CLASSIFICATION OF THE HEMATOLOGIC VARIATIONS AND ABNORMALITIES ASSOCIATED WITH BOECK'S SARCOID; REVIEW OF THE LITERATURE

REPORT OF A CASE OF THROMBOCYTOPENIC PURPURA ASSOCIATED WITH SARCOIDOSIS, WITH RECOVERY FOLLOWING SPLENECTOMY

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THE PURPOSE of this paper is to classify the hematologic variations and abnormalities associated with Boeck's sarcoid, to discuss whether the abnormalities are causally or coincidentally related and to present a case of thrombocytopenic purpura associated with sarcoidosis with recovery following splenectomy.

It should be pointed out that although blood dyscrasias accompanying sarcoidosis are uncommon in the reported literature, they may be more common than is generally appreciated. Several examples1,2 can be found in which hematologic abnormalities reported in association with tuberculosis may be associated instead with sarcoidosis.

In this report the hematologic findings associated with Boeck's sarcoid will be reviewed under three general headings: (a) abnormalities of the erythrocytes, (b) abnormalities of the leukocytes and (c) abnormalities of the thrombocytes, including pancytopenia.

Abnormalities of the Erythrocytes

Anemia. Many authors agree that a mild anemia can exist with sarcoidosis but this point varies with the different series of cases. Chevallier and Ely3 found that a slight anemia can exist but is uncommon. In 23 cases reported by Longcope,4 "Anemia was not often observed." Scott2 found that 1 out of 8 cases had hemoglobin values of 8 and 78 per cent, respectively; Harrell6 found 4 out of 11 cases with a range of hemoglobin between 10 and 11.5 grams, while Longcope and Pierson7 reported 3 out of 8 cases with hemoglobin values of 70, 61, and 60 per cent respectively. McCort and associates8 noted an erythrocyte count below 4,000,000 in only 2 of 28 cases.

Polycythemia. Pinner1 stated that polycythemia due to secondary pulmonary fibrosis has occurred in sarcoidosis.

Hemolytic anemia. Crane and Zetlin10 reported a case of sarcoidosis with an accompanying hemolytic anemia and hyperglobulinemia in a 46 year old white female. The spleen, removed surgically, weighed 485 grams and revealed no sarcoidosis. At autopsy, sarcoidosis was found involving the lymph nodes and bone marrow.

A heretofore unreported case11 taken from the files of the Presbyterian Hospital, New York City follows in detail:

From the Department of Medicine, Methodist Hospital of Brooklyn, Brooklyn, N. Y.

* Permission for use of this case was obtained from the Department of Medicine, College of Physicians and Surgeons, Columbia University, N. Y.
A 45 year old Negro female (H. L., #704380) was admitted to the medical service in April of 1943 for upper gastrointestinal complaints together with increasing dyspnea and orthopnea. On physical examination marked pallor of the mucous membranes and an easily palpable spleen were noted. Laboratory evaluation revealed the following: hemoglobin of 5.2 grams, 1.8 million red blood cells with a mean corpuscular diameter of 8.5 micra; up to 52 nucleated red blood cells per cent; platelet count of 274,000; white blood count of 1900 with 73 per cent polymorphonuclears, 10 per cent lymphocytes, 3 per cent monocytes, 1 per cent eosinophils and 3 per cent basophiles; the reticulocyte count ranged up to 22 per cent; the fragility test was within normal limits as were the bleeding time, clotting time, capillary fragility test, test for sickle cells, cold-, warm- and self-agglutinins. A bone marrow biopsy revealed an erythropoietic hyperplasia with many megaloblasts. The indirect bilirubin was 0.5 to 1.0 mg., the serum albumin and globulin were within normal limits as were the bromsulfalein test, cephalin flocculation test, blood cholesterol, blood arsenic and urine for urobilinogen. Reaction to the Kline test was negative. Chest x-ray was within normal limits as were upper and lower gastrointestinal series and x-ray of the hands. Repeated guaiac examination of the stool for occult blood was negative. The tuberculin skin test using old tuberculin was negative in a dilution of 1/1000.

The patient received multiple transfusions, and, in addition, intramuscular crude liver and iron by mouth, with no change in her clinical and laboratory course except for a progressive enlargement of her spleen. Three months after admission, a splenectomy was performed and the pathologic report, in part, follows:

The spleen weighed approximately 500 grams and microscopically resembled that seen in congestive splenomegaly associated with portal vein obstruction, but the branches of the splenic vein were thin-walled and free of sclerosis. There were two unusual features. One was the presence in the pulp cords of rather numerous eosinophilic polymorphonuclears; the other was the presence in the same areas of numerous giant cells of the Langhans type with a striking absence of necrosis. This same type of giant cell was found in a liver biopsy and a splenic lymph node. Carbolfuchsin stain revealed no acid-fast bacilli in the spleen, liver or lymph nodes. Diagnosis: Boeck's sarcoid involving splenic lymph node, spleen and liver; splenomegaly.

The patient improved clinically following splenectomy with the following hematologic data five months after operation: hemoglobin 11.6 grams; red blood cells 4.1 million; white blood count 3,800 with 10 per cent eosinophils, 1 per cent basophiles, 32 per cent lymphocytes, 32 per cent neutrophils and 5 per cent monocytes. Eight months following the operation there was a fall in the hemoglobin to 7.0 grams, red blood count of 2.6 million and a rise in the reticulocyte count to 3.6 per cent.

Since this time the patient has been lost to clinical follow-up. Contact by mail up to the winter of 1948 revealed that she has felt well, gained weight and has required no medical attention.

Stats, Rosenthal and Wasserman reported a Negro female child with severe hemolytic anemia without spherocytosis at the age of 6 months. There was no family history of hemolytic anemia. At the age of 7 years she had a recurrence of hemolytic anemia with spherocytosis, and Boeck's sarcoid was found in a biopsied axillary lymph node.

One case of McCort et al. was found to have an accompanying acquired hemolytic anemia with splenomegaly, for which a splenectomy was performed with no significant change in the blood picture eight months following operation. The diagnosis of sarcoidosis was made from a biopsied lymph node. The spleen revealed no evidence of sarcoidosis.

Abnormalities of the Leukocytes

Leukopenia. Reisner, who reviewed 35 cases, observed leukocyte counts below the range of normal in about one-third of them. In Longcope's report it was found that 16 of 28 patients had leukocyte counts varying between 3,000 and 6,000. McCort et al. found 7 out of 28 cases with leukocyte counts below 4,500. Snapper
and Pompen\(^4\) reported 7 of 13 cases with leukocyte counts between 3,000 and 6,000, with 4 of these 7 cases also revealing splenomegaly.

**Leukocytosis.** Harrell,\(^6\) who reported 11 cases of sarcoidosis, noted that leukocyte counts were either normal or slightly elevated in 9 of the cases on whom blood counts were performed. One of 8 cases reported by Longcope and Pierson\(^7\) showed a leukocyte count of 11,300, while one of McCort and associates\(^8\) 28 cases showed a leukocyte count of 13,000.

**Eosinophilia.** Longcope and Pierson\(^7\) and Longcope\(^4\) noted eosinophilia ranging from 6 to 35 per cent in 11 of 30 cases on whom blood counts were done. Reisner\(^13\) found the eosinophile count to vary between 6 and 14 per cent in about one-quarter of 35 cases. McCort and associates\(^8\) recorded 7 of 28 cases with an eosinophil count of 5 to 13 per cent. Harrell\(^6\) found an eosinophilia ranging as high as 16 per cent in all of his 9 cases on whom blood counts were done. Scott\(^5\) found an eosinophilia of 3 and 9 per cent, respectively, in 2 out of 8 cases. Snapper and Pompen\(^4\) failed to observe eosinophilia in their entire series of 13 cases, while Reisner\(^13\) found a variation of between 6 and 14 per cent in about one-quarter of 35 cases.

**Monocytes.** This type of cell did not seem to be consistently elevated. Harrell,\(^6\) by doing repeated differential counts, noted monocytosis varying between 7 and 16 per cent in 7 of his 9 aforementioned cases. Scott\(^5\) found a moderate mononucleosis of 7 to 14 per cent in 2 of 8 cases. Snapper and Pompen\(^4\) and McCort et al.\(^8\) observed no striking increase in monocytes in sarcoidosis, while Reisner\(^13\) noted an increase in monocytes from 8 to 20 per cent in about one-half of his entire series.

**Leukemoid reaction.** Naumann\(^15\) described a 3 month old infant with anemia and leukemoid reaction; autopsy revealed diffuse sarcoid. Posner\(^16\) presented a 25 months old infant with anemia and a bone marrow picture suggestive of lymphatic leukemia; autopsy revealed miliary nodules of Boeck's sarcoid with extensive fibrosis in the marrow.

**Abnormalities of the Thrombocytes**

Berblinger\(^17\) described the case of a 25 year old male who developed bilateral iridocyclitis with enlarged hilar lymph nodes demonstrated by roentgenography. This patient later developed gingival and cutaneous bleeding caused by a total lack of thrombocytes. The patient expired suddenly of cerebral hemorrhage, which was confirmed at autopsy. Epithelioid and lymphocytic tubercles with a few giant cells and no caseation were found in the lungs, spleen, liver, tongue and in the massively enlarged lymph nodes of the mediastinum.

Kraus\(^1\) described a 41 year old female with an endocrine disease characterized by dystrophia, hypotrichosis, cessation of menses, polyuria and a marked thrombocytopenia which caused her death. Autopsy revealed granulomas composed of epithelioid cells, lymphocytes and giant cells, with no caseation involving the lung, internal lymph nodes, spleen, infundibulum, pituitary stalk and the pituitary gland itself.

The case reported by Nordland, Ylvisaker, Larson and Reiff\(^19\) was that of a 26 year old pregnant white female who had an undefined lung disease at the age of 8 years. At the age of 13 the Mantoux test reaction was slightly positive in a 1/100
dilution but negative in a 1/1000 dilution. She had noted red spots on her abdomen six weeks before hospital admission. Examination disclosed an enlarged spleen and numerous petechiae. She was admitted several times afterward for transfusions. On her third admission, for hematuria, the clot retraction was incomplete in twenty-four hours; bleeding time was 40 minutes; prothrombin time 20 seconds with a control of 15 seconds; Rumpel-Leede tourniquet test reaction was positive and the platelet count ranged from 80,000 to 230,000, dropping to 20,000 several days before splenectomy. Sternal aspiration revealed megakaryocytic hyperplasia with very few platelets seen in the marrow smears. The megakaryocytic morphology was normal except for absence of granular zoning, the presence of which is characteristic of platelet formation of adult cells. The bone marrow revealed a moderate neutrophilic hyperplasia.

The platelets rose to 484,000 six days after splenectomy and ranged between 440,000 and 500,000 during the succeeding four days. The bleeding stopped, and the patient went on to normal delivery of a viable infant.

The spleen weighed 2.75 grams and microscopically revealed many of the malpighian bodies replaced by tubercles composed of epithelioid cells which contained giant cells of the Langhans type with no caseation.

Jersild\(^{2}\) described a 35 year old male who developed Heerfordt’s syndrome, characterized by parotitis, iridocyclitis and facial paresis. Two years prior to admission he had noted bleeding tendencies following tooth extraction. The diagnosis of Boeck’s sarcoid was based on the chest roentgenogram and a negative reaction to the Mantoux test in 0.0 mg., but positive in 0.1 mg. Hematologic evaluation revealed a positive tourniquet test reaction, thrombocyte count of between 16,000 and 57,000, bleeding time of 10.5 minutes and coagulation time of 2.5 minutes.

Freiman\(^{21}\) and Dameshek and Miller\(^{22}\) both noted cases of thrombocytopenic purpura associated with sarcoidosis.

Pancytopenia. Dameshek and Estren\(^{23}\) reported the case of a 41 year old female with a history of weakness, fatigue and anorexia. Physical examination revealed axillary nodes and a spleen enlarged to 6 fingerbreadths. X-ray examination of the chest showed a slight pulmonary fibrosis. Before splenectomy, the bone marrow was found to be normal; the hemoglobin was 8.0 grams, the red blood count 3.9 million; the white blood count 3100 with 1100 polymorphonuclears; the platelets were decreased. Following splenectomy the above laboratory values returned to within normal limits. The removed spleen was found to be three times normal size and microscopically revealed sarcoidosis.

The following case presented thrombocytopenic purpura associated with Boeck’s sarcoid with recovery from the former following splenectomy.

**Case Report**

H. W., a 37 year old white typewriter cleaner, was admitted to another hospital in the fall of 1943 with a one-month history of nausea, vomiting, jaundice and easy fatigability. Examination at that time disclosed jaundice, marked anemia and enlargement of the spleen. X-ray examination of his chest demonstrated "marked symmetrical accentuation of the pulmonary markings throughout both lung fields, mainly in the lower halves where these markings became circumscribed and very closely resembled a tuberculous lesion of a probable miliary type." A gall bladder series showed a normal functional response
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with no calculi. Laboratory studies revealed an erythrocyte count of 1.38 million with macrocytosis of the red blood cells; hemoglobin of 35 per cent; leukocyte count of 4,410 with a differential of 86 per cent polymorphonuclears and 14 per cent lymphocytes. The serum cholesterol was 92.5 milligrams per cent; serum alkaline phosphatase was 9.2 Bodansky units; cephalin flocculation was negative and an erythrocyte fragility test was within normal limits. The urinalysis revealed no bile. Sputum examination showed no acid-fast bacilli and gastric analysis showed normal acidity.

The patient received two blood transfusions of 500 cc. each, after which he left the hospital against advice, following thirty days' hospitalization. The blood count on discharge demonstrated 4,575,000 erythrocytes with a hemoglobin of 88 per cent; 3,350 leukocytes with a differential of 70 per cent polymorphonuclears, 16 per cent lymphocytes, 3 per cent monocytes and 1 per cent basophiles.

Since his discharge from the former hospital he denied any recurrence of jaundice, fatigability, dyspnea, palpitation or blood loss of any kind from any orifice until his present admission. He had been rejected for army service because of a "rare chest condition."

His chief complaint on admission to the Medical Service of the Methodist Hospital of Brooklyn on December 24, 1947 was that of bleeding gums and epistaxis of four days' duration. The bleeding was mild, intermittent and persistent. Twenty-four hours prior to admission he noted some "spots" on his legs as well as an increase in the bleeding of his gums and nasal cavity.

His occupational history revealed the use of petroleum fractionation products and an air-gun in the cleaning of typewriters for eighteen years. He admitted to no contact with beryllium. There was no family history of bleeding tendency. His dietary intake was adequate. He denied the use of sedatives or injections of any kind and specifically that of Sedormid, sulfa drugs, gold salts or arsenicals. This was confirmed by his local doctor. He further denied any type of allergy.

Physical examination. The patient was a slender, poorly nourished and poorly developed white male with many minute petechiae over both upper and lower extremities. There were no other abnormalities.
of the skin. A solitary moderately enlarged lymph node was noted in the left submaxillary region. No
enlargement of the parotid glands was noted.

The conjunctiva of the left lower eyelid disclosed a petechia. No hemorrhages were noted in the reti-
nas, and the retinal vessels and discs were normal. Examination of the mouth revealed moderate oozing
of the gums with a marked fetor oris.

No abnormalities of the chest were noted except for a left lateral scoliosis of the thoracic vertebrae.
The lungs were clear to percussion and auscultation. Auscultation of the heart revealed a faint, blowing,
miral systolic murmur. The liver was palpably smooth and slightly enlarged to one fingerbreadth below
the costal margin, in the right midclavicular line. Enlargement of the spleen to two fingerbreadths below
the left costal margin in the midclavicular line was found. No blood was found on the examining finger
following rectal examination.

**Fig. 1—Significant laboratory data before and after splenectomy.**

*Laboratory examinations.* Blood counts revealed erythrocytes 4.41 million with a hemoglobin of
13.1 grams and reticulocyte count of 3.9 per cent, and leukocytes 8,800 with a differential of 87 per cent
polymorphonuclears and 13 per cent lymphocytes together with a platelet count of 36,000. Prothrombin
time was 16.1 seconds with a control of 15.7 seconds. Bleeding time was 32 minutes with a Lee-White
coaulation time of 10 minutes. The clot retraction time showed no retraction after twenty-four hours.

There was practically a total lack of platelets in the bone marrow. The megakaryocytes were normal
in number and were not abnormal in morphology except for a slight loss of granulation of the cytoplasm.
The bone marrow count and differential of 300 cells were normal except for a moderate erythroblastic
hyperplasia. There was an increase in the proerythroblasts to 5 per 100 nucleated white blood cells; of
the erythroblasts to 22 per 100 nucleated white blood cells, and of the normoblasts to 26 per 100 white
blood cells.

* Appreciation is expressed to Dr. Nathan Rosenthal of Mt. Sinai Hospital, New York City for de-

etermination of this test.
X-ray examination of the chest (fig. 1) revealed a bilateral fibrosis with fine to moderate sized nodular infiltrations in the lower two-thirds of the lung fields and with confluence of the infiltrates in the second right interspace and in the second, third and fourth left interspaces.

A skin test with old tuberculin gave a negative reaction in a dilution up to 1/100. The blood fragility, urinalysis, blood Wassermann, sedimentation rate, cephalin flocculation, bromsulfalein excretion test, icterus index, serum albumin and globulin, as well as the blood nonprotein nitrogen and blood sugar, were all within normal limits.

Course. After 42 days the patient displayed slight clinical improvement. However, the oozying gums and petechiae persisted, and erythrocyte count dropped slowly to 3,570,000. This was maintained at a level of over 4,000,000 by an occasional small transfusion. The platelet count varied between 20,000 and 84,000, averaging approximately 35,000 prior to his operation. The prolonged clot retraction and bleeding times and positive Rumpel-Leede tourniquet test remained markedly abnormal on repeated determinations as shown in figure 2.

Drug therapy resulted in little change from either the clinical or laboratory standpoints. This included Hykinone, Pyribenzamine, Rutin, moccasin snake venom, topical thrombin, ascorbic acid and calcium lactate.

Benzol intoxication was investigated as a possible etiologic agent because of the patient’s occupation, but Dr. John E. Silson of the New York State Department of Labor, could not incriminate it in this case.

Splenectomy was considered to be indicated, as intensive therapy of other types had proven ineffectual. A second influencing factor was the threat of intracranial hemorrhage which, as pointed out by Hertzog and Wintrobe, constitutes the most serious complication of thrombocytopenic purpura.

Splenectomy was performed forty-three days after admission. Platelet counts were taken at frequent intervals as shown in figure 2. The highest platelet count was 406,000 on the sixth postoperative day.

Bone marrow study several days after splenectomy revealed normal numbers of megakaryocytes with no abnormalities of the granulation of the cytoplasm and a superabundance of platelets. Bleeding and clot retraction times and tourniquet test were all within normal limits prior to discharge. The patient made an uneventful recovery and was discharged on the fifty-sixth hospital day, thirteen days after operation with an erythrocyte count of 4,920,000 cells and a platelet count of 308,000.
A follow-up fifteen months after discharge from the hospital disclosed that the patient had returned to his former occupation and resumed his normal activities of life with no recurrence of illness.

Description of surgical specimen. The spleen weighed 680 grams and measured $17 \times 11.5 \times 7$ cm. The capsule was moderately thickened. On section the spleen was beefy red, firm and the pulp scraped away with difficulty. The malpighian follicles were unusually prominent. No focal lesions were noted. A second specimen consisted of a firm whitish abdominal lymph node $1.5 \times 1.5 \times 1.5$ cm, which on section showed no gross lesions.

Sections of the spleen (fig. 3) showed large lymphoid follicles, some of them two to three times normal size, with actively hyperplastic germinal centers. The splenic sinuses were relatively empty, and the fibrous reticulum slightly increased in amount. Scattered throughout the red and white pulp were numerous eosinophilic polymorphonuclear leukocytes, while the sinuses contained occasional megakaryocytes. In both the red and white pulp there were occasional circumscribed cellular tubercles composed of epithelioid cells with occasional giant cells of the Langhans type and no caseation necrosis. No asteroid bodies nor cellular inclusions were seen.

Sections of the abdominal lymph node (fig. 4) showed extensive replacement of the lymphoid tissue by similarly uniform, discrete, cellular tubercles composed largely of epithelioid cells with occasional centrally placed Langhans giant cells. No caseation necrosis was present and Ziehl-Neelsen stains revealed no acid-fast bacilli. A moderate number of eosinophilic polymorphonuclear leukocytes were noted both within the cellular tubercles and within the intervening lymphoid tissue.

Pathologic diagnosis. Boeck's sarcoid involving abdominal lymph node and spleen; splenomegaly.

Discussion

There are several schools of thought on just how the spleen affects the platelets in thrombocytopenic purpura. Two commonly discussed mechanisms are (i) a thrombolytic effect in the spleen on the platelets wherein the platelets are excessively destroyed—a concept favored by Wiseman, Doan and Wilson and
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others,20-23 and (2) a hormonal effect of the spleen on platelet formation in the bone marrow as stressed by Dameshek and Miller,22 Dameshek and Estren23 and others.24-41

The concept of splenic thrombolysis does not receive primary consideration in the case herein reported because there was no evidence of accumulated platelets, platelet degeneration nor platelet sequestration in the spleen; however, we did not use the supravital staining technic to demonstrate phagocytosis of the platelets29 nor did we take platelet counts from the splenic artery and vein at the time of operation prior to splenectomy to demonstrate a platelet difference. (In view of the low platelet count this would be of doubtful value.) The thrombolytic concept could be favored with the following points. It could be argued that the splenic thrombolysis took place at a faster rate than bone marrow platelet production, and that there were therefore few platelets in the bone marrow. It could also be argued that the decrease in megakaryocytic granulation was due not to a hormone suppression but to an exhaustion phenomenon because of a hyperproduction of platelets which were rapidly destroyed in the spleen.

In the present case, however, it seems more reasonable to accept a splenic hormonal concept than one of splenic thrombolysis as the causative factor responsible for the thrombocytopenia. The splenic hormonal concept could better explain the rapid appearance of platelets following splenectomy in the formerly practically platelet-free bone marrow. It is difficult to explain the thrombocytopenia on the basis of splenic thrombolysis when so few platelets were found in the bone marrow. In addition, the decrease in megakaryocytic cytoplasmic granulation and the absence of platelets in the bone marrow suggest that the presence of some factor was preventing the complete maturation of platelets from the megakaryocytes. With the removal of the spleen this (hormonal?) factor was removed, the megakaryocytes regained their normal granularity, and the platelets became abundant in the bone marrow.

Another important consideration was whether or not two separate diseases (i.e., idiopathic thrombocytic purpura and Boeck's sarcoid) were coexistent in the same individual. The patient's age, sex and easily palpable spleen, which weighed 680 grams, would not favor this possibility. Splenomegaly of this size appears to be rather emphatically against the diagnosis of idiopathic thrombocytic purpura, and because this point is so important it will be enlarged upon.

Wiseman et al.30 stated that as a diagnostic essential in idiopathic thrombocytopenic purpura there must be no appreciable enlargement of the spleen. They found the range of splenic weights in this disease to be from 12.4 to 230 grams. Nickerson and Sunderland42 found the average weight of the spleen to be 227 grams in this disease. Hertzog,58 in reporting the autopsy findings of 36 cases of essential thrombocytic purpura, found that the average weight of twenty spleens from patients over 20 years of age was 232 grams. Elliott43 stressed that the presence of splenomegaly of any size was a point against the diagnosis of idiopathic thrombocytic purpura.

It should be pointed out, however, that splenomegaly has been reported in a significant percentage of such cases.27 Also, the microscopic appearance of the
spleen in our case, which revealed enlarged active germinal centers with eosinophilic polymorphonuclear leukocytes and megakaryocytes in the splenic sinuses, is similar to that described by Nickerson and Sunderland as characteristic of idiopathic thrombocytopenic purpura. In addition, the megakaryocytes in the bone marrow showing slight loss of granulation of cytoplasm and the almost total loss of platelets in the bone marrow have been described in idiopathic thrombocytopenic purpura. Finally, the size of the spleen can not be explained entirely on the basis of the small amount of sarcoidosis present.

Whether there was a causal relationship between the splenic sarcoidosis and the thrombocytopenic purpura is an interesting speculation. If the size and the hyperactivity of the spleen could be attributed to a spleen enlarged with Boeck's tubercules, a definite statement of agreement could be made regarding the causal relationship with thrombocytopenic purpura. However, the size of the spleen cannot be attributed to the occasional tubercule found, and this fact weakens such a concept. Arguments favoring a causal relationship are: (1) admitting that the size of the spleen in sarcoidosis is usually related to the amount of sarcoid infiltration, an occasional case is found in which the splenomegaly is out of proportion to the amount of splenic sarcoidosis; (2) admitting that such a large spleen should have a massive replacement of splenic tissue by sarcoid tubercules, would it be possible to have enough existing splenic tissue to function and to cause an overactivity of the spleen? It is obvious that an accurate estimate of the relationship between the thrombocytopenic purpura and Boeck's sarcoid in the reported case is impossible to determine.

In the consideration of the blood abnormalities reviewed in relationship to Boeck's sarcoid, we can point out a causal relationship between the secondary polycythemia because of the fibrosis of the lung; in addition, we can point out a relationship with the leukemoid reaction because of bone marrow replacement by sarcoid tubercules with bone marrow fibrosis. When it comes to the consideration of a causal relationship with the hemolytic anemia and thrombocytopenic purpura, however, we are faced with a different problem. In the cases of hemolytic anemia associated with this disease and reviewed in this paper, two things are clear: (1) the hemolytic anemia was not cured by splenectomy in all of the 3 patients on whom it was performed; (2) the extirpated spleen in 2 out of 3 cases revealed no evidence of sarcoidosis. These facts would tend to rule out a splenic factor as the responsible agent. Singer and Dameshek and Stats et al. have noted what they term "symptomatic hemolytic anemia," a form of acquired hemolytic anemia, occurring with numerous types of malignant diseases and Boeck's sarcoid. The exact pathogenesis is not known. Singer and Dameshek suggest that the pathologic lesion itself either produces or stimulates the production of hemolysins and that splenectomy may be valueless. A definite relationship between these diseases and hemolytic anemia has not been established, and we believe that this thought applies to the cases of hemolytic anemia occurring with sarcoidosis.

In the consideration of a causal effect between Boeck's sarcoid and thrombocytopenic purpura, we feel that, in order to evaluate the effect of the spleen, only the 3 cases which underwent splenectomy should be considered: in these 3 cases there
was recovery from the thrombocytopenic purpura. The other 3 cases reviewed herein did not have splenectomy and do not demonstrate precisely this relationship, although it probably existed. Thus, in the evaluation of the case reported by Nordland et al.,19 we agree with the authors that there was a co-existing idiopathic thrombocytic purpura with the sarcoidosis and that there was therefore no causal relationship between the sarcoid found in the spleen and the thrombocytopenic purpura. In the evaluation of the case described by Dameshek and Estren,23 we feel that the lack of detailed microscopic description of the removed spleen makes it impossible to prove this causal relationship. In our case report and discussion we have pointed out the lack of conclusive evidence for a causal relationship. In the evaluation of all 7 cases (plus the present one) of thrombocytopenic purpura occurring with sarcoidosis, we do not feel that the number alone is significant, for one might expect even greater numbers of such cases in light of the fact that splenomegaly is common in sarcoidosis and that the spleen is secondary only to the lungs as a site of involvement.28, 45

SUMMARY AND CONCLUSIONS

The hematologic aspects of Boeck’s sarcoid are reviewed. Anemia is uncommon. The leukocyte count and differential picture are variable; they may be normal, or leukopenia may exist; leukocytosis is less commonly found. Eosinophilia may be present, and the monocytes may be increased. Abnormalities such as secondary polycythemia and leukemoid reaction are rare but may be causally related. Major disturbances include hemolytic anemia and thrombocytopenic purpura. The causal relationships between Boeck’s sarcoid and hemolytic anemia and thrombocytopenic purpura, although suggestive, have not been definitely established.

A case of sarcoidosis with splenomegaly and thrombocytopenic purpura with recovery of the thrombocytopenia following splenectomy is reported and discussed.

REFERENCES

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