

C-REACTIVE PROTEIN IN ODONTOGENOUS OSTEOMYELITIS

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C-REACTIVE PROTEIN IN ODONTOGENOUS OSTEOMYELITIS

[Following is the translation of an article by A. F. Medvedeva, Stomatology Department (Head - Associate Professor Z. A. Shishki a; Scientific Supervisor - Prof. V. S. Dmitrieva) of the Kazanskiy Institute for the Development of Doctors imeni V. I. Lenina, published in the Russian-language periodical Stomatologiya (Stomatology), Vol 44, Jan-Feb 1965, pages 54--57. Translation performed by Sp/7 Charles T. Ostertag, Jr.]

Up until the present time the problem of odontogenous osteomyelitis of the jaws has an urgent significance. A number of problems, connected with the pathogenesis and immunological factors, require a more thorough study. The serological shifts, emerging during odontogenous osteomyelites, have been studied insufficiently, though the solving of this problem may have both a theoretical and practical significance. The appearance of C-reactive protein in the serum of a patient belongs to one of such moments.

This protein was detected for the first time by Tillet and Francis in the serum of pneumonia patients. It was named C-reactive because of its ability to enter into the precipitation reaction with the C-polysaccharide antigen of the pneumococcus. This protein was obtained in a crystalized state by McCarty. It has been studied with the aim of exposing the acuity and gravity of the pathological process during myocardial infarction, infectious diseases and rheumatism (Anderson, McCarty; Kroop, Shreckman; A. I. Vorobyeva; Miltenyi, Gal; A. P. Sleptsov, A. L. Yampolskiy, P. M. Pashinin; Yu. K. Tokmachev, Ch. L. Kasalitsa).

C-reactive protein -- this is a substance which appears in the blood serum during inflammatory and necrotic processes and is absent in healthy persons. The appearance of this protein in the blood is connected with pathological changes of an inflammatory nature and therefore Selman and Halpern, Taylor, Carcassi, and Pitzus, and Prencipe named it "inflammatory protein."

The majority of investigators consider that the appearance of this protein is a more sensitive index of an inflammatory process than the ESR [erythrocyte sedimentation rate], leukocytosis, and the temperature curve.

C-reactive protein possesses expressed antigenic properties; highly specific immune serum is obtained following the hyperimmunization of rabbits with this protein.

In connection with the wide application of antibiotics, at a given time the clinical picture of the inflammatory processes in many cases is changed significantly and no strict dependency is noted between the gravity of the process and the blood picture.

On the basis of the investigations of a number of authors it can be noted that C-reactive protein may be detected both with an accelerated ESR and with a normal one. It appears in 14--26 hours following the onset of inflammation. This is earlier than the ESR testifies to the development of the inflammation. The disappearance of this protein as an element of the process also sets in earlier than the ESR (Taylor; A. I. Vorobyeva).

We undertook the mission to clear up the dynamics of C-reactive protein in odontogenous osteomyelites in connection with their clinical course and remoteness of the disease, and also in connection with the indices of blood and prognosis. For this the blood was investigated prior to the operation and on subsequent days in various periods.

The investigations were carried out according to the method of Anderson and McCarty in the modification of P. M. Pashinin. The reaction is based on precipitation in capillary tubes, where the serum of the patient is the antigen and the serum of the rabbit is the antibody. As a result of the high sensitivity and specificity of the reaction it is possible to detect a minimal amount of antigen (0.01 ml/liter).

The blood for the investigation is taken from the vein on an empty stomach, and the serum is obtained by the usual way.

Into a thin glass capillary 9 cm in length, 1/3 of antiserum is collected and then 1/3 of the serum being investigated. The capillary, which is 2/3 filled, is kept swinging lightly, thus moving the liquid from one end to the other for the mixing of the reagents (10 times). Then the liquid in the capillary is adjusted so that a 15 mm length of its end is free from the liquid. The end of the capillary with the air column is immersed in plasticine in such a way that part of the air column is visible and the capillary is set up vertically. After standing for 2 hours at room temperature approximate data are obtained, and after 16--18 hours the final result is determined. For this, the support with the capillaries is located toward a natural source of light and the reaction is evaluated based on the magnitude of the precipitate, the height of which is measured in millimeters. The height of the column depends on the quantity of C-reactive protein. A precipitate height of 1 mm is appraised as a weakly positive reaction (+), of 2 and 3 mm as a positive reaction correspondingly for (++) and (+++), and a precipitate with a height of 4 mm and more is evaluated as a sharply positive reaction for the corresponding number of crosses. Such a measuring of the height of the column in millimeters gives an idea about changes in the acuteness of the inflammatory process from the quantitative viewpoint.

We investigated the C-reactive proteins in 43 patients with odontogenous osteomyelites. Of these, 32 had acute processes and 11 - chronic. The remoteness of the disease in 6 patients was up to 3 days, in 9 patients from 4 to 7 days, in 7 patients from 8 to 14 days, in 11 patients from 15 to 30 days, and in 10 patients more than 30 days. All told 95 investigations

were made. Of these, 11 patients were investigated 1 time, 20 patients - 2 times, 8 patients - 3 times, 1 patient - 4 times, 2 patients - 5 times, and 1 patient - 6 times. During acute osteomyelites negative results were obtained in 1 case, a positive reaction for (+) in 4, for (++) in 7, for (+++) in 5, for (++++) in 10, and for (+++++) in 5. During chronic osteomyelites negative data were obtained in 5 patients, a positive reaction for (+) in 3, for (++) in 3. The average amount of protein during acute osteomyelites comprised 3 mm, and during chronic -- 0.8 mm, that is, the amount of C-reactive protein was greater in persons with acute inflammatory processes than with chronic. The amount of C-reactive protein is found in a reverse dependency on the remoteness of the disease. With a remoteness of the disease up to 3 days the average amount of it was 3.8 mm, from 4 to 7 days -- 3 mm, from 8--14 days -- 2.7 mm, from 15 to 30 days -- 2.3 mm, and with periods greater than 30 days -- 1.2 mm (see drawing).

During acute inflammatory processes, following an operation the content of C-reactive protein begins to rapidly drop. While prior to the operation the average amount of it is 3 mm, after 7 days it becomes equal to 1.2 mm, and after 8--14 days it drops to 0.7 mm.

In our investigations all the acute processes ended favorably and did not transform into a chronic form. The time for healing was various. With a remoteness of the disease up to 3 days the average bed-day was 3.3, with a remoteness of from 4 to 7 days it also equaled 8.3 days, and with a remoteness from 8 days and greater -- 14. The greater the remoteness of the disease, the longer the process of recovery lasted. The rapid lowering of the C-reactive protein following the operation points to the possibility of an earlier recovery.

Another picture was observed in patients with chronic osteomyelites. The remoteness of the disease in these patients was up to 4 months. Bed-days were found within the limits of 7--25 days (average number of bed-days equaled 16). In this group of patients during the process of healing a small amount of C-reactive protein was constantly preserved in the blood. Upon the admission of 3 patients this protein was not detected, and it was not found during subsequent investigations. Following the operation during chronic osteomyelites there was hardly any dynamics in the content of C-reactive protein. These data speak for the fact that in the early periods of the disease the responsive reaction of the body is more expressed than in patients with a great remoteness of the disease. During chronic osteomyelites the immunological reorganization in the organism lasts much longer and the responsive reaction is less expressed.

We also studied the connection between C-reactive protein and the amount of leukocytes. With a protein content of (0) and (+) the average number of leukocytes equaled 8190, for proteins (++) and (+++) it was 8360, and for proteins (++++) and (+++++) -- 10,000. Consequently, for a sharply positive reaction an increase in the amount of leukocytes in the blood is characteristic for C-reactive protein.

In studying the similarity between C-reactive protein and the ESR, it was noted that for protein in the quantity of (++++) and (++++) the average ESR equaled 24 mm/hour, for protein (++) and (+++) -- 14 mm/hr, and for negative data and indices for (+) the ESR was 19 mm/hr. From these data we could not establish a dependency between the content of C-reactive protein and the ESR.

We observed a significant increase in the content of C-reactive protein with an increase of the body temperature of the patient. With a room temperature of 37.1° the indices of protein were from 0 up to (++), and with a temperature of 38° -- (++++) and (+++++). These data confirm that during acute processes with high temperature an expressed responsive immunological reaction is observed in the form of an accumulation of C-reactive protein.

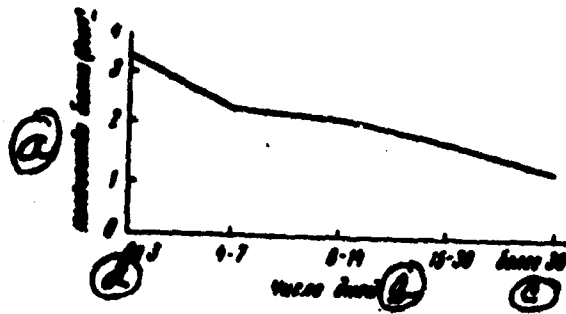
Conclusions

1. During acute odontogenous osteomyelitis of the jaws, C-reactive protein appears in the blood, and the quantity of it depends on the acuteness of inflammation and the body temperature.
2. The content of C-reactive protein is found in a reversely proportional dependency on the remoteness of the disease; the smaller the remoteness the more protein in the blood.
3. A direct dependency between the amount of C-reactive protein and the ESR is not observed. A sharply positive reaction to this protein in the majority of cases corresponds to a higher content of leukocytes.
4. Following an operation with inflammatory processes the amount of C-reactive protein is rapidly lowered.
5. During chronic osteomyelitis, C-reactive protein is not present in all patients and the quantity of it is significantly less than during acute processes. Following the operation, in these patients the protein is preserved for a long time in the blood and a sharp lowering of it is not observed.

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Dynamics of C-reactive protein depending on the remoteness of the disease.

- a - Amount of protein (in mm)
- b - Number of days
- c - More than 30
- d - Up to 3