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QUALITATIVE STUDY OF THE FLOUNDER MUSCLE AFTER AMPUTATION IN PATIENTS WITH CRITICAL LOWER LIMB ISCHEMIA ON THE BACKGROUND OF DIABETES MELLITUS

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Resume

In this work biomaterials of the operation of muscular tissue taken in time from m. soleus and m. gastrocnemius from one anatomic zone were studied from amputated extremities. Results of a research showed at the patients operated concerning critical ischemia of the lower extremity of heavy degree (Wagner IV-V), to 91,9% cases the pathogenic growth of microflora in soleus muscles unlike a biceps is noted that can promote to later operational complications in the form of wound suppuration. At operations at the level of a shin on Mitish, it is necessary to define microflora to make bacteriological crops from soleus muscle tissue, for definition of further purposeful treatment. For the purpose of prevention of purulent complications in stages of removal of a soleus muscle and later, it is necessary to carry out step-by-step sanitation of a soleus muscle and surrounding fabrics.

Keywords

diabetes mellitus, critical ischemia, amputation of a shin, biomaterial, microflora, prevention.

КАЧЕСТВЕННОЕ ИССЛЕДОВАНИЕ КАМБАЛОВИДНОЙ МЫШЦЫ ПОСЛЕ АМПУТАЦИИ У БОЛЬНЫХ КРИТИЧЕСКОЙ ИШЕМИИ НИЖНЕЙ КОНЕЧНОСТИ НА ФОНЕ САХАРНОГО ДИАБЕТА

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Резюме

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Изучены микрофлоры из биоматериалы взятой во время операции мышечной ткани от m. soleus и m. gastrocnetius из одной анатомической зоны со стороны ампутированного конечности по поводу критической ишемии нижней конечности тяжелой степени. Результаты исследования показали у больных, оперированных по поводу критической ишемии нижней конечности тяжелой степени (Wagner IV-V), до 91,9 % случаях отмечается патогенный рост микрофлоры в камбаловидных мышцах в отличие от двуглавой мышцы, что может способствовать к после операционным осложнениям в виде нагноения раны. При операциях на уровне голени по Митишу, необходимо определить микрофлору, сделать бактериологический посев из ткани камбаловидной мышцы, для определения дальнейшего целенаправленного лечения. С целью профилактики гнойных осложнений в этапах удаления камбаловидной мышцы и после, необходимо провести поэтапную санацию камбаловидной мышцы и окружающей ткани.

Ключевые слова

сахарный диабет, критическая ишемия, ампутация голени, биоматериал, микрофлора, профилактика.

ҚАНДЛИ ДИАБЕТ ФОНИДА ПАСТКИ ОЁҚНИНГ КРИТИК ИШЕМИЯСИ БЎЛГАН БЕМОРЛАРДА АМПУТАЦИЯДАН КЕЙИН КАМБАЛА МУШАКЛАРИНИНГ СИФАТ ҲОЛАТИ (ПРОФИЛАКТИКА УСУЛЛАРИ)

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Резюме

Критик ишемия билан хасталанган беморларнинг болдир ампутацияси амалиёти вақтида m. soleus ва m. gastrocnetius ларнинг, бир хил анатомик соҳаларидан олинган биоматериалларни экиш орқали микрофлорасини ўргандик. Изланишлар натижасида қандли диабетли, оёқларида критик ишемия оғир даражаси (Wagner IV-V) бор беморларда 91,9% ҳолатларда m. soleus дан патоген микрофлора ўсиши кузатилди. Бу ўз навбатида операциядан кейинги йирингли асоратларнинг кўпайишига сабаб бўлади. Шундай қилиб, Митиш усулидаги болдир ампутацияси амалиёти вақтида камбаласимон мушаклардаги микрофлорани ва даво тактикасини аниқлаш мақсадида биоматериал олиш лозим. Йирингли асоратларни олдини олиш

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мақсадида камбаласимон мушак резекцияси вақтида ва кейинги даврда босқичма-босқич камбаласимон мушак ва отроф тўқималарни санация қилиш лозим.

Калит сўзлар

қандли диабет, критик ишемия, болдир ампутацияси, биоматериал, микрофлора, профилактика.

Relevance

Diabetes mellitus is an important medical and social problem in almost all countries of the world. The Republic of Uzbekistan is no exception. According to the World Health Organization, in 2010 there were more than 300 million people with diabetes in the world, and in 2025, according to expert forecasts, their number will double [1,3,8].

Despite the progress of medicine and significant advances in the treatment of various complications of diabetes mellitus, the problem of treating patients with purulent-necrotic lesions of the lower extremities remains unresolved to this day (Nabiev M.Kh. et al.. 2007: Bensman V.M., 2010; Galstyan G. R. et al., 2011; Lipsky B.A. et al., 2011). The widespread introduction of endovascular and non-traditional revascularization operations, the creation of new drugs, has significantly improved the results of treatment of diabetic foot syndrome, but many aspects remain completely unresolved (Ignatovich I.N. et al., 2010; Grekova N.M., Bordunovsky V.N. , 2009; Randon C. et al. 2010). In Russia, 5 out of 6 amputations not related to trauma and cancer are performed on patients with purulent-necrotic complications of diabetic foot syndrome[1,5,9,13]. However, the most common level of amputation is the upper third of the leg or thigh. In the structure of the causes of all non-traumatic amputations of the lower extremities, patients suffering from diabetes make up 50-70% (Bubnova HA et al., 2008; Gavrilenko AB, Skrylev S.I., 2005). In the United States, more than 60 thousand amputations are performed annually due to diabetes [1,7,10]. It should be noted that in more than half of the cases, limb amputations are performed on people of working age, which makes them deeply disabled (Pecoraro RE et al. 1990; Stone PAet al. 2006).

Most often, with purulent-necrotic lesions of the lower extremities, high amputations are performed, the frequency of which reaches 40-60% (Briskin BC et al., 2008; Yusof MIet al., 2007). Despite the successes achieved in the prevention of purulent-necrotic complications after amputation in patients with diabetes, primary wound healing is not always achieved [1,2,11]. At the same time, complications from the amputation stump develop in 5-40% of cases [1,4,6,12]. The reasons for this situation are: sepsis, incorrect choice of level and timing of amputation, stump

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hematomas, the presence of macro and microangiopathy, highly virulent infection (Bensman V.M., 2010; Zoloev G.K., 2004; Tsarev OA et al., 2011; Özdemir S. et al. 2009; Coulston JE et al., 2012).

Various complications that arise after limb amputation, the presence of severe concomitant diseases, resistant infections, cause a high mortality rate in this group of patients, reaching 25-50% (Savin V.V., 2001; Stepanov N.G., 2003; Dillingham TR et al., 2005; Hambleton IR et al. 2009).

Unsatisfactory treatment results require the use of new tactical approaches and improvement of surgical tactics, as well as the development of more effective methods for the prevention of postoperative complications.

Purpose of the study

Improving the results of treatment of amputated patients at the level of the leg with diabetes mellitus with critical ischemia of the lower limb through timely elimination of the source of infection and secondary wound healing.

Materials and methods

Studied case histories of 37 patients with critical ischemia of the lower limb due to diabetes mellitus. The age of the patients ranged from 42 to 77 years, with an average age of 59 ±0.5 years. The duration of the disease with critical ischemia is from one year to 8 years, the average duration of the disease is 4 ±0.5 years. Diabetic history revealed that out of 37 patients, diabetes mellitus was diagnosed for the first time in 3 (8.1%) patients, 22 (59.5%) patients had 4 or more years, the average duration of the disease was 11 years.

Table 1.

Duration of critical ischemia

Duration of disease (diabetes mellitus)	Absolute number	IN %
up to 1 year	15	40.6
4-5 years	10	27.0
6-8 years or more	12	32.4
Total	37	100

Table 2.

Duration of diabetic history

Duration of the disease (diabetes mellitus)	Absolute number	IN %
First identified	3	8.1
up to 1 year	5	13.5
1-3 years	7	18.9

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4-5 years	10	27.1
6-10 years	7	18.9
10 years or more	5	13.5
Total	37	100

2 grams were taken from everyone during the operation. muscle tissue from m . soleus and m . gastrocnemius from one anatomical zone on the side of the amputated limb. The biopsy material was studied to determine the microflora and to predict the course of the wound process, and therefore the qualitative and quantitative content of the microbial bodies of the material was determined by bacteriological examination. After identifying the microflora, the antibiotic resistance of microbial bodies was determined.

The complex of bacteriological studies included bacteriological examination of biopsy material, determination of the sensitivity of microflora to antibacterial drugs and the level of microbial contamination. The qualitative composition of the microflora was determined by the standard method of inoculating biopsy material on blood agar with incubation in a thermostat at a temperature of 37°C for 20 hours. If microbial associations were detected in the daily culture, subsequent identification of all enlarged colonies was carried out using appropriate media. To determine the sensitivity of microorganisms to antibacterial drugs, the standard disk diffusion method and the express method of S.D. Shapoval were used.

In addition, intoxication indicators were studied in all patients: body temperature, blood LII, ESR, average blood molecule.

Research results and discussion

A dynamic study of microflora inoculation in patients with complicated DFS showed that for the period 2014–2018. The nature of wound infection has undergone both quantitative and, to some extent, qualitative changes in the Bukhara region.

Results of bacteriological examination 2 gr. biopsy material taken from m . gastrocnemius in 37 patients with purulent-necrotic lesions of the lower extremity in diabetes mellitus operated on at the level of the lower leg, revealed a slight increase in the microflora of the collected tissue, which was observed only in 3 (8.1%) (Table 3) cases, pathogenic staphylococcus was sown, of which 1 (2.7%) in the form of monoculture and 2(5.4%) in associations. The total number of sown strains was 7, the percentage of microflora is shown in Table 3. It should be noted that these indicators were noted in patients who were admitted with critical stage V

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ischemia in serious condition. No anaerobic growth was observed. The number of sown aerobic strains is given in table. 3.

Table 3.

Aerobic associated microbial spectrum from biomaterial m . gastrocnemius .

Aerobes	Number of strains	IN %
Staph aureus	3	42.8
Proteus	2	28.6
Streptococcus	1	14.3
E. coli	1	14.3
Total	7	100

In contrast to the above, staphylococci were cultured from the tissue of the soleus muscle (m . soleus) in 34 (91.9%) cases, which in 13 (35.1%) cases were present as a monoculture and in 21 (56.7%) as part of microbial associations. It should be noted that out of the 34 patients mentioned above, wound suppuration was observed in 3 cases in the postoperative period. The latter, after appropriate treatment, wound healing occurred by secondary intention. In three cases, no growth of microflora was observed.

Analysis of the results of bacteriological research on the limb stump revealed that the number of species occurrence of aerobic microorganisms in relation to the number of strains was 51 (63.75%) observations, and anaerobic – 29 (36.25%) (Table 4).

Table 4.

Number of sown aerobic and anaerobic strains and their ratio from biomaterial taken m . soleus

Number of strains	80	100%
Number of sown aerobic strains	51	63.75
Number of anaerobic strains sown	29	36.25

In a qualitative analysis of aerobic microflora in the biomaterial, in most cases staphylococci, proteus, streptococci and Escherichia coli were found.

Table 5.

Identified aerobic associated microbial spectrum from biomaterial m . soleus .

Aerobes	Number of strains	IN %
Staph aureus	22	43.1
Proteus	15	29.4

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Streptococcus	8	15.7
E. coli	3	5.9
Enterecocus sp.	2	3.9
Pseud aerugenosa	1	2.0
Total	51	100

The table below indicates the species detectability of microorganisms in the examined patients, the biomaterial of which was taken from m . soleus . Of the total number (37) of patients, in this one this ratio of indicators is due to the presence of frequent seeding of microbes in associations.

Our qualitative analysis of anaerobic microflora revealed the following (Table 6).

It should be noted that among the identified anaerobes in most cases the following were identified: Pr . melaningenica – 11 (37.9%), B. fragili – 5(17.2%) and B . intermadius – 5(17.2%).

Table 6.

The identified anaerobic microbial spectrum from the biomaterial m. soleus.

Anaerobes	Number of strains	IN %
Pr.Melaningenica	eleven	37.9
B.fragilis	5	17.2
B.intermadius	5	17.2
Cl septicum	2	6.9
Fusobacterium sp.	4	13.8
Peptostrept sp.	1	3.5
Propinobacterium	1	3.5
Total	29	100

The next criteria for assessing the condition of patients were indicators of general intoxication of the body. The results of these studies are reflected in Table 7.

Table 7.

Dynamics of changes in intoxication indicators in the examined patients (n = 37)

Indicators	Norm	Day				
		First day	After operation	3 days p/o	7 days p/o	9 days p/o
t ^{0} body	36.6	38.6±0.3	37.4±0.3*	36.7±0.4	36.6±0.4	36.6±0.2
L -blood	6.0	9.4±0.5	7.8±0.3*	7.0±0.4	6.2±0.3	5.6±0.3
MSM	0.120	0.216±0.011	0.174±0.014*	0.116±0.012	0.101±0.011	0.098±0.012

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LII	1.2	2.5±0.18	1.8±0.14*	1.3±0.12	1.1±0.2	1.0±0.2
ESR	10	49.1±2.4	37.2±2.1*	24.7±1.3*	12.7±1.6*	10.5±1.6

Note where * P <0.05 – reliability indicator in relation to the previous day of treatment.

As evidenced by the data in Table 8, on the first day of admission, that is, before surgery, the body temperature of the patients averaged 38.6±0.3 ^{0} C. The content of blood leukocytes averaged 9.4±0.5 • 10 ^{9} /l . The volume of average molecules was 0.216±0.011 units. The LII and ESR indicators were 2.5±0.18 and 49.1±2.4, respectively. Increased levels of MSM, L , LII, as well as ESR, indicated severe endotoxicosis in this category of patients. Against the background of standard treatment after amputation at the level of the leg, on the third day of treatment, a significant decrease in all analyzed intoxication indicators was noted, as body temperature from 38.6±0.3 to 36.7±0.4 0 ^{C} , blood leukocytes - 9.4 ±0.5 to 7.0±0.4• 10 ^{9} /l, MSM – 0.216±0.011 to 0.116±0.012, LII – 2.5±0.18 to 1.3±0.12, ESR – 49, 1±2.4 to 24.7±1.3. By the seventh day of treatment, the average body temperature was within the normal range: blood L , MSM, LII and ESR only slightly differed from normal values: 7.8±0.3%. On the ninth day of treatment, as Table 8 shows, all analyzed indicators of body intoxication were within normal limits.

On the day of admission, the average blood sugar level was 14.7 ±2.1 mmol/l. Against the background of complex treatment and insulin therapy, on days 10-11 of treatment, a decrease in blood sugar levels to normal levels was noted.

When studying the sensitivity of the identified microflora to antibiotics, the following data were noted:

Table 8.

Indicators of sensitivity to antibiotics in identified microflora

Antibiotics / **Bacteria**	Ceftriaxone	Levofloxacin	Metranidazole	Sulperazon
Pr. melaninogenica	75.8%	89.7%	68.4%	93.7%
B.fragilis	94.5%	91.2%	97.8%	99.1%
B.intermadius	95.3%	91.5%	98.1%	99.3%
Cl septicum	56.9%	63.5%	87.6%	90.7%
Fusobacterium sp.	84.8%	94.2%	91.1%	98.9%
Peptostrept sp.	80.1%	98.4%	89.8%	96.6%

All patients were rehabilitated after the surgical period; no deaths were observed. The average bed days were 9±0.6.

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Thus, our research showed that in patients operated on for severe critical ischemia of the lower limb (Wagner IV - V), up to 91.9% of cases there is a pathogenic growth of microflora in the soleus muscles, in contrast to the biceps muscle, which can contribute to postoperative complications in the form of wound suppuration.

conclusions

1. with diabetes mellitus in stages IV - V according to F. W. _ Wagner (1981) the soleus muscle is infected in 91.9% of cases , while infection of the biceps muscle occurs insignificantly, only 8.1% of cases.
2. During operations at the shin level according to Mitish, it is necessary to determine the microflora and do bacteriological culture of the soleus muscle tissue to determine further targeted treatment.
3. For the purpose of prevention during the stages of removal of the soleus muscle and after, it is necessary to carry out step-by-step sanitation of the soleus muscle and surrounding tissues.

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