Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/11974
DOI URL: http://dx.doi.org/10.21474/IJAR01/11974

RESEARCH ARTICLE

SPONTANEOUS PNEUMOMEDIASTINUM: A RARE AND UNUSUAL COMPLICATION OF DIABETIC KETOACIDOSIS

Habib Bellamlih[1], Yousra Benabdelfedil[2], Mohamed Moutaoukil[3] and Abderrahim Chekabab[4]

1. Department of Radiology, Fourth Military Hospital, Dakhla, Morocco.
2. Department of Endocinology, Moulay Ismail Military Hospital, Meknes, Morocco.
3. Department of Anesthesiology and Intensive care, Fourth Military Hospital, Dakhla, Morocco.
4. Department of Biology, Fourth Military Hospital, Dakhla, Morocco.

Manuscript Info

Manuscript History
Received: 01 September 2020
Final Accepted: 05 October 2020
Published: November 2020

Abstract

Spontaneous pneumomediastinumis defined as the presence of free air in the mediastinum without any apparent concomitant factors or disease. It is most often affecting young males which is usually benign and self-limiting.The pathophysiology of this disease is probably based on a pressure gradient between the alveolus and the lung interstitium. The most important examination to make a diagnosis of spontaneous pneumomediastinum is radiography. Generally, no special interventions are indicated for the treatment.We report a case of 26-year-old manwith a benign spontaneous pneumomediastinum complicating an inaugural diabetic ketoacidosis.

Introduction:-

Spontaneous pneumomediastinum (SPM) is defined as a pneumomediastinum that is notrelated to trauma, surgery, or othermedicalprocedures. This entity is usually precipitated by high intrathoracic pressure conditions, such as vomiting, labor, or sneezing. [1]

SPM as a complication of diabeticketoacidosis (DKA) isvery rare and is likely related to vomiting. The following case illustrates a diagnostic and management challenge in a young male patient presenting with inaugural DKA, complicated by SPM.

Case Report:

A 26-year-old man with no past medical history presented to the emergency departmentwith three days of vomiting, abdominal pain, and progressive difficulty of breathing.

On clinical examination, the patient was dehydrated, polypneic at a rate of30 breaths/min,tachycardic at 120 bpm and his blood pressure was 140/99 mm Hg. The temperature was normal at37°C and oxygen saturation 93 % in room air. The lung, heart, and abdomen exam were unremarkable and there was no neck crepitus noted.

The laboratory evaluation showed leukocytosis of 21 x1000/mm3, elevated creatinine of 2 mg/dL, hyperglycemia of 780 mg/dL, hyponatremia of 130mEq/L, hyperkalemia of 5.2 mEq/L, and bicarbonate of 5 mEq/L. The anion gap was 27 and a venous blood gas showed a pH of 6,7. Urinalysis was positive for 3+ ketones and 1+ protein.

Corresponding Author:- Habib Bellamlih
Address:- Mohammed V-Souissi University, Rabat, Morocco.

A chest X-ray on admission showed free air in the mediastinum outlining the left and right heart border withoutpneumothorax(Fig 1)

Chest computed tomography (CT) reaffirmed the presence of extensive pneumomediastinum involving the base of the neck, around the great vessels, around the esophagus, and around the pericardium. There was no pneumothorax or any finding on lung parenchyma (Fig2). Oesophageal contrast studies showed no perforation of the oesophagus.

A diagnosis of diabetic ketoacidosis (DKA) with pneumomediastinum was made.

The patient was admitted to the intensive care unit formonitoring. His ketoacidosis resolved within 24 hours following initiation of intravenous normal saline, bicarbonate, and insulin drip as per DKA protocol.For pneumomediastinum, hewas treated conservatively with analgesia and respiratory support.

The patient was discharged home after 5 days without any complicationswith a plan for early review at the diabetes day centre.

Discussion:-

Pneumomediastinum (PM)is a rare condition characterised by the presence of free air in themediastinum. It is due to variousconditions leading to alveolaroverdistension and barotrauma. Thesecanresult inalveolar rupture and as a result, air leaksinto thepulmonaryinterstitium, dissectingthrough thebronchovascular bundles into the mediastinum. [1]

Air canalsotrack up into the pleural space, subcutaneoussoft tissues of the neck and pericardiumleading to pneumothorax, soft tissue emphysema and pneumopericardium,respectively.[2]

Spontaneouspneumomediastinum (SPM) isdefined as thatoccurringwithoutsurgical or medicalprocedures,chest trauma or mechanical ventilation. In 1937,Hammandescribed SPM for the first time. [3]Sincethat date, many cases werereportedin conditions leading to highintrathoracic pressure swings such as coughing, straining, vomiting, strenuouscryingespecially inpeoplewithasthma or chronic obstructive pulmonarydisease. But only a few case reports have described the association with DKA. [4]

The exact pathophysiologyisstillunknown; however, itisbelievedthatKussmaul respiration leads to a significant 20–30 mm Hg rise in intra-alveolar pressure and thismayresult inalveolar rupture.Furthermore, vomitingcanpredispose toalveolar rupture throughincreasingintrathoracic pressure.[5]

SPM canbeasymptomatic; however, chest pain shortness of breath, and subcutaneousemphysema have been reported.Hamman'ssignis an infrequentclinicalsign in the presence of mediastinalemphysema and isheard as a crunchingsound over the precordium, synchronouswith the heart-beat [6,7]. Our patientdid not presentwithemphysema on physical exam.

The diagnostic imaging for SPM is a two-viewchest X-ray, which has a sensitivity of 50%-90%. When suspicion is high and the chest X-ray isnegative,a CT chestwithoutcontrastcouldbe the nextstep in evaluation [6].The features of the X-ray are generated by leaked air itself and anenhancedmargin of mediastinalstructures by the air. On the posterior-anteriorview of the chest X-ray, thecommonestthreefindings are the following: air streaks in the superiormediastinum (sometimestheyreach to the neck), the prominent silhouette of the heart (especially on the left) and subcutaneousemphysema of the shoulder and neck.Infrequent but characteristicfeaturesincludethe double-bronchial-wallsign (the visualizedtracheal or main bronchial wallputtedbetweeninner air and leaked air) and the continuousdiaphragmsign (the diaphragm of bothsidesappearingconnected by leaked air between the inferior surface of heart and diaphragm).Especially in paediatric cases, the thymic spinnaker sailsignisproduced by airlifting the thymus off the mediastinal structures. [8]On chest CT, the leaked air mainlydistributesfrom the anteriormediastinum to the neck, and the amount of air isoften more thanisestimatedon chest X-ray. The airmayextend to the pericardium, retroperitoneum, peritoneum or spine.

Becausechest CT is essential to detect small air leakages, it shouldbeperformed to makea correct diagnosisin stronglysuspicious cases of SPM, even if the chest X-ray is in the normal range. [9]Furthermore, chest CT mayrevealotherfindingssuch as pre-existingpulmonarydisease.

Boerhaave's syndrome israrelyassociatedwith SPM; however, itis important to keepit inconsideration due to itsassociated high mortality rate of 70% [5]. This canbesuspected in a patient presentingwithsevereemesiswith or without blood leukocytosis, hypotension, and a priorhistory of gastroesophageal reflux disease. CT chestwithoutcontrast or esophagealswallowimagingcanbeuseful diagnostic tools [6].Recurrence of SPM isextremely rare.[10]

As evidenced in our case, SPM isgenerally a benign self-limited condition. Management isgenerally conservative, includingrest, oxygen, and analgesia [11]. There is no establishedrolefor antibioticsunlessthereis a concomitant infectiousprocess, neitheristhere a specificfollow-up indication for patients whohad an uncomplicated SPM. Fortunately, the evolution of thisentityisbenignwith an excellent prognosis and no recurrence in most cases [12].

Figure:-

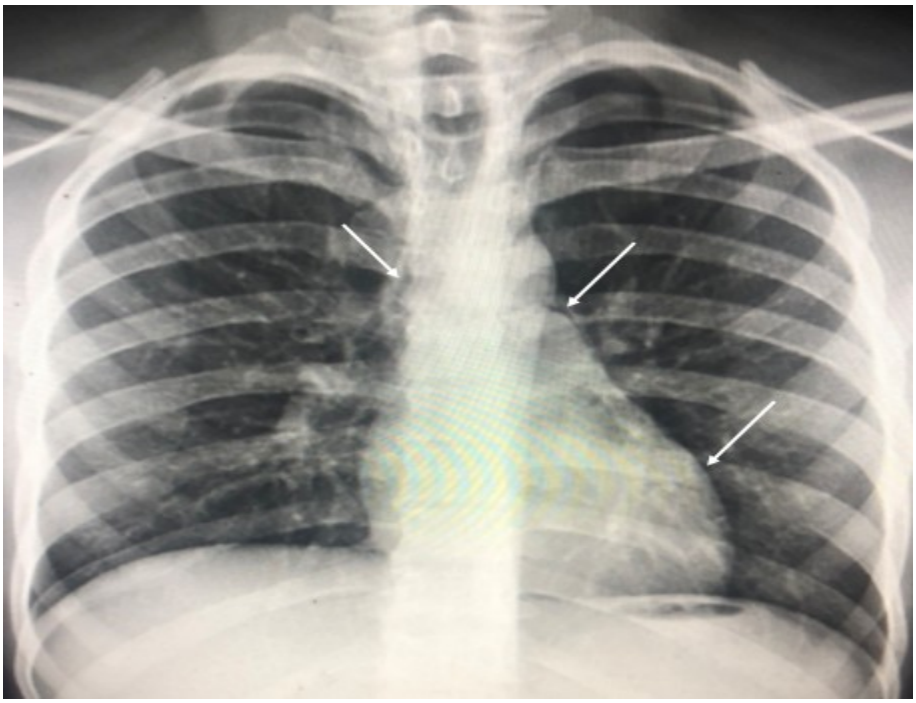

Figure 1:- A chest X-ray showing free air in the mediastinum outlining the left and rightheart border withoutpneumothorax(white arrows).

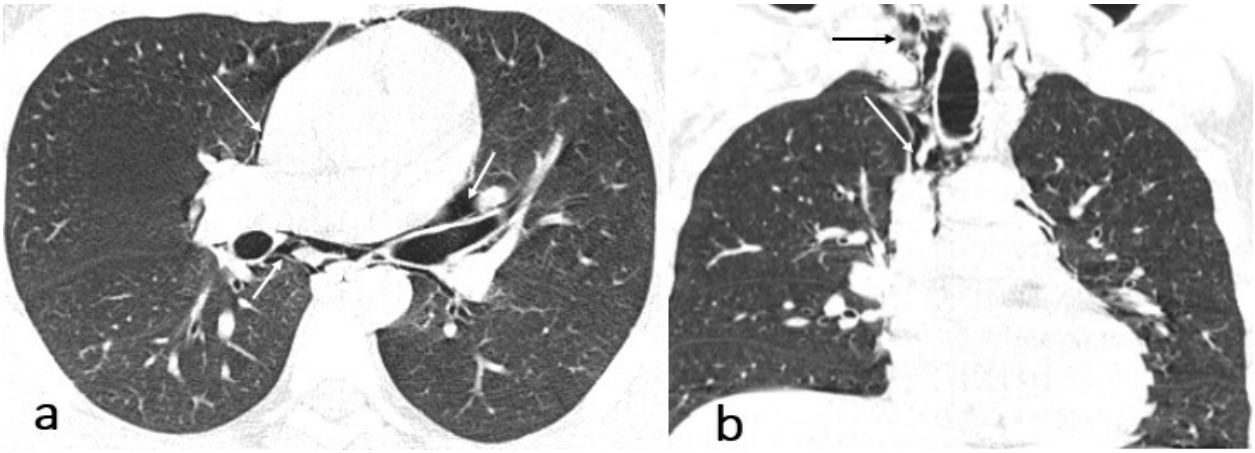

Figure 2 (a,b):- Chest computed tomography without contrast showing the presence ofpneumomediastinum involving the base of the neck (black arrow), around the greatvessels,around the esophagus, and around the pericardium (white arrows).

Conclusion:-

SPM isa rare and andunusual complication of DKA which results from the increased intra-alveolar pressure and alveolar rupture due to vomiting and ketoticbreathingassociatedwith DKA. It isusuallyasymptomatic and resolves with conservative management in most cases.

Conflict of interest statement:
Authors declare that there is no conflict of interest.

Acknowledgements:-

No specific acknowledgment.

Refrences:-

1. Abolink I, Lossos IS, Breuer R. Spontaneous pneumomediastinum. A report of 25 cases. Chest (1991);100:93–5.
2. Panacek EA, Singer AJ, Sherman BW, et al. Spontaneous pneumomediastinum: clinical and natural history. Ann Emerg Med (1992);21:1222–7
3. Guzman rojas P, Agostinho J, Hanna R, et al. Spontaneous Pneumomediastinum as aConsequence of Severe Vomiting in Diabetic Ketoacidosis. Cureus(2018) 10(5): e2562. DOI10.7759/cureus.2562
4. Pauw RG, van der Werf TS, van Dullemen HM, et al. Mediastinal emphysema complicating diabetic ketoacidosis: plea for conservative diagnostic approach.Neth J Med (2007) ;65:368–71.
5. Pooyan P, Puruckherr M, Summers JA, et al. Pneumomediastinumpneumopericardium, and epidural pneumatosis in DKA. J Diabetes Complications (2004);18:242–7.
6. Lane AS, Champion B, Orde S, Dravec D: Diabeticketoacidosis due to fulminant type Idiabetes: a rare subtype of type I diabetesleading to unusualsequelae. J Intensive Care Soc.(2015), 16:64-70. 10.1177/1751143714551249
7. Girard DE, Carlson V, Natelson EA, Fred HL: Pneumomediastinum in diabeticketoacidosis:comments on mechanism, incidence, and management. Chest. (1971), 60:455-459.10.1378/chest.60.5.455
8. Bejvan, S.M. and Godwin, J.D. Pneumomediastinum: oldsigns and new signs. AJR (1996)166: 1041_1048.
9. Iyer, V.N., Joshi, A.Y. and Ryu, J.H. Spontaneouspneumomediastinum: analysis of 62 consecutiveadult patients. Mayo Clin Proc (2009) 84: 417_421.
10. Natale C, D'Journo XB, Duconseil P, et al. Recurrentspontaneouspneumomediastinum in an adult. Eur J CardiothoracSurg(2012);41:1199–201.
11. Steenkamp D, Patel V, Minkin R: A case of pneumomediastinum: a rare complication of diabeticketoacidosis. Clin Diabetes. (2011), 29:76-77. 10.2337/diaclin.29.2.76
12. Macia I, Moya J, Ramos R, et al.:Spontaneouspneumomediastinum: 41 cases . Eur J CardiothoracSurg. (2007), 31:1110-1114. 10.1016/j.ejcts.2007.03.008.