

Optimization of Treatment of Patients with Tuberculous Spondylitis

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Abstract

Introduction: Tuberculous spondylitis (TC) in the structure of osteoarticular tuberculosis in adults occupies a leading position and reaches 40 - 61.5% [2,4,8].

Aim of the Study: Improving the effectiveness of treatment of patients with tuberculous spondylitis.

Materials and Methods of Research: The clinical material of this study were the protocols of clinical and radiological examination, treatment analysis of 60 patients with active tuberculous spondylitis, operated on the clinical bases of the department.

The main group (group №1) included patients (n = 30) with tuberculous spondylitis of the thoracic and lumbar vertebrae, operated using a sliding titanium cage for ventral interbody fusion. A feature of preoperative preparation of patients in this group was the mandatory bacteriological examination before treatment to determine the sensitivity of the Office to ABP, the appointment of a short intensive course of specific antibacterial therapy based on the results of the study for 2 - 3 weeks followed by surgery. The basis for such a short period of preoperative preparation were the results of our experimental study [1]. A feature of the operative stage of treatment in this group of patients was the performance after the sanitizing stage (decompression necrectomy) of anterior spondylodesis using a telescopic titanium cage.

The comparison group (group № 2) included patients (n = 30) with tuberculous spondylitis of the thoracic and lumbar vertebrae using traditional approaches to surgical treatment of TC - preoperative preparation using 3-5 specific ABP without determining the sensitivity for 2 - 3 months with subsequent surgical intervention - decompressive necrectomy of the affected vertebrae and anterior spondylodesis autograft taken from a fragment of the rib (in the case of thoracic access) or from the wing of the iliac bone during surgery on the lumbar spine.

By age, sex, number of affected vertebral motor segments, activity of infectious inflammatory process, patients of the main group and the comparison group are almost identical, so comparing the results of treatment of patients of both groups in the near (3 months) and distant periods (1 - 2 years) is quite correct.

Results of Research and Discussion: For clinical evaluation of the results of treatment of patients of both groups used a score scale proposed by Ulrich EV, Mushkin O. Yu [7].

At the same time excellent results were obtained in 14 patients of the main group (54%) and in 8 - control group (32%); good - in 71 (24.7%) patients of the main group and in 7 (28%) patients of the control group; satisfactory - in 4 (15.4%) patients of the main group and in 7 (28%) of the control group, unsatisfactory - in 3 (12%) patients of the control group, unsatisfactory results in patients of the main group.

The analysis of long-term results testifies to essentially better results of treatment of patients of the main group.

Conclusion:

1. Our proposed method of surgical treatment of vehicles using modern advances in vertebral surgery (the use of telescopic titanium cages during surgery) after short-term intensive antibacterial therapy, taking into account the previous etiological diagnosis is a promising area for improving surgical treatment.
2. A comparative study of the effectiveness of treatment of patients of the main and control groups with TC showed that the use of the proposed technique in patients of the main group significantly improved treatment results by significantly reducing the stage of preparation for radical surgery, reducing complications, reducing inpatient treatment and improving quality life.

Keywords: *Experimental Vehicle; Etiological Diagnostics of Vehicle; Optimization of Vehicle Testing; Operative Testing of Vehicle; Results of Testing*

Introduction

Tuberculous spondylitis (TC) in the structure of osteoarticular tuberculosis in adults occupies a leading position and reaches 40 - 61.5% [2,4,8].

The modern approach in the treatment of tuberculous spondylitis is based on the use of radical, radical-restorative and reconstructive operations, the use of which allowed in 70.5% - 80% of cases to achieve good treatment results, which significantly exceeds the effectiveness of conservative treatments. But to this day the question of adequate stabilization of the spine remains relevant. Anterior spondylodesis as its basic component in the vast majority of cases is performed by autograft [4,6,9].

Despite the good result of anterior bone grafting in the immediate postoperative period, in the separated - the frequency of adverse effects increases from 16 to 40% [5,6,8].

Inpatient treatment of a patient with active spinal tuberculosis currently lasts at least a year, and a set of surgical interventions does not always give the desired result. Prolonged hypodynamics leads to severe dystrophic changes in the musculoskeletal system and internal organs, which complicates the rehabilitation of patients in the postoperative period. At the end of treatment, up to 85% of patients are discharged from the hospital with I-II disability groups and then for 3 - 5 years each year for 2 - 4 months to carry out in specialized hospitals or sanatoriums.

Until now, the issue of approaches to preoperative treatment remains unresolved (the feasibility of using second-line ABP, terms of preoperative treatment, the use of existing advances in vertebral surgery in terms of phthisio orthopedics (modern methods of anterior spondylodesis)).

Aim of the Study

Improving the effectiveness of treatment of patients with tuberculous spondylitis.

Materials and Methods of Research

The clinical material of this study were the protocols of clinical and radiological examination, analysis of treatment of 60 patients with active tuberculous spondylitis, operated on the basis of the Department of Osteoarticular Tuberculosis OPTD № 1 Kharkiv under

the contract № 1031/04-16 from April 8, 2016 and the clinic. base of the Department of Traumatology and Orthopedics of KhNMU in the departments of traumatology and orthopedics of the Municipal non-profit enterprise «City Clinical Hospital of Emergency and Emergency Care prof. OI Meshchaninov» of the Kharkiv City Council in the period from 2012 to 2017, where patients with vehicles were treated who did not pose any threat to others in terms of epidemiology, the so-called “closed” forms of the disease (without fistulas, connective tuberculous lung lesions). Patients are divided into two groups, depending on the approaches to preoperative preparation and the method of surgical stabilization of the destructive specific process of the spine (main group and control).

Patients in the control and main groups underwent preoperative preparation, performed radical decompressive - stabilizing operations necreseurectomy, decompression of neural-vascular structures of the spinal canal with subsequent interbody fusion.

The main group (group №1) included patients (n = 30) with tuberculous spondylitis of the thoracic and lumbar vertebrae, operated using a sliding titanium cage for ventral interbody fusion. A feature of preoperative preparation of patients in this group was the mandatory bacteriological examination before treatment to determine the sensitivity of the Office to ABP, the appointment of a short intensive course of specific antibacterial therapy based on the results of the study for 2 - 3 weeks followed by surgery. The basis for such a short period of preoperative preparation were the results of our experimental study [1]. A feature of the operative stage of treatment in this group of patients was the performance after the sanitizing stage (decompression necrectomy) of anterior spondylodesis using a telescopic titanium cage.

The comparison group (group № 2) included patients (n = 30) with tuberculous spondylitis of the thoracic and lumbar vertebrae using traditional approaches to surgical treatment of TC - preoperative preparation using 3 - 5 specific ABP without determining the sensitivity for 2 - 3 months with subsequent surgical intervention - decompressive necrectomy of the affected vertebrae and anterior spondylodesis autograft taken from a fragment of the rib (in the case of thoracic access) or from the wing of the iliac bone during surgery on the lumbar spine. This group of patients was analyzed in retrospect (based on the analysis of case histories of patients who were treated in the department of KST Kharkiv OTL №1 in 2002 - 2005).

Criteria for inclusion of patients in the study

TC in the active phase (verified pathomorphologically and/or bacteriologically); Criteria for excluding patients from the study:

- Patients older than 75 years;
- Previously operated patients on the spine;
- Patients with decompensated concomitant (non-tuberculous) impressions.

By age, sex, number of affected vertebral motor segments, activity of infectious inflammatory process, patients of the main group and the comparison group are almost identical, so comparing the results of treatment of patients of both groups in the near (3 months) and distant periods (1 - 2 years) is quite correct.

In the main group and the comparison group among male patients 66.4% and 59.94% (n = 20; n = 18), women, respectively, 33.4% and 40.06% (n = 10; n = 12) (Table 1).

The mean age of patients in the main group and the comparison group was 38.2 ± 9.6 and 40 ± 10.8 years, respectively ($p > 0.05$).

When comparing age indicators in both groups, the following feature was revealed. It was found that patients aged 20 to 30 years are significantly less prone to TC than people older than 40 years. The disease was also relatively rare in elderly patients. Thus, the development of vehicles is most characteristic of adults.

		Age, years										Total			
		21 - 30		31 - 40		41 - 50		51 - 60		> 60		abs		%	
Groups of patients		I	II	I	II	I	II	I	II	I	II	I	II	I	II
		Abs.	1	2	5	4	12	11	9	10	3	3	30	30	
Total	%	3,33	6,66	16,65	13,32	39,96	36,63	29,97	33,3	9,99	9,99			100	100

Table 1: Distribution of patients by age.

Patients with vertebral body lesions predominated among the patients. Only 2 patients of the first group were affected posterior vertebrae: transverse and articular processes, arches.

The distribution of patients by location of the lesion and the number of affected vertebrae are given in table 2. In the vast majority of observations in both groups there were lesions of the bodies of two vertebrae: in group I - 25 (83.25%), in group II - also 25 (83.25%) patients. Most often, in both the first and second groups, the thoracolumbar spine was affected. It should be noted that when localizing a destructive specific process in these parts of the spine, the involvement of three vertebral bodies in the inflammatory process was observed more often.

Localization	The number of affected vertebrae								Total			
	2				3							
	I rp.		II rp.		I rp.		II rp.		I rp.		II rp.	
	Abs	%	Abs	%	Abs	%	Abs	%	Abs	%	Abs	%
Pectoral	7	23,31	8	26,64	3	9,99	2	6,66	10	33,3	10	33,3
Thoracolumbar	8	26,64	9	29,97	2	6,66	3	6,66	10	33,3	12	39,96
Lumbar	6	19,98	5	16,65	-	0	-	0	6	19,98	5	16,65
Lumbosacral	4	13,32	3	9,99	-	0	-	0	4	13,32	3	9,99
Total	25	83,25	25	83,25	5	16,65	5	16,65	30	100	30	100

Table 2: Distribution of patients by location and number of affected vertebrae.

We used the Frankel/Asia scale to qualitatively assess neurological disorders [7].

It should be noted that the patients of both groups did not differ fundamentally in the degree of neurological disorders.

All patients with newly diagnosed TC before treatment underwent a comprehensive examination (clinical, radiological, laboratory, instrumental), which allowed to clarify the prevalence and activity of a specific process, identify complications and comorbidities, dysfunction of various organs and systems.

In patients of the main group, a puncture etiological diagnosis of the disease was mandatory before starting treatment. This examination allowed to determine the location, size, prevalence and nature of the destruction of vertebral bodies, as well as the condition of the paravertebral tissues adjacent to the cell (the presence of abscesses, abscess-like shadows).

For the treatment of patients with TC on the basis of traditional approaches (control group of 30 patients, we used surgical treatment techniques, including remediation of abscesses, resection or necrectomy of the destruction, stabilization of the affected spine by anterior or anterolateral spondylodesis autograft and immobilization) - and the postoperative period using bed rest.

Operations were performed in the amount of necrectomy, radical resection of foci of destruction, anterolateral spondylodesis with autografts. It should be noted that long pre- and postoperative bed rest in patients of this group is necessary for long-term (2 - 3 months) preoperative preparation and due to the lack of stable fixation of the operated segment of the spine, which also required bed rest within the next 2 - 4 months. Such a significant term had a negative effect on the functional state of organs and systems, especially during the transition to a more active orthopedic regime (verticalization and walking with crutches). Functional changes of the cardiovascular system in the control group were detected in 20 patients (66.6%), in the form of lymphostasis of the lower extremities in 9 patients (29.99%). In 11 patients (36.6%) in the early postoperative period there were symptoms of venous insufficiency of the lower extremities.

It is important to note that surgery in patients of both groups was performed as a stage of treatment, after basic antibacterial and pathogenetic therapy.

The fundamental differences in the treatment of patients in the main and control groups were as follows:

1. Mandatory examination of the pathological material of the focus of destruction in patients of the first group to determine the sensitivity of the Office to ABP.
2. Short-term course of intensive ABT for 2 - 3 weeks, taking into account the sensitivity of the Office.
3. When performing surgery in patients of the main group, a sliding telescopic titanium cage was used instead of an autograft.

During surgical interventions on the thoracic and lumbar spine, preference was given to anterior accesses, which are described in detail in the monograph by OO Korzh, RR Talyshynsky, MI Khvysyuk [3]. In patients of the control group, typical resections of two adjacent affected vertebrae were used, kyphotic deformity was eliminated, and autografts were wedged into the formed groove.

In all cases, the kyphotic deformity of the vertebrae was eliminated as much as possible by resection, wedging of the deformation zone and complete replacement of the defect with autografts.

The next stage of the operation were actions aimed at eliminating spinal disorders. Elimination of soft tissue compression (pus, caseous masses, granulations, scars) or rigid compression of the brain by bone sequestration or angle of deformation by resection of this angle and reconstruction of the spinal canal.

Below is a clinical example of surgical treatment of vehicles in the thoracic spine using autografts in patients of the control group (Figure 1).

After performing the rehabilitative stage of surgery, patients of both groups underwent anterior spondylodesis using an autograft (control group), or a sliding titanium cage - the main group.

In our opinion, the use of cages for anterior spondylodesis in patients with TC compared to autografts has a number of advantages: It is known that titanium implants for anterior accesses are superior to bone in their biomechanical parameters. Such structures can withstand loads of more than 3 tons. Metal fatigue test has shown that cages can withstand 5 million cycles with a load of one ton [2,5,8,9]. The frequency of bone ankylosis formation when using titanium cages is similar to that when using bone and reaches 80 - 93% [6,8,9].

In addition, telescopic body implants can provide:

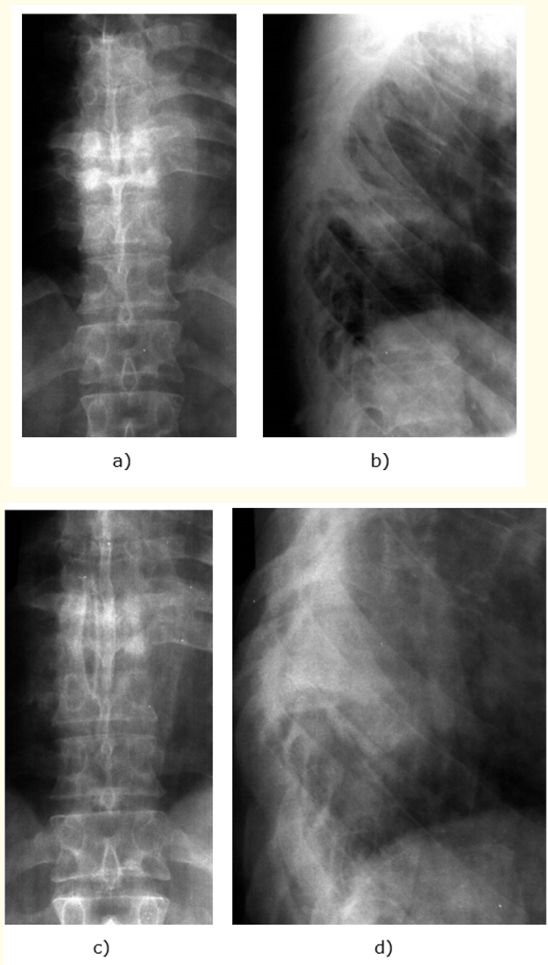


Figure 1: Photographs of radiographs of patient K, medical history № 5280: a, b) before surgery (visualized destruction in the segment D7-D8 with the presence of inflowing abscess, kyphotic deformation in the area of destruction); c, d) after surgery (performed decompression necrectomy of the affected segment of the spine with wedge spondylodesis autograft from the rib, which was resicced when performing anterior access).

- Restoration of the height of the interbody space.
- Fixation and stabilization of the supporting columns of the spine.
- Individually select the end parts according to the patient’s anatomy.
- To correct sagittal deformation of the spine due to the possibility of distraction.

Below are clinical examples of surgical treatment of vehicles in the thoracic and lumbar spine using a sliding telescopic cage - the main group (Figure 2).

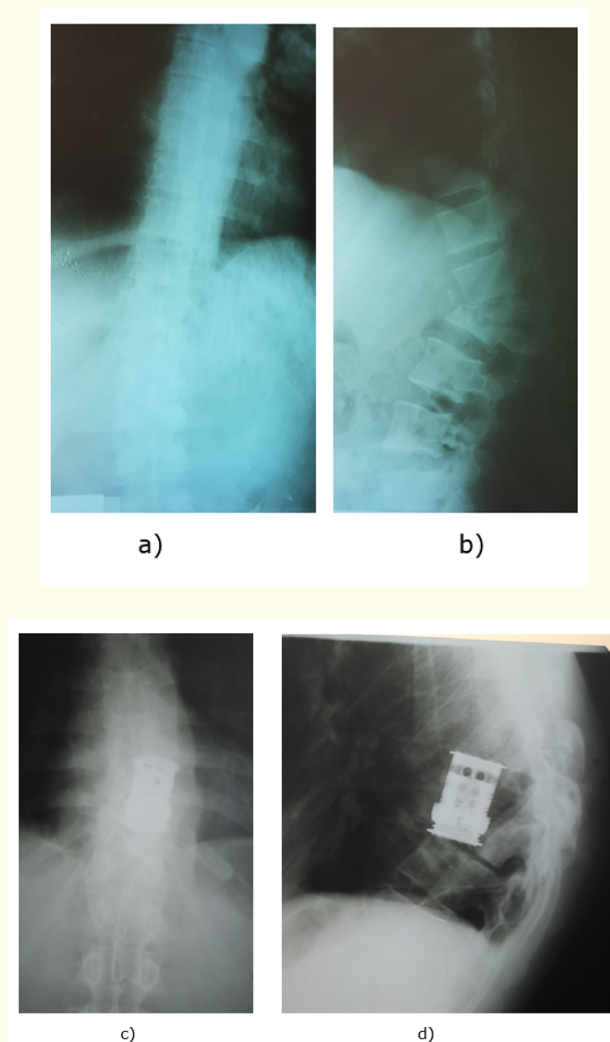


Figure 2: Photographs of radiographs of patient K., medical history № 5280: a, b) before surgery (visual destruction in the segment D10-D11 is visualized with the presence of inflowing abscess, kyphotic deformation in the area of destruction); c, d) after surgery (performed decompression necrectomy of the affected segment of the spine with wedge spondylodesis titanium telescopic cade).

Results and Discussion

For clinical evaluation of the results of treatment of patients of both groups used a score scale proposed by Ulrich EV, Mushkin O.Yu [7].

Long-term results of TC treatment were studied by us in 26 patients of group I (86.7%) and in 25 patients of group II (83.3%) in the period from 1 to 10 years. The remaining patients were residents of remote regions of Ukraine and they were unable to trace the long-term results of treatment. Clinical, radiological, neurological examination, as well as in the cases shown, computed tomography did not

reveal recurrence of the disease. At the same time excellent results were obtained in 14 patients of the main group (54%) and in 8 - control group (32%); good - in 71 (24.7%) patients of the main group and in 7 (28%) patients of the control group; satisfactory - in 4 (15.4%) patients of the main group and in 7 (28%) of the control group, unsatisfactory - in 3 (12%) patients of the control group, unsatisfactory results in patients of the main group.

In patients with acute neurological complications of TC only in 2 cases no positive effect was obtained. Of the 7 patients with the initial picture of lower paraplegia (types A and B according to Frankel) as a result of treatment 5 restored the ability to move independently, including 3 - functionally complete gait (types E and D according to Frankel).

Long-term results of treatment of patients with tuberculous spondylitis of the main and control groups are presented in table 3.

Signs / Groups	Basic (n = 30; 100%)		Control (n = 30; 100%)	
	abs.	%	abs.	%
Excellent result	14	46,7	8	26,7
Unsatisfactory result	-	-	3	10,0
The result is not traced	4	13,3	5	16,7

Table 3: Long-term results of treatment of patients with tuberculous spondylitis from the main and control groups.

Thus, the analysis of long-term results conducted in the examined patients of the main group with intensive short-term (2 - 3 weeks) antibacterial therapy (taking into account the sensitivity of the Office to ABP) followed by surgery using a telescopic titanium sliding cage, showed that this method allows to achieve high efficiency of treatment.

The analysis of long-term results testifies to essentially better results of treatment of patients of the main group.

Further increase of efficiency of treatment of patients with TC in our opinion will depend first of all on timeliness of diagnosis of this disease, studying of blood supply of a spinal cord, development of schemes of the directed neurovasotropic therapy, improvement of methods of neurostimulation treatment.

The frequency of complications observed in the postoperative period in patients of both groups was also studied. The nearest complications include complications directly related to the operation, which developed within 2-3 months after it: 1) suppuration of the surgical wound, discharge of silk and catgut ligatures; 2) postoperative pneumonia, exudative pleurisy; 3) exacerbation of the inflammatory process with the formation of fistulas; 4) necrosis of the skin edges of the wound and its secondary suppuration. Remote complications of the postoperative period included fractures and displacement of the autograft or cage, the progression of deformation in the area of specific impression of the spine. These complications were detected after 4 - 6 months and at a later date after surgery. Types of complications and their frequency are presented in table 4. A total of 4 complications or 13.32% of the total number of operations in patients of the main group, and 10 complications (33%) of the total number of operations in patients of the control group.

It should be noted that, out of 30 patients of the main group, only 5 people changed jobs, 7 received disability of group III, 18 patients - disability of group II, others returned to the previous work in 6 - 8 months.

Complication	Main group N = 30	Control group N = 30
General complications		
Postoperative pneumonia	1	1
Exudative pleurisy	-	1
Local inflammatory (serous inflammation)	2	2
Disease progression	0	2
Postoperative wound suppuration	1	1
Fractures, displacement of the autograft, cage	0	3

Table 4: The structure of complications in the immediate and distant postoperative periods in patients of the main and control groups.

It is important to emphasize that the average duration of inpatient treatment in patients of the main group was significantly shorter than in the control group (main group 96 ± 12 days), control (190 ± 21).

In our opinion, such a significant difference in terms of inpatient treatment is due primarily to the etiological diagnosis to identify the sensitivity of the Office to ABP, followed by the appointment of ABT, taking into account the study, short-term intensive preoperative preparation and use of surgical intervention before surgery. which allows much earlier rehabilitation and verticalization of operated patients, significantly reducing inpatient treatment.

Conclusion

1. Our proposed method of surgical treatment of vehicles using modern advances in vertebrology (the use of telescopic titanium cages during surgery) after short-term intensive antibacterial therapy, taking into account the previous etiological diagnosis is a promising area for improving surgical treatment.
2. A comparative study of the effectiveness of treatment of patients of the main and control groups with TC showed that the use of the proposed technique in patients of the main group significantly improved treatment results by significantly reducing the stage of preparation for radical surgery, reducing complications, reducing inpatient treatment and improving quality life.

Conflict of Interests

The author of the publication declares about the presence of the conflict of interests.

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