



Case report

Anaphylactic latex reaction during anaesthesia: The silent culprit in a fatal case

E. Turillazzi^a, P. Greco^b, M. Neri^a, C. Pomara^a, I. Riezzo^a, V. Fineschi^{a,*}

^a *Department of Forensic Pathology, University of Foggia, Ospedale Colonnello D'Avanzo, Via degli Aviatori 1, 71100 Foggia, Italy*

^b *Department of Obstetrics and Gynaecology, University of Foggia, Ospedali Riuniti, Via L. Pinto 1, 71100 Foggia, Italy*

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Abstract

The true incidence of anaphylactic latex reactions and their associated morbidity and mortality remain poorly defined. It is noteworthy that a number of groups of individuals are at risk for anaphylactic reactions to latex during surgical and medical procedures; one of these groups is represented by the obstetric and gynaecologic population. A case of unrecognized first anaphylactic reaction to latex in a pregnant woman patient who underwent a caesarean section is presented. The diagnosis of latex allergy was missed and the following day the woman underwent a surgical re-exploration complicated by fatal cardiovascular arrest. At post-mortem examination, pulmonary mast cells in the bronchial walls and capillary septa were identified and a great number of degranulating mast cells with tryptase-positive material outside the cells was documented. A post-mortem latex-specific IgE test showed a high titre (14.00 U/I). Latex-induced fatal anaphylactic shock was recorded as the cause of death. This case highlights some of the practical difficulties in the initial diagnosis and subsequent investigation of fatal anaphylactic reaction during anaesthesia. Anaphylaxis is often misdiagnosed because many other pathologic conditions may present identical clinical manifestations, so anaphylactic shock must be differentiated from other causes of circulatory collapse. Although latex allergy usually has a delayed onset after the start of the surgery and most often a slow onset too, it should be always suspected if circulatory collapse and respiratory failure occur during surgery, even if the patient does not belong to a risk group; in the presence of identified risk factors for latex allergy a well-founded suspicion must be stronger, leading to an immediate discontinuation of the potential trigger.

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1. Introduction

Latex allergy presents a major medical problem, raises public policy interest and sometimes forensic troubles, and yet there is surprisingly little consensus on the fundamental issues that comprise its core [1]. The true incidence of anaphylactic latex reactions and their associated morbidity and mortality remain poorly defined; as well as in other forms of allergic reactions, the prevalence of sensitization is much higher than the incidence of reactions. It is noteworthy that a number of groups of individuals are at risk for anaphylactic reactions to latex during surgical and medical procedures; one of these groups is represented by the obstetric and gynaecologic population. Adverse reactions following exposure to latex products may be categorized as

irritant contact dermatitis, allergic contact dermatitis, or immediate hypersensitivity reactions (urticaria, angioedema, allergic rhinitis, asthma, or anaphylaxis). Anaphylactic reactions to latex are potentially life-threatening so they require prompt recognition and immediate management. However, the diagnosis of an anaphylactic reaction, especially during anaesthesia, may be challenging and latex sensitivity must always be kept in mind.

We present a case of an unrecognized first anaphylactic reaction to latex in a pregnant woman patient who underwent a caesarean section. The diagnosis of latex allergy was missed and the following day the woman underwent a surgical re-exploration complicated by fatal cardiovascular arrest.

2. Case report

A 33-year-old woman, gravida 3, para 2, aborta 0, was admitted at 38 weeks gestation in preparation for a caesarean

* Corresponding author. Tel.: +39 0881 733193; fax: +39 0881 736903.

E-mail address: vfinesc@tin.it (V. Fineschi).

Table 1
Levels of haemoglobin and platelets registered

Time	Pre	3:25 pm (1st day)	6:48 pm (1st day)	8:18 pm (1st day)	9:24 pm (1st day)	10:22 pm (1st day)	11:44 pm (1st day)	5:01 am (2nd day)
Hb (g/dl)	12.8	9.09	8.55	4.74	4.38	5.08	6.25	6.59
PLT ($\times 10^3/\text{mm}^3$)		190	183	116	71.7	54.9	47.3	47.8

section. She had undergone two previous caesarean sections. The past medical history was significant for asthma, rhinoconjunctivitis, and urticaria; she stated that she had an allergy to chestnuts. On admission, blood pressure was 110/60 mmHg with Hb 12.8 g/dl. At 9.55 a.m. a spinal anaesthesia was performed with 2.2 ml of 0.5% bupivacaine, and within a few minutes of oxytocin administration the woman underwent a caesarean delivery and gave birth to live male baby. Ten minutes after the surgical procedure started, the respiratory status deteriorated with severe bronchospasm and persistent hypotension. The patient required tracheal intubation, continuous fluid replacement, administration of vasoactive drugs and treatment in the intensive care unit. The patient responded to treatment with crystalloid infusion and inotropes. Over the next several hours, repeated exams showed lowered levels of platelets and haemoglobin (Table 1). Blood and plasma transfusions were administered. At 6.50 p.m. a pelvic and abdominal ultrasonography showed a large amount of fluid in the abdominal and Douglas cavities. At 9.10 a.m. of the day after the caesarean section, the patient was moved to the operating room for surgical re-exploration; a total of approximately 1 l of fresh and clotted blood was recovered in the abdominal cavity. The surgery was complicated by severe hypotension, bronchospasm and cardiovascular arrest (10.30 a.m.); a prolonged CPR attempt was unsuccessful.

2.1. Autopsy findings

A complete autopsy was performed 48 h after death. An internal examination revealed 550 ml reddish coloured liquid in the left pleural cavity and 750 ml reddish coloured liquid in the right pleural cavity. The lungs were oedematous and heavy, both weighing 1150 g. The peritoneal cavity showed a small quantity of reddish coloured liquid and the caesarean section was unremarkable. Numerous reddish petechiae in the serosa of parietal peritoneal were appreciated. The other organs did not show specific pathological alterations except for an intense cerebral oedema.

Histological lung examination showed alveolar septa mildly thickened by oedema and capillary congestion and severe alveolar oedema. Liver examination revealed mild necrosis in acinar zone 3. The kidney specimens showed focal necrosis of the tubular epithelium. Other organs were unremarkable except for cerebral oedema.

An immunohistochemical technique was performed to estimate mast cell population, using the anti-tryptase antibody as a mast-cells specific marker on 5 μm thick paraffin sections; pulmonary mast cells in the bronchial walls and capillary septa were identified and a great number of degranulating mast cells with tryptase-positive material outside the cells was documented. A halo of tryptase positiveness around the mast cells revealed evidence of mast cell degranulation (Fig. 1).

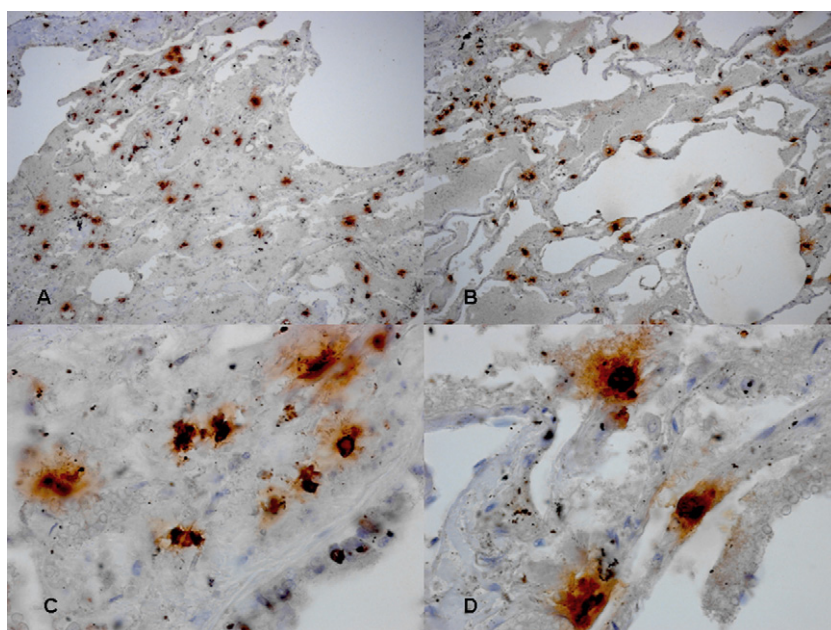


Fig. 1. Lung: degranulating mast cells (starry effect) with tryptase-positive material outside the cells was documented (A and B, Ab anti-tryptase). A halo (golden reaction) of tryptase positiveness around the mast cells reveals evidence of mast cell degranulation (C and D, Ab anti-tryptase).

A post-mortem latex-specific IgE test showed a high titre (14.00 U/I).

Latex-induced fatal anaphylactic shock was recorded as the cause of death.

3. Discussion

This case highlights some of the practical difficulties in the initial diagnosis and subsequent investigation of an anaphylactic reaction during anaesthesia [2]. In our case, notwithstanding the presence of evident risk factors, latex anaphylaxis during the caesarean section was not suspected at all; throughout the resuscitative efforts, all anaesthesia and surgical care providers continued to wear latex gloves. Many other latex-containing products were used in the operating room and during post-anaesthesia care. The following day the patient underwent a second surgical operation under general anaesthesia and was re-exposed to latex, resulting in a fatal anaphylactic shock. The suspicion of latex-related anaphylactic shock was verified and confirmed post-mortem by IgE dosage and β -tryptase immunohistochemical investigation, which provided paramount information in assessing the cause of death.

Post-mortem diagnosis of anaphylaxis is sometimes difficult and most often done by exclusion [3]. Tryptase is a serine protease stored mainly in mast cell granules. Since tryptase is released from the granules at the onset of anaphylactic events, serum tryptase levels are considered a reliable indicator of anaphylaxis. Furthermore, measurement of serum tryptase levels is known to be useful for post-mortem diagnosis of anaphylaxis, because of its long serum half-life compared with other chemical mediators like histamine [4,5].

Allergy to latex products is a result of an immunologic response to one or more of the products contained in the approximately 400 latex products used in the medical community. These products are composed of two types of substances that may cause medical problems: added chemical antioxidants and natural proteins associated with immunoglobulin E (IgE)-mediated reactions. The chemical antioxidants may cause type IV dermatitis reactions, and the natural proteins may cause type I systemic allergic reactions in some individuals [6,7]. The incidence of latex sensitization in the general population is about 1:100, and some groups at high risk have been identified: patients with spina bifida and/or urogenital abnormalities, healthcare workers and patients with a history of multiple surgical procedures or allergies to some fruits [8]. It is estimated that a patient with a history of fruit allergy (kiwi, banana, chestnuts, figs, avocado) has an 11% risk of concurrent latex allergy [9]. Patients with multiple surgical procedures and health care workers (particularly those working in the operating room) are also at high risk for anaphylaxis to latex during surgical or medical procedures. Moreover, a chronic bladder care (neural tube defects, spinal cord trauma, urogenital malformations, neurogenic bladder) is a well-known risk factor for latex hypersensitivity. The true prevalence of latex sensitivity is unknown, with estimates for the general population, rubber industry workers, and health-

care workers ranging from 5 to 10%, 1 to 11%, and 0.5 to 17%, respectively [10].

One of the most common settings for latex anaphylaxis during surgical procedures is represented by obstetric and gynaecological procedures, which have been reported to account for approximately 50% of all reactions due to latex [11,12]. Many factors have been invoked to explain this observation. One important factor is the higher predisposition of women to allergic diseases and their more frequent exposure to NRL (Natural Rubber Latex) items during everyday life and working life [7,13]. Another factor is a greater mucosal contact with latex through barrier contraceptives and during vaginal delivery and vaginal explorations [14–22]. In the obstetric population, latex reactions can follow the injection of oxytocin, which raises uterine contraction and may cause the release of latex particles that are deposited in the uterus into the bloodstream [11].

It is noteworthy that the diagnosis of anaphylactic shock, especially if intraoperative, is particularly difficult. Anaphylaxis is often misdiagnosed because many other pathologic conditions may present identical clinical manifestations, so anaphylactic shock must be differentiated from other causes of circulatory collapse [23,24]. Latex allergy usually has a delayed onset after the start of the surgery and most often a slow onset too. Post-mortem examination, using a complete immunohistochemical study for tryptase, is warranted for the diagnosis of the disease. It is important to have a high index of diagnostic suspicion if circulatory collapse and respiratory failure occur during surgery, even if the patient does not belong to a risk group; in the presence of identified risk factors for latex allergy extra vigilance is essential.

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