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COMPARATIVE CHARACTERISTICS OF WOUND INFECTION IN PATIENTS WITH COMPLICATED FORM OF DIABETIC FOOT SYNDROME

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ANNOTATION: According to WHO data, diabetic foot syndrome (DFS) is one of the most severe complications of diabetes mellitus, which affects up to 10% of patients with diabetes mellitus. As a result, deep lesions of soft tissues and destruction of bony structures of the feet can develop against the background of damage to the microcirculatory system and peripheral nerve structures, which leads to infectious damage of foot structures, from simple cellulitis to chronic osteomyelitis and gangrene. Up to 20% of patients subsequently undergo high amputation. Up to 50% of patients die within 3 years, the average survival rate is no more than 5-6 years. This problem leads to severe social consequences for patients and the economy of society as a whole. For 40 years the number of patients with diabetes in the world has increased more than 3 times and is now about 500 million people. Most often the population of underdeveloped countries with low income suffers from DM. When studying the question of types of wound infection, regardless of the form of DFS (neuropathic and/or ischemic), 98 patients were included in the review, of which men-55(56,1%), women-43(43,3%), from 25- to 80 years old, type 1 diabetes mellitus in 15(15,3%, type 2 - 83(84,7%), neuropathic and/or neuroischemic form of DFS - in 44(44,9%), critical ischemia of lower limbs with obliterating atherosclerosis on the background of diabetes mellitus - 54(55,1%). It was revealed that the most frequent wound infection in DFS and critical ischemia with lower limbs Chronic Obstructive Diseases of the Arteries of the Lower extremity on the background of diabetes mellitus develops more often in persons with decompensated type II DM.

Key words: diabetes mellitus, wound infection, ischemia, neuropathy, atherosclerosis.

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СРАВНИТЕЛЬНАЯ ХАРАКТЕРИСТИКА РАНЕВОЙ ИНФЕКЦИИ У ПАЦИЕНТОВ С ОСЛОЖНЕННОЙ ФОРМОЙ СИНДРОМА ДИАБЕТИЧЕСКОЙ СТОПЫ

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АННОТАЦИЯ:По данным ВОЗ, синдром диабетической стопы (СДС) является одним из наиболее тяжелых осложнений сахарного диабета, которым страдают до 10% пациентов с сахарным диабетом. В результате на фоне повреждения системы микроциркуляции и

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периферических нервных структур могут развиться глубокие поражения мягких тканей и разрушение костных структур стоп, что приводит к инфекционному поражению структур стопы, от простого целлюлита до хронического остеомиелита и гангрены. До 20% пациентов впоследствии подвергаются высокой ампутации. До 50% пациентов умирают в течение 3 лет, средняя выживаемость составляет не более 5-6 лет. Эта проблема приводит к серьезным социальным последствиям для пациентов и экономики общества в целом. За 40 лет число больных сахарным диабетом в мире увеличилось более чем в 3 раза и сейчас составляет около 500 миллионов человек. Чаще всего СД страдает население слаборазвитых стран с низким уровнем дохода. При изучении вопроса о типах раневой инфекции, независимо от формы СДС (невропатической и/или ишемической), в обзор были включены 98 пациентов, из которых мужчин - 55(56,1%), женщин - 43(43,3%), возраст от 25 до 80 лет, тип 1 сахарный диабет у 15 (15,3%), тип 2 - у 83 (84,7%), нейропатическая и/или нейроишемическая форма СДС - у 44 (44,9%), критическая ишемия нижних конечностей с облитерирующим атеросклерозом на фоне сахарного диабета - у 54 (55,1%). Выявлено, что наиболее частая раневая инфекция при СДС и критическая ишемия нижних конечностей при хронических обструктивных заболеваниях артерий нижней конечности на фоне сахарного диабета чаще развивается у лиц с декомпенсированным СД II типа.

Ключевые слова: сахарный диабет, раневая инфекция, ишемия, невропатия, атеросклероз.

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DIABETIK OYOQ SINDROMINING MURAKKAB SHAKLI BO'LGAN BEMORLARDA YARA INFEKTSIYASINING QIYOSIY XUSUSIYATLARI

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ANNOTASIA:JSST ma'lumotlariga ko'ra, diabetik oyoq sindromi (DOS) qandli diabetning eng og'ir asoratlaridan biri bo'lib, qandli diabet bilan og'rigan bemorlarning 10% gacha ta'sir qiladi. Natijada, yumshoq to'qimalarning chuqur shikastlanishi va oyoqlarning suyak tuzilmalarining buzilishi mikrosirkulyatsiya tizimi va periferik asab tuzilmalarining shikastlanishi fonida rivojlanishi mumkin, bu esa oddiy selulitdan surunkali osteomiyelit va gangrenaga qadar oyoq tuzilmalarining yuqumli shikastlanishiga olib keladi. Keyinchalik bemorlarning 20% gacha yuqori amputatsiya qilinadi. Bemorlarning 50% gacha 3 yil ichida vafot etadi, o'rtacha omon qolish darajasi 5-6 yildan oshmaydi. Ushbu muammo bemorlar va umuman jamiyat iqtisodiyoti uchun jiddiy ijtimoiy oqibatlarga olib keladi. 40 yil davomida dunyoda diabet bilan og'rigan bemorlar soni 3 martadan oshdi va hozirda 500 millionga yaqin odam. Eng tez-tez kam daromadli rivojlanmagan mamlakatlar aholisi QD aziyat chekmoqda. DOS (neyropatik va/yoki ishemik) shaklidan qat'i nazar, yara infektsiyasining turlari haqidagi savolni o'rganishda 98 bemor ko'rib chiqildi, ulardan erkaklar-55 (56,1%), ayollar-43 (43,3%), 25 yoshdan 80 yoshgacha, 1-toifa diabetes mellitus 15(15,3%, turi 2 - 83(84,7%), neyropatik va/yoki DOS neuroischemic shakli - 44(44,9%), diabet fonida obliterating ateroskleroz bilan pastki oyoqlarda tanqidiy ishemiya - 54 (55,1%). DOS da eng ko'p uchraydigan yara infektsiyasi va diabetes mellitus fonida Pastki oyoq-qo'l arteriyalarining surunkali obstruktiv kasalliklari, pastki oyoq-qo'llari bilan kritik ishemiya dekompensatsiyalangan II DM tipidagi odamlarda tez-tez rivojlanib borishi aniqlandi.

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Kalit so'zlar: qandli diabet, yara infektsiyasi, ishemiya, neyropatiya, ateroskleroz.

Relevance: The diabetes mellitus is one of the most serious medico-social problems of our time relating to the priority directions of national health systems of all countries. According to the experts World Health Organization, the total number of patients with diabetes mellitus making 120 million people in 1996 by 2025 will increase to 250 million [5,10].

DFS occurs about 8-10% of patients with diabetes mellitus. In a multicenteral research, the organized European Study Group on Diabete sand the Lower Extremity (Eurodiale) it is shown that among for the first time the addressed patients in 51% of cases the DFS neuropathic form is diagnosed (among them with the infected ulcers there are 27%), in 31% — a neuroischemic form and with signs of infection of an ulcer and at 18% — ischemic. Ulcers can be formed on any part of foot, but about a half is formed on a bottom surface (including fingers) and the others in other areas. [1,3,8]

Heavy outcome of an ulcer of feet is amputation of the lower extremity, which at patients with DM is carried out 10-30 times more often in comparison with all population. After the first amputation, the risk of repeated amputation and death considerably increases. Despite existence of the drafted protocols and standards, desirable high performance of treatment of ulcers at DFS does not manage to be reached now. Treatment of DFS in most cases remains long, labor consuming and highly expensive. According to the research Eurodiale with participation of 1000 people from DFS which are observed in specialized clinics of several countries of Europe, the median of terms of healing of ulcers in the field of a front part of foot made 147 days, in average – 188 days and in a heel zone – 237 days [2,4,11].

The submitted review of literature is devoted to the description of the practice existing now and perspectives of use of innovative methods of treatment of patients with DFS. Neuropathy and/or ischemia plays a major role in the development of diabetic foot syndrome infection[6,7,9]. The ulcerative defects that appear become a constant source of infection in complicated DFS, which, with the prolonged existence of a superficial ulcer at first, can later be complicated by phlegmon, osteomyelitis and gangrene. This pathology is usually very difficult to treat and it is important to know the bacterial flora for adequate antibiotic therapy. Studies conducted in the UK, USA, Russia, show that even a year after diagnosis of diabetic foot infection in 55% of patient's infection persisted, and 15% were amputated. In view of this, the treatment of this disease is a complex clinical problem[7,11].

Aim of the study: to investigate the most common wound infection in patients with complicated DFS. This study aims to investigate the prevalence of bacteria isolated from diabetic foot infections.

Materials and Methods:

A total of 98 patients with diabetes mellitus whose course was complicated by diabetic foot syndrome in 2020-2021 were enrolled in the study.

Baseline data of groups of patients with neuropathic and ischemic form of DFS, comparative analysis

Neuropathy	Ischemia
Mean age 54.4 ± 13.4	Mean age 67±13
Men 30 (68.1%) Women 14 (31.8%)	Men 22 (40.7) Women 32 (59.3%)
Type 1 DM 13(27%) Type 2 DM 35(73%)	Type 1 DM 1(2%) Type 2 DM 49(98%)
On admission:	At admission:

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12(25%)-decompensated, 30(62,5%)-subcompensated, 6(12,%)-compensated. At discharge: 6(12.5%)-subcompensation, 42(87.5%)-compensation	0(0%)-decompensation, 30(58%)-subcompensation, 20(40%)-compensation At discharge: 8(16%)-subcompensation, 42(84%)-compensation.

The diagnosis of diabetes mellitus in all patients was confirmed earlier by repeated blood sugar studies on fasting and 2 hours after meals, glucose tolerance test and glycated hemoglobin determination. According to the nature of damage trophic ulcers were detected in 24(26,9%), phlegmons 36(36,7%), infected wounds 20(22,4%) and gangrene of feet 18(20,2%)

For microflora type examination, the study material was taken from the wound according to the rules of sterility. The skin around the wounds are treated with antiseptics (betadine, aqueous and/or alcoholic chlorhexidine solution, iodopyron, etc.). The material was collected with a sterile cotton swab, and the wound contents (exudate, pus, detritus, necrotic masses) were previously removed. The material was collected by circular rotational movements from the center of the wound to the edges and sent to the laboratory within 1 hour, if impossible, it was stored in the refrigerator for no more than 2 hours. Seeding was performed simultaneously on 3 types of nutrient media: 5% blood agar, sugar broth, plain nutrient agar and endo medium.

Results and Discussion: When analyzing the microbiological study between groups of patients with complicated forms of DFS, the main pathogens of purulent infection were identified among 98 study participants. A total of 243 studies were performed

Main pathogens of purulent infection

Type of pathogen	2020 year	2021 year
Staph. Spp	52,4%	52,8
Enterobacter. spp	20,2	20,8%
Pseudomonas. spp	13,6%	11,9
Acinetobacter. spp	5,2%	3,5%
Enterococcus. spp	4,2%	4,3%
Strept. spp	2,7%	1,5%
Candida. spp	1,7%	2,5

Comparative evaluation of foot infectious agents in neuropathic and ischemic forms of DFS

Type of pathogen	Neuropathy	Ischemia
Staph aureus	56%	44%
Staph MRSA	14%	19%
Entreobacter spp	20%	25%
Pseud+Acinet spp	10%	12%

The study revealed that Gram-positive cocci are the most frequently detected, up to 56% in neuropathy and 44% in ischemia, mainly Staphylococcus aureus and Staph. MRSA(14% and 19%), from gram-negative flora- Enterobacter spp.(20% and 25%) and Pseydomonas+ Acinetobacter spp. (10% and 12%). From the obtained results we can see that both aerobic and anaerobic flora plays an important role in the development of purulent-necrotic processes in

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patients with complicated form of SDS, which can complicate the course of purulent-necrotic process and creates difficulties in treatment of this category of patients.

Conclusions: as can be seen from the study, in the structure of infectious agents in patients with complicated form of DFS prevails Staphylococcus aureus, both in neuropathic and ischemic forms, associations are noted in 27-38% of patients.

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