

Efficiency Of Segmental-Reflex Balneo-Physiotherapeutic Complex In Ischemic Diabetic Foot Patients

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ABSTRACT

Background: The article examines the relationship between diabetic foot and pyo-destructive lesions of the lower extremities.

Objective: The research covers 109 patients with LEDA of II-IV stages and DFS divided into 2 groups according to the aims of research and used methods of treatment: I control - 60 patients treated with conventional surgical and conservative methods, II main - 49 treated with RSBPTC consisting of peloid therapy with mud from Azerbaijan volcanoes, trental-electrophoresis with "Polyus-1", darsonvalization and magnetotherapy with "Volna-2" to lower extremities.

Methods: The study included 109 patients with ischaemic form of DF. They were divided into two groups based on the tasks and treatment methods used: the control group, which consisted of 60 patients who received traditional treatment, and the main group, which consisted of 49 patients who received conventional treatment plus SRBPTC, which included pelotherapy, trental-electrophoresis, darsonvalization, and magnetotherapy.

Results: We found that the use of RSBPTC consisting of peloid therapy, trental-electrophoresis, darsonvalization and magnetotherapy in patients with LEDA of II-IV stages and DFS significantly improves microcirculation and microcirculation and tissue metabolism, reduce inflammation and builds up restoration, healing of tropical ulcers and postoperative wounds, reliably improves the results of treatment.

Conclusion: The complicated treatment of patients with diabetic angiopathy of the lower extremities in the second to fourth phases by RSBPTC, which includes pelotherapy, magnetotherapy, darsonvalization, and trental electrophoresis, is a pathogenetically established, efficient, and effective form of therapy.

Keywords: balneo-physiotherapeutic methos of treatment, diabetic foot, DFS significantly, LEDA of II-IV stages.

Introduction

1. Relevance.

Diabetic foot is mainly associated with pyo-destructive lesions of lower extremities. Nearly 85% of these lesions are trophic ulcers of foot; the remaining part is abscesses, phlegmons, osteomyelitis, tenovaginitis, purulent arthritis and other lesions developing independently or as a complication of trophic ulcer (International Working Group, 2000). The treatment of such patients is a very difficult problem. It should be aimed at correction of carbohydrate metabolism, normalization of micro- and macrocirculation, control of pyo-necrotic processes. Despite successful results, many aspects of the problem remain unsolved. The results of treatment could not be considered satisfactory due to mortality, reaching 8-10% in patients with lower extremities diabetic angiopathy (LEDA) complicated with diabetic foot (DF) (Pokrovsky., Koshkin., Kovalenko., Chupin, 1998). Balneo-physiotherapy, using natural factors, has a good effect on many aspects of pathogenesis of diabetic angiopathies i.e. hyperglycemia, dyslipidemia, microcirculation (MC) and tissue trophism (Kazmin, 2001: 187; Kalinin, 2003; 52-54; Krashenitsa, Mozzherin, Boranukova, 1989: 289; Musayev, Nasrullaeva, Namazov, 2002; Shinkarenko, Milenina, 1973: 25).

The modern medical researchers are aimed to prove efficacy of natural factors that have good

effects on normalization and improvement of MC and peripheral blood circulation in treatment of diabetes mellitus (DM) complicated with diabetic foot (Kartashova, 1994: 19; Krashenitsa, Botvineva, Topuria, Samutin, 2000: 236; Musayev, Nasirov, Efendieva, 1997: 26-27).

There is a need to work out scientifically confirmed methods of pelotherapy together with other natural factors which could have good effect on metabolism and regional tissue trophism in patients with DM complicated with LEDA of the 2nd - 4th stages and DF (Boranukova, 1993: 14; Dobordzhinidze, 2001: 36).

The segmental-reflex balneo-physiotherapeutic treatment complex (SRBPTC) consisting of pelotherapy and magnetotherapy, darsonvalization, trental-electrophoresis with high aftereffect was worked out at the Department of surgical diseases together with Research Institute of balneology and natural factors of MoH of Azerbaijan Republic (Nasirov, Efendieva, Kazimov, 1996: 181-182; Nasirov, Efendieva, Ismaylova, 2009: 47-49; Nasirov, Efendieva, Ismaylova, 2009: 42-43).

In this research we aimed to study the effect of this method on the results of surgical treatment of patients with ischemic type of DF.

2. Material and methods

The research covers 109 patients with ischemic type of DF. They were divided into 2 groups according to the tasks and used methods of treatment:

I – the control group – 60 patients underwent traditional treatment: dietotherapy, insulin with thorough control of glucosuria and glycemia, antibacterial medicines, anticoagulants, desagregants, vasodilating, antihistaminic etc., topical (wound dressing) and surgical treatment (necrectomy, lower extremities amputations and resections on different levels), balneo-physiotherapeutic methods such as pelotherapy and magnetotherapy, ultraviolet irradiation or electrophoresis etc.

II- the main group with 49 patients treated conventionally but with addition of SRBPTC consisting of pelotherapy, trental-electrophoresis, darsonvalization and magnetotherapy.

There were 30 (50%) cases with pyo-necrotic lesions (trophic ulcers), 15 (25%) cases with moist gangrene of toes and distal part of foot, 5 patients with phlegmon of foot (8,3%), 6 cases of dry gangrene of toes and distal part of foot (10%), 15 cases of gangrene of foot spreading to lower leg (25%) in the first group. There were 15 (25%) patients with LEDA in the 2nd stage, 24 (40%) - in the 3rd stage and 21 (35%) in the 4th stage.

We observed pyo-necrotic lesions (trophic ulcers) of foot in 23 (46.9%) cases, moist gangrene of toes and distal part of foot in 12 (24.5%), foot phlegmon in 6 (12.2%), dry gangrene of toes in 3 (6.1%), moist gangrene of foot in 12 (24.5%), gangrene of foot spreading to lower leg in 5 (10.5%) of the second group. There were 12 (24.5%) patients with LEDA in the 2nd stage, 23 (46.9%) with the 3rd stage and 14 (28.6%) the 4th stage (Table №1).

Table I. Clinical types of DF in different treatment groups

NOSOLOGIC TYPE	NUMBER OF OBSERVATIONS (n)			
	I group (n=60)		II group (n=49)	
	Abs.	%	Abs.	%
Pyo-necrotic lesions (trophic ulcers)	30	50	23	46,9
Foot phlegmon	5	8,3	6	12,2
Moist gangrene of toes and distal part of foot	15	25	12	24,5
Dry gangrene of toes and distal part of foot	6	10	3	6,1
Gangrene of foot spreading to lower leg	4	6,7	5	10,2
TOTAL	60	100	49	100

So, both groups correlated with stages of LEDA, clinical types and severity of diabetic foot.

We applied non-medicine SRBPTC consisting of pelotherapy, trental-electrophoresis, darsonvalization and magnetotherapy in 49 patients with LEDA of the 2nd – 4th stages and DF from the main group. This treatment was carried out in the hospitals of AMU.

We used mount therapeutic muds from Azerbaijan volcanoes (mud preparation “Palcıq”) for

pelotherapy. The first mud application was applied to back of neck covering neck sympathetic ganglions (in supine position), the second covered lumbar ganglions, the third was on lower leg, avoiding gangrene location. The mud temperature was in the range of 39-40 C°, one application lasted for 30 minutes, the course of treatment consisted of 12- 15 applications.

Darsonvalization was carried out by covering all parts of lower leg and nearest areas to the lesion.

The duration of procedure was 8-10 minutes. The course of treatment consisted of 10-15 procedures.

Every other day the patients underwent trental-electrophoresis with 2% solution injected through positive terminal of "Polyus-1" apparatus. Pads moistened with trental solution were put on both sides of lower leg (above gangrene location), negative terminal was on the waist. The amperage was up to 10-12mA, the procedure lasted for 20-30 minutes. The course of treatment consisted of 10-15 procedures, alternating with darsonvalization.

Magnetotherapy to the affected extremity was carried out with "Volna-2" apparatus. The procedure lasted for 10-20 minutes daily. The course of treatment made up to 20 procedures with constant (induction 10-30 mT) or impulse (induction 10-50 mT) mode. The electric treatments were carried out half an hour before therapeutic muds to strengthen and fix vasodilating effects.

3. Results and discussions

The assessment of clinical results was based on general condition of patients, the way they felt, body temperature, in terms of wound: disappearance of edema, hyperemia of surrounding tissues, the cleaning time of pyo-necrotic masses, appearance of granulations, beginning of epithelization and time of wound healing.

We observed the clinical effect from the beginning of treatment by SRBPTC of patients with LEDA and DF. We observed improvement of general condition, reduction of hypostatic edema, disappearance of signs of endogenous intoxication with considerably reduced pain and spread of pyo-necrotic lesion in patients with severe trophic disorders and gangrene. The continuation of complex treatment up to 16-18 days where SRBPTC was one of components, helped to considerably improve general condition, local tissue condition, to clean trophic ulcers on foot and lower leg, to transform moist gangrene into dry and so let to make limb-saving operations.

Wounds of patient who underwent SRBPTC cleared from pyo-necrotic masses for 4 -5 days earlier with simultaneously disappearing signs of local inflammation and general intoxication. Their temperature and blood count normalized for 3 - 4 days earlier than in the control group.

As a result, SRBPTC as a part of complex treatment helped to improve MC, lowered glucose tolerance to insulin and made detoxicating effect.

In addition, we managed to make so called small operations on toes and foot (amputation of toes, resection of distal part of foot) and lower the level of supposed amputation in 40 (81.6%) of 49 patients from the main group (Table №2). The treatment of 9 (18.4%) patients with apparent and increasing pain and large pyo-necrotic lesion was ineffective. These patients underwent amputation of limbs on upper third of the leg (4 patients, 8.2%) and thigh (5 patients, 10.2%) by life-saving indication.

Table II. The types of primary operations and their results in patients with LEDA of the 2nd -4th stage and DF from the main group (n=49)

The type of operation	The number of operated		The number of died	
	Abs.	%	Abs.	%
Necrectomy	29	58.2	-	-
Exarticulation of toes	10	20.4	-	-
Transmetatarsal amputation of foot	4	8.2	-	-
Amputation of lower leg	3	6.1	1	33.3
Amputation of thigh	3	6.1	1	33.3
TOTAL	49	100	2	4.1

The results from Table №3 show that 6 patients of 9 with pyo-necrotic lesions of foot were improved. But 3 patients with apparent trophic disorders and necrotic changes showed increase of ascending infection and intoxication, appearance of signs of hepato-renal failure. 2 such patients underwent amputations on middle third of thigh and 1-on upper third of shin by life-saving indication. The rate of high amputations was 18.4%

Table III. The type of repeated operations and their results in patients with 2nd -4th stage LEDA and DF from the main group.

The type of operation	The number of patients	Good outcome	Satisfactory outcome	Unsatisfactory outcome	Died
Necrectomy, purulent leakage and plantar aponeurosis cutting	4	3	1	-	-
Transmetatarsal amputation of foot	3	2	1	-	-
Amputation of shin	1	-	-	1	-
Amputation of thigh	2	1	-	1	1
TOTAL	10	6	2	2	1

17 patients (73.9%) of 23 patients with LEDA of the 2nd-4th stage and DF suffering from trophic ulcers on lower limbs significantly improved: ulcers either completely healed or cleared of necrotic tissues and reduced in size. 6 patients (26.1%) did not show any positive changes but there were some positive indications of instrumental examinations. 2 of them were with LEDA of the 2nd-4th stage and trophic ulcers on feet. 4 had to undergo transmetatarsal amputation of foot, 1 amputation of upper third of shin, 1 amputation of thigh.

Patients with trophic ulcers underwent skin transplantations by Tirsch-Davies after ulcers cleared and clean wound with good granulations appeared.

20 patients (40.8%) of 49 from the second group showed good results. 20 patients (40.8%) from the same group showed satisfactory results. 9 (18.4%) showed unsatisfactory results. 40 (81.6%) patients underwent necrectomies, small amputations such as exarticulation of toes or transmetatarsal amputation of foot. 4 (8.2%) patients underwent amputation of shin and 5 (10.2%) - amputation of thigh. 3 patients died (6.1%).

20 patients (33.3%) of 60 from the control group showed good results. 17 patients (28.3%) from the same group showed satisfactory results. 23 (38.3%) showed unsatisfactory results. 37 (61.6%) patients underwent necrectomies and small amputations. 6 (10.0%) patients underwent amputation of shin and 17 (28.3%) - amputation of thigh. 4 patients died (6.7%) (Table №4)

Table IV. The results of treatment in near postoperative period in different groups

Groups of patients	Number of patients (n)	Results			Amputations		General mortality
		Good	Satisfactory	No changes	Shin	Thigh	
1 Control	60 100%	20 33.3%	17 28.3%	23 38.3%	6 10%	17 28.3%	4 6.7%
2 Main	49 100%	20 40.8%	20 40.8%	9 18.4%	4 8.2%	5 10.2%	3 6.1%

The difference in mortality numbers from the control and the main groups is not statistically significant but

the number of good and satisfactory results in the main group is significantly higher (for 20%).

4. Conclusions

The application of SRBPTC consisting of pelotherapy, magnetotherapy, darsonvalization, trental-electrophoresis in patients with diabetic angiopathy of lower extremities of the 2nd -4th stages help to improve microcirculation and tissue metabolism, reduces inflammation, strengthens reparation leading to faster healing of trophic ulcers and postoperative wounds, significantly improves results of treatment.

The complex treatment of patients with diabetic angiopathy of lower extremities of the 2nd -4th stages by RSBPTC consisting of pelotherapy, magnetotherapy, darsonvalization and trental- electrophoresis is pathogenetically established, efficient and adequate method of therapy.

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