CASE REPORT

Close temporal association of bronchial asthma and ischemic colitis—case report and review of the literature

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Summary We report a case of ischemic colitis in an elderly male who had initially presented with acute asthma exacerbation. The clinical course of hospitalization, surgical and pathological findings were described. We review three previously reported cases of ischemic colitis and bronchial asthma and explore possible mechanisms to explain this association. The complex interaction of smooth muscle tone and autonomic nervous system in the etiopathogenesis of bronchial asthma and ischemic colitis is discussed. Further studies should be undertaken to clarify this association.

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Introduction

Asthma is a complex clinical disease that is characterized by airway obstruction, airway inflammation and bronchial hyperresponsiveness to a variety of pharmacological stimuli like histamine, methacholine; and physical stimuli like exercise and cold air. In susceptible individuals, inflammation causes recurrent episodes of wheezing, breathlessness, chest tightness and cough. An intricate interaction among inflammatory cell mediators such as lymphocytes, mast cells, macrophages, eosinophils, basophils and neutrophils is thought to contribute to the pathogenesis of asthma.

Ischemic colitis is a heterogeneous clinical, radiologic and pathologic entity that is described in elderly patients and in patients who have significant comorbidities. Causes that include shock, autoimmune disease, coagulopathies, long-distance running, illicit drug use, and medication-induced colonic ischemia have been reported, in patients both young and old. Ischemic injury to the colon is recognized to manifest distinct clinical subtypes, which range in severity from transient segmental colopathy to fulminant gangrenous colitis.

We describe a case history of ischemic colitis occurring in an elderly patient who presented with...
acute asthma exacerbation, and review three previously reported cases of ischemic colitis and bronchial asthma.

Case report

The patient is a 76-year-old Chinese male who presented to us with intractable dyspnea, wheeze, cough and epigastric pain that occurred immediately after dinner. A non-smoker, he had two previous admissions where reversible asthma exacerbations were documented. He was tachypneic and drowsy on arrival at the emergency room. His blood pressure was 130/76 mmHg and oxygen saturation was 60% on room air and 100% on non-rebreathing mask. Diffuse rhonchi were present over both lung fields. Nebulized ventolin with ipratropium bromide and intravenous hydrocortisone were immediately administered. Arterial blood gas showed severe acidosis—pH 6.763, PCO₂ > 130 mmHg, PO₂ 201 mmHg with unrecordable base excess and bicarbonate levels.

Rapid sequence incubation was immediately performed with intravenous midazolam 5 mg and suxamethonium 100 mg. Intravenous 8-4% sodium bicarbonate 100 mls was infused. Blood pressure remained stable throughout this period. As he was observed to have a low-grade temperature of 37.9°C, empirical intravenous ceftriaxone was administered after blood cultures were taken. A repeat blood gas showed improvement (pH 6.933, PCO₂ 108·7 mmHg, PO₂ 301 mmHg, HCO₃ 18 mmol/dl, SaO₂ 100%) and he was transferred to the intensive care unit.

He was continued on intravenous sodium bicarbonate. Leukocytes counts were 10.0 × 10⁹ cells/l with neutrophilic predominance, haemoglobin 7·7 g/dl, creatinine 117 mmol/l, phosphate 3·63 mmol/l (normal, 0·85–1·45 mmol/l) and lactate 5·9 mmol/l (normal, 0·7–2·1 mmol/l). Prothrombin time was 10·5 s (normal, 9–12 s) and activated partial thromboplastin time, 28 s (normal, 25–35 s). In view of his history of epigastric pain and elevated lactate, amylase was done and this returned significantly elevated at 1060 U/l (normal, 25–115 U/l). A provisional diagnosis of acute pancreatitis was made and a surgical opinion was sought. A computed tomography of his abdomen and pelvis was performed and this showed diffuse bowel dilation with multiple hypodense lesions within the kidneys and spleen, and the pancreas appeared normal. A provisional diagnosis of ischaemic colitis was made.

He underwent an emergency laparotomy and gangrenous colon was found, extending from ascending colon up to splenic flexure. Serous fluid was noted and the rest of small intestines and pancreas appeared normal. A subtotal colectomy with defunctioning ileostomy and mucous fistula creation was performed. His postoperative recovery was complicated by disseminated intravascular coagulopathy, intraabdominal blood loss and haemodialysis-requiring renal failure. Bedside echocardiography did not show any valvular vegetation and the ejection fraction was 70%. Blood culture yielded *Prevotella melaninogenica*. Serological studies for vasculitis, including antinuclear antibody, extractable nuclear antigen, anti-double-stranded DNA, serum complements, antineutrophil cytoplasm antibody, and rheumatoid factor, were unremarkable.

Histopathological findings revealed extensive edema, congestion and haemorrhage in the submucosa with transmural acute inflammation in small blood vessels in the colon, in keeping with ischemic colitis. Despite maximal treatment, his condition deteriorated and he died sixteen days after admission.

Discussion

A close temporal association of ischemic colitis and acute asthma exacerbation was reported to occur in an elderly patient who did not have any biochemical and pathological features of vasculitis and occlusive vascular disease. To examine if this association is coincidental or sharing a true relationship, we reviewed previous case reports of patients with ischemic colitis and acute asthma exacerbation, compared them and explored possible mechanisms that may explain this association.

There have been three reported cases of bronchial asthma associated with ischemic colitis in the medical literature. Reversible bronchial hyperresponsiveness were documented in each patient who presented with moderate to severe type 2 respiratory failure. Similar to our patient, the diagnosis of ischemic colitis was histologically confirmed. Apart from one patient who received epinephrine, the remaining patients did not receive any drugs that may result in splanchnic vasoconstriction and ischemia, such as digitalis, vasopressin, norepinephrine, contraceptives, or a cleansing enema throughout the clinical course.

Bronchial asthma and ischemic colitis affect two different anatomic systems that may potentially...
share a common pathogenic interface. Interesting observations have been made in patients with irritable bowel syndrome (IBS) and in females where cyclical fluctuations in hormonal levels during menstruation, in relation to bronchial asthma and ischemic colitis. In a study of 87,449 people with an IBS diagnosis using information from medical claims data, the incidence of ischemic colitis in people of IBS was found to be 3.4 times higher than in persons without IBS, more common with an increase in age and in women.6 IBS has been similarly associated with increased bronchial hyperresponsiveness, a hallmark feature of bronchial asthma, in metacholine-challenge,7 population-based8 and cohort-control studies.9,10 Similarly, bronchial asthma has been reported to worsen during menstruation11 and is associated with higher morbidity and mortality among females.12 Transient episodes of ischemic colitis has been reported to occur in patients receiving oral contraceptive pills13 and occurs more commonly in females than males.14

An altered contractility and smooth muscle tone within the bronchial and gastrointestinal systems has previously been reported in IBS, ischemic colitis and bronchial asthma,15 mediated by neural modulation and smooth muscle contraction16. It has been suggested that a close interplay between the parasympathetic and sympathetic divisions of the autonomic nervous system may result in a spectrum of respiratory and gastrointestinal manifestations.10 Wide hormonal fluctuation during the difference phases of the menstrual cycle is characterized by periods of hypoestrogenemia followed by hyperestrogenemia. Transient hypoestrogenemia has been suggested to increase sensitivity to mesenteric vasoconstriction17 and hyperestrogenemia result in a hypercoagulable state18 that may result in ischemic colitis. Similarly, sudden withdrawal and change in estrogen level have been shown to result in bronchial airway constriction among asthmatics.19

The association of ischemic colitis and bronchial asthma is unique as it expands our understanding on the etiopathogenesis of IBS and ischemic colitis in relation to bronchial asthma. The closely linked interface between smooth muscle and autonomic nervous system producing respiratory and gastrointestinal manifestations, and fluctuating levels of female hormones may be important mechanisms explaining the association between bronchial asthma and ischemic colitis. Further studies should be undertaken to clarify this association.

### References


### Table 1 Comparison of current and reported cases of ischemic colitis in patients with acute asthma exacerbations.

<table>
<thead>
<tr>
<th>Current case</th>
<th>Case 1</th>
<th>Case 2</th>
<th>Case 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>76</td>
<td>19</td>
<td>42</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>Female</td>
<td>Female</td>
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<tr>
<td>PaCO2 on admission(mmHg)</td>
<td>&gt; 130</td>
<td>&gt; 130</td>
<td>47</td>
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<tr>
<td>Diagnosis of ischemic colitis</td>
<td>Gangrenous bowel found during surgery</td>
<td>Gangrenous bowel found during surgery</td>
<td>Histopathological features of ischemic colitis during surgery</td>
</tr>
<tr>
<td>Part of involved colon</td>
<td>Ascending to transverse colon</td>
<td>Ileum</td>
<td>Sigmoid colon</td>
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<tr>
<td>Autoimmune screen</td>
<td>Negative</td>
<td>Negative</td>
<td>Negative</td>
</tr>
<tr>
<td>Hypotension episode</td>
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<td>Nil</td>
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<tr>
<td>Outcome</td>
<td>Death</td>
<td>Recovery</td>
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