

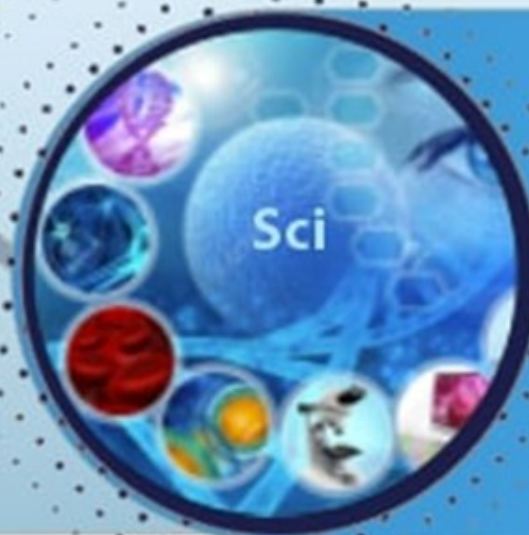


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Features of diagnosing the treatment of diabetic foot syndrome

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Abstract

Relevance. Diabetes mellitus is a chronic disease, the rate and prevalence of which are increasing every year. Every year, huge budget funds are spent on the treatment of patients with diabetic foot syndrome.

Purpose of the study. To conduct a retrospective analysis and evaluation of the effectiveness of the results of treatment of patients combined by traditional methods in the diagnosis and treatment of diabetic foot syndrome.

Conclusion. Methods based on the principles of economical removal of tissues and preservation of the supporting function of the foot formed the basis of therapeutic measures for patients with ulcerative-necrotic lesions of various clinical and pathogenetic forms of the diabetic foot syndrome.

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INTRODUCTION

Amputation of a limb is an operation aimed at saving the patient's life, subsequently making significant adjustments to the lifestyle of the patient and his family. Amputation is accompanied by a severe physical and psychological impact on the patient [1,4]. That is why reducing the frequency of amputations is one of the most important tasks of WHO, which was proclaimed by the St. Vincent Declaration of 1989. However, the goal proclaimed by the Declaration - to reduce the number of high amputations by half in 5 years has not been achieved, and the available data on the frequency of amputations in different countries do not inspire optimism. According to some estimates, the number of amputations in the world in patients with diabetes mellitus (DM) on a global scale is 55 amputations per hour [5,8].

In addition to a poor life prognosis, amputation is costly to public health. So if the cost of

primary ulcer healing ranges from \$7–17 thousand, then the costs associated with amputation of the lower limb reach \$30–60 thousand [1,3,9,10]. Epidemiological studies of recent years leave no doubt about the need to develop measures to prevent and reduce the frequency of amputations in patients with diabetes mellitus, to study new methods of local treatment of ulcerative defects.

The purpose of our study was to conduct a retrospective analysis and evaluate the effectiveness of the results of treatment of patients combined by traditional methods in the diagnosis and treatment of diabetic foot syndrome.

MATERIAL AND RESEARCH METHODS

The effectiveness of a comprehensive examination and treatment of 893 patients with various clinical and pathogenetic forms of diabetic foot syndrome (DFS), who have been treated and examined in a multidisciplinary clinic of

the Tashkent Medical Academy since 2010, has been evaluated.

All patients, depending on the clinical and pathogenetic form of foot lesions, were divided into two subgroups:

- I subgroup, patients with neuropathic form (NPF) of diabetic foot syndrome - 669 patients;
- II subgroup, patients with neuroischemic form (NIF) of diabetic foot syndrome - 224 patients;

The distribution of patients according to the nature of the disease at the time of admission to the clinic showed the predominance of patients with neuropathic form of DFS (74.9%). In the remaining 224 patients (25.1%), we stated the presence of a neuroischemic form of DFS.

The distribution of patients by sex and age showed that the main contingent of patients were male patients aged 51 to 80 years. At the same time, female patients, who accounted for 34.3% of the total number, did not have a tendentious dispersion of the age scale. The mean age among patients with NAF of diabetic foot syndrome was 54.4 ± 7.41 years, while among patients with NIF of diabetic foot syndrome, the mean age was older on average 8.2 ± 1.18 years.

The distribution of patients according to the duration of diabetes, depending on the form of diabetes, showed that in 75.9% of patients the duration of the disease was more than 11 years. At the same time, the dispersion of this indicator among patients, depending on the clinical and pathogenetic form of DFS, was predominant among patients with NPF of the diabetic foot syndrome (by 11.9%). In 20% of patients, diabetes was diagnosed less than 10 years ago, and in 4.1% of patients, this disease was first detected. The main contingent of patients, both with NPF and NIF of diabetic foot syndrome, had type II DM (98.1%).

In the majority of patients with NIF, diabetic foot syndrome during DM was severe (80.4%). Among patients with NPF of the diabetic foot syndrome, this type of severity of the course of the underlying disease was noted by us only in 59.9% (within the corresponding subgroup). In the remaining 312 patients (34.9%), the course of DM was of moderate severity, and in patients with NPF of diabetic foot syndrome, it was 20.5% more than with NIF.

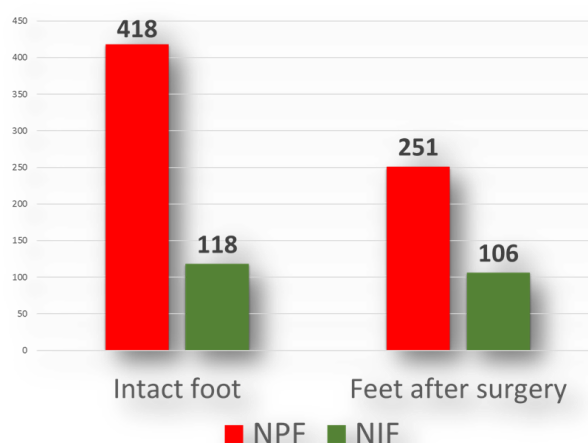
The decompensated form of DM was registered by us in 641 patients (71.8%), while the subcompensated form - in the remaining 252 patients (28.2%). A comparative analysis of DM compensation among various clinical and pathogenetic forms of DFS showed that in patients with NIF of diabetic foot syndrome, the

decompensated form was 15.1% more than in patients with APF. There were no patients with compensated form of DM in the studied groups of patients.

As a result of a comprehensive examination of patients with various clinical and pathogenetic forms of DFS, 1526 comorbidities were diagnosed. In most cases, they were combined in nature, with an average distribution of 1.7 concomitant lesions per patient. The distribution of concomitant pathologies depending on the systems showed that diseases from the cardiovascular system were in 37.0% of cases, lesions of the urinary system - in 24% of cases, central nervous system - in 12% of cases, respiratory organs - in 8.2 % of cases, organs of the gastrointestinal tract - in 8% of cases, musculoskeletal system in the form of arthrosis - in 2.0% of cases, and diseases of the skin of the mucous membrane - in 1.0% of cases. 103 patients suffered from obesity of varying degrees, which accounted for 6.7% of the total number of comorbidities.

With the presence of a full-fledged anatomical and functional state of the foot, 60% of patients were hospitalized to the center. In the remaining patients, the affected foot in the anamnesis was subjected to surgical intervention. This circumstance also took place in subgroups of patients, that is, both with neuropathic and neuroischemic clinical and pathogenetic forms of the foot (Figure 1).

Figure 1
The nature of the distribution of patients depending on the anatomical integrity of the foot



In 357 patients (40%), various surgical interventions on the foot were performed in the anamnesis due to its lesion with an ulcerative necrotic process. Among them were: opening of the phlegmon of the foot with necrectomy (22.4%), amputation of the fingers or toe

(17.6%), disarticulation of the toe or toes (11.5%), amputation of the fingers or toe with opening of the phlegmon of the foot and necrectomy (24.1%), disarticulation of the toe or toes with opening of the phlegmon of the foot and necrectomy (17.9%), transmetatarsal amputation of the foot (6.4%) - table 2.

As can be seen from the above information, in most cases, combined surgical interventions on the foot were used in the anamnesis. In 277

patients, the foot operated on in history had the form of a stump (77.6%). In 91.7% of cases, the stump was at the level of the fingers, and in 8.3% of cases, at the level of the metatarsus.

RESULTS

All patients were diagnosed with a certain degree of ulcerative lesions, which we assessed according to the Wagner classification. At the same time, patients with grade 0 foot ulcers were not included in our studies (Table 1).

Table 1

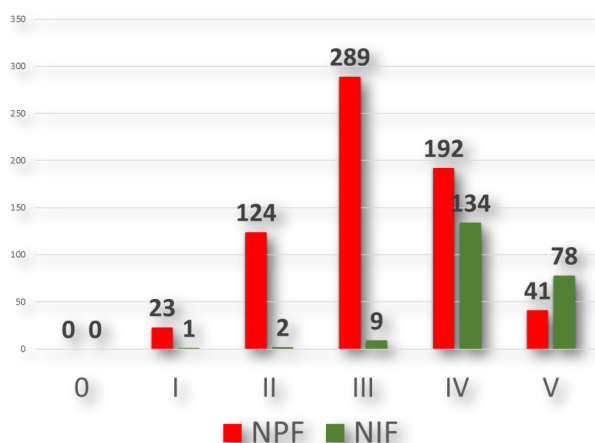
The nature of the distribution of patients depending on the history of foot surgery

OPERATION TYPES	SUBGROUPS OF PATIENTS				TOTAL	
	NPF (n=251)		NIF (n=106)		n	%
	n	%	n	%		
Foot phlegmon incision+necrectomy	68	27,1	12	11,3	80	22,4
Amputation of fingers or toes	42	16,7	21	19,8	63	17,6
Disarticulation of the toe or toes	32	12,7	9	8,5	41	11,5
Amputation of fingers or toe+opening of phlegmon of the foot+necrectomy	58	23,1	28	26,4	86	24,1
Exarticulation of a finger or toes+opening of the phlegmon of the foot+necrectomy	49	19,5	15	14,1	64	17,9
Transmetatarsal foot amputation	2	0,8	21	19,8	23	6,4
TOTAL	251	70,3	106	29,7	357	40

In the total amount, among the majority of patients (69.9%), we diagnosed ulcerative lesions of III and IV degrees. Almost in the same proportion, ulcerative lesions of the foot II (14.1%) and V (13.3%) degrees were noted. Patients with I degree of ulcerative lesions were only in 2.7% of cases (Figure 2).

Figure 2

The degree of ulcerative lesions according to Wagner



An analysis of the distribution of patients with foot ulcers showed that if grade III (43.2%) and IV (28.7%) were prevalent among

patients with NPF of diabetic foot syndrome, grade IV (59) was predominant among patients with NIF of diabetic foot syndrome. .8%) and V (34.8%) degree of ulcerative lesions. This characteristic of the prevalence of a higher degree of ulcerative lesions among patients with NIF of the diabetic foot syndrome, apparently, was associated with the prevailing damage to the microcirculation and the progression of tissue ischemia.

The duration of the formation of a foot ulcer in patients with various clinical and pathogenetic forms of DFS in 40% of cases was from 1 to 3 months. At the same time, in the same proportion of 21.4%, the terms for the formation of an ulcerative lesion were stated up to 1 month or from 3 to 6 months. In 154 patients (17.2%), the duration of the formation of a foot ulcer was chronic and was more than 6 months. At the same time, the duration of the formation of a foot ulcer in the majority of patients (78.1%) with NPF of the diabetic foot syndrome was observed in terms of up to 3 months, while in the majority of patients with NIF of the diabetic foot syndrome (88.8%) the duration of the process was noted in terms of more than 3 months.

Among the factors provoking the occurrence of ulcerative defects and purulent-necrotic process on the foot, in patients, we identified such as blunt foot trauma (20.3%), wound after treatment with a sharp object (17.1%), shoe wear (24%), the presence of an ingrown nail (2.3%) and mycotic skin lesions (20.6%), hyperkeratosis (15%). In 0.7% of cases, the cause that provoked the occurrence of ulcers on the foot remained unknown.

The analysis of the distribution frequency of factors provoking the occurrence of ulcerative defects and purulent-necrotic process on the foot among patients with various clinical and pathogenetic forms of diabetic foot syndrome showed that in the case of NPF, in most cases, patients indicated that the shoes were worn (30.9%). At the same time, in patients with NIF of the diabetic foot syndrome, the prevailing factors were blunt foot trauma (50%) and injury during handling with a sharp object (28.6%).

Ulcerative-necrotic lesions of the feet in patients with diabetes in 27.5% of cases (246 patients) were in the form of trophic ulcers. Moreover, among patients with APF, this type of lesion was 32.2% more than in patients with NIF of diabetic foot syndrome.

The main reason for the treatment of 185 patients with various clinical and pathogenetic forms of diabetic foot syndrome were complaints of long-term non-healing wounds in the limb. Prevailing by 6.9%, such cases were among patients with NIF of diabetic foot syndrome. 62 (6.9%) patients were hospitalized with soft tissue phlegmon in the area of ulcerative-necrotic lesions of DFS.

Purulent-inflammatory process in the area of the foot in the form of dry gangrene was diagnosed by us in 35 (3.9%) patients. All of them belonged to the subgroup with NIF of diabetic foot syndrome (15.6% within the subgroup). There were fewer patients with wet gangrene (2.7%). At the same time, in the analysis of variance, among various clinical and pathogenetic forms of DFS, they were found in almost the same number.

The basis of therapeutic measures for patients with ulcerative-necrotic lesions of various clinical and pathogenetic forms of DFS was based on the principles of economical removal of tissues and preservation of the supporting function of the foot. According to these methods, in order to prevent the spread of a purulent-necrotic process into the deep layers of the plantar space of the foot, antibiotic solutions were injected in the operation area. After the formation of a protective shaft within healthy tis-

ues, an incision was made in the skin, subcutaneous tissue and muscles with an additional incision up to 7-8 cm long along the dorsal and plantar surface of the foot. Through them, the flexor and extensor tendons of the affected fingers were removed with excision of the corresponding articular capsules of the metatarsophalangeal joint, as well as the metatarsal bone. The surgical wound was not sutured, but loosely packed with ointment napkins. Within 3-4 days of the postoperative period, the wound was circularly chipped daily with solutions of antibiotics based on novocaine.

For the treatment of deep anaerobic plantar phlegmons of the foot in patients with DM, after treating the foot with alcohol, the area around the affected area was chipped with a novocaine-based antibiotic solution and thus a protective shaft was formed within the healthy tissue. Then, within healthy tissues in the form of a cone, a wide excision and removal of the skin, subcutaneous tissue, plantar aponeurosis and tendons of the long and short flexors along with the affected toes were performed.

With an isolated purulent-necrotic lesion of the first toe, taking into account the possibility of progression of the pathological process along the medial fascial bed (tendon-synovial complex of the flexors of this finger), its resection was performed with the removal of the synovial membranes.

With an isolated lesion of one of the II-V fingers, this finger was excised with the removal of the tendon-synovial complexes on both surfaces of the foot and circular wound antibiotics for 6-7 cm.

With a combined lesion of II-V or two adjacent fingers with the spread of the process to the distal part of the plantar surface of the foot, all these fingers were resected in one block with the capture of the distal half of the II-V metatarsal bones and the removal of the common tendon-synovial complex up to 6 cm within unchanged tissues.

In case of combined purulent-necrotic lesions of the I and II-V toes in patients with DM at the level of the metatarsal bones, an incision was made in the skin, subcutaneous tissue and muscles at the same level, then the metatarsal bones were sawn. An additional incision was made along the plantar surface from the middle of the foot to the calcaneal tuber against the background of injection with antibiotic solutions within healthy tissues. To prevent the transition of the pathological process to the lower leg, the plantar aponeurosis, the tendons of the long flexors of the toes and the long flexors of the

first toe were removed.

It should be noted that if patients with NIF of the diabetic foot syndrome, operations in the form of disarticulation of the finger or fingers amounted to 35.3%, then among patients with NPF, operations not associated with amputations were prevalent (52.2%).

An analysis of the distribution of patients depending on the final version of the performed surgical interventions showed that the largest number of patients completed the treatment with amputations or exarticulations at the level of the fingers (44.8%). 30% of patients completed operations not related to amputations, foot amputations - 12.8%, and hip amputations - 12.4%.

Among the operations performed in the clinic, not associated with amputation of the limb, the opening of the abscess both with necrectomy (52.1%) and without necrectomy (32.5%) was prevalent. In 7.8% of patients, plastic surgeries were performed in the form of autodermoplasty aimed at closing the granulating wound.

The dynamics of changes in the nature of performed surgical interventions not related to amputation revealed the prevalence of their number in the early stages of treatment in the clinic. At the same time, non-amputation operations in 63.3% of cases occurred on the 1st day of treatment, and 25.4% of cases on the 3rd day of treatment.

Such a high frequency of surgical interventions performed in patients with various forms of DFS was associated with the repetition of operations. In total, reoperations were performed in 83.2% of cases.

In most cases, operations were performed 2-3 times (44%). However, there were cases when patients underwent surgery 4 times (18.8%), 5 times (16%) and even 6 times (16.7%). This circumstance was associated with the presence of an ischemic process against the background of angiopathy.

When analyzing the frequency of reoperations among the selected subgroups of patients, it should be noted that if among patients with NPF of the diabetic foot syndrome, repeated surgical interventions in most cases were 2-3 times (54.6%), then among patients with NIF of the diabetic foot syndrome, 5 - 6 multiple surgical interventions (57.9%).

In general, in the course of the treatment, 176 patients (48.6%) out of 362 managed to achieve excellent results without surgical intervention. This conclusion was due to the preservation of the anatomical and functional structure of the

limb. Of the 717 (80.3%) patients undergoing surgery, 51 patients died, which was 7.1% in relation to the last indicator, and 5.7% in relation to the total number of patients. Satisfactory results should also include cases with hip amputations. In 397 patients, the results of treatment were stated as good.

CONCLUSION

Thus, the presented general characteristics and therapeutic measures made it possible to determine a number of patterns, both during the pathological process and in the scope of treatment methods. The aggravated course of the NIF of the diabetic foot syndrome, in our opinion, is due to the severity of the processes not with corrected tissue ischemia. This, in turn, led to an increase in the frequency of both amputation operations performed and the number of repeated surgical interventions.

Conflict of interest - The author declares no conflict of interest.

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Compliance with patient rights & principles of bioethics - All patients gave written informed consent to participate in the study.

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