ABSTRACT

Spontaneous pneumomediastinum (SP) is air within the mediastinum due to increased alveolar pressure. It can present with chest pain and dyspnea. It is considered a rare presentation in the pediatric population but can be seen in those with a pulmonary history or after playing sports. It is typically a self-limiting condition but can have serious complications. This case details a pediatric patient who was found to have SP after traveling from a high-altitude area while playing soccer. His imaging was notable for dissection of air into the spinal canal, a phenomenon known as pneumorrhachis. He was admitted for observation with resolution of his symptoms prior to discharge. In an otherwise healthy patient, his etiology was multifactorial including high altitude environment, exertional activity with sports, and changes in barometric pressure. Treatment included symptomatic control and rest prior to return to activity.

INTRODUCTION

Spontaneous pneumomediastinum is defined as air within the mediastinum without known chest trauma, surgical procedures, or mechanical ventilation.1 Incidence of SP in ER settings represents 1 case per 30,000 visits.2 The typical triad of symptoms includes chest pain, dyspnea, and subcutaneous emphysema.3 There may also be presence of Hamman’s Sign which is a finding of audible crepitus occurring with the heartbeat on chest auscultation, because of the mediastinal air.4 While spontaneous pneumomediastinum is typically a self-limiting process, life threatening complications can occur including pneumothorax, esophageal perforation, widespread air build-up causing respiratory compression or tamponade on pulmonary physiology.5,6 In rare instances, air can dissect between the mediastinum and the upper spine causing pneumorrhachis (free air in the spinal canal).7

Spontaneous pneumomediastinum is rare in the pediatric population accounting for 1 in 14,000 cases of pediatric patients presenting with dyspnea in ER setting.5 It can be seen in pediatric patients with an underlying history of asthma8 or in older adolescents/young men with no predisposing risk factors after sports.9 There are case reports of high-altitude, defined as 1,500 meters (about 4921.26 ft) or greater above sea level, causing SP in the adult population but there is little literature of these instances in the pediatric population.10 In this case, we discuss a pediatric patient who presented with chest pain and dyspnea after traveling from a high-altitude area while partaking in strenuous exercise and continued sports in a lower altitude area found to have spontaneous pneumomediastinum.

CASE DESCRIPTION

A previously healthy 13-year-old male presented with acute onset of chest pain and dyspnea while sitting in class at school. The pain was midsternal with radiation to the back and upper abdomen and worsened throughout the day prompting evaluation in an urgent care setting. Prior to the onset of the patients’ symptoms, he had recently returned from Mexico City 2 days prior (elevation: 2,240 meters) to the Chicagoland area (elevation 208 meters). He had been in Mexico City for 15 days (about 2 weeks) and had been playing soccer during that time and had played Pickle Ball earlier the day that his symptoms started. No recent URI symptoms, hemi-inhalation, diving, falls, or trauma. No history of vaping or smoking use. No cardiac or pulmonary history. Patient denied any water sports (scuba diving, snorkeling, swimming). No recent contact sports.

The patient was initially seen at an urgent care where chest X-ray showed findings concerning pneumomediastinum, and he was sent to the emergency room (ER) for further evaluation. In the ER, vitals were stable and the patient’s chest pain had resolved. His exam throughout his course was notable for bilateral neck crepitus in the clavicular region but no increased work of breathing or reproducible chest tenderness. Hamman’s Sign was negative. Lab work-up was obtained including CBC, CMP, and repeated ventilation studies notable for a mildly elevated WBC of 13.4, HGB mildly low at 12.7, and PTT mildly elevated to 31 but overall reassuring. EKG was obtained and showed sinus rhythm with rightward axis and early repolarization phase without cardiac or pulmonary symptoms.

DISCUSSION

SP occurs from rupture of the terminal alveoli due to external factors that can cause increased alveolar pressure such as coughing, vomiting, straining, or Valsalva maneuver.11 There was no identified etiology for this patient’s SP though it may have been multifactorial. Though not previously reported in pediatric patients, high altitude environments have been reported with SP in the adult population as they can cause coughing and dyspnea which can lead to increased alveolar pressure.12 Athletics can also cause SP by direct chest trauma or by straining associated with strenuous exercise. In one retrospective study, scuba diving (40%) and soccer (30%) were the most encountered predisposing sporting activities prior to SP. Additionally, barometric pressure tends to increase as altitude decreases.4 The patient in this case had a decrease in altitude of over 2,000 meters (about 1.24 mi) going from Mexico City to Chicago. It can be hypothesized that this decrease in altitude could have led to increased barometric pressure, and subsequently barotrauma leading to increased alveolar pressure.12 Diagnosis is typically made by chest-X ray, though CT chest is accepted as the gold standard as one study noted that 30% of SP cases presented with normal chest-X ray.13 SP is considered a benign condition and usually resolves within 3-15 days.10 Treatment involves analgesics and management of an underlying condition if present.11 Given the potential complications that may occur, it is reasonable to advise rest and avoid maneuvers that could increase alveolar pressure such as physical activity during the recovery phase.14 There has been proposed treatment with inhaled oxygen though the efficacy and indication for supplementary oxygen therapy is ongoing.15 In conclusion, spontaneous pneumomediastinum is a self-limited condition with the possibility for life threatening sequela. It should be considered in previously healthy young adolescents patients with a history of recent travel from a high-altitude area in a sports setting. Treatment includes symptomatic support and rest to prevent potential complications with a complete return to activities 2 weeks from diagnosis and supportive care during the recovery phase.

REFERENCES


3. Raven J, DO; Doran A, MD. SP occurs from rupture of the terminal alveoli due to external factors that can cause increased alveolar pressure such as coughing, vomiting, straining, or Valsalva maneuver. There was no identified etiology for this patient’s SP though it may have been multifactorial. Though not previously reported in pediatric patients, high altitude environments have been reported with SP in the adult population as they can cause coughing and dyspnea which can lead to increased alveolar pressure. Athletics can also cause SP by direct chest trauma or by straining associated with strenuous exercise. In one retrospective study, scuba diving (40%) and soccer (30%) were the most encountered predisposing sporting activities prior to SP. Additionally, barometric pressure tends to increase as altitude decreases. The patient in this case had a decrease in altitude of over 2,000 meters (about 1.24 mi) going from Mexico City to Chicago. It can be hypothesized that this decrease in altitude could have led to increased barometric pressure, and subsequently barotrauma leading to increased alveolar pressure. Diagnosis is typically made by chest-X ray, though CT chest is accepted as the gold standard as one study noted that 30% of SP cases presented with normal chest-X ray. SP is considered a benign condition and usually resolves within 3-15 days. Treatment involves analgesics and management of an underlying condition if present. Given the potential complications that may occur, it is reasonable to advise rest and avoid maneuvers that could increase alveolar pressure such as physical activity during the recovery phase. There has been proposed treatment with inhaled oxygen though the efficacy and indication for supplementary oxygen therapy is ongoing. In conclusion, spontaneous pneumomediastinum is a self-limited condition with the possibility for life threatening sequela. It should be considered in previously healthy young adolescents patients with a history of recent travel from a high-altitude area in a sports setting. Treatment includes symptomatic support and rest to prevent potential complications with a complete return to activities 2 weeks from diagnosis and supportive care during the recovery phase.


