

Case Report

Autopsy findings and clinical course of severe anorexia nervosa complicated by spontaneous pneumothorax and bullous pulmonary emphysema: a case report

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ABSTRACT

Anorexia nervosa is a severe psychiatric disorder with systemic effects, such as life-threatening pulmonary complications. This case report investigates the pathological anatomy and clinical course of advanced anorexia nervosa complicated by bullous emphysema, spontaneous pneumothorax, and multiorgan failure. A retrospective clinical and autopsy analysis was conducted on a patient with severe anorexia nervosa (BMI 11.8) admitted for the following pulmonary complications: spontaneous pneumothorax and bullous emphysema. Clinical course, surgical interventions, laboratory data, and autopsy findings were reviewed to elaborate on the mechanisms and complications connected to this advanced malnutrition. The patient subsequently developed extensive pulmonary destruction, persistent air leaks, and infections secondary to this condition leading to respiratory failure and sepsis. Multiorgan involvement included myocardial dystrophy, polyfactorial anemia, thrombocytopenia, secondary immunodeficiency, and disseminated intravascular coagulation. Surgical management was complicated by failure of lung reinflation after collapse and progressive respiratory failure regardless of the segmentectomy performed. The progressive course and combined systemic risks illustrated the severity of complications in advanced anorexia nervosa. This case elucidates the multiorgan impact of anorexia nervosa and the challenges encountered in managing complex pulmonary complications and surgical risks. Clinicians should focus on early detection, aggressive primary care with attentive nutritional and infection control, and careful clinical judgment for surgery, when conservative therapy fails.

Keywords: Anorexia nervosa, Bullous emphysema, Spontaneous pneumothorax, Malnutrition, Case report

INTRODUCTION

According to the International Classification of Diseases, 10th revision (ICD-10), anorexia nervosa is a severe mental illness with code F50.0.¹ Its symptoms include self-induced fasting, a significant fear of gaining weight, and a distorted body image.^{2,3} Due to both psychological aspects and severe systemic problems resulting from chronic starvation, it is linked to one of the highest fatality rates among mental diseases. Regardless of the patient's age or physical characteristics, its clinical severity should never

be undervalued, despite the fact that it is frequently thought of as a condition that mostly affects young adults.

Prolonged starvation impairs several organ systems, including the cardiovascular, respiratory, hematological, and immunological systems.^{4,5} Patients with severe anorexia typically present with extreme cachexia, as evidenced by the significantly low body mass index (BMI 11.8) in this case, indicating serious depletion of fat and muscle resources. Severe nutritional deficit can damage

tissue integrity, particularly the lungs, leading to rare but potentially fatal pulmonary complications.⁵

Spontaneous pneumothorax and bullous pulmonary emphysema are rare consequences of advanced anorexia nervosa.^{6,7} These disorders can develop due to weakened alveolar walls, lack of connective tissue support, and increased lung parenchymal fragility. Malnutrition-induced immunosuppression increases susceptibility to infections, including severe pneumonia and sepsis, which can worsen respiratory failure.^{4,8} As demonstrated in this patient, the clinical course can quickly develop into more severe disorders such as acute respiratory distress syndrome (ARDS), multi-organ dysfunction syndrome (MODS), and secondary immunodeficiency.

Importantly, anorexia nervosa should not be dismissed as a harmless or merely psychological disorder. Even in young patients, it can cause catastrophic systemic repercussions affecting numerous organs, including cardiac failure, haematological problems, coagulopathy, and renal impairment.^{4,5,9} Respiratory difficulties, especially in extremely malnourished individuals, necessitate cautious clinical attention because they may appear disproportionate to the patient's age but actually signal advanced underlying illness.

The clinical course and postmortem results of a severely cachectic patient with anorexia nervosa (ICD-10: F50.0), complicated by spontaneous pneumothorax, bullous pulmonary emphysema, and subsequent infections and multi-organ problems, are described in this case study. The purpose of this study is to highlight that individuals who suffer from anorexia nervosa, even though they are frequently young and physically small, are highly susceptible to serious and perhaps fatal illnesses, especially those that affect the respiratory system. By emphasizing the link between extreme malnutrition, lung structural damage, infection susceptibility, and multi-organ failure, this paper emphasizes the necessity of early detection and active care of the consequences. It also seeks to improve clinician awareness that anorexia nervosa should be treated seriously in all settings, particularly when patients present with respiratory or infectious symptoms, which may indicate significant systemic deterioration rather than isolated disease processes.

CASE REPORT

The patient was a 24-year-old male, born on 30 August 1995. He was admitted on 23 December 2019, and died on 14 January 2020. At admission, his height was 189 cm, weight was 42 kg, and body mass index (BMI) was 11.8, indicating severe underweight and cachexia. His relevant medical history included a spontaneous pneumothorax approximately six months prior to admission, which was managed on an outpatient basis. He suffered from severe anorexia nervosa (F50.0), which caused extreme malnutrition and cachexia, an underlying lung disease (bullous pulmonary emphysema), a trophic ulcer (3 cm in

diameter) on the middle third of the left anterior shin, and peripheral edema of the lower extremities. On presentation, the patient was emaciated and cachectic, with chief complaints of right-sided chest pain, shortness of breath upon minimal exertion, and severe general weakness lasting three days. Physical examination revealed pale skin, a clear tongue, vesicular breath sounds on the left with sharply weakened breath sounds and isolated wheezing on the right, rhythmic but muffled heart sounds, blood pressure of 110/70 mmHg, pulse of 68 beats per minute, a soft and non-tender abdomen without hepatosplenomegaly, peripheral edema, and the aforementioned trophic ulcer. A chest radiograph on the day of admission demonstrated a total right-sided pneumothorax, leading to a diagnosis of spontaneous right pneumothorax (J93.1) with cachexia.

Progression of anorexia nervosa (F50.0)

The patient was admitted with severe anorexia nervosa (F50.0) and extreme cachexia, measuring 189 cm and weighing 42 kg (BMI 11.8). He remained emaciated and pale, exhibiting lower extremity edema, a 3 cm ulcer on his left shin, and blisters on both feet. Nutritional support was initiated between 27 December and 30 December 2019, consisting of enteral nutrition (Enterolin 250 ml/day) and parenteral nutrition (Vamin 14 for protein, 10% glucose, and lipids), started at 30% of daily requirements and increased by 10% daily. Anabolic steroid therapy (Retabolil 50 mg intramuscularly) was administered on 27 December, 03 January, and January 10. Laboratory markers of malnutrition included hypoproteinemia, low serum iron levels, and low transferrin levels. Hypoproteinemia was treated with albumin infusions, and iron deficiency was treated with Ferromed. Despite the interventions, anorexia-related complications worsened. The patient had mild anemia at admission, and by 03 January, coagulopathy (INR 2.18) developed. On 10 January, the complications included myocardial dystrophy, severe anemia, thrombocytopenia, and secondary coagulopathy. By 13 January, hypoproteinemia persisted, and secondary immunodeficiency was suspected. On 14 January, the patient's BMI remained at 11.8 with severe agranulocytosis and DIC. Doctors recommended intravenous immunoglobulin therapy, but the nutritional status did not improve, leading to multisystem failure primarily due to anorexia.

Development of spontaneous pneumothorax and bullous pulmonary emphysema

On 23 December 2019, the patient exhibited three days of right-sided chest pain, dyspnea, and severe weakness, with a history of similar issues treated in an outpatient setting six months before. A chest radiograph revealed a right-sided pneumothorax, leading to a diagnosis of J93.1 spontaneous right pneumothorax and cachexia. Thoracentesis and pleural drainage were performed; however, the lung remained significantly collapsed. By 27 December, the patient developed bullous pulmonary

emphysema and mild anemia. Video-assisted thoracic surgery (VATS) was scheduled for 03 January but was postponed due to coagulopathy. Surgery was performed on 06 January 2020, and involved a right mini-thoracotomy and segmentectomy to remove the leaking bullae. The patient experienced respiratory failure, necessitating mechanical ventilation, with multiple extubation and reintubation events from 07-10 January.

On 14 January, the patient was on mechanical ventilation and norepinephrine (0.5 mg/kg/min) for hemodynamic support. Later that day, the patient developed bradycardia and asystole. Resuscitation for 30 min failed, and he was declared biologically dead at 2:21 PM. The final diagnoses included COPD with bullous transformation, status post-thoracotomy and segmentectomy, right pneumothorax, pneumonia, ARDS, sepsis, and multi-organ dysfunction syndrome. Severe anorexia and cachexia were noted, with hematologic and immunologic complications associated with malnutrition and sepsis.

Autopsy findings

The autopsy was conducted with a detailed examination of the major organ systems, concentrating on the pathological results of anorexia nervosa and concomitant pulmonary complications. The following techniques were utilized such as standard gross and histological examination involving comprehensive organ inspection, tissue sampling, and microscopic evaluation. Key autopsy procedures consisted of macroscopic evaluation of internal organs for atrophy and pathological consequences; histological assessment of brain, heart, liver, kidneys, lungs, and pancreas; microbiological and histopathological examination of pulmonary tissue to explore the infectious agents and assessment of pleural cavities and postoperative thoracic sites.

Key findings associated to anorexia nervosa included: severe cachexia with significant emaciation (weight 42 kg, height 189 cm, BMI 11.8); atrophy of multiple organs mainly the myocardium (heart weight 191 g), liver (980 g), and spleen (97 g); hypoproteinemia and secondary immunodeficiency was determined by low serum protein and immunoglobulin levels; severe agranulocytosis, thrombocytopenia, and multifactorial anemia; brain edema and vascular congestion; cardiac findings consisted of myocardial atrophy with lipofuscin inclusions and large focal cardiosclerosis; liver displayed hepatocyte atrophy, congestion, and lymphohistiocytic infiltration; and renal tubular epithelial dystrophy and congestion.

Observations of pulmonary complications included: bullous emphysema with spontaneous pneumothorax on the right, established by histology (Figures 1 and 2); postoperative changes after drainage and right anterolateral thoracotomy with segmentectomy of S1-2 of the right lung; bilateral large-focal polysegmental fibrinous-purulent pneumonia of mixed etiology, comprised of *Pseudomonas aeruginosa*, candidal, and

pneumocystis infections; fibrinous-purulent pleurisy; hydrothorax bilaterally (right 360 ml, left 800 ml); partial collapse of the right lung with current air leakage; and postoperative wound healing accompanied by mixed primary and secondary intention with signs of inflammation with no purulent exudate.

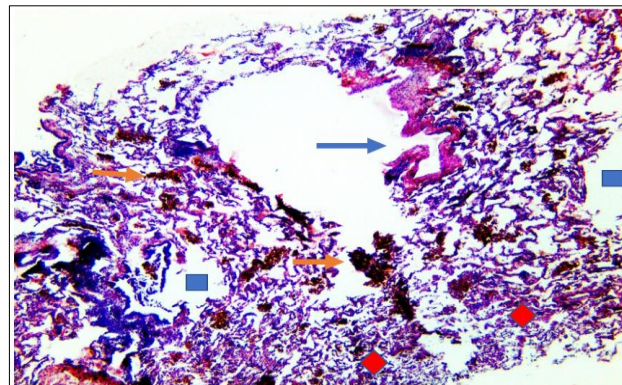


Figure 1: Bullous emphysema, microscopic. Hematoxylin-eosin stain, zoom×40. The histoarchitecture of the lung tissue is disrupted: the alveoli are emphysematously dilated, in some places formed bullae with sclerotic walls. In other areas alveolar walls are thinned and ruptured. In addition, parenchymal collapse and focal hemorrhages are noted as a consequence of pneumothorax.

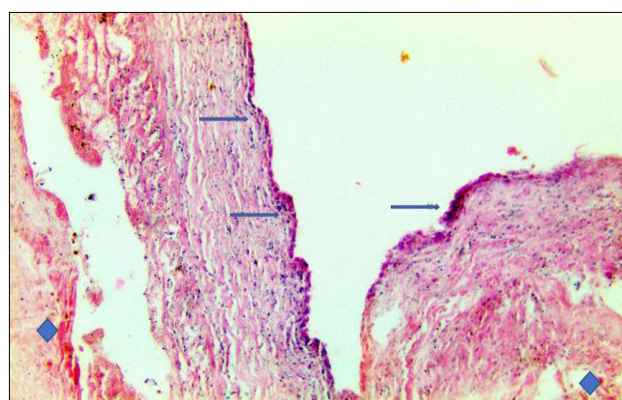


Figure 2: Bullous emphysema (wall of the bulla), microscopic. Hematoxylin-eosin stain, zoom×100. The bulla wall is composed of loose connective tissue with patchy hemorrhages. The mesothelium is hyperplastic over most of its surface.

The autopsy findings depicted the catastrophic consequences of anorexia nervosa, mainly through cachexia and atrophy of multiple organs, supporting the clinical presentation of severe malnutrition with a low BMI (11.8). The myocardial atrophy and cardiosclerosis connected with clinical signs of toxic cardiomyopathy was noticed during hospitalization. Hypoproteinemia and secondary immunodeficiency increased the patient's susceptibility to infections and poor wound healing.

Pulmonary complications were wide-ranging and complex. The bullous emphysema and spontaneous pneumothorax tallied with the patient's respiratory symptoms and radiographic findings. The persistence of air leakage and lung collapse post-thoracotomy highlighted the intensity of pulmonary damage. The development of bilateral fibrinous-purulent pneumonia of mixed etiology corresponds with the clinical decline of the patient noticed by sepsis, ARDS, and MODS.

These pathological findings align with the clinical course, such as repeated respiratory failure demanding mechanical ventilation, persistent infections, and coagulopathy. The severe immunosuppression and hematological anomalies (such as agranulocytosis, thrombocytopenia) likely increase the infectious complications and prolongate the patient's recovery.

In addition, compared to current literature, this case elaborates the extreme nature of systemic consequences for anorexia nervosa worsened by severe pulmonary pathology. Similar reports depicted the high risk of respiratory infections, pneumothorax, and multi-organ dysfunction in severely cachectic patients.¹⁰ The combination of bullous emphysema, spontaneous pneumothorax, and secondary infections highlighted the complex nature in managing these patients and their associated poor prognosis with advanced stage of this disease primarily due to the presence of immunosuppression.

DISCUSSION

This case report highlighted the severe clinical course and multivariable complications related with anorexia nervosa, as demonstrated by the detailed autopsy findings. The patient's significantly low BMI of 11.8 and severe cachexia emphasize the profound deep impact of anorexia nervosa on multiple organ systems. The autopsy and clinical trajectory showed the pathological anatomy underlying critical complications such as bullous emphysema, spontaneous pneumothorax, and extensive pulmonary destruction ultimately resulting in respiratory failure. These findings underline the susceptibility of malnourished patients to pulmonary complications, likely aggravated by the destructive metabolism and immunodeficiency connected with severe anorexia.

The pathological anatomy noticed, such as persistent air leaks, lung collapse, and infections secondary to this cause (right-sided polysegmental pneumonia with destruction, pneumohydrothorax), illustrates the complex nature of managing pulmonary complications in anorexic patients. The progressive course towards sepsis, disseminated intravascular coagulation (DIC), and multiple organ dysfunction syndrome (MODS) indicates the systemic outcomes of long-term malnutrition and critical illness. Additionally, the contribution of myocardial dystrophy, polyfactorial anemia, thrombocytopenia, and secondary immunodeficiency resulted to the poor prognosis and

emphasized the complex nature of anorexia nervosa complications.

Clinically, this case highlighted the significance of early recognition and aggressive management of pulmonary complications in anorexic patients, such as attentive nutritional support, infection control, and careful surgical planning. The failure of lung reinflation after collapse in spite of drainage and the requirement for segmentectomy highlighted the challenges in surgical intervention in this patient population. The persistent air leak and progressive respiratory deterioration regardless of intervention illustrated the conservative management may sometimes be beneficial, or that timing and patient selection for surgery may require careful clinical judgement.

Comparatively, similar case reports demonstrated the high risk of pneumothorax and pulmonary complications in anorexia nervosa, often connected to underlying emphysematous changes and malnutrition caused tissue sensitivity.¹¹⁻¹³ However, this case is significant for the rapid progression to severe respiratory failure and multiorgan complications, which contrasts in comparison to other clinical cases in which patients overcame with intensive nutritional and respiratory assistance.¹⁴⁻¹⁶ The concurrence of severe hematological abnormalities and secondary immunodeficiency further separates this case, illustrating the interconnected risks in advanced stage of anorexia nervosa.

Limitations

As a single case report, the findings are limited in generalizability. The multifactorial association of anorexia nervosa with severe pulmonary complications makes it challenging to separate the etiologic factors and to predict the prognosis in other patients with similar clinical condition.

CONCLUSION

This clinical case illustrated the deep nature of multisystem complications of severe anorexia nervosa, especially the pulmonary destruction and subsequent respiratory failure. Thus, highlighting the challenges encountered in managing complicated pulmonary issues and surgical risks in malnourished patients.

Recommendations

Clinicians should focus on early detection, aggressive primary care with attentive nutritional and infection control, and careful clinical judgment for surgery, when conservative therapy fails. Future studies should focus on prospective studies to investigate the pathophysiology of pulmonary complications in anorexia nervosa and to examine the biomarkers related to poor prognosis. The ethical considerations should be taken to account in reporting autopsy data in order to maintain patient

confidentiality with addition of the educational value of such reports, ensuring respectful presentation of the case.

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