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Proceedings of an emergency medical team (paramedics) with a patient in anaphylaxis

Magdalena Babuska Rocznik¹, Magdalena Wojtanowska Kaczka¹, Oliwer Racz²,
Hubert Marek¹, Krzysztof Sośnicki¹, Wojciech Rocznik¹

¹ The Jan Grodek State University in Sanok, Medical Institute, Sanok, Poland

² University of Pavol Jozef Safarik Kosice, Kosice, Slovakia

ABSTRACT

Introduction: Anaphylactic shock is an acute allergic body reaction to allergens. This condition threatens the patient's life and health. Anaphylaxis can be caused by intolerance to many nutrients, medications or hymenoptera stings.

Aim of the manuscript: The aim of the manuscript was to determine the pattern of proceedings of emergency medical teams with patients in anaphylactic shock.

Material and methods: The individual case method of a patient stung by a Hymenoptera insect, for whom a medical rescue team was dispatched, was used. The research material was obtained thanks to the analysis of medical rescue operations and dispatch orders.

Results: The analysis of medical records of the injured person depicted an appropriate algorithm of proceedings with a patient in anaphylactic shock. In anaphylaxis, it is important

to gather information as soon as possible, make an accurate and prompt diagnosis, and provide immediate pharmacotherapy. In this case, the first-line drug is Adrenaline, which prevents the release of histamine and reverses the effects of shock. Further treatment requires oxygen, fluids and second-line pharmacotherapy.

Conclusions: The emergency medical team followed the applicable algorithms and current knowledge. It implemented appropriate medical rescue operations, thanks to which the condition of the injured was stabilized. The first step is to stop the exposure to the allergen.

Key words: anaphylaxis, shock, emergency medical team, rescue procedure.

INTRODUCTION

Anaphylactic shock is an acute allergic body reaction to allergens caused by the release of large amounts of histamine, which results in cardiovascular and respiratory disorders in the form of tachycardia, tachypnoe, hypotension, hypoxemia and angioedema. Other symptoms associated with hypersensitivity reactions are also skin lesions in the form of urticaria and/or rashes, shortness of breath, mucosal hyperemia and peripheral perfusion disorders [1]. Symptoms of anaphylaxis appear immediately after exposure and progress quickly. This condition threatens the patient's life and health. Anaphylaxis can be caused by intolerance to many nutrients, medications or hymenoptera stings.

The severity of acute anaphylactic reactions is seasonal. An increased number is recorded during spring and summer. Half of anaphylactic reactions are caused by Hymenoptera stings, which include two families: Apidae - bees and bumblebees, and Vespidae - wasps and hornets. Women show a greater predisposition to acute anaphylactic reactions. Mortality as a result of anaphylactic reactions compared to cardiovascular diseases, neurological diseases and injuries is much lower [3].

Depending on the causative agent of an acute allergic reaction, exposure should be immediately stopped. In the case of anaphylactic reactions due to stings, the local reaction is limited to the sting site and most often occurs in the form of painful swelling with redness. What is more, there may be a feeling of itching and/or burning.

The classification of the symptoms of general anaphylactic reactions after Hymenoptera stings is as follows:

- *Mild form*: skin redness, itching, rash, swelling, runny nose, vomiting;
- *Moderate form*: bronchospasm: asthma, vascular oedema and abdominal pain;
- *Severe form*: respiratory disorders - laryngeal oedema/asthma attack, hypotension, loss of consciousness [4].

The therapeutic process in a person who has an anaphylactic shock after a Hymenoptera sting is based on the VIP treatment scheme [4, 5]. Proceedings with the injured party in accordance with the VIP scheme include:

Tab. IVIP scheme

V (Ventilate)	Patency of airways	<ul style="list-style-type: none"> • Instrumental and non-instrumental patency of the upper respiratory tract, • Oxygen therapy
I (Infusate)	Plynoterpiav	<ul style="list-style-type: none"> • Getting intravenous, central access, • Administration of crystalloids and colloids
P (Pressure support)	Maintenance of valid CTK values	<ul style="list-style-type: none"> • Administration of adrenaline and/or other pressures

Source: Own study based on [4]

The scheme should be used immediately after the first symptoms, in particular, in people who have an allergic history and have experienced episodes of severe anaphylactic reactions.

AIM OF THE MANUSCRIPT

The aim of the manuscript was to determine the pattern of proceedings of emergency medical teams with patients in anaphylactic shock.

MATERIAL AND METHODS

The individual case method of a patient stung by a Hymenoptera insect, for whom a medical rescue team was dispatched, was used. The research material was obtained thanks to the analysis of medical rescue operations and dispatch orders.

CASE REPORT

July 2018, 11.42 AM

A notification of a 32-year-old man was sent to the Emergency Notification Centre in Sanok. Dispatch interview: bee or wasp sting during gardening. Party calling for help: a family member who was also a witness to the incident.

A "P" (basic) emergency medical team was dispatched to the injured party in the "K1" urgency code - using light and sound signals. The team's travel time to the place of the accident was 6 minutes.

At the scene of the accident, rescuers found the victim sitting on the garden lawn. The man was conscious, very nervous. He was oriented as to place and time. He hardly answered the questions. On the GCS scale - 15 points.

Upon physical examination, feeling short of breath, redness and itching of the skin. Increasing swelling of the lips and tongue (Quincke's oedema). Pain at the sting area. No drug allergies. The man did not take any medicines permanently. No chronic diseases. Last meal at 8:00 AM. The injured informed that while pruning roses he felt an insect sting on his neck. Most likely a bee or a wasp.

In physical examination, the respiratory tract at risk (increasing swelling). Breath: 29/min. Auscultatory - normal and bilateral alveolar murmur, light inspiratory stridor slightly heard. Visible features of breathing effort. SpO₂: 92%. Active work of additional respiratory muscles. Chest symmetrically rising. CTK: 80/60 mmHg. Heart sounds clear, loud, HR: 120 beats/minute. No peripheral cyanosis. Pale and sweaty skin. Skin changes visible in the form of urticaria on the neck. A sting was visible at the sting site.

Rescue diagnosis: anaphylactic shock.

The team leader decided to undertake medical emergency services at the scene. Allergen exposure was discontinued - the sting was removed. Passive oxygen therapy was implemented on a facial mask with oxygen (flow rate 15 l/min). Pharmacotherapy was implemented: Adrenaline 0.5 mg i.m., 2 peripheral punctures (2 x G18) were obtained. Liquid therapy with Sol started. Ringeri 500 ml i.v. in rapid flow. Corhydron 200 mg i.v., Clemastinum 2 mg i.v.

The injured was transported to the nearest E.R.

During transport to hospital, vital signs of the injured were reassessed. ECG was monitored. Fluid flow was controlled. More Sol fluids were transfused. Ringeri 500 ml i.v. After the pharmacological steps implemented, the injured person's condition improved:

- Airways patent,
- breath 22/min.,
- SpO₂: 95%.

- CTK: 120/75 mmHg.
- in 12-lead ECG - accelerated sinus rhythm, steady-state,
- HR: 100 u/min.
- GCS 15 points.

The injured person was transported to the medical personnel of the Emergency Room.

DISCUSSION

An acute anaphylactic reaction occurs with many somatic symptoms, leading to anaphylactic shock, which is a life-threatening condition. The implementation of the correct rescue procedure is to prevent decompensation of the patient's condition, thereby eliminating the threat [4, 6].

The correct diagnosis of an acute allergic reaction is not only based on somatic symptoms. An important role is also played by the interview, which is extremely helpful and automatically suggests which appropriate medical steps should be undertaken. A diagnosis of an allergic reaction is highly likely if the patient's body, after exposure to a triggering factor, reacts suddenly with skin changes as well as respiratory and circulatory symptoms [4, 7, 8].

The proceedings of the Emergency Medical Team, dispatched to the patient who had been stung by Hymenoptera insects, focuses mainly on symptomatic treatment, but also on preventing the recurrence of an allergic reaction.

In accordance with current EMT procedures, an incident and safety assessment is in accordance with the so-called 'First five', i.e. own safety, safety of the incident site, number of victims, mechanism of injury, as well as strength and resources. Without meeting the first two conditions, the EMT cannot risk its own safety and it is necessary to call the Fire Brigade.

If the place of the accident is safe and the rescuers are not in danger posed by the surroundings, the EMT commences medical emergency operations [3, 9].

Examination of the injured person according to the ABCDE pattern allows noticing all the symptoms resulting from the pathomechanism of allergic reaction and adequate implementation of medical rescue operations.

An accurate conduct of the ABCDE examination is crucial for patients in anaphylactic shock, as it is often difficult or even impossible to collect the SAMPLE interview due to the patient's condition.

In a patient with an anaphylactic reaction, the following symptoms of various systems will appear in a short time.

Upper airway obstruction:

- Swelling of the airways at the throat and tongue levels (Quincke's oedema),
- Hoarseness,
- Stridor.

Airway disorders:

- Dyspnoea,
- Tachypnea,
- Stridor,
- Activation of additional respiratory muscles,
- Hypoxia,
- Cyanosis,
- Respiratory arrest.

Circulatory system disorders:

- Decompensation - pale, sweaty skin,
- Tachycardia,
- Hypotension (with syncope)
- Disorders of consciousness/loss of consciousness,
- Ischemic changes in 12-lead ECG,
- Cardiac arrest [3, 5].

Skin and mucosal lesions should be checked at the "exposure" stage in the ABCDE test. They are often the first symptom of an allergic reaction [6]. They can appear in extreme forms: mild skin lesions or severe. They appear on the skin and on mucous membranes as erythema, urticaria or red skin rash. Urticaria-like angioedema, involving deeper tissues around the eyelids, lips, mouth and throat, may increase. If the above-mentioned skin changes occur and are not accompanied by respiratory and circulatory symptoms, it is not a health and life threatening condition for the patient [5].

Correct differentiation of symptoms and their causes is important. Symptoms are not always explicit, and may also indicate other diseases. A thorough examination in the ABCDE pattern allows diversifying the symptoms and choosing the right course of action [3, 10].

Securing the patency of the upper respiratory tract is a priority for the EMT. In anaphylactic shock, the best method to provide patency is endotracheal intubation, which in rapidly progressing oedema may prove very difficult or even impossible. Moreover, for Basic Medical Emergency Teams, endotracheal intubation is only possible in cardiac arrest. The instrumental patency of the upper airways by oropharyngeal tube, or a supraglottic system, e.g. I-gel, LT or LMA tube, requires deep sedation of the patient, but in case of failure, the only remaining option is cricothyrotomy. Unfortunately, none of these solutions is not without flaws because either they do not fully protect the patency or the paramedics' poor experience in cricothyrotomy is not a guarantee of its efficient performance. Therefore, the basic priority of the MET is to prevent obstruction of the upper respiratory tract, which prevents gas exchange.

For a stung person who experiences generalized symptoms, it is necessary to implement a VIP scheme and pharmacotherapy:

- Oxygen therapy (V),
- Liquid therapy (I),
- Pressors: Adrenaline 0.5 mg i.m (P),
- Glucocorticoids: Hydrocortisone 100 - 200 mg i.v,
- Antihistamines: Cllemastine 2mg i.v/i.m [7, 10, 11].

An alternative route of adrenaline administration for severe anaphylaxis is nebulization. This way, adrenaline acts locally on the mucosa to reduce swelling. Additionally, it has relaxant effects in the respiratory tract, and thus prevents the growth of Quinkie oedema [9].

According to the VIP pattern (Table I), fluid therapy is an important stage of medical rescue operations in a patient who has experienced an anaphylactic reaction. Obtaining a high flow peripheral cannula (G14) and starting fluid therapy (20-30 ml/kg/day) of crystalloids.

The subject of fluid therapy for patients in anaphylactic shock is complex and difficult. The volume of transfused fluids, speed and type are important. Commonly known and used in everyday out-of-hospital practice are crystalloids (NaCl, PWE) and colloids (Gelaspan, Tetraspan), and Glucose 5%. The use of a 5% Glucose solution is not suitable for equalizing intravascular volume, because it completely penetrates into the extravascular space [11-13]. The supply of colloids carries the risk of anaphylactic reactions therefore crystalloid transfusion is the safest one.

If cardiac arrest occurs despite the implemented emergency measures (VIP), the MET implements advanced resuscitation procedures (ALS), proceeding adequately to the rhythm in which cardiac arrest occurred [14]. Cardiac arrest in anaphylactic shock is most often caused by hypoxia, therefore when starting resuscitation, great attention should be paid to the patency of the upper respiratory tract. Sometimes, the only chance to unblock is to perform cricothyrotomy with a ready-made kit.

It should be remembered that resuscitation procedures in patients in cardiac arrest in the course of an anaphylactic reaction may require longer management than in other cases [7].

CONCLUSIONS

The first steps in anaphylactic shock include stopping the body's exposure to the allergen, maintaining the patency of the upper airways with proper oxygen therapy, inhibiting histamine release, and fluid therapy for peripheral perfusion.

The emergency medical team followed the applicable algorithms and current knowledge. It implemented appropriate medical rescue operations, thanks to which the condition of the injured was stabilized.

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