JAOA CASE REPORT

Non–Anion Gap Metabolic Acidosis in a Patient With a Pancreaticopleural Fistula

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While acid-base disturbances are known to occur with chronic pancreatitis, few cases have been reported in which non–anion gap metabolic acidosis is caused by pancreaticopleural fistula, a known complication of chronic pancreatitis. The current report describes the case of a 49-year-old African American woman who presented with severe pleuritic chest pain and dyspnea at rest. The patient had a history of alcohol-induced chronic pancreatitis. Her chest radiograph was positive for a large left-sided pleural effusion. Magnetic resonance cholangiopancreatography revealed a small connection between the pancreas and the thoracic cavity. Arterial blood gas analysis revealed non–anion gap metabolic acidosis in the absence of substantial urinary or diarrheal bicarbonate losses. The patient was diagnosed as having non–anion gap metabolic acidosis as a result of a pancreaticopleural fistula and was successfully treated with pancreatic ductal stent placement by means of endoscopic retrograde cholangiopancreatography.

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Pancreaticopleural fistula, a complication that occurs in 0.5% to 4.5% of reported cases of chronic pancreatitis,[1-3] is an aberrant communication between the pancreas and the pleural space. The condition is usually caused by the leakage of corrosive pancreatic fluid posteriorly into the retroperitoneum through a perforation in the main pancreatic duct or by the extension of a pancreatic pseudocyst superiorly. Negative intrathoracic pressures generated during inspiration draw pancreatic fluid into the pleural space from the pancreas along the fistula's tract, creating a pleural effusion that can be large enough to cause shifting of mediastinal structures contralaterally. Thoracentesis and octreotide acetate (100 μg every 8 hours intravenously) are effective in resolving approximately half of all pancreaticopleural fistulas.[1-4] Cases refractory to conservative therapy are managed surgically with partial pancreatectomy or pancreatic ductal stent placement by means of endoscopic retrograde cholangiopancreatography.

Acid-base disturbances that occur with chronic pancreatitis are known to be associated with diabetic ketoacidosis and lactic acidosis, secondary to pancreatic endocrine dysfunction and impaired effective circulation, respectively.[5-7] Acid-base disturbances can also occur in the presence of a pancreaticopleural fistula; the leakage of corrosive pancreatic fluid causes pleural fluid to become rich in pancreatic bicarbonate, which is sequestered from the systemic circulation. The present case involves non–anion gap metabolic acidosis in a patient with chronic pancreatitis complicated by a large, left-sided pleural effusion and a pancreaticopleural fistula.

Report of Case

A 49-year-old African American woman presented to the emergency department with a 3-week history of worsening dyspnea on exertion and severe pleuritic chest pain. Her past medical history was notable for alcohol-induced chronic pancreatitis, with the last flare having occurred 4 months before her presentation. Three days prior to presentation, the patient underwent therapeutic thoracocentesis at an outside hospital, 2 L of fluid was removed, and she was discharged to home.

Our review of systems was positive for nausea without vomiting and diffuse abdominal pain with radiation to the back. The patient denied associated diarrhea or urinary complaints and reported no other past medical or surgical history. She was not taking medication. The patient denied drug allergies, and her family history was noncontributory. The patient's social history included a 6-year history of 5 alcoholic drinks per day after the death of her husband, with her last drink 1 year before presentation. She also reported a 10 pack-year smoking history and occasional marijuana use. Physical examination was positive for decreased breath sounds on the left side of the chest and diffuse tenderness to abdominal palpation. The patient's vital signs and laboratory test results are listed in the *Table*.

A chest radiograph revealed a large, left-sided pleural effusion with mediastinal structures shifted to the right. At this time, the patient was admitted to the hospital. Thoracentesis performed on the day of admission removed 1.5 L of fluid and provided the patient with substantial symptomatic relief. Pleural fluid analysis was positive for an elevated pancreatic amylase level of 23,678 U/L, which is suggestive of an

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Table.
Vital Signs and Laboratory Results for a 49-Year-Old Woman With a Pancreaticopleural Fistula

Test	Finding
■ **Vital Signs**	
□ Temperature, °F	98.8
□ Respiratory rate, breaths/min	25
□ Oxygen saturation, % with 2 L oxygen	98
□ Heart rate, beats/min	101
□ Blood pressure, mm Hg	112/78
■ **Laboratory**	
□ Sodium, mmol/L	133
□ Potassium, mmol/L	3.4
□ Chloride, mmol/L	115
□ Bicarbonate, mmol/L	8
□ Amylase, U/L	284
□ Lipase, U/L	340
□ Lactate dehydrogenase, U/L	380
□ Protein (total), g/dL	5.8
□ Albumin, g/dL	3.7
□ White blood cell count, /μL	17,000

underlying pancreaticopleural fistula. Arterial blood gas analysis—pH, 7.20; PCO_2, 23.1 mm Hg; PO_2, 108.0 mm Hg; bicarbonate, 9 mmol/L; oxygen saturation, 97.1%—identified a non–anion gap metabolic acidosis (anion gap, 10 mmol/L). The patient's baseline anion gap obtained from previous hospitalization records was 6 mmol/L. Urine chemistry values—sodium, 126 mmol/L; chloride, 156 mmol/L; potassium, 21.2 mmol/L; creatine, 59.0 mmol/L—were within normal limits.

Octreotide acetate (100 μg by means of subcutaneous injection every 8 hours) was administered to decrease pancreatic secretions and an oral diet was permitted as tolerated. Findings from computed tomography of the chest showed chronic calcifications of the pancreas and 2 small pseudocysts in the pancreatic genu region. Magnetic resonance cholangiopancreatography showed a small connection between the pancreas and the thoracic cavity. A stent was placed in the perforated main pancreatic duct by using endoscopic retrograde cholangiopancreatography. The procedure was well tolerated, and the patient was continued on octreotide acetate therapy and was observed for 3 additional days in the hospital. The patient's clinical condition improved, and a follow-up chest radiograph on day 5 of admission revealed a decrease in the pleural effusion

The patient was discharged to home 5 days after being admitted. Two weeks after discharge, the patient returned for follow-up and reported no chest pain, shortness of breath, or abdominal pain.

Comment

Non–anion gap metabolic acidosis associated with low to normal serum potassium levels is known to be caused by either intestinal diarrhea, proximal and distal renal tubular acidosis, intestinal and biliary fistula, pancreatic fistula associated with transplant, or toluene ingestion.[8,9] Diabetes mellitus secondary to pancreatic endocrine dysfunction may manifest as diabetic ketoacidosis and anion gap metabolic acidosis.[10] Cases of pancreatic transplants complicated by fistulas resulting in non–anion gap metabolic acidosis have been reported.[11,12] To our knowledge, however, no reports have been published on pancreaticopleural fistula causing non–anion gap metabolic acidosis.

Pancreaticopleural fistulas are commonly associated with large pleural effusions. If pleural fluid analysis is positive for extremely elevated pancreatic amylase, an underlying pancreaticopleural fistula should be suspected. The fistula causes pleural fluid to become rich in pancreatic bicarbonate, which is sequestered from the systemic circulation. In the current case, non–anion gap metabolic acidosis was present in a patient with a pancreaticopleural fistula. We believe the systemic bicarbonate sequestration into the pleural fluid in the absence of substantial renal or diarrheal contribution was the cause of the patient's acid-base disturbance.

Conclusion

Non–anion gap metabolic acidosis may be an unrecognized complication of pancreaticopleural fistulas with pancreatic bicarbonate loss to the pleural fluid as the cause of acid-base disturbance.

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