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CASE REPORT

Splenic Atrophy as Complication of Ulcerative Colitis Diagnosed by Antigranulocyte Antibodies Labeled with Tc-99m-Pertechnetate

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The scintigraphic examination with Tc-99m pertechnetate-labeled anti-NCA 95 antigranulocyte antibodies (AGAb) was performed in a 14-year-old boy with a 7-year history of poorly controlled ulcerative colitis to estimate the spread and activity of the disease. The disturbance of the splenic function was also suspected because Howell-Jolly bodies were present in the peripheral blood smears. High AGAb uptake in the rectum, sigma, and descending colon was observed on scintigraphy scans, indicating an active inflammatory process. Slight depression of hemopoiesis was also noticed. The spleen was not visible on the scans, although it was visible on ultrasound examination performed a few years earlier. Because of the refractory disease, total colectomy was performed. The spleen was not found on surgery. This case shows all benefits of using AGAb as a diagnostic tool. With a single injection we were able to show the spread and activity of the intestinal disease, distribution and function of the granulopoietic bone marrow, and absence of the spleen.

Key words: *atrophy; colitis, ulcerative; inflammatory bowel disease; radionuclide imaging; sodium pertechnetate Tc 99m; spleen; splenectomy*

Splenic atrophy is a very rare but possible complication of ulcerative colitis, especially in the patients with active and poorly controlled disease. It is caused by intravascular thrombosis of splenic blood vessels. This condition may lead to dangerous infection with capsulated bacteria and sometimes fatal pneumococcal septicemia (1,2).

Nuclear medicine offers useful methods for imaging of the infection or inflammation processes (3,4). Leukocytes labeled with Tc-99m hexamethylpropylene amine oxime (HMPAO) and monoclonal antigranulocyte antibodies labeled with Tc-99m pertechnetate (AGAb) are usually used for inflammatory bowel disease imaging (5-8). A promising method with ^{18}F-fluorodeoxyglucose (FDG) positron emission tomography for the early diagnosis of enterocolitis was recently described (9).

AGAb are directed against a nonspecific cross-reacting NCA-95 antigen, which is present exclusively on granulocytes, promyelocytes, and myelocytes in the hemopoietically active bone marrow, spleen, and peripheral blood.

Case Report

A 14-year-old boy with a 7-year history of ulcerative colitis presented with permanent bloody diarrhea, abdominal pain, and weight loss. Previous colonoscopy and radiological studies revealed colitis involving the entire colon. Patient was treated with sulfasalazine and corticosteroids. In the last few months, azathioprine was added, because the steroid dose needed to reduce the inflammation was too high. Since the disease was poorly controlled, colectomy was the option considered. In addition to all signs and symptoms characteristic for active inflammatory bowel disease, Howell-Jolly bodies have been also found in peripheral blood smears.

To estimate the spread and activity of the disease, scintigraphic study with Tc-99m labeled anti-NCA 95 antigranulocyte antibodies was performed (0.5 mg of BW 250/183, intact murine antibody, IgG1 isotype; CIS bio international, Baar, Switzerland). Anterior and posterior whole body scans and planar scan of the abdomen were performed 5 hours after an I.V. injection of 370 MBq AGAb. Bone marrow uptake ratio (UR) was calculated in the sacroiliac region as described elsewhere (10).

High AGAb uptake in the rectum, sigma, and descending colon was observed on the posterior whole body scan (Fig. 1) and on the planar scan of the abdomen, indicating a distinct inflammatory process (Fig. 2). Hemopoietically active bone marrow was visible in the appendicular skeleton and proximal parts of humeral and femoral bones. According to the bone marrow uptake ratio (UR) calculated in the

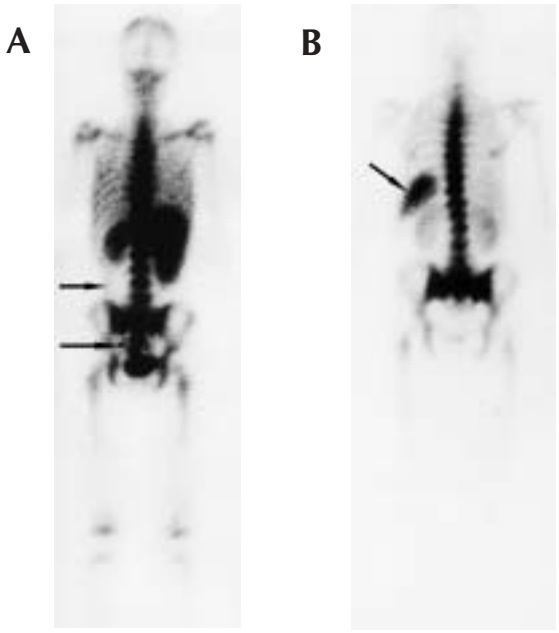

Figure 1. A. A whole-body posterior scan obtained 5 hours after injection of Tc-99m pertechnetate-labeled anti-NCA 95 antigranulocyte antibodies (AGAb). Pathological AGAb accumulation can be seen in the rectum and descending colon (arrows). Hemopoietically active bone marrow is present in central skeleton, and proximal parts of humeri and femora. Distinct AGAb accumulation can be seen in the kidneys and liver. The splenic tissue is not visible. **B.** The same scan in a patient with normal spleen appearance (arrow). Usually, about 6% of injected AGAb accumulated into the splenic tissue (6).

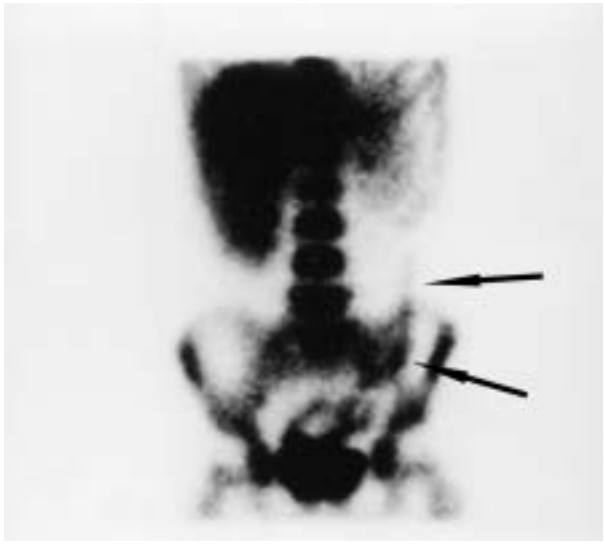

Figure 2. A planar anterior scan of the abdomen performed 5 hours after injection of Tc-99m pertechnetate-labeled anti-NCA 95 antigranulocyte antibodies (AGAb). Pathological AGAb accumulation is evident in the descending colon and sigma (arrows). The spleen is not visible.

sacroiliac region, slight depression of hemopoiesis was noticed. Measured UR value was 4.1 (normal values for the patient's age: 6.4 – 12.6; ref. 10). This value did not correlate with the actual blood-cell counts (red cell count, 4.1×10^{12}/L; white cell count, 7.9×10^{9}/L; and thrombocyte count, 915×10^{9}/L). On either scan, splenic tissue was not visible.

Discussion

Scintigraphy with AGAb was primarily introduced for infection/inflammation imaging. However, because of high AGAb uptake in the bone marrow, which amounts to about 55% four hours after injection (6), this method was proved to be very useful also for bone marrow scintigraphy. Whole body bone marrow scintigraphy with AGAb offers possibility to estimate distribution pattern of bone marrow subpopulation (11), to identify local lesions in the bone marrow (12,13), and quantitatively assess bone marrow hemopoietic capacity (10). Furthermore, about 6% of injected activity is usually accumulated into the spleen (6), which makes splenic visualization very feasible.

All benefits of this technique are presented in our case. With a single injection of AGAb we were able to show the spread and activity of the intestinal disease, distribution and function of the granulopoietic bone marrow (which was depressed most likely because of immunosuppressive therapy with azathioprine), and the absence of the spleen. Because of splenic atrophy and bone marrow depression, more AGAb remained free in the circulation, which can explain more pronounced liver and kidney appearance in our patient (Figs. 1A and 2) in comparison to a normal scan (Fig. 1B). Computed tomography and ultrasound examination confirmed our findings. In both modalities the splenic tissue was not visible.

The absence of blood-cell sequestration in the spleen was the probable reason for normal or, in the case of blood platelets, even elevated blood-cell counts, despite of immunosuppressive therapy. Active inflammatory bowel disease is often associated with elevated thrombocyte count (14,15).

Due to the refractory disease in our patient, total colectomy was performed. The spleen was not found on surgery, although it was present on ultrasound examination performed a few years ago.

Absence of splenic uptake of radiotracer can also occur in some other diseases, such as sickle cell disease, secondary to radiation therapy and chemotherapy, secondary to tumor invasion of the spleen, with splenic anoxia, or after bone marrow transplantation (16). Traditionally, asplenia has been diagnosed by using Tc-99m-labeled denaturated red blood cells (16,17). To the best of our knowledge and according to the MEDLINE database search, this is the first visualization of splenic atrophy, as a complication of ulcerative colitis, by using antigranulocyte antibodies labeled with Tc-99m pertechnetate.

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