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Myocardial infarction or a foreign body in the airways? Case study

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ABSTRACT
According to the European Society of Cardiology (ESC) and its 2018 IV universal definition of myocardial infarction, this pathology is not only the result of atherothrombotic coronary artery disease (CAD) but also extracardiac causes – such as type II, where the cause is a pathophysiological mechanism leading to ischemic myocardial damage in a situation of imbalance between oxygen supply and myocardial oxygen demand. As acute chest pain (ACP) is a common reason for emergency department (ED) visits, it is important to remember that it involves a wide range of both cardiovascular and non-cardiac causes. This case report describes a diagnostic challenge involving a 67-year-old patient presenting with dyspnea and acute chest pain, initially diagnosed with ST-elevation myocardial infarction (STEMI).
The patient, with a history of laryngeal cancer treated with total laryngectomy and tracheostomy, was admitted with experiencing dyspnea, chest pain, and electrocardiogram (ECG) artifacts. Imaging and clinical findings suggested moderate pulmonary congestion, while laboratory tests showed elevated troponin and d-dimer levels. An otolaryngologist (ENT) consultation revealed tracheal obstruction caused by dried blood clots, leading to periodic airway obstruction. Removing the clots significantly improved the patient's condition.
Coronary angiography did not reveal significant coronary artery stenosis, indicate myocardial infarction as the cause of symptoms. The clinical implications of this case include focusing the interview on tracheostomy tube care in the prehospital setting. They may also aid in decision-making regarding the type of hospital to which the patient should be transported – ideally, it should have both cardiology and otolaryngology facilities. However, in the hospital setting, in similar cases, the diagnosis of chest pain in patients with a tracheostomy tube should also include otolaryngology consultation, especially if the self-observation of the tube raises doubts about its patency.
Keywords: foreign body; airways; obstruction; chest pain; dyspnea; STEMI.

INTRODUCTION

Acute pain in the chest is frequently defined as a anterior or posterior chest discomfort occurring within the past 24 h. It comprises about 10% of all emergency departments (ED) admissions and constitutes the second most frequent reason of non-trauma-related visits at hospital ED [1, 2]. Although, often suggestive of an acute coronary incident, its etiology is sometimes non-cardiological causes – gastroenterological, pulmonary and osteoarticular. About half of the patients do not require hospitalization, and only 2–3% present symptoms of acute cardiovascular syndrome. In 25% an acute coronary incident is diagnosed, including unstable angina or myocardial infarction. [1]. However, symptoms of acute chest pain (ACP) accompanied by increasing cardiorespiratory insufficiency and which resemble angina pain may also depict myocardial infarction – according to the European Society of Cardiology (ESC) and its Fourth Universal Definition of Myocardial Infarction, type II where the cause is a pathophysiological mechanism leading to ischemic damage to the myocardium in a situation of imbalance between oxygen supply and oxygen demand of the myocardium [3]. Quite often associated with the presence of a foreign body in the airway [4, 5, 6].

Foreign body aspiration mainly affects children and adults over the age 60 with primary neurological disorders (stroke, Parkinson's disease, brain tumors, seizures) or after medical procedures such as intubation or tracheotomy. Alcohol and psychoactive drugs also increase the risk [6, 7].

Most commonly aspirated are fishbones, food fragments, teeth or prosthetic elements, usually localized in the right bronchus, due to its anatomy [7,8].

The aim of this study is to point out the diagnostic difficulties in differentiating chest pain and to emphasize the importance of a comprehensive approach to the patient – exemplified by a case report in which symptoms mimicked a myocardial infarction, and the cause turned out to be aspiration of bronchial tree secretions.

METHODOLOGY

The research was conducted from July to September 2024, according to the regulation of The Declaration of Helsinki. It was approved by the Management Board of the University Clinical Hospital no DO.075.17.2024 dated on 5th July 2024. The patient's history, including the medical rescue intervention

card (KMCR in Polish), descriptive data of the hospitalization, specialist's consultation documents and laboratory tests were precisely analysed according to the case study method. Unfortunately, it was not possible to access images of electrocardiographic recording, which could limit the transparency and completeness of case documentation, thereby reducing the ability of other investigators to independently evaluate and compare electrocardiogram (ECG) recordings.

CASE DESCRIPTION

A 67-year-old male was brought to the ED by a medical rescue team with a preliminary diagnosis of acute myocardial infarction of the cardiac inferior wall (STEMI).

According to the prehospital report, the call was initiated due to dyspnoea and abnormal breathing in a patient with a history of laryngeal cancer. On scene, the patient reported sudden chest pain, fainting, and shortness of breath. The patient seemed anxious.

Physical examination disclosed livedo reticularis (purplish skin), skin humidity within normal limits, on auscultation wheezing superior to the pulmonary area, and clear heart sounds. Vital signs recorded on scene: BP 155/92 mmHg, HR 140 bpm, RR 50/min, SpO_2 86%, Glasgow Coma Scale (GCS) 15, glycemia 123 mg%. Electrocardiogram demonstrated inferior wall ST-elevation. The rescue team administered oxygen therapy via tracheostomy tube, morphine 10 mg IV, diazepam 5 mg IV, and heparin 5000 IU IV.

Past medical history included total laryngectomy with bilateral lymph node dissection for laryngeal carcinoma 6 years earlier and post-traumatic intracranial bleeding after a car accident 4 months before admission. The patient was a long-term smoker, with no known allergies. On ED he was psychomotorically overactive and non-cooperative. Communication was limited due to the tracheostomy tube; the patient used gestures indicating dyspnoea and chest/abdominal pain.

The tracheostomy was poorly maintained tied with a shoelace and lacking inner cannula. Physical examination revealed tachypnoea, sinus tachycardia, and generalized abdominal tenderness. Vital signs: BP 148/97 mmHg, HR 128 bpm, SpO_2 98% on oxygen.

Electrocardiogram interpretation was difficult due to motion artifacts but confirmed sinus tachycardia and ST-elevation in inferior leads. Echocardiography revealed normal chamber size and preserved ventricular function: "The heart cavities not enlarged, left ventricle (LV) and right ventricle (RV) functions maintained, AcT 140 ms, the vena cava with normal respiratory variation, no fluid in the pericardium".

Chest X-ray showed tracheostomy tube in place, no cardiomegaly, and moderate pulmonary congestion. Abdominal ultrasound was nondiagnostic due to gas but excluded free fluid or major organ enlargement. The liver, pancreas, appendix and other structures were without abnormalities. The abdominal aorta partially visible – in the visible range not widened, with atherosclerotic plaques.

Computed tomography of the head revealed only chronic vascular changes, consistent with prior trauma. Laboratory tests showed elevated troponin (213.8 → 632 ng/L), increased CK-MB (10.33 → 16.97), CRP 29.6 mg/L, hyponatremia (Na 129 mmol/L), D-dimers 1676 ng/mL, and prolonged activated partial thromboplastin time (>220 s). The results of the rest laboratory test and blood gases are presented in tables 1 and 2. Due to the dyspnoea, the respiratory tract swab was taken for COMBO examination to detect SarsCoV-2, influenza A and B or RSV. The result was negative.

While waiting for the laboratory test results, the patient displayed intermittent breathing difficulties and agitation. Laryngological consultation with fiberoscopy was performed, revealing airway obstruction by blood clots. Using forceps, a 3 cm clot ("stub") was removed from the trachea and right bronchus (Figs. 1–3), restoring airway patency.

TABLE 1. Venous blood test results

Test		Norm	Results	Results after 3 h
Biochemistry	ALAT	<41	27	
	AMYL	28–100	69	
	BIL T	0.2–1.2	0.61	
	CKMB	<6.22	10.33	16.97
	CRP	<5	29.58	
	HDL	>55	54.6	
	Mg	1.6–2.6	1.63	
	UREA	16–48	34.6	
	ETHANOL		0.02	
	ALP	40–129	54	
	GLUC	82–115	175	
	Na	135–150	129	
	K	3.5–5	3.66	
	Cl	98–108	90	
	CREA	0.7–1.2	1.06	
	LIPAZA	13–60	47	
	PBNP	<879	885.1	
	Troponin		213.8	632
Coagulation	DDIMER	<500	1676	
	APTT	25–36	>220 s	
	PT	10.5–13	12.5	
	INR	0.8–1.2	1.12	

Test		Norm	Results	Results after 3 h
Morphology	WBC	4–10	11.33	
	IG%	<1	0.4	
	NE%	37–70	84.4	
	LY%	20–45	6.4	
	MO%	1–10	8.6	
	EO%	1–5	0.0	
	BA%	<1	0.2	
	IG#	<0.1	0.05	
	NE#	1.5–5.5	9.56	
	LY#	1–4.5	0.72	
	MO#	0.03–1	0.98	
	EO#	<0.5	0.0	
	BA#	0.02–0.1	0.02	
	RBC	4.1–5.9	5.11	
	Hgb	13–17.5	16.1	
	Hct	39–53	45.4	
	MCV	80–95	88.8	
	MCH	27–33	31.5	
	RDW–CV	11–15	12.8	
	RDW–SD	36.3–47.3	41.5	
	NRBC%	<0.026	0.0	
	PLT	150–380	272	
	MPV	9.2–12.2	10.4	
	NRBC	<0.014	0.0	
	PCT	0.19–0.36	0.28	

Following clot removal, the patient's respiration normalized, oxygen saturation improved, and he became calm and cooperative. Subsequent ECG showed improvement with residual minor ST elevation. The laboratory tests showed higher level of cardio-necrotic enzymes (Tab. 1). Coronary angiography revealed no significant coronary artery stenosis: "The left coronary artery (LM) with no narrowing, the left anterior descending artery branch without narrowing, the DI branch without narrowing, the Cx branch without narrowing and the OM branch without narrowing. The right coronary artery narrowed to 50% in segment 1 (type B1)".

The patient was transferred from the hemodynamic department to the cardiological unit, where the the patient's cardiac enzymes decreased, and echocardiography confirmed preserved LV function: "The heart cavities proved not to be enlarged, the LV overgrown with the MWT of 1.5 cm, without regional wall motion abnormalities, the left ventricular ejection fraction (LVEF) preserved, without valve defects". During further hospitalization, recurrent airway obstruction due to mobile clots was managed successfully with repeated bronchoscopic removal. Due to the improvement of the patient's cardiac condition, he was transferred to the laryngolog department for further observation and airway care on the second day of hospitalization.

TABLE 2. Venous blood gases

Parameter	Result on admission in ED		Norm
Gasometry values			
pH	7.278		7.320–7.430
pCO_2	58.3	mmHg	40.0–60.0
pO_2	34.6	mmHg	
Oximetry values			
ctHb	16.1	g/dL	13.6–16.6
Hct.c	49.4	%	40.0–54.0
sO_2	59.4	%	70.0–80.0
FO2Hb	58.3	%	–
FCOHb	1.5	%	0.5–1.5
FHHb	39.9	%	–
FMetHb	0.3	%	0.0–1.5
Electrolyte values			
cK^+	3.8	mmol/L	3.4–4.5
cNa^+	132	mmol/L	136–146
cCa^{2+}	1.12	mmol/L	1.16–1.29
cCa^{2+}(7,4).c	1.05	mmol/L	–
CCl-	92	mmol/L	103–111
An-Gap.c	12.7	mmol/L	6.0–16.0
mOsm.c	274.7	mmol/kg	285.0–295.0
Metabolite values			
cGlu	182	mg/dL	70–99
cLac	2.5	mmol/L	0.5–1.6
ctBil	0.0	mg/dL	0.0–2.0
Oxygenation status			
ct02, c	13.2	Vol%	–
p50, c	30.09	mmHg	25.00–31.00
pO2(a)/ FO2(1).c	165	mmHg	–
FShunt, e	60.3	%	
Acid-based balance status			
ABE.c	–1.0	mmol/L	–
SBE.c	0.5	mmol/L	–
$CHCO^{3-}$ (P, st), c	22.6	mmol/L	20.0–28.0
$CHCO^{3-}$ (P).c	27.3	mmol/L	–

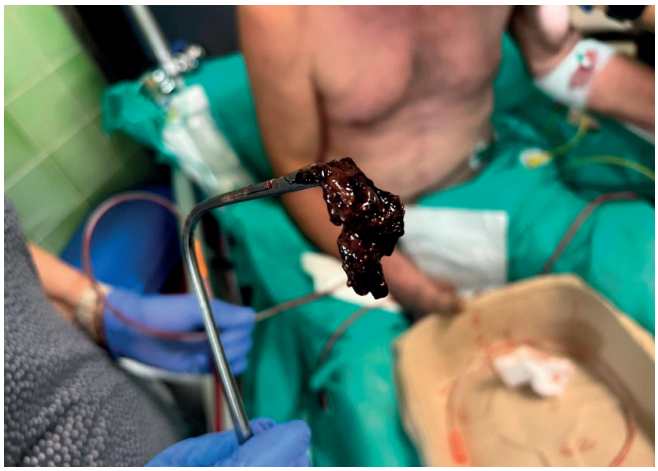

FIGURE 1. First "stub"

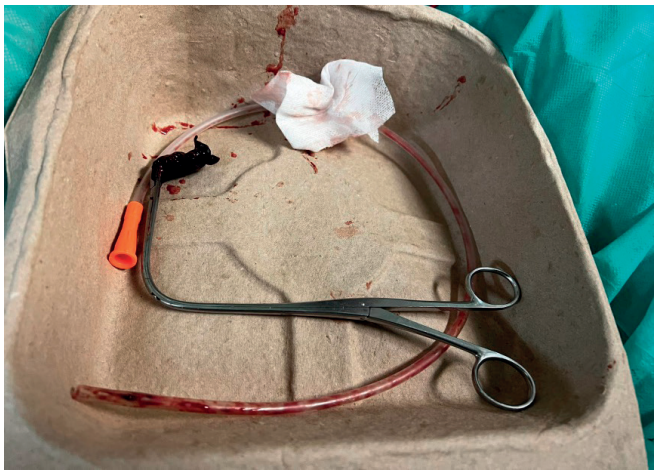

FIGURE 2. Size of the first "stub"

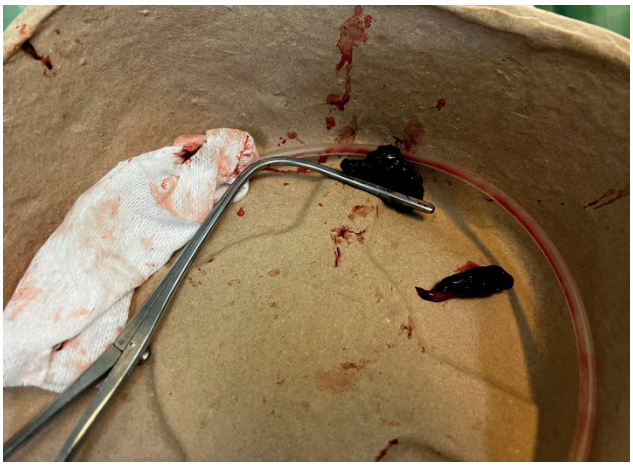

FIGURE 3. Second "stub"

DISCUSSION

Foreign bodies in the respiratory tract are rare in adults, and the incidence increases after age 60 [9, 10]. The obstruction of a foreign body causes approx. 250 deaths annually in Great Britain [11] and 5,200 in the USA [12]. It is, however, one of the most common causes of deaths in Japan [13]. Major risk factors for aspiration include old age, neurological diseases, epileptic seizures and use of psychoactive drugs [14].

Chest pain, which is the second most common reason of ED visits [15], does not always have a cardiac background and may accompany foreign body aspiration. In the absence of changes in ECG and cardiac markers, esophageal or airway pathologies should be considered [2]. Salma et al. described a 40-year-old female with chest pain and dyspnea whose CT scan showed a bone fragment in the right bronchus [16]. After bronchoscopic removal and antibiotic therapy, a full recovery was achieved. A similar course was described by Ha and Jeong in a 77-year-old man with pneumothorax and a pea in the right bronchus [17], and the authors of a Chinese report in which a 58-year-old patient with chronic cough and fever had a pepper grain in the bronchus [6]. Di Marco Berardino et al. presented the case of a 59-year-old female with shortness of breath and chest pain, in whom only a thoracotomy revealed a toothpick fragment [4]. Also, Risal et al. described a 51-year-old man with recurrent chest pain and cough, in whom bronchoscopy revealed 3 drug sacs in the left bronchus [7]. These cases demonstrate that aspiration symptoms can mimic cardiac disease.

Indian studies described, among others, a 43-year-old female with a fishbone migrating into the thyroid gland and a patient with an esophageal perforation caused by ingestion of a prosthesis [18]. This indicates a wide clinical spectrum of aspiration, ranging from cough and hemoptysis to inflammation or lung abscess [6]. It should, however, be remembered that they may be different in different patients depending on the mass of the foreign body and its location [19], patient's age or their clinical condition [20].

In 60–100% of cases, as in the patient in the present description, foreign bodies are successfully removed bronchoscopically [21], which is necessary in 10–20% of patients [22]. The most common include food fragments, chicken bones, fishbones, fruit stones, coins, bezoars, teeth and drugs [23]. However, there have been no reported cases in the literature of a "plugs" of secretion from the bronchial tree mimicking a myocardial infarction, as in the patient described, making this report unique.

CONCLUSIONS

Initial examination according to the ABC procedure and a proper assessment of airway patency could have changed the initial diagnosis and subsequent management, especially that reason of call did not embrace chest pain.

Due to communication difficulties the interview required precision and holistic approach, without focusing on single symptom. The patient's poor hygienic condition, prevented proper assessment and care of the tracheostomy tube.

Electrocardiogram changes are not always indicative of cardiac pathologies, as emphasized by the ESC in the Fourth

Universal Definition of Myocardial Infarction. Thus, management should be based on clinical evaluation, supported by, but not limited to, test results.

This case highlights the importance of cooperation of the entire treatment team and the need to take into account airway patency and ENT consultation in similar situations. In prehospital practice, the history should include an assessment of tracheostomy tube care, and patients with suspected chest pain and a tracheostomy should go to centers with access to both a cardiologist and an otolaryngologist.

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