

## CASE REPORT

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# One case report and literature review of arrhythmia caused by pituitrin

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## Abstract

Arrhythmias are perceived as a complication of pituitrin. However, injecting a standard dose of pituitrin via vein causes different arrhythmias. In our case, a 35-year-old female patient was admitted to the hospital due to a productive cough with sputum for 5 days and two occasions of massive hemoptysis. After 1 day of treatment using 500ml normal saline with 10u pituitrin, the sputum was filled with small amounts of kermesinus bloodstains. When pituitrin was stopped without any other treatment, all presenting symptoms gradually subsided after half an hour, and the ECG returned to normal. Therefore, when treating massive hemoptysis by administering pituitrin intravenously, it is necessary to exercise great precaution and therapeutic measures.

## KEYWORDS

arrhythmia, atrioventricular block, hemoptysis, pituitrin, symptoms

## 1 | INTRODUCTION

Pituitrin is derived from the posterior pituitary gland of mammals, such as pigs, cattle, and sheep. Due to its better vasoconstriction ability, pituitrin is usually an effective drug for controlling recurrent hemoptysis (Fletcher et al., 1996). Hemoptysis is a common critical illness seen in emergency departments (Sakr & Dutau, 2010). The predominant causes are lung diseases, such as bronchiectasis, tuberculosis, pneumonia, lung cancer, bronchial vascular malformation, or lung abscess. However, blood system diseases, such as thrombocytopenic purpura, and autoimmunity diseases, such as polyarteritis, Wegener granulomatosis, and cardiovascular disease, can also cause hemoptysis (Sakr & Dutau, 2010). When pituitrin is used to

treat hemoptysis, it is usually administered continuously until the hemoptysis improves. However, when pituitrin accumulates to a certain extent in the body, there are many adverse reactions, such as neurological symptoms including headache, disturbance of consciousness, irritability, and gastrointestinal symptoms, such as nausea and vomiting, loss of appetite, and abdominal pain. It can also lead to myocardial ischemia and arrhythmias, causing symptoms of chest tightness and chest pain (Lin et al., 2017; Wang et al., 2020; Xu et al., 2015). Still, there are fewer reports on bradyarrhythmias, especially those related to atrioventricular block. Herein we report the case of a patient who suffered from bradyarrhythmia, especially related to atrioventricular obstruction caused by pituitrin and investigate the possible pathogenesis.

Xiaohong Cao and Liqin Zheng contributed equally to this study.

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## 2 | CASE REPORT

### 2.1 | Chief complaints

A 35-year-old female patient was admitted due to a productive cough with sputum for 5 days and two occasions of massive hemoptysis.

### 2.2 | History of present illness

The patient was healthy in the past; however, she had a cold for 5 days before admission and began to present cough symptoms. It started with her producing sputum with whitish phlegm, with occasional yellowish phlegm observed. Though antibiotics were prescribed and consumed by the patient, the effect was unsatisfactory. There was an episode of hemoptysis with about 200ml of fresh blood 2 days before admission. The hemostatic drugs did not seem to have any effect on her. The second episode of 150ml fresh blood of hemoptysis was reported the day after the patient was admitted.

### 2.3 | Physical examination

Physical examination showed T: 36.8°C, P: 98bpm, R: 22bpm, BP: 15/10kPa, and the patient was pale looking. A dull sound in her right lower lung with attenuating partial breath was detected, but her left lung was clear. Physical examinations of heart and abdomen were normal.

### 2.4 | Laboratory examinations

Laboratory examination indicated that leucocyte:  $5.7 \times 10^9/L$ , neutrophil: 64.8%, hemoglobin: 92g/L, ESR: 19 mm/h, PCT: 0.425 ng/ml, ECG was normal.

### 2.5 | Imaging examinations

A chest CT scan indicated a high density in her right lower lung. The diagnosis was right lower lung pneumonia.

### 2.6 | Treatment

The patient was prescribed 0.5 g azithromycin and 2.0 g ceftriaxone for anti-phlogosis; she took Yunnan Baiyao and adrenobazone orally and conducted a continuous intravenous drip injecting 8.0 g aminocaproic acid. A bolus of 10u pituitrin in 500ml normal saline was used at 10 drops per minute for hemostasis.

### 2.7 | Control measures

Continual cardiac monitoring could detect and treat arrhythmia and myocardial ischemia in time. If patients are confirmed to have bradycardia while sleeping but return to normal heart rate when awake, there is no need to take special treatments. Adjust drug dosage, when necessary, with close monitoring of vital status. The curative and side effects of pituitrin are related to rate and dosage. However, it depends on the individual, so it is difficult to determine the optimal point of a better curative effect with fewer side effects. Observing any symptoms and adjusting dosage utilizing prophylactic medication accordingly is preferred. While given pituitrin, patients may require atropine and nitrate in accordance with their conditions. When treating symptomatic bradycardia, the half-life of pituitrin is 20min; most patients with arrhythmia could recover by reducing dosage infusion. Symptomatic patients should seek medical treatment immediately.

### 2.8 | Outcome and follow-up

After 1 day of treatment, the sputum was filled with a small amount of *Boletus kermesinus* bloodstain. However, the patient complained of headache and dizziness, which were the possible side effects of pituitrin. The intravenous infusion rate was adjusted to five drops per minute, but the results remained unchanged. The patient complained of palpitations and blacked out; she suffered profuse sweating with glassy eyes, agnosia, epigastric discomfort, nausea and vomiting. Physical examination showed that her neck was soft, heart rate was 70bpm with arrhythmia. An emergency ECG indicated a Wenckebach atrioventricular block, a possible side effect of pituitrin-caused coronary spasm and insufficient blood supply to the heart. Pituitrin was stopped without any other treatment. Finally, all the presenting symptoms gradually subsided after half an hour, and the ECG returned to normal (Figure 1).

## 3 | DISCUSSION

As a 'pharmaceutical hemostat', pituitrin is routinely used for massive hemoptysis and has a significant curative effect on arresting pulmonary bleeding (Sakr & Dutau, 2010). It is used for the treatment of pulmonary hemorrhages. The mechanism of the action is that when the pituitrin is administered intravenously, it can effectively contract the pulmonary blood vessels so that the rupture of the blood vessels in the lungs is minimized. The contraction also reduces the blood flow in the lungs. It lowers the pulmonary circulation pressure, which is beneficial in healing the ruptured blood vessels by forming a stable thrombus to achieve hemostasis and prevent the recurrence of the hemorrhage (Qi, 2018; Zhang, 2016). In Pituitrin, oxytocin could contract the uterine smooth muscle, and vasopressin could contract the small vascular smooth muscle, especially on

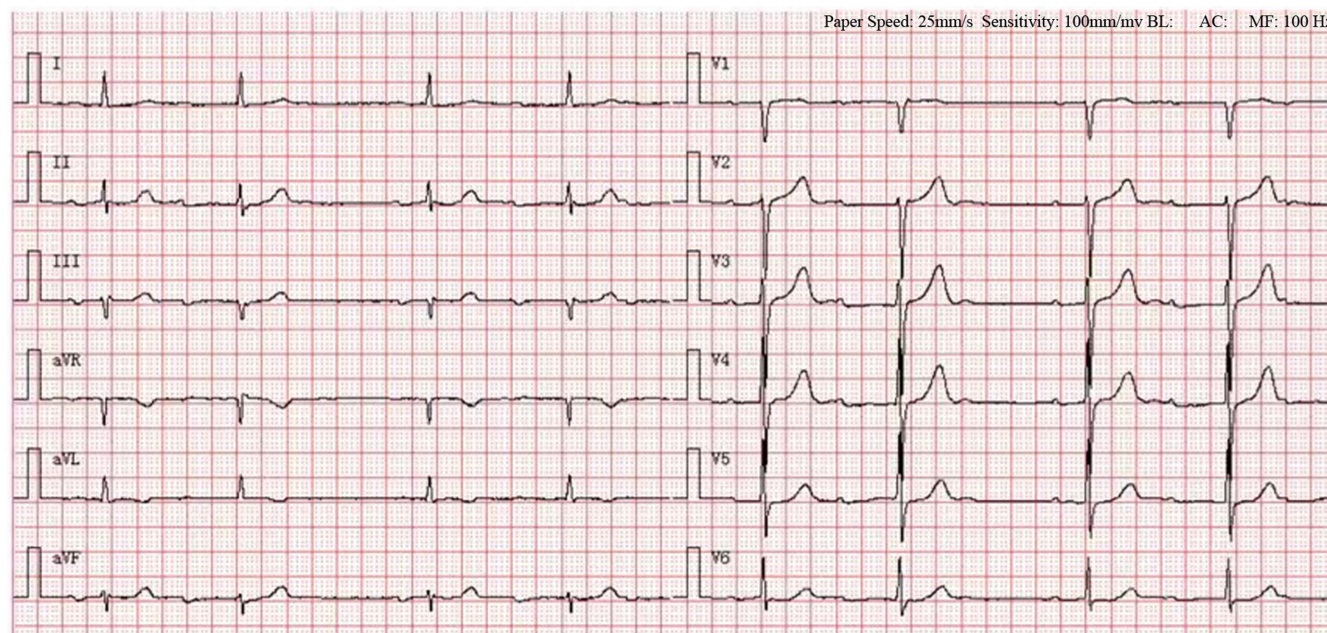


FIGURE 1 All the presenting symptoms gradually subsided after half an hour, and the ECG returned to normal.

the splanchnic vessels. However, the contraction of small vascular smooth muscles is nonselective, which could play a role not only for small pulmonary vessels but also for small vessels in the heart, brain, stomach and intestinal tract. It is contraindicated for patients who have coronary heart disease, hypertension, arteriosclerosis and pulmonary heart disease.

Moreover, pituitrin could stimulate the parasympathetic nerve so that it causes a decreased heart rate, cardiac output and portal venous flow. This could reduce pulmonary circulation pressure and form a clot through the coagulation mechanism of pulmonary vascular disease for hemostasis (Wang et al., 2011; Zhai et al., 2012). However, in treating pulmonary tuberculosis hemoptysis with pituitrin, patients may develop symptoms of chest tightness, elevated blood pressure, palpitations, abdominal pain, dizziness or other adverse reactions and possible side effects.

There were a few reports on bradyarrhythmias caused by the normal dosage of pituitrin. First, pituitrin constricts the coronary artery, which causes a reduced blood supply to the sinoatrial node, atrioventricular node and Purkinje fibers. The excitability and conduction of the heart will be impaired. Second, pituitrin excites the parasympathetic nerve, which is an indirect way to impact the excitability and conduction of the heart. There were reports that pitressin in pituitrin could combine with receptors of the collecting tubules in the kidneys. In this case, it is easier for the drug to accumulate, and side effects become more prominent (Li, 1998). However, studies have also shown that pituitrin (vasopressin and oxytocin) may increase glomerular filtration and not affect renal function (Li, 1998).

The standard dose of pituitrin could cause slow arrhythmias and complicate the state of hemoptysis patients (Song et al., 2021). Previous history of cardiovascular disease should be considered before administering pituitrin. There is a need to explain to the patients

how to look out for possible adverse effects of pituitrin. Besides having cardiac adverse effects, it may also cause local necrosis if the liquid leakage occurs and may contract the smooth muscle in the gastrointestinal tract, leading to gastrointestinal hemorrhage, especially for patients with cirrhosis (Salerno et al., 2007; Wang et al., 2019). Patients will have to be on the lookout for blood in the stools or severe stomach cramps. With the informed knowledge of the possible side effects, patients could then alert the medical team to have the necessary treatment administered in time and effectively prevent these adverse reactions. In addition, it is crucial to adjust the intravenous infusion rate and concentration administered in accordance with the patient's condition. At the same time, the patient could also continue to take the medication to prevent bradyarrhythmias if necessary. If patients have symptoms, clinical personnel should give the necessary treatment in time to prevent them from deteriorating.

## 4 | CONCLUSION

In conclusion, atrioventricular block caused by a normal dose of pituitrin is not commonly seen in clinical practice and rarely reported in previous literatures. More attention should be paid to prevent this side effect when using pituitrin to treat patients with massive hemoptysis.

## AUTHOR CONTRIBUTION

CXH and ZLQ conceived of the study. SXZ and WMJ participated in its design and data analysis. AZY and HXY was responsible for statistics analysis. CXH, ZLQ and BLX supervised the manuscript. All authors helped to draft the manuscript. All authors read and approved the final manuscript.

## CONFLICT OF INTEREST

All of the authors had no any personal, financial, commercial, or academic conflicts of interest separately.

## DATA AVAILABILITY STATEMENT

All data generated or analyzed during this study are included in this published article

## ETHICAL APPROVAL

This study was conducted in accordance with the Declaration of Helsinki and approved by the ethics committee of Fenyang Hospital of Shanxi Province.

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