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CASA REPORT

A case of gunshot wound presenting with atypical cardiorespiratory findings

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Abstract:
It is well known that a significant increase has occurred in the incidence of thoracic gunshot wounds in children over the last 15 years. Gunshot wounds have been defined as an "epidemic", "a disease", and "a preventable public health problem" all over the world. Gunshot wounds in children lead to more lethal or morbid outcomes due to the relatively small area in which their vital organs exist. Gunshot wounds are an increasingly more important problem in present communities with both their morbidities leading to significant impairment in quality of life and significant mortality. In this article, a case with various clinical outcomes following a gunshot wound is presented.

Keywords:, gunshot wound, child, heart, lung, tracheotomy
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Introduction

Gunshot wounds may give rise to very different clinical courses ranging from a simple bruising to sudden death as a result of serious neurological damage or hypovolemia due to rupture of a great vessel. Ten to fifteen percent of gunshot wounds in children are thoracic wounds [1-3]. The thorax consists of such vital organs as heart, great vessels, lungs, esophagus, and trachea. Because of this, high level of morbidity-mortality is seen within a few hours following gunshot wound of the thorax [4]. It has been reported that a significant increase in the incidence of thoracic gunshot wounds has occurred in children over the last 15 years and that 77% of homicides during adolescent period is due to the use of firearms. Also, it has been reported from U.S.A. that 90.000 children died of gunshot wounds between 1979 and 2001, about 10 children die of gunshot wounds every day, and rate of firearm deaths among kids under age 15 is almost 12 times higher than in 25 other industrialized countries combined [5]. Psychological and socioeconomic problems during adolescent and childhood period have been implicated for this increase [2, 3, 6]. Despite the increase in the incidence of gunshot wounds and related severe morbidity and mortality, the data is not sufficient in literature. Furthermore, unfortunately no required measures are being taken to prevent

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unregistered use of guns, children recognize and learn to use guns in their early life, and rise in individual armament is increasingly being more dramatic. For this reason, we would like to present a case of gunshot wound presenting with various and atypical clinical findings from time of presentation to the end of follow-up period.

Case Report

A nine-years-old male patient admitted to the hospital with complaint of dyspnea. The patient, who had subjected to gunshot (air gun) wound 4 years ago, had a history of long-term intubation (for 2.5 months) after the injury showing acute and chronic findings of pellets on his organs in the cardiovascular, musculo-skeletal, respiratory and gastrointestinal systems. He also had a history of two abdominal operations due to the complications of the gunshot wound, and often admissions to the emergency departments for receiving inhalation therapies because of respiratory distresses seen in the follow-up period. On his physical examination, respiratory sounds were reduced and widespread sibilant rhonchi were present on the right lower and middle zones. Systolic murmur of 2/6 degree was heard on the mesocardiac center and weakness on the right lower limb on neurological examination was detected (which was a complication of the injury).

The complete blood count, serum transaminase, urea and creatinine levels were all normal and the patient was started on parenteral ceftriaxone treatment upon finding of high levels of acute phase reactants. All the cultures (urine, blood and throat) which were taken to detect the infectious agent were negative. The antibiotic treatment was changed to oral cefixime on day 7 which was stopped on day 14.

Total atelectasis (with bronchiectasis) on the middle and lower lobes of right lung and linear atelectasis on the lower lobe of left lung were seen on thoracic high-resolution computed tomography (HRCT) scanning which was performed to detect the etiology of attacks of respiratory distress (Figure 1). It was observed on ventilation/perfusion scan of the lung that partial perfusion-ventilation defect existed on the right lung and that the left lung was normally ventilating and perfusing. As a result of the tests performed, gastro-esophageal reflux disease, immunodeficiencies, tuberculosis, cystic fibrosis, primary ciliary dyskinesia, and atopic etiologies that might cause bronchiectasis were ruled out. It was considered that recurrent aspirations and infections might be the underlying cause of the respiratory symptoms.

On bronchoscopic examination of the patient, because of the small opening (2 mm) between the vocal cords, the distal part couldn't be seen and the procedure was terminated due to observed inspiratory stridor. Significant stenosis was observed at the glottic and supraglottic level on neck radiography and tomography in the patient with history of long-term intubation (Figures 2 and 3). Montgomery laryngeal stent was inserted to the patient through a tracheotomy by Department of Ear, Nose & Throat.

Ventricular septal defect, mitral regurgitation of second degree and aortic regurgitation of first degree were observed on echocardiogram performed upon finding of murmur. These findings were considered to be secondary to the pellet injuries. Findings consistent with chronic sequel radicular impairment at the level of right L5-S1 were observed on electromyography (EMG) performed upon weakness on the right lower limb. The patient was discharged with enalapril and spironolactone treatment for prophylactic therapy of cardiac failure and nebulized formoterol and budesonid treatment for respiratory symptoms. Three months later, it was learnt that the patient died of sudden respiratory distress while he was being followed at home.

Discussion

Gunshot wounds have been defined as an "epidemic", "a disease", and "a preventable public health problem" all over the world [7]. A significant increase in thoracic injuries and death due to gunshot wounds in children, especially in the big cities, has drawn attention in recent years. UNICEF (The United Nations Children's Fund) has reported that, 300.000 children from 40 countries are under arms [8]. Besides, especially in our country, most households have a gun for purposes of hunting or self-protection. Thus, gunshot wounds originated from accidental causes or homicides are being inevitable. Gunshot wounds in children lead to more lethal or morbid outcomes due to their vital organs of small volume which occupy relatively small area. It was observed in a study carried out in Konya, Turkey that 4.5% of

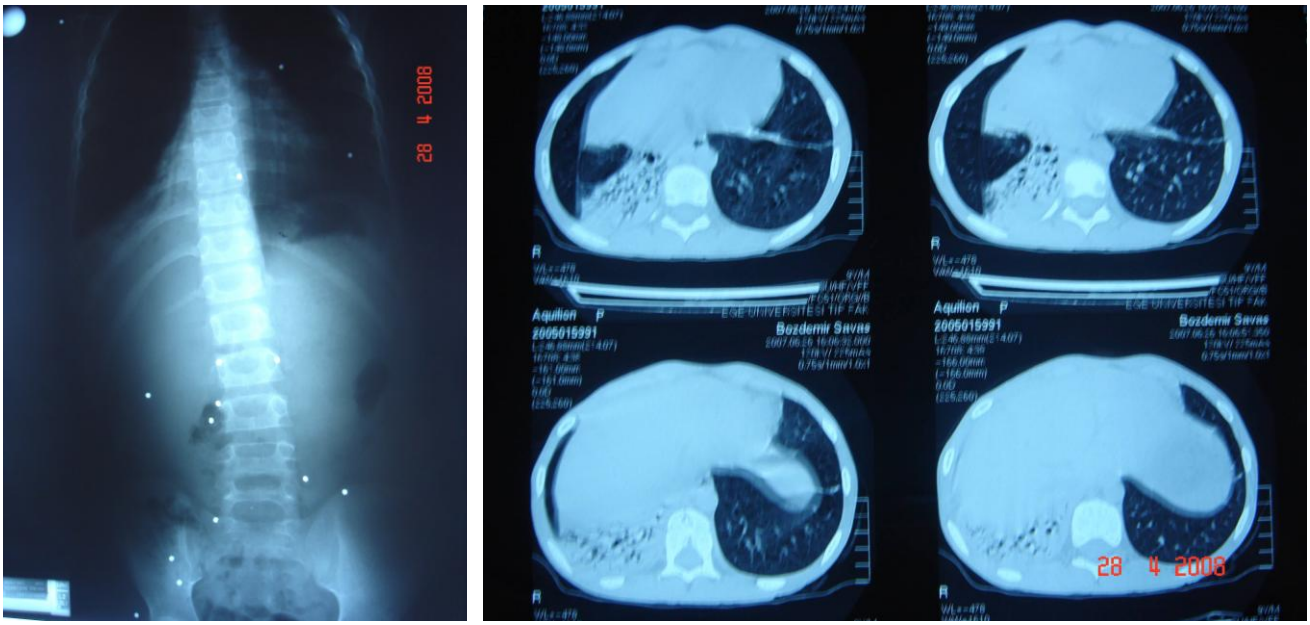

Figure I. Plain abdominal radiography and thoracic tomography of the patient subjected to pellet wound.

all deaths between 0 and 18 years of age during 2001-2006 period was due to gunshot wounds (3% of accidental deaths and 28.6% of homicides) [9].

Penetrating chest traumas following gunshot wounds may lead to events requiring surgical intervention such as pulmonary contusion, pulmonary laseration, hemothorax, pneumothorax, and hemopneumothorax as well as they require medical treatment for their long-term complications. A study reported that

Figure II. Finding of laryngeal stenosis on neck radiography of the patient who had a history of long-term intubation.

16.6% of all cases of gunshot wound had thoracic or pulmonary trauma and 4.5% of the cases had associated trauma in other organs. The same study reported that 47.9% of the subjects developed such complications as bronchopneumonia, atelectasia, pleural effusion, pleural empyema, sepsis, and other complications while in 52.1% of the patients no complications developed [4].

In a study of 110 patients younger than 16 years old developing thoracic trauma due to gunshot wounds between 1987 and 2002 in Dicle University (Diyarbakır, Turkey), it was observed that 65.5% of the patients had pulmonary damage and 34.5% had damage to pleura, chest wall, diaphragm, heart, esophagus, trachea, main bronchus, great vessels, pericardium, and ductus thoracicus. It was reported that thoracic trauma was accompanied by orthopedic, neurological, vascular, and intra-abdominal damage in some patients [1]. Our patient had also damage to nervous, cardiovascular, and gastrointestinal systems in addition to thoracic trauma.

Atelectasia is the most common late complication of gunshot wounds. Other complications include infections, intra-abdominal complications, nervous system complications, empyema, hematoma, orthopedic complications, hemoptysis, adult respiratory distress syndrome, bronchopleural fistula,

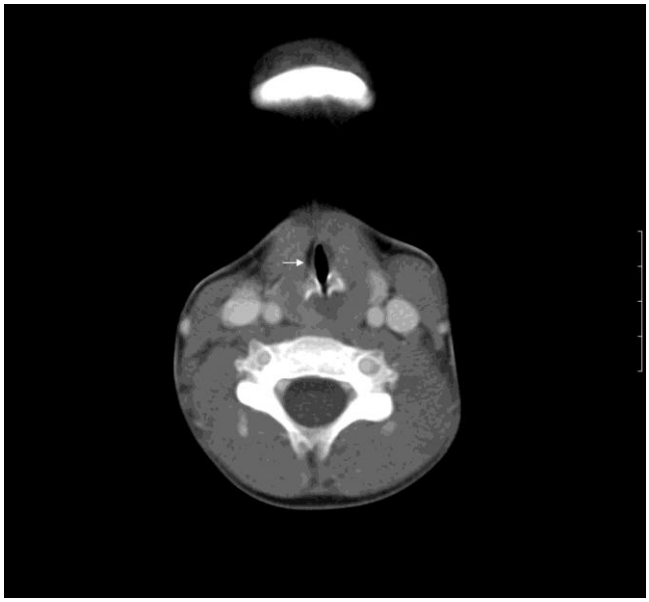

Figure III. Laryngeal air column is observed to narrow at glottis level on the thoracic CT. Luminal diameter was measured to be 3 mm at this level.

acute renal failure, and sepsis. As in the child presented here, the patients surviving the acute effects of the trauma may die of unexpected causes during their follow-up periods due to sequels and long-term effects of the trauma. Mortality rate of the patients subjected to gunshot wounds ranges from 11.8% to 31% in different studies [6, 10].

Gunshot wounds are an increasingly more important problem in present communities with both their morbidities leading to significant impairment in quality of life and significant mortality. Considering that the children will experience psychological problems and conflicts during the late adolescent period during which psychological development of the child accelerates remarkably, service of psychological counseling should be activated and armament of the society and deaths due to gunshot wounds should be reduced.

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