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INTRAVENOUS PARACETAMOL EFFICACY FOR POSTOPERATIVE PAIN CONTROL IN PATIENTS WITH DIABETIC FOOT SYNDROME

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The aim of the research is to determine the intravenous paracetamol effectiveness for postoperative pain control in patients with diabetic foot syndrome (DFS).

Materials and methods. The characteristics of pain syndrome has been analysed in 149 patients, among whom 88 (59.0%) were women. Patients were divided into two groups. 1st group - 77 patients with neuropathic form of DFS, 2nd group - 72 patients with ischemic form of DFS. The groups have been compared in mean age, body mass index and duration of diabetes. The main subgroup, with a paracetamol included in the treatment program ("Infulgan" manufactured by "Yuria-Pharm", Ukraine), and control subgroup (pain control with other non-steroidal anti-inflammatory drugs) were allocated in each group.

Results and discussion. It was established that the postoperative pain syndrome features in patients depend on the form of DFS and applied method of pain control.

Conclusions. Anticonvulsants in combination with paracetamol are useful for adequate treatment of pain syndrome in patients with neuropathic form of DFS, paracetamol in combination with pentoxifylline - in patients with ischemic form of DFS. The use of intravenous paracetamol in complex of surgical treatment in patients with DFS allows to reduce severity of postoperative pain syndrome, reduce inpatient stay duration and improve the comfort of patient in the hospital.

Key words: postoperative pain control, paracetamol, diabetic foot.

Diabetic foot syndrome (DFS) - a set of anatomical and physiological changes that are developed as a complication of diabetes mellitus (DM) and caused by diabetic neuropathy, angiopathy and the development of purulent necrotic processes. Many patients with DFS may have pain syndrome, which has some differences depending on the form of DFS.

Pain in neuropathic form is characterized by the greater intensity at night than during the day; intensifying at rest, reducing in walking; paresthesias, hypersensitivities and hyperpathic tint. To treat this type of pain syndrome there are a number of medicinal products

related to their adverse effects (ulcerogenicity, reduced blood flow, impaired renal function, increased volume of blood loss during surgery), especially in patients with peptic ulcer disease, kidney diseases (diabetic nephropathy), hypocoagulation, thrombocytopenia, bronchial asthma [5]. In such cases, paracetamol can be used, whereas undesirable adverse effects are rare.

Paracetamol - is one of the most popular non-opioid analgesics in all branches of medicine. It is used in various types of pain - from mild to severe as monotherapy or in combination with another analgesic - NSAID, "Tramadol", codeine. Rapid analgesic effect, good tolerability is typical for paracetamol. Despite belonging to a central acting analgesic, paracetamol has no negative effects characteristic of opioid analgesics: inhibition or activation of the centres of the brain stem or medulla oblongata (sedation, respiratory depression and reduced blood circulation, nausea, vomiting). [3]

Until recently there was no paracetamol dosage form for parenteral perioperative application, it was widely used for postoperative pain control in oral or rectal forms, separately or in combination with opioids. However, oral analgesic administration is impossible after many types of surgeries, and in case of rectal administration of the drug, its absorption may decrease [2, 5].

Recently, a new form of paracetamol has appeared - for intravenous administration as a solution for infusion in vials (1 g per 100 ml), which has osmolarity of 290 mOsmol/l, good tolerability and other benefits: usability and convenience of administration that saves time of personnel [8].

The aim of the research is to determine the intravenous paracetamol effectiveness for postoperative pain control in patients with diabetic foot syndrome.

MATERIALS AND METHODS

Treatment, course of perioperative period and pain syndrome characteristics were analysed in 149 patients, among whom 88 (59.0%) were women. 1st group - 77 patients with neuropathic form of DFS, 2nd group - 72 patients with ischemic form of DFS. The groups were comparable in mean age (in 1st - (59.3 + 11.8), the 2nd - (62.1 + 1.9) years; $p = 0.29$), height (respectively - (12.5 + 169.3) and (170.6 + 15.1) cm; $p = 0.63$), body mass index ((1.6 + 27.9) and (27.5 + 6.9) kg/m²; $p = 0.45$) and duration of diabetes ((7.9 + 1.6) and (6.4 + 1.9) years; $p = 0.14$). The main subgroup and the control one have been allocated out in each group.

For perioperative pain control, as recommended (M. Ahmad, C.R. Goucke, 2002; Barry Gidal, 2006 and others.), anticonvulsants (gabapentin)

in combination with paracetamol ("Infulgan" manufactured by "Yuria-Pharm", Ukraine) was applied in patients of the main subgroup of the first group (neuropathic form of DFS), paracetamol ("Infulgan") in combination with pentoxifylline ("Latren" manufactured by "Yuria-Pharm", Ukraine) was applied in 2-nd group patients (ischemic form of DFS). Administration of paracetamol solution in a dose of 1.2-1.5 ml/kg (1000 mg) was started in both major subgroups during surgery to ensure the effect of "preemptive analgesia" [4]. The duration of infusion was at least 15 minutes. 2-3 infusions were performed during the first day depending on the presence and severity of pain in the patient. The interval between doses was 4.5-12.0 hours. No more than 4 infusions daily were administrated (maximum daily dose - 4 g). Conventional pain control with the use of NSAIDs was applied in patients of control subgroups.

All patients had undergone clinical laboratory, instrumental, biochemical tests.

RESULTS AND DISCUSSION

It was established that the postoperative pain syndrome features in patients depend on the form of DFS and applied method of pain control.

Assessment of pain syndrome in the preoperative and postoperative period was performed on the basis of parameters proposed by the International Association for the Study of Pain as criteria that reflect its dynamics: a) time prior to the first need to use analgesics, i.e. the duration of pain-free period after the surgery; b) average pain intensity according to the 10-point visual analogue scale (VAS) within 48 hours after surgery; c) the average amount of morphine applied within 48 hours after surgery; d) proportion of patients who did not require postoperative pain control [3, 9, 10]. The obtained results are shown in Table 1.

The application of proposed comprehensive pain control has contributed to reduction of severity of diabetic neuropathy manifestations in neuropathic form of DFS: burning pain - from 78.6 to 52.4% ($p = 0.029$), "lighting" pain - from 59.0 to 38.3% ($p = 0.04$) and phantom pain syndrome, that is more than in other analgesic techniques.

Faster reduction in the number of complaints after surgery was observed in patients of the second group. (Table 2).

Application of the proposed method in the comprehensive surgical treatment of patients with DFS allowed to reduce the severity of postoperative pain syndrome in neuropathic and ischemic forms of DFS and, therefore, to improve the comfort of the patient's stay in the hospital. The duration of their stay in the hospital decreased from

Table 1
Intensity of pain in patients with neuropathic form of DFS

Parameter	Main group (61 surgical interventions in 48 patients)	Control subgroup (43 surgical interventions in 29 patients)
Time prior to first requirement of analgesics, h	7.24 ± 2.75	2.97 ± 1.50*
The mean pain intensity according to VAS during 48 hours, points	3.51 ± 1.08	4.93 ± 2.16**
The average amount of morphine applied for 48 h, mg	21.8 ± 5.6	34.9 ± 8.5**
Number of surgical interventions in which patients did not require administration of opioids	2 (3.27 %)	0

The difference in comparison with the parameter of the main subgroup is significant: * p < 0.01; ** p < 0.05.

Table 2
Dynamics of complaints of patients in 2nd group

Parameter	Main group (43 surgical intervention in 38 patients)			Control subgroup (37 surgical intervention in 34 patients)		
	Prior to surgery	3rd day	7th day	Prior to surgery	3rd day	7th day
Muscle pain	34 (79.0 %)	30 (69.7 %)	25 (58.1%)*	29 (78.3 %)	28 (75.6 %)	27 (72.9 %)
Intensifies with movements	25 (58.1 %)	22 (51.1 %)	19 (44.1 %)*	21 (56.7 %)	21 (56.7 %)	20 (54.0 %)
Intensifies in the horizontal position of the body	12 (27.9 %)	11 (25.6 %)	11 (25.6 %)	10 (27.0 %)	11 (29.7 %)	10 (29.7 %)
Night pain	12 (27.9 %)	12 (27.9 %)	10 (23.6 %)	10 (29.7 %)	10 (29.7 %)	9 (24.3 %)
Numbness of feet	18 (41.8 %)	16 (37.2 %)	13 (30.2 %)*	15 (40.5 %)	15 (40.5 %)	14 (37.8 %)
Cooling of feet	17 (39.5 %)	16 (37.2 %)	15 (34.9 %)	14 (37.8 %)	16 (43.2 %)	15 (40.5 %)

* The difference in comparison with the parameter prior to surgery is significant (p < 0.05).

(36.1 ± 12.1) bed days (in the control group) to (26.1 ± 9.3) bed day in neuropathic form and the DFS (25.6 ± 10.9) bed day in ischemic form of DFS.

CONCLUSIONS

Anticonvulsants in combination with paracetamol are useful for adequate treatment of pain syndrome in patients with neuropathic form of DFS,

paracetamol in combination with pentoxifylline - in patients with ischemic form of DFS.

The use of intravenous paracetamol in complex of surgical treatment in patients with DFS allows to reduce severity of postoperative pain syndrome, reducing inpatient stay duration and improve the comfort of patient in the hospital.

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