European Journal of Humanities and Educational Advancements (EJHEA)
Available Online at: https://www.scholarzest.com
Vol. 2 No. 7, July 2021
ISSN: 2660-5589

C-REACTIVE PROTEIN AS A CRITERION OF EFFICIENCYTREATMENT OF PATIENTS WITH PURULENT-NECROTIC INFECTION SOFT TISSUE USING VACUUM THERAPY

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Article history:

Received 26th June 2021
Accepted: 11th July 2021
Published: 31th July 2021

Abstract:

Vacuum therapy improves the course of all stages of the wound process by reducing local edema and increasing local blood flow, helps to reduce the level of microbial contamination of wounds, and reduces the size of the affected area. With the use of the technology, exudation in the wound area is reduced, a moist environment is maintained, which is the key to successful healing of a soft tissue defect. When examining data that reflect an assessment of the effectiveness of treatment of necrotizing soft tissue infection, the evidence for an assessment has not been reliably determined. Among biochemical parameters, the dynamics of the C-reactive protein content has not been studied enough; the correlation of the C-reactive protein content when using physical methods of treating chronic wounds is unknown. Taking into account the inconsistency of the data, we determined the dynamics of C-reactive protein in patients with wound infection using a vacuum bandage. C-reactive protein is one of the most pathognomonic markers of acute inflammation. C-reactive protein is synthesized mainly in hepatocytes, its synthesis is activated by immune complexes, antigens, bacteria, fungi.

Keywords: Vacuum therapy,C-reactive protein,blood,patients,immune complexes.

INTRODUCTION

Among all surgical patients, wound infection occurs in 35-45%, the treatment time of which is significantly longer than the average. In the structure of morbidity, patients with long-term non-healing wounds account for up to 4%, which is associated with concomitant pathology and localization of the pathological process [1]. Modern approaches to the treatment of wounds are aimed at minimizing the phase-side process by improving the healing process. This goal is achieved by using various methods of physical and drug effects on the wound [2, 3]. With similar clinical variants of a wound defect, the use of different therapeutic approaches leads to different results. To assess the effectiveness of the healing of chronic wounds, there are both subjective control methods, which include clinical observation of wound cleansing and the appearance of granulations, the appearance of epithelization, normalization of body temperature, and objective - cytological and microbiological studies of wound smears, measuring the pH of the wound environment, laser Doppler flowmetry, transcutaneous oxygen tension and the use of modern computer videometry [4]. In the treatment of purulent-necrotic soft tissue infection, a large role is assigned to the surgical stage, and in the postoperative period it is necessary to achieve the transition of the wound process to the regeneration phase. In recent decades, the most interesting method has been treatment of acute and chronic wounds using negative pressure (NPWT - Negative Pressure Wound Treatment). This method is based on the use of a closed sealed drainage system and a medical pump that maintains negative pressure, which creates optimal conditions for the fastest cleansing and wound healing [5, 6]. Vacuum therapy improves the course of all stages of the wound process by reducing local edema and increasing local blood flow, helps to reduce the level of microbial contamination of wounds, and reduces the size of the affected area.Againstthe background of the application of the technology, exudation in the wound area decreases, a moist environment is maintained, which is the key to successful healing of a soft tissue defect [7, 8].Evaluation of the effectiveness of treatment of necrotizing soft tissue infection, the evidence for the evaluation is not reliably determined. Among biochemical indicators, the dynamics of the content of C-reactive protein (hereinafter CRP) has not been studied enough, the correlation of the content of CRP is unknown when using physical methods of treating chronic wounds. Taking into account the inconsistency of the data, we determined the dynamics of CRP in patients with wound infection using a vacuum bandage. CRP is one of the most pathognomonic markers of acute inflammation. CRP is synthesized mainly in hepatocytes, its synthesis is activated by immune

complexes, antigens, bacteria, fungi.In the blood has a high variability with the activity of the disease, the stage of the process [9]. The CRP level increases manifold in inflammations of various localization and etiology in trauma, surgical interventions, tumors accompanied by inflammation and tissue devitalization, and also instantly decreases in the absence of infectious complications [10].

THE AIM OF THE STUDY

The aim of the study was to determine the CRP content in the blood serum of patients as an objective laboratory criterion for the effectiveness of treatment of patients with purulent-necrotic soft tissue infection of various localizations using vacuum therapy.

MATERIAL AND METHODS

The criterion for the inclusion of patients in the study is age over 18 years, the presence of chronic long-lasting wounds of various localization, previous necrectomy in patients. 24 patients took part in the study. The structure of nosology is presented in table 1.

Table 1 - Structure of nosology.

No	Structure of nosology	Quantity	Quantity
		Group 1, n (%)	Group 2, n (%)
1.	Syndrome of diabetic foot	7 (29,2%)	8 (33,3%)
2.	Suppuration of the postoperative stump of the upper third of the thigh	3 (12,5%)	2 (8,3%)
3.	Complicated wounds after metal osteosynthesis	2 (8,3%)	1(4,2%)
4.	Syndrome of positional compression	1 (4,2%)	0 (0%)

To achieve this goal, the patients were divided into groups: group 1 - patients who received vacuum therapy against the background of general treatment (n = 13); group 2 - patients who used traditional methods of treatment (n = 11).
The characteristics of patients in these groups are shown in Table 2.

Table 2 - General characteristics of patients in groups 1 and 2.

Indicators	Group 1 (M (25%;75%)), n=13	Group 2 (M (25%;75%)), n=11	Confidence level, r*
Sex, m / f:	12/1	10/1	>0,05
Age, years	59,0 (47,0;68,0)	60,0 (53,0;66,0)	>0,05
Body weight,kg	85,0 (76,0;97,0)	76,0 (73,0;82,0)	>0,05
Height, cm	176,0 (168,0;178,5)	170 (168,0;174,0)	>0,05
Body mass index, kg /m²	23,8 (22,0;28,4)	22,5 (21,1;23,6)	>0,05

Note: * - the Mann-Whitney U test was used for the analysis.

All patients underwent antibiotic therapy according to antibiotic sensitivity culture, staged surgical debridement, correction of existing ischemia, adequate unloading of the lower limb, elimination of bacterial contamination of the wound surface. All patients received non-steroidal anti-inflammatory drugs, antibacterial therapy, physiotherapeutic procedures, and concomitant treatment. , thermometry was performed. All patients on admission to the operating room underwent a puncture of the peripheral vein. For anesthetic management, conduction or spinal anesthesia was performed. During the operation, the parameters of pulse oximetry, non-invasive blood pressure, respiratory rate, and ECG were assessed. All patients underwent successful surgical intervention - necrectomy. In all patients of the first group, necrectomy was accompanied by the application of a vacuum bandage. Patients receiving conventional therapy (second group) were daily bandaged with 0.05% chlorhexedinedigluconate solution. All patients after the operation were in the ward of the department of purulent surgery. The duration of hospitalization of patients was 26.0 (24; 28) days, later all patients were discharged for outpatient treatment. When analyzing the patient's stationary medical records, the content of C-reactive protein in the blood serum was recorded. In patients of both groups, blood samples were taken to determine the CRP content at the following stages:Stage 1 - before surgery; Stage 2 - 2 days after surgery;Stage 3 - 5 days after the operation.

RESULTS AND DISCUSSION.

Negative pressure wound treatment was performed in a continuous mode (evacuation at -125 mm Hg). The patients underwent 3 sessions of VAC therapy for 6 days (the dressing was changed every 48 hours). NPWT was performed using an inflow drainage, which lay at the bottom of the wound. Repeated necrectomies were not observed in any case; the absence of frequent painful dressings with the use of vacuum dressings contributed to a better tolerability of the treatment. At the 1st stage of the study (before the operation), the content of CRP in the blood serum in patients was 106.70 (29.12; 184.17) mg / l, at the 2nd stage (2 days after the operation) there was a slight decrease in CRP, which was 41 , 13 (17.61; 172.46) mg / l (p> 0.05). At stage 3 (5 days after surgery), the content of CRP decreased compared to stage 1 and stage 2 - 39.24 (8.31; 94.32) mg / l, statistically significant differences (p = 0.01). Thus, we found that in the postoperative period, the serum CRP content in all patients of both groups after radical surgical necrectomy decreased 2 days after surgery, which amounted to 41.13 mg / l (p> 0.05), and the maximum after 5 days after surgery - 39.24 mg / l (p = 0.01). Analysis of the dynamics of CRP in patients showed the following: the level of CRP was equal at stage 1 in group 1 - 101.09 (30.59; 206.99) mg / l, and in group 2 - 112.3 (22.10; 150, 71) mg / l (p> 0.05). The CRP content at stage 2 was 33.50 (12.51; 132.82) mg / l in group 1 and 107.74 (31.36; 177.75) mg / l in group 2 (p> 0, 05). At stage 3, the CRP level was 13.88 (05.94; 104.12) mg / L in group 1 and 52.97 (18.28; 97.00) mg / L in group 2 (p <0, 05).Thus, our data indicate that in the postoperative period, the content of C-reactive protein in serum decreased statistically significantly at the third stage of the study in patients of only the first group. In our study, the maximum decrease in CRP was also recorded 5 days after the vacuum therapy. It was revealed that patients of the second group had a longer hospitalization, slow elimination of bacterial contamination and local inflammatory process in the wound. We quantified the efficacy in terms of CRP content when using vacuum therapy in the treatment of wound infection. The CRP level was equal at stage 1 in group 1 - 101.09 (30.59; 206.99) mg / l, and in group 2 - 112.3 (22.10; 150.71) mg / l (p> 0.05). The content of CRP at stage 2 was 33.50 (12.51; 132.82) mg / l in group 1 and 107.74 (31.36; 177.75) mg / l in group 2 (p> 0, 05). At stage 3, the CRP level was 13.88 (05.94; 104.12) mg / L in group 1 and 52.97 (18.28; 97.00) mg / L in group 2 (p <0, 05).

CONCLUSION

1. The content of C-reactive protein in the blood serum of patients with purulent-necrotic soft tissue infection using vacuum therapy significantly decreased five days after treatment from 106.70 mg / l to 39.24 mg / l.
2. In patients, the CRP level 2 days after treatment was 33.50 (12.51; 132.82) mg / l in group 1 and 107.74 (31.36; 177.75) mg / l in group 2 5 days after treatment, the CRP level was 13.88 (05.94; 104.12) mg / l in group 1 and 52.97 (18.28; 97.00) mg / l in group 2.
3. Control of the level of C-reactive protein in blood serum is an objective laboratory criterion for the effectiveness of treatment of patients with purulent-necrotic soft tissue infection using vacuum therapy.

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