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Subcutaneous emphysema and pneumomediastinum secondary to H1N1 pneumonia in Saudi children: 2 case reports.

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Abstract

Spontaneous Pneumomediastinum (SPM) is an innocuous condition in children, which usually responds to supportive therapy. The incidence of H1N1 Influenza A infection in children is exceedingly rare and may culminates into spontaneous pneumomediastinum and subcutaneous emphysema. We are presenting 2 cases where subcutaneous emphysema and spontaneous pneumomediastinum complicated H1N1 Influenza A viral infection in children, with an excellent outcome.

Keywords: Subcutaneous emphysema, Pneumomediastinum, H1N1 pneumonia, Viral pneumonia.

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Introduction

Spontaneous Pneumomediastinum (SPM) is usually a benign, self-limiting condition in pediatric population, caused by rupture of alveoli and dissection of air in the mediastinum and hilum. Although its association with asthma is well known, it may also be caused by Valsalva maneuver, forceful vomiting and cough [1]. Rarely may it be a complication of blunt chest trauma, anorexia nervosa, cecal rupture, emergency tracheotomy and viral infections [2-6]. The condition is usually heralded by chest pain, dyspnea and emphysema [7]. Subcutaneous emphysema may occur with or without spontaneous pneumomediastinum and is usually manifested by difficulty in swallowing, facial and neck swelling with pain and a characteristic crepitation on touch.

Since its emergence in 2009, the H1N1 Influenza virus is considered a public health challenge in Saudi Arabia [8]. Although this virus has reportedly caused trivial infections such as *Pityriasis rosea*, and some cases of deafness, the main threat is the severe respiratory complications [9-11]. Like other viruses, children are more susceptible to be affected from this infection and exhibit more pronounced complications [12].

We are presenting 2 cases of subcutaneous emphysema and spontaneous pneumomediastinum complicated H1N1 Influenza A viral infection in children.

Case Report 1

1.5 year old Saudi boy, with an unremarkable past history. During his visit to Makkah, the child developed high grade fever, vomiting and diarrhea for 3 days. He was given anti-pyretic and oral rehydration therapy, but his fever did not subside. Subsequently the child developed symptoms of upper respiratory tract infection resulting in decreased oral intake and had to be admitted in a local hospital where his condition further deteriorated with the onset of dry cough, cyanosis, labored breathing, irritability and facial swelling, extending down to the neck and chest. There was no history of chocking or foreign body aspiration, vomiting or chest pain.

Patient was transferred to our hospital for further management. On arrival he was in respiratory distress with tachypnea (60 breaths/min), tachycardia (150 beats/min), an O_2 saturation of 78% on room air, normotensive (blood pressure 95/51 mm Hg) and was afebrile. There was an obvious facial and neck swelling. Chest Examination revealed bilateral subcutaneous emphysema, fair aeration, bilateral crepitation and wheezing. The rest of the systemic examination was unremarkable. His labs depicted a WBC of 5.95 × 10^3/µL, (Neutrophils 2.04%, Lymphocytes 2.96%), Hb 10.9 g/dl and Platelets 486/mm^3, ESR 44 mm/h, with a normal renal and liver profile.

Nasopharyngeal swab came positive for Influenza A (H1N1). Chest X-ray revealed extensive bilateral subcutaneous emphysema (blue arrow) in head, neck, left side of the

chest wall and left upper limb, pneumomediastinum (green arrow), spinnaker sail sign(black arrow) and signs of pneumonia such with air bronchogram and bilateral infiltrations (Figure 1).

Patient was admitted to Pediatric Intensive Care Unit (PICU) as viral H1N1 pneumonia with reactive airway disease and spontaneous pneumomediastinum. He was treated supportively with 100% oxygen, intravenous fluids, bronchodilators, albuterol (Ventolin), ipratropium bromide (Atrovent), steroids, intravenous antibiotics and oseltamivir (Tamiflu). X-ray chest was repeated after 2 days and showed a marked improvement with complete recovery (Figure 2).

After 2 weeks, patient was discharged on inhalers for reactive airway disease. Chest X-ray at discharge was normal after complete resolution

Case Report 2

Our 2nd case is a four years old Saudi boy who was brought to our emergency department with complaints of lower neck swelling with a sensation of "bubbles", increased work of breathing for one day and cough, fever and coryza for 3 days. There was a past history of bronchial asthma. On examination, patient was alert and responsive albeit with signs of respiratory distress such as tachypnea, tachycardia, a blood pressure of 123/65, and a swelling extending from the neck down to the chest. He was afebrile, with equal bilateral air entry associated with crepitation and occasional rhonchi on both sides.

Patient's labs, blood gases and ECG were within normal limits. Chest radiograph revealed subtle pneumomediastinum and soft tissue emphysema at the base of neck with no pneumothorax (Figure 3).

CT scan of neck and chest confirmed the x-ray findings with further depiction of peripheral emphysematous bullae in sub-pleural areas bilaterally and a few bullae in the lung parenchyma (Figure 4).

Patient was admitted and managed conservatively in pediatric intensive care unit for 4 days, during which his

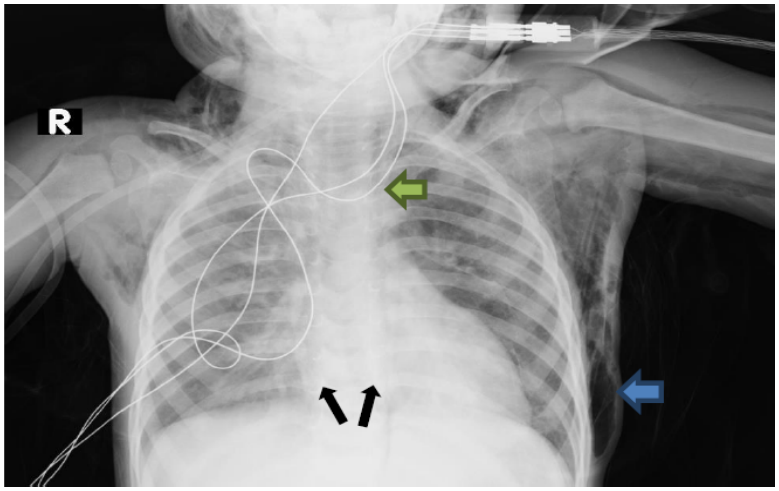

Figure 1. *Chest X-ray showing extensive bilateral subcutaneous emphysema (blue arrow), pneumomediastinum (green arrow), spinnaker sail sign (black arrow), air bronchogram and bilateral infiltrations*

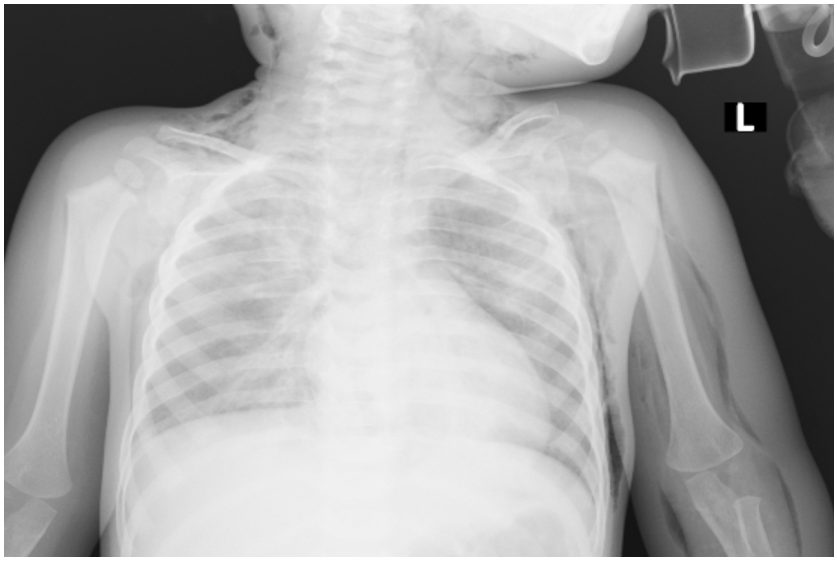

Figure 2. *Chest X-ray after 2 days of management, showing marked improvement*

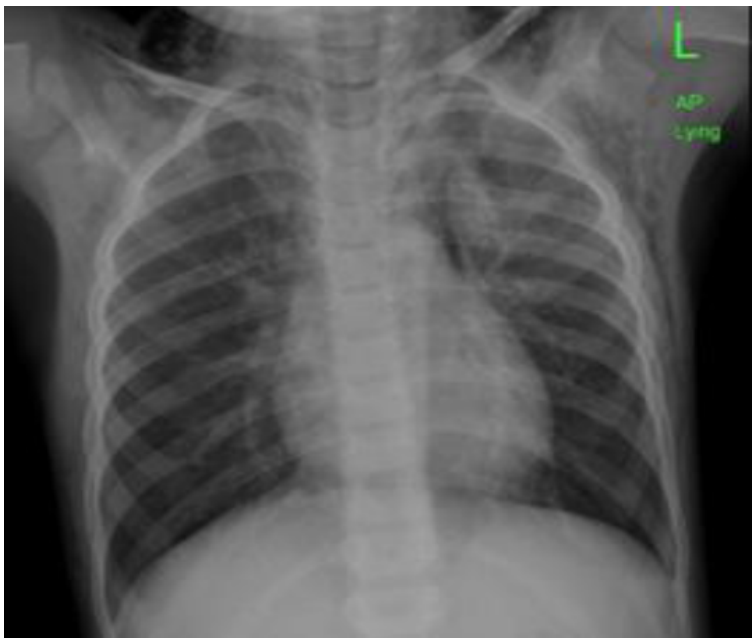

Figure 3. *Chest X-ray showing subcutaneous emphysema*

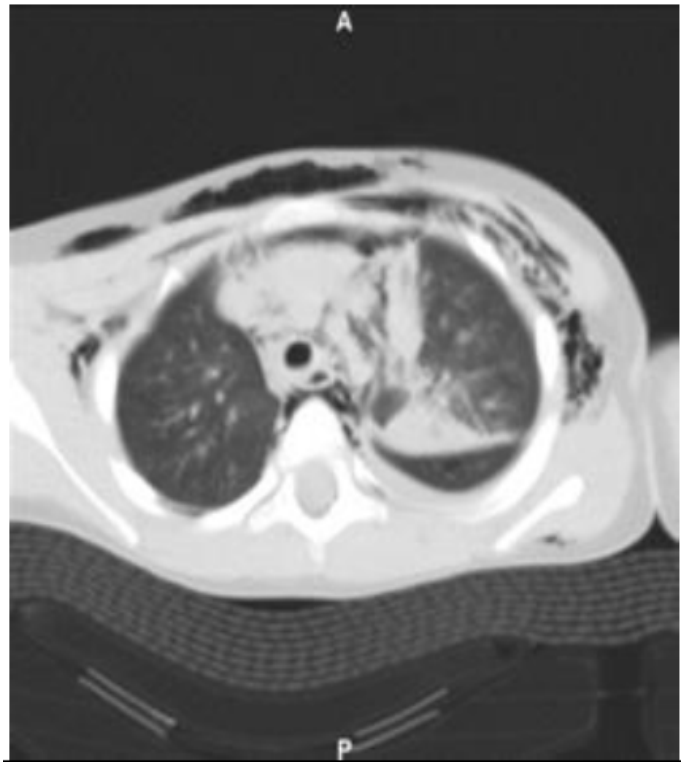

Figure 4. *CT Scan showing emphysematous bullae in sub-pleura and lung parenchyma*

subcutaneous emphysema gradually improved without complete resolution. He was placed on 10-12 L of oxygen through a non-rebreather mask, covered with antibiotics and screened for H1N1 by real time reverse transcription-PCR (RT-PCR), which came positive. The Corona screen was negative. Patient gradually improved with diminishing subcutaneous emphysema both clinically and radiologically on follow-up chest x-rays. The patient shifted to the ward on 1 L of oxygen in order to maintain 100% SPO_2 (96% in RA), intravenous fluids, bronchodilators, steroids, intravenous antibiotics and oseltamivir (Tamiflu). Later he was discharged in a stable condition with minimal residual emphysema.

Discussion

Spontaneous Pneumomediastinum is usually a benign condition caused by collection of free air in the mediastinum due to alveolar rupture. Asthma is considered to be the most common cause. A bimodal peak in incidence is reported in children younger than 7 years and in adolescents aged from 13 to 17 years, with a predilection for boys [13].

During 2009 pandemic, more than 208 countries were affected with H1N1 Influenza viral infection which is heralded by fever, cough, body ache, sore throat, chills and fatigue. There have been very few cases reported in children with Influenza A H1N1 infection leading to pneumomediastinum and subcutaneous emphysema.

Hasegawa and his colleagues described two Japanese children during the 200 pandemic, where their H1N1 infection culminated into pneumonia and pneumomediastinum [11]. The patients were 8 and 10 years of age respectively with on preceding history of Asthma. Udupa et al. shared three Canadian asthmatic children with Pneumomediastinum and subcutaneous emphysema associated with pandemic (H1N1) influenza, all of which were discharged within a week after treatment [14].

Abraham et al. described the pathological features of lethal pandemic H1N1 infection included necrosis and hemorrhage of the upper respiratory tract and necrosis of the bronchial walls [15].

In Germany, active screening showed a continued high incidence of H1N1 associated PICU admissions in the post-pandemic seasons as well [16].

Mesman et al. found that pre-existing immunity played a significant role in protecting the patients during the 2009 pandemic due to the presence of antibody dependent cellular toxicity [17].

Our index case had visited Makkah in 2015, which raises the possibility of him having acquired the H1N1 infection. Due to the high index of suspicion, we carried out nasopharyngeal smear which came out to be positive. Due to a prompt diagnosis, we were able to start appropriate management in a timely manner. He responded very well to supportive therapy and did not require mechanical ventilation and surgical intervention with complete resolution in few weeks.

Bucher et al. found out that after H1N1 infection, there is no significant change in sputum colonization and lung disease progression in cystic fibrosis patients, endorsing the fact that in most cases the disease can be managed conservatively once diagnosed and treated early [18].

The role of vaccination especially in children is also controversial. Mahmud et al. have documented that vaccination was very helpful in reducing risk of admission in children less than 5 years of age, during 2009 pandemic in Canada [19]. Stiff et al. came up with similar findings that vaccination for H1N1 resulted in less PICU demands [20].

We suggest that pneumomediastinum should be considered in patients with H1N1 Influenza especially in asthmatics.

Conclusion

Based on the outcomes of our patients as well as results from other centers, we conclude that there is an association between H1N1 Influenza virus and air leak syndromes especially pneumomediastinum and subcutaneous emphysema. Usually they can be managed with supportive therapy without significant respiratory or systemic sequelae provided they are recognized and treated early.

References

1. Bullaro FM, Bartoletti SC. Spontaneous pneumomediastinum in children: A literature review. Pediatr Emerg Care 2007; 23: 28-30.
2. Trujillo CHA, Tovar NF, Gomez PCI, et al. Blunt chest trauma with pneumomediastinum and pneumoperitoneum secondary to Macklin effect. Case report. Cirugia y Cirujanos 2016; 84: 409-414.
3. Lee KJ, Yum HK, Park IN. Spontaneous pneumomediastinum: An unusual pulmonary complication in anorexia nervosa. Tuberc Respir Dis 2015; 78: 360-362.
4. Vecchio R, Intagliata E, Basile F, et al. Subcutaneous cervical emphysema and pneumomediastinum due to a diastatic rupture of the cecum. Il Giornale di Chirurgia 2015; 36: 272-275.
5. Martin DLM, Galan MJ, Gallego J. Pneumomediastinum and pneumothorax during emergency tracheotomy under spontaneous ventilation: Macklin meets Mueller? Revista Espanola de Anestesiologia y Reanimacion 2016; 63: 231-234.
6. Emiralioglu N, Ozcan HN, Oguz B, et al. Pneumomediastinum, pneumorrhachis and subcutaneous emphysema associated with viral infections: Report of three cases. Pediatr Int 2015; 57: 1038-1040.
7. Gupta A, Rizvi I, Srivastava VK, et al. Spontaneous pneumomediastinum. Medical J Armed Forces India 2015; 71: S85-88.
8. AlMazroa MA, Memish ZA, AlWadey AM. Pandemic influenza A (H1N1) in Saudi Arabia: Description of the first one hundred cases. Ann Saudi Med 2010; 30: 11-14.
9. Mubki TF, Bin Dayel SA, Kadry R. A case of *Pityriasis rosea* concurrent with the novel influenza A (H1N1) infection. Pediatr Dermatol. 2011; 28: 341-342.
10. Alsanosi AA. Influenza A (H1N1): A rare cause of deafness in two children. J Laryngol Otol 2012; 126: 1274-1275.
11. Hasegawa M, Hashimoto K, Morozumi M, et al. Spontaneous pneumomediastinum complicating pneumonia in children infected with the 2009 pandemic influenza A (H1N1) virus. Clin Microbial Infect 2010; 16: 195-199.
12. Mansour MM, Al Hadidib KM. 2009 H1N1 influenza A in children: A descriptive clinical study. Ann Saudi Med 2012; 32: 59-63.

13. Banaszak IW, Schoeneich N, Potoczna JK, et al. Analysis of incidence and clinical picture of pneumothorax in children. Polski merkuriusz lekarski: Organ Polskiego Towarzystwa Lekarskiego 2011; 31: 335-339.
14. Udupa S, Hameed T, Kovesi T. Pneumomediastinum and subcutaneous emphysema associated with pandemic (H1N1) influenza in three children. Can Med Assoc J 2011; 183: 220-222.
15. Abraham SMV, Rosas SJ, Quinonez DA, et al. Pathological changes associated with the 2009 H1N1 virus. N Engl J Med 2009; 361: 2001-2003.
16. Streng A, Prifert C, Weissbrich B, et al. Continued high incidence of children with severe influenza A(H1N1)pdm09 admitted to paediatric intensive care units in Germany during the first three post-pandemic influenza seasons, 2010/11-2012/13. BMC Infect Dis 2015; 15: 573.
17. Mesman AW, Westerhuis BM, Ten Hulscher HI, et al. Influenza virus A(H1N1)2009 antibody-dependent cellular cytotoxicity in young children prior to the H1N1 pandemic. J Gen Virol 2016; 97: 2157-2165.
18. Bucher J, Boelle PY, Hubert D, et al. Lessons from a French collaborative case-control study in cystic fibrosis patients during the 2009 A/H1N1 influenza pandemy. BMC Infect Dis 2016; 16: 55.
19. Mahmud SM, Emre BS, Hammond G, et al. Did the H1N1 vaccine reduce the risk of admission with influenza and pneumonia during the pandemic? PloS ONE 2015; 10: e0142754.
20. Stiff D, Kumar A, Kissoon N, et al. Potential pediatric intensive care unit demand/capacity mismatch due to novel pH1N1 in Canada. Pediatr Crit Care Med 2011; 12: e51-57.

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