A 7-year-old Boy with a High Fever
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A 7-year-old Hispanic boy developed high intermittent fever, associated with intermittent inguinal and lower extremity pain, 2 months before presentation. Evaluation revealed bilateral dental abscesses, which were treated with two courses of oral antibiotics and dental extractions but without response. The fever persisted and became associated with night sweats, anorexia, weight loss, and right lower quadrant abdominal pain. He had an unremarkable past medical history. His family history was significant only for a maternal grandmother who had three siblings with colon cancer. His temperature was 101°F, heart rate 101, blood pressure 105/58 mm Hg, weight 18.3 kg (less than 5th percentile for age), and height 119 cm. He had pallor, perioral cyanosis, and clubbed fingers. He had cervical, axillary, and inguinal lymphadenopathy and a right lower quadrant abdominal mass.

During the hospital admission, a comprehensive evaluation was performed. Laboratory investigations revealed anemia of chronic disease with high serum ferritin, ESR, and CRP levels, along with normal serum LDH, and uric acid. Anemia of chronic disease was documented, along with elevated serum ferritin, ESR and CRP, normal serum LDH, and uric acid.

The right lower quadrant mass was 3.4x3.7x3.5 cm in size, hypoechoic with surrounding vascularity on ultrasound, and diffusely heterogeneously enhancing on computerized tomography (CT). At the time of the surgery, the mass was round, encapsulated, and attached to the peritoneum. Evaluation revealed a predominant, fibrohistiocytic spindle and pleomorphic cell population, with scattered T and B cell lymphocytes and plasma cells and a background of associated collagen production consistent with intra-abdominal inflammatory pseudotumor.

For diagnosis, see page 13.

Editor’s note: Each month, this department features a discussion of an unusual diagnosis in genetics, radiology, or dermatology. A description and images are presented, followed by the diagnosis and an explanation of how the diagnosis was determined. As always, your comments are welcome via e-mail at editor@pediatricsuper.com.
DISCUSSION

Inflammatory pseudotumor, also known as plasma cell granuloma and inflammatory myofibroblastic tumor, was first observed in the lung and described by Brunn in 1939. It was named by Umiker et al. in 1954 because of its propensity to clinically and radiologically mimic a malignant process. Inflammatory pseudotumor has been described in the literature in various forms, including plasma cell granuloma (heart); inflammatory myofibroblastic tumor (lung); inflammatory myofibrohistiocytic proliferation; histiocytoma; xanthoma; fibroxanthoma; xanthogranuloma; fibrous xanthoma; plasma cell histiocytoma complex (lung); plasmocytoma; solitary mast cell granuloma; and inflammatory fibrosarcoma (bladder).1

Inflammatory pseudotumor is a rare, non-neoplastic lesion consisting mainly of spindle-shaped mesenchymal and inflammatory cells.1-3 It most commonly involves the lung and the orbit, but it can occur in nearly every site in the body, from the central nervous system to the gastrointestinal tract.1 Because inflammatory pseudotumors mimic malignant tumors clinically and radiologically, the radiologist should be familiar with this entity to help avoid unnecessary surgery whenever possible. The extrapulmonary sites in which pseudotumor has been recorded are in the orbit; stomach; testes; esophagus; liver; spleen; pancreas; kidney; adrenal glands; retroperitoneum; diaphragm; mesentry; bladder; heart; thyroid; tonsil; fourth ventricle; spinal cord meninges; central nervous system; maxillary sinus; nasal cavity; nasopharynx; larynx; and trachea.1,4,5

The underlying cause and pathogenesis remain uncertain, and various theories have been documented, including prior trauma or surgery, immune-autoimmune mechanism, and infection.1 In certain cases, it is thought to result from inflammation following minor trauma or surgery or is associated with other malignancy.1,4,6 The ones secondary to infection that are found in association with the organism include mycobacteria associated with spindle cell tumor; Epstein-Barr virus found in splenic and nodal pseudotumors; actinomycetes and nocardiae found in hepatic and pulmonary pseudotumors, respectively; and mycoplasma in pulmonary pseudotumors.1,7

There have been reports of patients younger than 16 years developing inflammatory pseudotumors that most frequently present as primary tumor-like lesions of the lung.2 The incidence of the development of such tumors was only 23 of 56,400 cases that underwent thoracic surgery (0.04%).2 Pseudotumors accounted for only 0.7% of cases of lung and bronchogenic tumors.2 Although it is generally acknowledged that inflammatory pseudotumors involve a non-neoplastic process characterized by unregulated growth of inflammatory cells, the existence of genuine involvement of neighboring structures or its rapid recurrence, in this case, may appear incongruous and raises the possibility of an inflammatory pseudotumor being a neoplasm.

Some cases may be related to an infectious process.2 Abdominal inflammatory pseudotumor should be considered in the differential diagnosis of any soft-tissue mass within
the abdomen and viscera in a child. Gastrointestinal tract involvement is rare, with ileocecal and gastric tumors in young girls being the most frequently described type. Abdominal pain, a palpable mass, and iron deficiency anemia are the most common presenting features and were significant in the presenting case. Gastrointestinal inflammatory pseudotumors often have features suggestive of malignancy, including ulceration, infiltration of the wall, and extragastric extension.

Hepatic involvement by inflammatory pseudotumors was first described in 1953 by Pack and Baker. Inflammatory pseudotumor of the liver has been recognized with increased frequency, mainly in Asian countries. The majority of hepatic inflammatory pseudotumors occur in children and young adults. Most cases have been solitary solid tumors, mainly arising from the right hepatic lobe. In a few cases, inflammatory pseudotumor has involved the porta hepatitis or bile ducts, which results in obstructive jaundice. Other symptoms include abdominal pain and weight loss. In addition, other unusual inflammatory or immune responses, such as sclerosing cholangitis, phlebitis, and retroperitoneal fibrosis, have been found in association with inflammatory pseudotumor.

Spindle cell tumors in the liver have been described in immunocompromised patients after transplantation. Although these tumors occur much less commonly than posttransplantation lymphoproliferative disorder, Epstein-Barr virus has also been implicated in some of these lesions. Spontaneous regression of hepatic inflammatory pseudotumor has been reported. The appearance of abdominal inflammatory pseudotumor on CT scan can be variable. The mass may be hypoattenuated or isoattenuated relative to muscle on unenhanced scans, and calcification has been observed within inflammatory pseudotumors of the pancreas, stomach, and liver. Enhancement with contrast material usually occurs but is not pronounced, and a variety of patterns have been noted. These patterns include early peripheral, with delayed central filling heterogeneous (see Figure 1, page 13); homogeneous; and no enhancement.

Larger lesions may have central necrosis. A common histological finding is fibrous histiocytic pattern, which is the most common, and is characterized by spindle-shaped myofibroblasts arranged in whorls (see Figure 2), and lymphohistiocytic pattern, which is the least common. The important entities included in the differential diagnosis include hepatocellular carcinoma, gastric carcinoma, and pancreatic carcinoma.

Urinary tract involvement by inflammatory pseudotumors was first described by Roth in 1980, who reported a case of urinary bladder inflammatory pseudotumor. This entity is rare in children and can occur at any age but typically appears in young adults.

CONCLUSION
Inflammatory pseudotumors radiologically and clinically mimic a malignant process. They involve many anatomic sites. If this diagnosis is considered, unnecessary surgery can be avoided. The treatment options are varied. Surgical removal is the treatment of choice for most inflammatory pseudotumors, with the exception of orbital lesions, which have been treated.
with high-dose steroids, irradiation, and chemotherapeutic agents.

The boy is doing very well now. He is in good health, free of the disease, and not on any medication.

REFERENCES