

Pelvic actinomycosis-associated dysplastic granulocytes: are they truly dysplastic?

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Abstract

Breach of the gastrointestinal system by intraabdominal actinomycosis can cause extensive formation of abscesses and/or fistulae within the peritoneal cavity. With the exception of few reports revealing left shift, the hematologic manifestations in response to actinomycosis infection have rarely been explored. Here, we present a patient with severe actinomycosis infection requiring both surgical and medical treatment, who showed dysplastic granulocytes resembling those reported in primary hematologic malignancies such as myelodysplastic syndrome or myeloid leukemia. Resolution of granulocytic dysplasia occurred after medical and surgical treatment, implying these changes are likely reactive responses to severe actinomycosis infection.

KEY WORDS: Actinomycosis, acute myeloid leukemia, dysplastic granulocytes, myelodysplastic syndrome

Introduction

Actinomycosis is a subacute-to-chronic bacterial infection caused by filamentous, Gram-positive, non-acid-fast bacteria. The craniofacial area is the most commonly affected area, and abdominal infection follows.^[1] Intraabdominal *Actinomyces* species can cause an extensive degree of abscesses, fistulae, or reactive fibrosis and necrosis when the barrier of the gastrointestinal system is breached.^[2] Hematologic manifestations in response to actinomycosis infection have rarely been explored except a few reports of patients revealing left shift in the peripheral blood smear or thrombotic thrombocytopenic purpura.^[3] Here, we report a singular case of a patient who revealed dysplastic granulocytes in the peripheral blood smear, which proved to be a reactive response to severe actinomycosis infection.

Case Report

A 48-year-old previously healthy woman presented with fatigue, weight loss, and lower abdominal pain for 2 months. Initial vital signs were within normal limits with no fever. Physical examination was remarkable for a palpable mass in the suprapubic area and foul-smelling vaginal discharge. Initial laboratory studies indicated white blood cell count 15,000/ μ L with a differential of neutrophils 85.6%, lymphocytes 8.6%, monocytes 5.1%, eosinophils 0.3%, and basophils 0.4%. Vitamin B12 and folic acid level were within normal limits, and human immunodeficiency virus test result was negative. Computerized tomography of abdomen and pelvis revealed a 12-cm masslike structure in the pelvis (Figure 1A). An exploratory laparotomy was performed and revealed a large pelvic abscess. The surgical sequel resulted in modified radical hysterectomy, ureterolysis, resection of left and right tubo-ovarian abscess complexes, rectosigmoid resection with end-sigmoid colostomy and Hartmann's pouch, and ileocolic resection with a primary anastomosis. Pathology examination revealed a segment of colon with perforated diverticulosis and a tubo-ovarian complex with bacterial colonies demonstrating filamentous, Gram-positive organism in the granules suggestive of actinomycosis (sulfur granules, Figures 1B and 1C). The patient was started on intravenous penicillin G. Her initial peripheral blood smears revealed dysplastic

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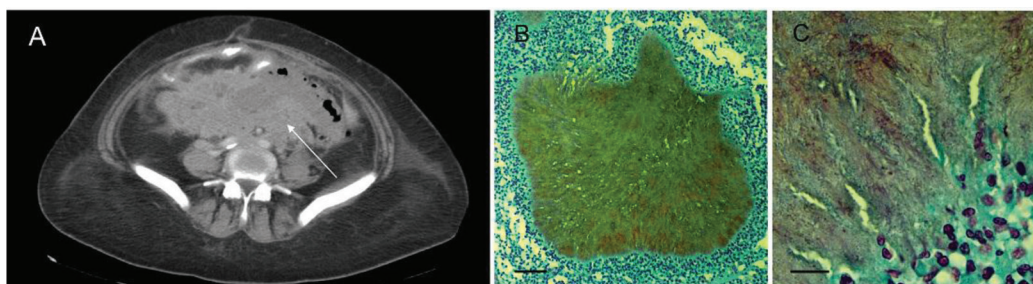


Figure 1: (A) Computerized tomography of the pelvis, revealing a 12-cm masslike structure (white arrow). (B) A bacterial colony (sulfur granule) of actinomycosis found in the right fallopian tube. Scale bar = 500 μm . (C) The detailed structure of filamentous, Gram-positive bacteria at the edge of the granule. Scale bar = 100 μm . (B) and (C) Gram stain.

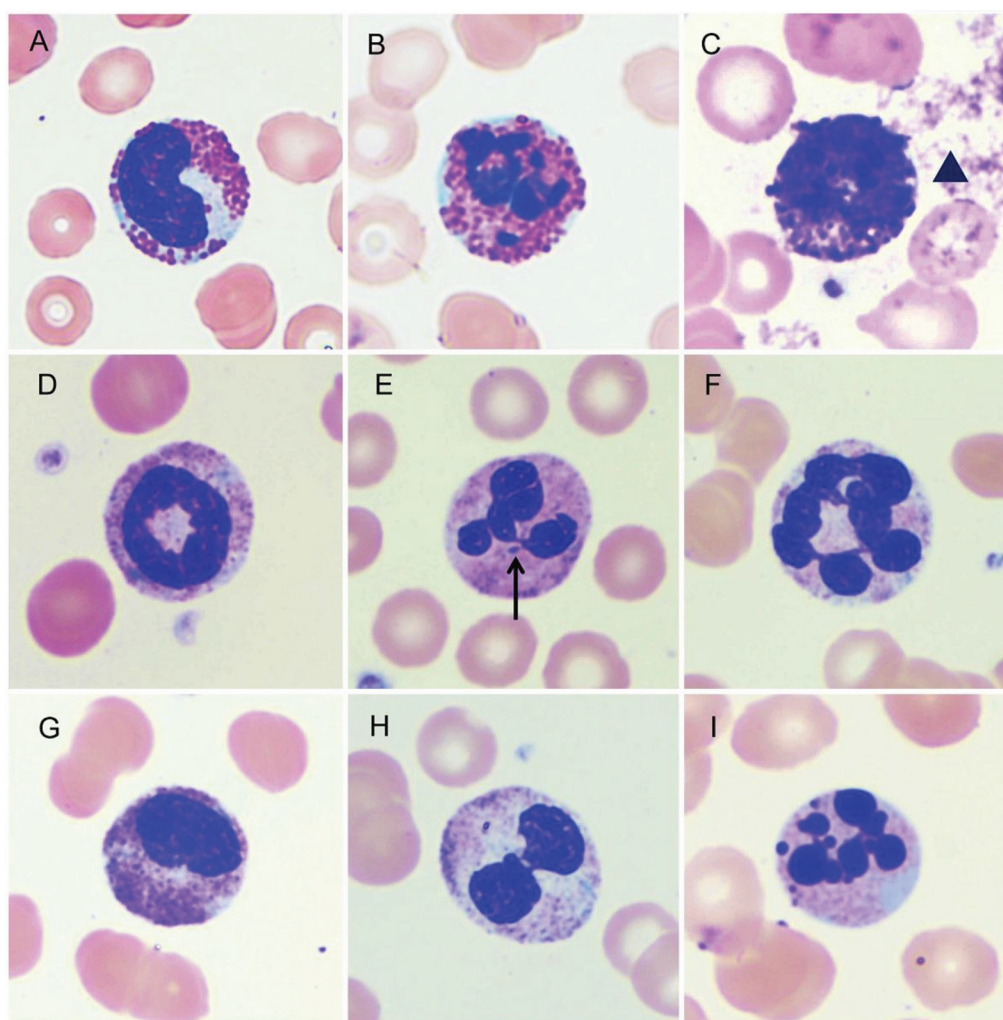


Figure 2: (A) Monolobed eosinophil (pseudo-Pelger–Huët anomaly) with a large degree of cytoplasmic clearing (a cytoplasmic area not filled with granules) and both eosinophilic and basophilic granules (pro-eosinophilic granules) in the cytoplasm. (B) Karyorrhexis of an eosinophil with cytoplasmic clearing and pro-eosinophilic granules. (C) Basophil with empty vacuoles near the plasma membrane, representing partial degranulation with a large degree of granular heterogeneity in size and distribution. The arrowhead points out diffuse basophilic materials, status postdegranulation from the basophil. (D) A closed-loop nucleus of a neutrophil. (E) A neutrophil with a nuclear projection (arrow). (F) Hypersegmented neutrophils. (G) and (H) show pseudo-Pelger–Huët anomaly with mono- (G) and bilobed (H) neutrophils. (I) Nuclear fragmentation, representing karyorrhexis. Neutrophils in (D)–(I) reveal toxic granules and Döhle bodies. Wright stain, $\times 1,000$.

granulocytes previously reported in primary hematologic pathologies. Resolution of dysplastic changes occurred after actinomycosis was surgically and medically treated. Bone marrow biopsy was not performed because of low suspicion of underlying hematologic pathologies.

Discussion

Although only a small number of eosinophils were found in peripheral blood smears, eosinophils demonstrated dysplastic features: (1) cytoplasmic clearing with a large empty area of the cytoplasm as previously reported in hypereosinophilic syndrome^[4] (Figure 2A), (2) karyorrhexis, a fragmentation of nuclei and a hallmark of apoptosis, listed as dyserythropoiesis in the World Health Organization criteria of myelodysplastic syndrome (MDS) and an extremely rare finding in granulocytes (dysgranulopoiesis)^[5] (Figure 2B), (3) pseudo-Pelger–Huët anomaly (PHA) showing a monolobed, highly clumped nucleus, representing granulocytic dysplasia or a reactive change to severe inflammation^[6,7] (Figure 2A), and (4) eosinophils with both basophilic and eosinophilic granules (pro-eosinophilic granules), which was reported in myeloid leukemias^[8] (Figures 2A and 2B). Other dysplastic features such as pseudo-myelokathexis or hypersegmentation of nuclei were not observed.

Basophils displayed dysplastic features previously reported in acute myeloid leukemia (AML)^[9] (Figure 2C): (1) partial degranulation demonstrated as empty vacuoles near the plasma membrane with a diffuse basophilic degranulated material surrounding the basophil (arrowhead in Figure 2C) and (2) large, coarse basophilic granules unevenly distributed in the cytoplasm.

Neutrophils revealed toxic changes such as toxic granules, vacuoles, and Döhle bodies, well-documented changes demonstrated in severe infection or inflammation. However, dysplastic features previously reported in primary hematologic diseases were also revealed in peripheral blood smears: (1) a neutrophil with a closed-loop nucleus, a dysplastic feature reported in myeloproliferative neoplasm^[10] (Figure 2D), (2) nuclear projections previously reported in androgen-expressing tumors^[11] (Figure 2E), (3) hypersegmented nuclei, a common finding in vitamin B12 or folic acid deficiency (Figure 2F), (4) pseudo-PHA referring to neutrophils with mono- and bilobed nuclei^[6,7] (Figures 2G and 2H), and (5) karyorrhexis, which is a rare finding of dysgranulopoiesis as discussed earlier^[5] (Figure 2I).

Conclusion

Resolution of granulocytic dysplasia occurred after medical and surgical treatment. This implies that these

changes are reactive responses to severe actinomycosis infection. Pseudo-PHA has been considered to be both reactive and dysplastic features as it was reported in a variety of bacterial or viral infection and in hematologic malignancies such as MDS or AML.^[6,7] However, this report demonstrates that reactive morphologic features mimicking granulocytic dysplasia are not limited to pseudo-PHA.

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