NOTES

Diagnosis of Meningococcal Arthritis by Immuno-electrophoresis of Synovial Fluid

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In a case of meningococcal arthritis, the organism was identified promptly through examination of synovial fluid by countercurrent immuno-electrophoresis.

Countercurrent immuno-electrophoresis has been shown to be a sensitive, accurate, and rapid diagnostic tool for the identification of meningococcal infection in blood and cerebral spinal fluid (2, 3). This report documents the efficacy and rapidity of this technique in the demonstration of the meningococcus within synovial fluid, and its usefulness in the difficult differential diagnosis of neisserial arthritides (4).

A 19-year-old recruit seaman was admitted to a hospital with a 2-day history of spiking fever, migratory myalgias, and a tender, swollen ankle. He had had recent sexual exposure to a prostitute but denied genito-urinary disease symptoms. The right ankle was fluctuant with marked decrease in range of movement. An evanescent but nonhemorrhagic erythematous, macular cutaneous eruption was noted and there were no meningeal signs. The oral temperature was 39.3 °C and the white blood cell count was 17,700/mm³ with 88% neutrophiles. The aspirated, viscous, green joint fluid contained 85,000 neutrophiles/mm³, some of which contained phagocytosed gram-negative diplococci.

The joint fluid was then submitted to countercurrent immuno-electrophoresis by established techniques (1). Antigen wells were loaded with 10 μl of the patient’s synovial fluid and positive control fluids containing the soluble antigen of Neisseria meningitidis groups A, B, C, and Y. Antisera against these N. meningitidis types were placed in the antibody wells. A strong reaction was obtained with the synovial fluid and the antiserum to group C meningococci (Fig 1). Culture of the synovial fluid produced a gram-negative diplococcus that fermented glucose and maltose, but not sucrose or lactose, and slide agglutination tests with polyvalent and type C meningococcal antisera (Difco) were positive with the cultured organism.

Cultures of blood and spinal fluid were sterile and did not contain soluble antigen; there was no leukocytosis within the cerebrospinal fluid. The patient was treated with intravenous penicillin, and his fever became normal after 2 days of therapy. There was, however, recurrent accumulation of fluid within the right ankle, and two subsequent aspirations, 4 and 7 days after initiation of antibiotic therapy, were undertaken for relief of pressure symptoms. Neither bacterial growth nor the soluble antigen were present in these samplings.

Because gram-negative septic arthritis may be the first sign of either meningococcal or gonococcal septic syndromes, a rapid differential diagnosis is very important and is afforded by countercurrent immuno-electrophoresis. While routine bacteriological analysis entails a 24-h period for the development of colonies followed by an additional 1-day incubation time for differentiating sugars, countercurrent immuno-electrophoresis can be accomplished within 1 h of receipt of the specimen. The therapy of these two organisms may involve different antibiotic spectra, especially in cases where penicillin cannot be used. Furthermore, the prompt institution of surveillance or prophylaxis, or both, is crucial in stopping meningococcal epidemics, particularly in cases of barracks housing, as was the situation in our case.

This report demonstrates that N. meningitidis type C can be correctly identified
in synovial fluid by the technique of immuno-electrophoresis. It is hoped that this procedure may also effectively identify within synovial fluid the range of organisms which are detectable in other fluids, such as spinal fluid.

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Fig. 1. Synovial fluid has been placed in antigen wells (left column) in rows 1 through 4. Antisera to Neisseria meningitidis types A, B, C, and Y were placed in the antibody wells (right column) in rows 1 through 4, respectively.