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CASE REPORT

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# A case report of death of an adolascent with pectus carinatum (pigeon breast) deformity due to lighter gas (butane) usage

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**Abstract**

The usage of lighter gas (butane) and similar volatile substances is an important, common and possibly fatal public health problem among young people. A significant proportion of sudden deaths due to volatile substance usage has been reported to be caused by its cardiotoxic effect. Pectus Carinatum; is the deformity of the front chest wall that protrudes forward. While it is mildly prominent at birth, it usually increases with ages (11-15 years). It was aimed to share a case of a 17-year-old male with pigeon breast deformity with literature that his autopsy and toxicological examination showed cause of death as lighter gas inhalation.

**Keywords:** Butane, volatile substance, young adult, sudden death, forensic medicine

## Introduction

The usage of lighter gas (butane) and similar volatile substances is an important, common and possibly fatal public health problem among young people [1,2]. Because of the easiness to access to volatile substances and the simplicity of their usage in everyday life, its use prevalence is increasing [3,4].

Tendencies of social circles, wish to be involved in a group of friends, desire of being accepted, taking someone as role model, socioeconomic and cultural factors, inter-familial and individual psychological problems can be the reasons for the abuse of volatile substances. Also the euphoria, stimulation and pleasure, which is induced shortly after their usage gives the volatile substances a ‘’pleasing’’ quality, is one of the factors that play a role in their increasing frequency of usage [5,6].

Volatile substances can be fatal due to suffocation, parasympathetic inhibition, cardiac arrhythmia, respiratory depression. Also, because of their effects on the state of consciousness they may cause death due to secondary reasons like exposure to trauma. A significant proportion of sudden deaths due to volatile substance usage has been reported to be due to cardiotoxic effects [7-9].

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The lighter gas reduces the rate of oxygen in the environment, prevents sufficient oxygen from reaching the lungs and causes anoxic hypoxia [10]. Therefore, it is more likely that negative effects will be seen in those who have respiratory-related diseases.

Pigeon breast (Pectus Carinatum); is the deformity that the front chest wall protrudes forward. While it is mildly prominent at birth, it usually shows up at advanced ages (11-15 years). With the increase in growth rate in adolescence, the deformity dramatically aggravates. Most of the patients are asymptomatic. No significant pathology is found in pulmonary function tests. In cases accompanied by scoliosis, restrictive type of respiratory dysfunction is detected [11,12]. It was aimed to share with the literature a case of a 17-year-old with pigeon breast deformity that was determined to be died as a result of lighter gas inhalation by autopsy and toxicological examination.

## Case Report

The person who has been reported dead in a construction site was 17 years old male with pigeon breast deformation and his autopsy was performed by our department. Furthermore, it has been learned that his father was a construction worker and he was the fourth child out of five children in a family which has low socio-economical standards and he didn’t attend the school after 7th grade. By crime scene investigation units, it was reported that his body was lying face down at the 2nd floor of three story construction, besides there was no element of a criminal action

at the scene and there was no trace of a struggle of a fight etc. at the particular scene. On deceased's father's testimony, he stated that he didn't know his son was using lighter gas and he might be affected by his peer influence. On examination of deceased; there was yellow serous fluid coming from deceased's nose. Also there was multiple yellow-brown blots on abdominal area and breast's front face. It was seen that deceased's breast structure has an anatomical deformation called "pigeon breast", especially his breast's right side was particularly narrow (figur 1).

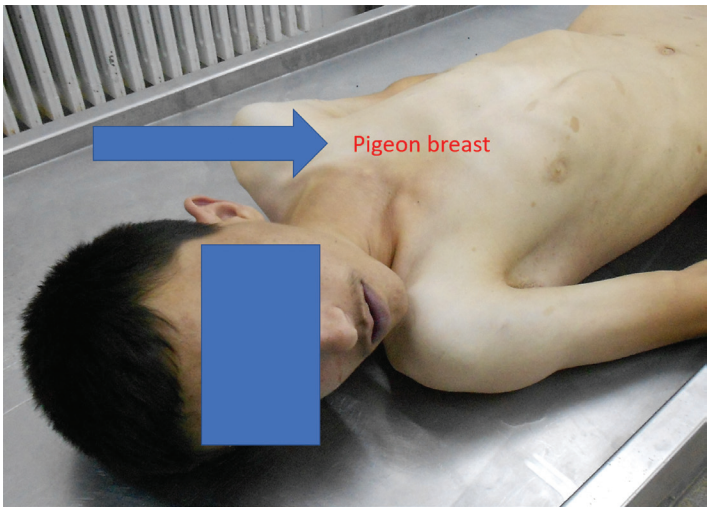


**Figure 1**. Pectus carinatum deformity of the chest

On internal examination, under his scalp, spot bleeds were seen. Also the brain was edematous. There was no macroscopic pathology except a limited number of spot bleedings on brain sections. Afterwards, the breast was opened. In lung sections, there was intra-tissue bleeding locations was seen (figure 2). There was no macroscopic pathology in heart sections. On histopathologic examination, it was reported that there was common atelectasis and intra-alveolar fresh bleeding was seen inside the lungs. After the analysis; in blood, stomach contents and bile, presence of butane was qualitatively detected with HS/GC method. In conclusion; in the light of the autopsy, histopathological and toxicological examination, death was caused by butane (lighter gas) inhalation, consequently there was no external force connected to deceased's death.


**Figure 2**. Lung appearance

## Discussion

Abuse of volatile gases is an important public health problem throughout the world, especially among adolescents and young adults [1,13-15]. In a survey conducted on 20,245 high school students in our country, the rate of individuals who used volatile substances at least once in their lives was found to be 3.8% [16]. Being a child or adolescent, presence of family problems, and low socioeconomic level have been identified as risk factors for volatile substance usage [14,15]. The presenting case is a 17-year-old child with a low socioeconomic level who does not continue his education. It is known from the literature that social circle has an important influence on volatile substance usage [1,13-15,17]. Various factors such as social circle tendencies, taking someone as role model, socioeconomic-cultural factors, familial and individual problems have been reported to be related with abuse of volatile substances by children, adolescents and young adults [4,13,15]. In addition, reflection or direct demonstration of the idea that inhaling volatile substances are "pleasurable" by the means of inducing euphoria, excitation and cheerful behaviors by the media organs increases the curiosity for these substances [1,14,17,18]. It has been reported that common locations for the use of volatile substances are places such as abandoned houses, constructions and train tracks, which are preferred because they are secluded and distant from society [14,15,17]. Likewise, it has been identified that our case used volatile substances with his friends, in a construction.

In a case report presented by Akcan et al., it has been reported that a nineteen-year-old female case was suddenly fainted and died on the road to hospital, after breathing gas from the lighter gas cylinder with his friends. In this case, histopathologic examination revealed lung parenchyma hemorrhage and ischemic heart findings, and no substances were found in toxicological analysis [1]. In the study presented by Tekelioğlu et al. it has been reported that a 19-year-old male case has been found fainted in his room with a lighter gas cylinder by his side, died after hospitalization and 27 days of treatment, and his reason of death was found to be multiorgan failure, hypoxia and acute coronary syndrome [19]. Histopathologic examination of our case revealed intraalveolar fresh bleeding and diffuse atelectasis in the lungs; and presence of butane in blood, stomach contents and bile was detected by toxicological examination with HS/GC method. It is determined that our case was dead at the scene. It was thought that the pigeon breast deformity triggered the asphyxiatic process and accelerated death. Patients who have pigeon breast deformity, suffer from asthma frequently. In a study that covers six hundred ninety-four cases, asthma has been detected in 35 patient (%5,2) [20-22]. In literature; also dyspnea on exertion, getting exhausted quickly, chest pain, frequent respiratory system infections have been seen in children who have pigeon breast deformity. In pulmonary function tests and exercise tests, there are cases which total lung capacity is decreased, residual volume / total lung capacity is normal or increased and exercise tolerance is decreased [23,24].

As a result, we believe that there is not enough interest in volatile substance abuse, which is an increasing public health problem in our country. The possibility to obtain volatile substances legally and easily is an important factor in the prevalence of volatile substance usage in adolescents. In addition, the use of volatile substances is a step in starting to use other narcotics. Additional

regulations regarding the sale and possession of these materials are required. We believe that with educational activities for parents, risk groups and educators, community and individuals should be informed about the possible consequences of abuse, especially those working with children and adolescents should take an active role in this issue.

**Competing interests**
*The authors declare that they have no competing interest.*

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