementation, both groups were divided into 3 subgroups.

Subgroup 1 included patients in whom, due to the prevalence of tuberculosis and functional status, radical mini-invasive bilateral one-stage or consecutive lung resections may have been performed.

Subgroup 2 included patients with fibrous-cavernous pulmonary tuberculosis with indications for unilateral or bilateral mini-invasive collapse surgery.

Subgroup 3 included patients with fibrous-cavernous pulmonary tuberculosis complicated by pleural empyema, with indications for pleura-pneumonectomy.

Thus, the main group of patients operated with the use of mini-invasive techniques was divided into subgroup1 which included 58 patients, subgroup 2 – 53 patients and subgroup 3 – 18 patients.

In the comparison group, we also separated subgroup 1.1. – 79 patients, subgroup 2.1. – 32 patients and subgroup 3.1. – 19 patients (Table 2).

Table 2

Patients under study according to groups

Patients, total (n=259)	
main group (n=129)	**comparison group (n=130)**
1. One-stage or staging bilateral video-assisted resections of the lungs (n=58)	**1.1. Unilateral or consecutive bilateral resections of the lungs using standard thoracotomies or sternectomies (n=79)**
2. Video-assisted collapse unilateral and bilateral surgeries (n=53)	**2.1. Unilateral classic thoracoplasties in bilateral pulmonary tuberculosis (n=32)**
3. Staging mini-invasive pleura-pneumectomia (n=18)	**3.1. Standard thoracotomia, pleura-pneumectomia (n=19)**

A total of 192 operations were performed in 129 patients of the main group (Table 3), including 18 stage mini-invasive pleura-pneumonectomies, 21 video-assisted lobectomies, 2 lobectomies with resection of the sixth segment, 85 segmental. polysegmental or subsegmental resections.

Table 3

Surgeries performed in patients with bilateral destructive pulmonary tuberculosis (abs.)

Surgeries	Main group				Comparison group			
	1	2	3	total	1.1	2.1	3.1	total
Segmental and subsegmental resections	**85**	**-**	**-**	**85***	**135**	**-**	**-**	**135***
Lobectomies	**21**	**-**	**-**	**21**	**15**	**-**	**-**	**15**
Lobectomies + resections S_6	**2**	**-**	**-**	**2**	**6**	**-**	**-**	**6**
Pleura-pneumectomia	**-**	**-**	**18**	**18**	**-**	**-**	**19**	**19**
Extra-pleural thoracoplasty		**53**		**53***	**-**	**32**	**-**	**32***
Extra-pleural corrective thoracoplasty	**2**	**-**	**-**	**2**	**8**	**-**	**-**	**8**
Local extra-pleural pneumolysis	**-**	**11**	**-**	**11**	**-**	**-**	**-**	**-**
Surgeries, total	**110**	**64**	**18**	**192**	**164**	**32**	**19**	**215**
Patients, total	**58**	**53**	**18**	**129**	**79**	**32**	**19**	**130**

Note. * $p<0.05$ – significance of differences between main and control group by Pearson $\chi 2$ criterion.

RESULTS AND DISCUSSION

Complications that developed during surgery with using mini-invasive technologies were isolated (1.6%) and did not have a negative impact on the postoperative period. while in the comparison group intraoperative complications were observed in 5.3% (by 3.3 times more often ($p<0.05$)) (Table 4).

Table 4

Frequency and features of intraoperative complications in patients of comparison groups

Features of complications	Main group (n=129)	Comparison group (n=130)
Incision of cavern or empyema of cavity	1	2
Incision of pleura during thoracoplacty	1	2
Injury of pulmonary root vessels	-	1
Injury of mediastinum vessels	-	1
Injury of diaphragm	-	1
Patients with complications. total	2 (1.6%)	7 (5.3%)

The volume of blood and plasma loss in the immediate postoperative period in both groups depended not only on the volume of surgery, but also on the size and traumatism of access (Table 5).

Table 5

Blood and plasma loss on drainages on the day 1 after different types of surgeries in patients of comparison groups (M±m)

Volume of surgery	Main group				Comparison group			
	number of surgeries	blood- and plasma losses (ml)			number of surgeries	blood- and plasma losses (ml)		
		min	max	average M±m		min	max	середня M±m
Segmental and subsegmental resections	85	57	526	111.6±10.2*	135	134	813	212.4±8.8*
Lobectomies	21	134	536	240.6±12.2*	15	156	742	385.5±17.6*
Lobectomies + resections S_6	2	172	531	386.7±11.4	6	180	629	403.2±12.7
Pneumaectomies	18	326	1112	813.3±15.3*	19	428	1634	1220.7±126.8*
Thoracoplasty	53	251	536	421.0±21.0*	32	318	715	534.0±28.0*
Surgeries, total	179	188	648	394.2±18.7*	207	243	906	550.8±21.4*

Note. * $p<0.05$ by Student criterion.

The average postoperative blood- and plasma loss in patients of the main group was 394.2±18.7 ml. being 1.4 times lower than the average blood- and plasma loss in patients of the comparison group – 550.8±21.4 ml ($p<0.001$). In contrast [16]. there were no intraoperative injuries of the pulmonary root vessels.

Post-operation complications developed in 13 (10.1%) of patients in the main group (Table 6).

Table 6

Frequency of postoperative complications and mortality after surgery in patients of comparison groups

Surgeries	Main group			Comparison group		
	number of surgeries abs. (%)	frequency of complications abs. (%)	died abs. (%)	number of surgeries abs. (%)	frequency of complications abs. (%)	died abs. (%)
Segmental and subsegmental resections	85 (44.3%)	1 (0.5%)	0	135 (62.8%)	7 (3.2%)	1 (0.5%)
Lobectomies	21 (10.9%)	2 (1.0%)*	0	15 (7.0%)	8 (3.7%)*	1 (0.5%)
Lobectomies + resections S_6	2 (1.0%)	1 (0.5%)	0	6 (2.8%)	3 (1.4%)	1 (0.5%)
Pneumaectomies	18 (9.4%)	6 (3.1%)	1 (0.5 %)	19 (8.8%)	9 (4.2%)	2 (0.9%)
Thoracoplasty	53 (27.6%)	3 (1.6%)*	0	32 (14.9%)	5 (2.3%)*	2 (0.9%)
Local extra-pluera-pneumolysis	11 (5.7%)	0	0	0	0	0
Correcting thoracoplasty	2 (1.0%)	0	0	8 (3.7%)	0	0
Surgeries, total	192 (100%)	13 (6.8%)*	1 (0.5 %)	215 (100%)	32 (14.9%)*	7 (3.2%)
Operated patients, total	129 (100%)	13 (10.1%)	1 (0.8%)	130 (100%)	32 (24.6%)	7 (5.4%)

Note. * – $p\leq0.05$ by Pearson $\chi2$ criterion.

The greatest number of complications was observed after pleura-pneumonectomies, lobectomies, medical thoracoplasty. But in the comparison group, postoperative complications were observed in 32 (24.6%) patients, i.e. by 2.2 times more often ($p=0.002$), which is significantly less as compared with the data [8] (37% and 50%, respectively).

The same trend is observed in the analysis of the number of complications after performing various types of operations. Thus, after lobectomy postoperative complications were observed 4 times more often in patients of the comparison group ($p<0.05$), which is much less as compared with the data [17], after performing therapeutic thoracoplasty – by 1.9 times more often ($p=0.05$), after pleuropneumonectomy – by 1.4 times more in patients of the comparison group.

We agree with the data [11] that probably lower (6.4 times) postoperative mortality in patients of the main group convincingly proves the benefits of mini-invasive operations in severe patients ($p=0.032$). In the main group, broncho-pleural complications developed in 8 cases (6.2%), and in the comparison group – in 16 patients (12.3%), i.e. 2 times less often, and exacerbation of pulmonary tuberculosis was observed 3.8 times more often in patients of comparison groups. But the most threatening complication in patients of the comparison group was acute respiratory failure, which was observed in 7 (5.4%) patients, while in the main

group such a complication was observed in only 1 case (0.8%) (p=0.03).

That is, our analysis of the nature of post-operative complications in both groups (Table 7) confirms the impact of traumatism of access [14] not only on the course of the wound process, but also on the frequency of pleuro-pulmonary and functional complications, which were more common in patients of the comparison group.

Table 7

Postoperative complications and their results

Types of postoperative complications	Main group (n=129)				Comparison group (n=130)			
	number of compli-cations	cured		not cured, including dead ones	number of compli-cations	cured		not cured, including dead ones
		Conser-vative	operated			Conser-vative	operated	
Pleural empyema with bronchial fistula	2	1	1	-	8	2	4	2
Residual pleural cavity	2	-	2	-	4	2	2	-
Slow lung expansion	4	4	-	-	4	4	-	-
Intrapleural bleeding	1	-	1	-	3	-	2	1
Acute respiratory failure	1	-	-	1	7	5	-	2
Pulmonary heart disease	1	1	-	-	4	3	-	1
Exacerbation of pulmonary TB	1	1	-	-	4	3	-	1
Suppuration or seroma of postoperation wound	2	2	-	-	2	2	-	-
Complications, total	14	9	4	1	36	21	8	7
Number of patients with complications	13			1	32			7

When analyzing the relationship between the frequency of complications and the nature of the operations performed, we found that the greatest number of complications was observed in both groups after pleura-pneumonectomy, in particular 33.0±2.6% in the main subgroup 3 and 47.3±3.4% in patients of the comparison subgroup 3.1 (Table 8).

Probably the lowest number of complications was registered in patients of subgroup 1 (radical resection interventions) and subgroup 2 (collapse surgery) (p=0.002). All cases of complications that ended in the death of the patient fell into the category of radical resection interventions in patients of subgroup 1.1 and subgroup 2.1. Postoperative mortality in the main group was 0.78% (1 case), and in the comparison group – 5.4% (7 cases). Probably 6.6 times higher postoperative mortality in patients of the comparison group convincingly proves a statistically significant advantage of mini-invasive operations in this category of patients (p=0.032). As a result of the performed operations and the subsequent treatment in a surgical unit it was possible to reach full clinical effect in 113 patients of the main group (Table 9).

Table 8

Frequency of postoperative complications and mortality in patients of comparison groups (P±m_p, %)

Groups of patients	Number of patients		
	operated	with complications (P±m_p %)	died (P±m_p %)
Subgroup 1	58	4 (6.9±1.2%)	0
Subgroup 2	53	3 (5.7±1.5%)	0
Subgroup 3	18	6 (33.3±2.6%)	1 (5.6±1.8%)
Main group, total	129	13 (10.1±2.1%)	1 (0.78%)
p between groups by Pearson χ2 criterion		p=0.002	p=0.045
Subgroup 1.1	79	18 (22.8±3.7%)	3 (3.8±1.1%)
Subgroup 2.1	32	5 (15.6±2.3%)	2 (6.2±1.2%)
Subgroup 3.1	19	9 (47.4±3.4%)	2 (10.5±2.3%)
Comparison group, total	130	32 (24.6±3.2%)	7 (5.4±2.7%)
p between groups by Pearson χ2 criterion		p=0.033	p=0.419

The full clinical effect in patients of the comparison group was achieved in 82 cases (63%) i.e. 1.4 times less than in the main group (p<0.001). Abacillation in preservation of destruction in one of the lungs occurred at the time of discharge from the hospital in 12 (9.3%) patients of the main and 21 (16.5%) – of comparison group. In 3 (2.3%) patients of the main group and 20 (15.4%) patients of the comparison group bacteria excretion remained.

Table 9

Immediate results of surgical treatment of bilateral pulmonary tuberculosis in patients of study groups (P±m_p, %)

Result	Main group				Comparison group			
	1	2	3	total	1.1	2.1	3.1	total
Full clinical effect	54 (93.1±2.2%)	43 (81.8±2.4%)	16 (88.8±2.5%)	113 (87.5±2.7%)*	45 (56.9±3.1%)	23 (72.2±4.1%)	14 (73.6±1.9%)	82 (63.0±2.3%)*
Improvement	2 (3.4±1.1%)	9 (16.9±2.1%)	1 (5.6±1.8%)	12 (9.3±1.1%)	18 (22.7±2.3%)	1 (3.1±0.9%)	2 (10.5±2.1%)	21 (16.5±1.8%)
Worsening	2 (3.4±0.8%)	1 (1.8±0.8%)	0	3 (2.3±1.1%)*	13 (16.5±2.1%)	6 (18.8±2.4%)	1 (5.2±1.9%)	20 (15.3±2.5%)*
Death	0	0	1 (5.6±0.9%)	1 (0.78±0.3%)*	3 (3.8±1.4%)	2 (6.2±1.4%)	2 (10.5±3.1%)	7 (5.3±0.8%)*
Total	58	53	18	129 (100%)	79	32	19	130 (100%)

Note. * p<0.05 by Pearson χ^2 criterion.

CONCLUSIONS

1. The study confirms the impact of traumatism of access not only on the course of the wound process, but also on the frequency of pleuro-pulmonary and functional complications, which were more common in patients operated without the use of mini-invasive methods.

2. The use of mini-invasive methods of surgical treatment of bilateral destructive pulmonary tuberculosis significantly reduced postoperative mortality by 6.4 times, increased clinical efficacy by 1.4 times, the cessation of bacterial excretion and closure of decay cavities was observed in 87.5% of patients on discharge from the hospital.

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