

Reação Anafilática Durante Transplante Renal Intervivos em Criança Alérgica ao Látex. Relato de Caso*

Anaphylaxis during Renal Transplantation of Live Donor Graft in a Child with Latex Allergy. Case Report

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RESUMO

Potério GMB, Braga AFA, Santos RMSF, Gomes IFSFB; Luchetta MI — Reação Anafilática Durante Transplante Renal Intervivos em Criança Alérgica ao Látex. Relato de Caso.

JUSTIFICATIVA E OBJETIVOS: A alergia ao látex vem se tornando frequente, atingindo pacientes e profissionais de saúde. O objetivo deste relato foi apresentar um caso de criança alérgica ao látex que desenvolveu crise anafilática durante anestesia para transplante renal e destacar algumas condutas multiprofissionais empregadas para diminuir o risco de choque anafilático após a reperusão do transplante.

RELATO DO CASO: Criança do sexo masculino, com 5 anos e 10 meses, P3 pela classificação da ASA, com história de alergia ao látex, diagnosticada após contato com bexigas de festa e confirmada por testes Rast específico para o látex e Prick teste, foi submetida a transplante renal intervivos, por insuficiência renal terminal em consequência de malformação urológica. Os cuidados para evitar a exposição da criança ao látex seguiram os protocolos para paciente alérgico ao látex, adotados pelo Serviço de Anestesia e de Enfermagem do Hospital das Clínicas da UNICAMP. Foram iniciados na véspera da operação com a limpeza terminal das salas cirúrgicas e a substituição de todos os produtos médico-hospitalares por produtos isentos de látex. Os equipamentos e materiais utilizados durante o procedimento possuíam laudo técnico de isenção completa de látex, fornecido pelo fabricante. A operação foi realizada sob anestesia geral com ventilação controlada mecânica. Ao final da operação necessitou de transfusão de con-

centrado de hemácias administrado com auxílio de pressurizador, apresentando rash cutâneo, cessou-se a transfusão, administrou-se hidrocortisona e aumentou-se a infusão de cristaloides. A resposta ao tratamento foi satisfatória e imediata.

CONCLUSÕES: A alergia ao látex tornou-se um problema de saúde pública e o conhecimento de condutas terapêuticas específicas possibilita o pronto atendimento e menor risco para os pacientes

Unitermos: CIRURGIA, Urológica: transplante renal; COMPLICAÇÕES: alergia ao látex

SUMMARY

Potério GMB, Braga AFA, Santos RMSF, Gomes IFSFB; Luchetta MI — Anaphylaxis during Renal Transplantation of Live Donor Graft in a Child Latex Allergy. Case Report.

BACKGROUND AND OBJECTIVES: Latex allergy is becoming increasingly more frequent, affecting patients and health care professionals. The objective of this report was to present the case of a child with allergy to latex, who developed anaphylaxis during anesthesia for renal transplantation, and emphasize some of the multidisciplinary conducts used to decrease the risk of anaphylactic shock after graft reperfusion.

CASE REPORT: A male child, 5 years and 10 months old, P3 by the ASA classification, with a history of allergy to latex diagnosed after contact with balloons and confirmed by Rast test specific for latex and Prick test, underwent renal transplantation of a live donor graft for end-stage renal disease secondary to urologic malformation. The protocols for patients with Latex Allergy adopted by the Anesthesiology and Nursing Departments of the Hospital das Clínicas da UNICAMP were observed to avoid exposure of the child to latex. They started the day before the surgery by cleaning the operating rooms and substituting of all medical-hospital products by latex-free material. The equipment and materials used during the procedure were latex-free according to a technical report provided by the manufacturers. The surgery was done under general anesthesia and controlled mechanical ventilation. At the end of the surgery, the patient required blood transfusion, which was administered by a pressurizer; he developed cutaneous rash and the blood transfusion was discontinued, hydrocortisone was administered, and the infusion of crystalloids was increased. The child had an immediate and satisfactory response to the treatment.

CONCLUSIONS: Latex allergy has become a public health problem and the knowledge of specific therapeutic conducts allows immediate treatment and decreases patient risks.

Key Words: COMPLICATIONS: latex allergy; SURGERY, Urologic: renal transplantation.

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Tabela II – Tratamento de Reações Anafiláticas, Fármacos, Doses e Vias de Administração ¹⁴

Fármaco	Via de administração	Dose recomendada
Adrenalina	venosa	0,1 µg.kg ⁻¹ (10 µg no adulto) 0,01 mg.kg ⁻¹ (parada cardíaca)
	subcutânea	300 µg (na falta de acesso venoso)
	traqueal	5 a 10 vezes a dose venosa ou 50 a 100 µg no adulto (10 mL da solução 1:10.000)
Anti-histamínicos		
Difenidramina	venosa/muscular	1 mg.kg ⁻¹ (dose máxima de 50 mg)
Ranitidina	venosa	1 mg.kg ⁻¹ (dose máxima de 50 mg).
Corticoides		
Hidrocortisona	venosa	5 mg.kg ⁻¹ (de ataque) + 2,5 mg.kg ⁻¹ de 6/6h
Metilprednisolona	venosa	1 mg.kg ⁻¹ (de ataque) + 0,8 mg.kg ⁻¹ de 4/4 ou 6/6h
Broncoespasmo persistente		
Aminofilina	venosa	5 a 6 mg.kg ⁻¹ (de ataque) + 0,4 a 0,9 mg.kg ⁻¹ .h ⁻¹
β ₂ -agonista	inalatório	
Fármacos vasoativos para manter pressão arterial		
Adrenalina	infusão contínua	0,02 a 0,05 µg.kg ⁻¹ .min ⁻¹
Noradrenalina	infusão contínua	0,05 µg.kg ⁻¹ .min ⁻¹
Dopamina	infusão contínua	
Isoproterenol	infusão contínua	0,02 a 0,05 µg.kg ⁻¹ .min ⁻¹

Anaphylaxis during Renal Transplantation of Live Donor Graft in a Child with Latex Allergy. Case Report

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INTRODUCTION

Latex is derived from the *Hevea brasiliensis* tree from the Amazon. It results from a vulcanization process, which consists in elevating the temperature to 130° C and adding of several chemical products; it can be found in many of the items used in the medical-hospital environment, such as tourniquets, catheters, urine-collecting bag, IV tubing, gloves, and other products. Hevein, the name of a group of latex proteins, is considered the main allergen in reactions to latex, and it is present in large quantities in latex gloves, considered a determinant factor in the increase in latex sensitization ¹. Reports of anaphylactic reactions linked to latex sensitivity started in 1989, with an increasing incidence from 0.5%, before 1980, to 15%, in the years 1990 ¹.

Although more severe anaphylactic reactions can occur in different situations, most reports were related to the perioperative period, and approximately 12 to 17% were attributed to latex ²⁻⁵.

The objective of the present report was to present a case of intraoperative allergic reaction in a patient with the diagnosis of latex allergy who underwent renal transplantation of a live donor graft.

CASE REPORT

A male patient, 5 years and 10 months old, with a history of latex allergy, P3 by the ASA classification, underwent renal transplantation for end-stage renal disease secondary to a urologic malformation.

The diagnosis of allergy was made in the first year of life due to an allergic reaction characterized by edema and erythema on the face and difficulty breathing after contact with balloons. The results of the RAST test specific for latex and Prick test were positive and confirmed the diagnosis. There are reports of other allergic episodes after the ingestion of bananas and potatoes.

History: a) bilateral hydrocephalus diagnosed on the 28th week of gestation, the child was born after labor was induced in the 32nd week due to severe oligoamnios and, even with good vitality, he remained in the Neonatal Intensive Care Unit;

b) vesicostomy on the third day of life and a pielostomy on the 15th day of life; c) hypertension since age two, treated with methyl dopa and hydralazine hydrochloride; d) several episodes of asymptomatic pyelonephritis and urinary tract infection since 3 months of age and, despite prophylactic treatment, most of the times he had to be hospitalized; e) prior anesthetics for placement and removal of ventricular-peritoneal valve, and closure of vesicostomy and pyeloplasty one year before this admission, at which time he underwent unsuccessful ureteral reimplantation requiring the use of an urinary catheter for two months; and f) bladder augmentation one year before admission, at which time he needed intermittent catheterization every three hours.

The steps taken to prevent latex exposure followed the protocols for patients allergic to latex adopted by the Anesthesiology and Nursing Departments of the Hospital das Clínicas da UNICAMP. They were initiated the day before surgery by cleaning the operating rooms and substituting all medical-hospital products, including the gowns of the surgical teams, for latex-free products. Technical reports provided by the manufactures indicating all equipment and materials used during the surgery were latex-free were made available. Those steps were also followed during the graft manipulation phase.

The surgery was performed under general anesthesia with controlled mechanical ventilation. Pre-anesthetic medication consisted of midazolam (1 mg IV) administered one hour before the beginning of anesthesia.

Monitoring consisted of cardioscope (derivation D_{II}), non-invasive blood pressure, pulse oximeter, and capnograph. Anesthetic induction was initiated with 100% O₂ with a mask and the intravenous administration of sufentanil (50 µg), propofol (50 mg), and cisatracurium (0.1 mg.kg⁻¹), followed by tracheal intubation. Isoflurane, administered by a calibrated vaporizer, in a mixture of O₂ and N₂O (1:1), and supplementary doses of sufentanil and cisatracurium were used for anesthesia maintenance.

The vascular clamping and unclamping phases evolved without interurrences. Diuresis occurred spontaneously after clamp removal and renal reperfusion.

At the end of the surgery, anemia (Hb = 6.5 g.dL⁻¹) was diagnosed and treated with blood transfusion under pressure using a pressurizer. A few minutes after beginning the transfusion, the patient developed generalized cutaneous rash. Blood transfusion was interrupted and the pressurization bag was removed from the operating room. Intravenous hydrocortisone was administered and the rate of crystalloid infusion was increased. The patient showed immediate and satisfactory response to treatment.

DISCUSSION

Allergic reactions can result from exposure to latex proteins through several routes: skin, mucous membranes, inhalational, and intravenous. Some severe allergic reactions were

related with the contact of surgical gloves with the peritoneum and viscera, since those tissues absorb latex proteins promptly⁶.

Thus, in the intraoperative period, besides using silicone gloves, the intravenous or inhalational administration of medications should be carefully done due to the presence of latex in syringes and the closing system of drug vials. In the present case, a venous filter capable of retaining latex particles (according to the manufacturer) was used for the intravenous administration of drugs originally stored in vials. When this device is not available, the drugs should always be previously processed aseptically, i. e., laminar flow, and placed in latex-free syringes. As for medications in glass vials, the care taken was restricted to washing the vials with water and soap⁶.

In the present case, the use of the same care provided to the receptor in the donor room was extremely relevant. It was considered that latex proteins can adhere to talcum particles and disseminate in the room air, originating two ways of contamination. First, by contact with the kidney to be transplanted during surgical manipulation for its removal or during preparation. Second, by contamination of health professionals who move between both rooms. Thus, exposure of the receptor to risky situations secondary to graft contamination was avoided⁶.

Currently, latex allergy is not a problem only for individuals with chronic exposure to latex-containing products. Therefore, anesthesiologists should be alert to identify, beforehand, patients at risk and adopt prophylactic measures.

Patients with latex allergy have, almost always, a history of sneezing, irritated eyes with tearing, and skin rash after handling domestic material containing latex, such as garden hoses and gloves. Concomitantly, 30% to 80% of the patients also present food allergies, especially to nuts, tomato, kiwi, banana, mango, papaya, and avocado, due to the similarity of the antigens⁶⁻⁸. Besides the examples mentioned above, the incidence of latex-allergy in children with spina bifida and congenital urologic abnormalities varies from 20% and 65%. Children with myelomeningocele, sacral/lumbar agenesis, some congenital bladder changes, orthopedic disorders secondary to trauma, or with spinal changes, who underwent surgical procedures and multiple bladder catheterization are also included in this group. This is most likely due to the chronic exposure to latex-containing products, such as urinary catheter, due to the countless surgical procedures those children undergo^{2,4,9,10}.

Although in the general population the prevalence of latex allergy is around 1%, in some professionals those indexes are higher. Health professionals, including anesthesiologists and those professionals with chronic exposure to latex, are among them. A prevalence of 12.5%, of which 10.1% are asymptomatic, of latex-allergy has been reported in anesthesiologists¹¹.

The past medical history is the most important information for the etiological diagnosis of allergic reactions that develop

during anesthesia. In the case of general anesthesia, it is more difficult to establish the cause-effect relationship with a specific drug due to the diversity of agents used ^{2,12,13}.

In the present case, the diagnosis was based on the history of latex allergy and the development of a generalized skin rash a few minutes after beginning the blood transfusion, which was administered under pressure using a pressurized bag that had been previously used in another procedure. Inadvertently, the cleaning protocol for removal of residual latex particles was not observed. Once the error was detected, the bag was removed from the operating room and the IV tubing was substituted. The patient showed an immediate response to the treatment with corticosteroids and fluids. This episode was diagnosed as latex-allergy and it was decided that postoperative immunological testing was not necessary.

The reaction occurred at the end of the surgery, showing no correlation with any of the drugs administered. The anesthetics were the same used in prior anesthetics without reports of complications.

Among the drugs used in anesthesia, neuromuscular blockers are responsible for most allergic reactions. A few studies have shown the correlation between latex allergy and positive testing for those drugs ^{7,12,13}.

Since vecuronium does not depend predominantly on renal elimination, it is an option in kidney transplantation protocols ^{8,12,13}. However, there are reports in the literature of cross reactions between latex and vecuronium ^{8,12,13}. Although rocuronium is indicated in patients with allergies, in the present case cisatracurium, which produces less histamine release and was used in other surgeries without interferences, was chosen.

Prior exposure does not represent a risk factor for neuromuscular blockers, but the history of anaphylactic reactions carries a high risk of new episodes, even when different neuromuscular blockers are used. Due to the high incidence of cross anaphylaxis, allergic tests before exposure to any neuromuscular blockers are mandatory. Although one can use the neuromuscular blockers with a negative result, avoiding the use of drugs from the same family is safer ³.

The evolution of the reaction in this patient was not associated with respiratory or hemodynamic changes.

According to the renal transplantation protocol, the hydration scheme might have been responsible for the stability of the

hemodynamic parameters. Therefore, this can be considered a grade I reaction, characterized by low plasma levels of histamine, which was manifested clinically by skin changes, and did not pose any risk for the patient. Grades II, III, IV, and V reactions are associated with respiratory and cardiovascular symptoms due to the release of higher amounts of histamine, and carry a high risk of death (Table I) ¹³.

Although the results of skin tests are diagnostically controversial, they are the most common *in vivo* method used to determine the presence of IgE specific for drugs. They are frequently negative in individuals without a history of past reactions. According to the literature, positive skin test in patients with positive past medical history is a contraindication to the use of the drug; however, the exact meaning of a positive skin test is not known ⁸. In the case presented here, specific tests for neuromuscular blockers were not done, but drugs recommended in other protocols for latex allergy were used. Secondary prevention is fundamental in the care of patients with latex allergic, but the wide variety of latex-containing products and equipment in the operating room hinder the adoption of preventive measures. Since the antigen can affect the patient by different routes, secondary prevention is aimed at avoiding the exposure of allergic individuals to the risk of contamination. However, protocols should be strictly followed in all steps of patient care, from the preoperative physical exam, intraoperatively, and extending through the postoperative period.

It is recommended that as soon as admission is confirmed, the following steps should be taken: a) include in the medical chart a list of latex-containing equipment and medications, as well as latex-free products; b) use a green patch on the chart, identification bracelet, and bed to identify patients with latex allergy; c) place a sign on the door of the operating room to inform the presence of a patient allergic to latex; d) limit the number of people in the operating room to those directly involved in patient care who should be wearing latex-free garments, including cap and shoe protector; e) schedule elective surgeries early in the morning, therefore preventing the presence of high antigen levels, in the form of aerosol, in the operating room ¹⁴. The need to generate conducts that contribute for the humanization of patient care, recognizing the value of health teams on transmission of disease knowledge, and individualized holistic care should be considered. Information should also be transmitted to families, and a

Table I – Severity of Allergic Reactions *versus* Plasma Levels of Histamine ^{8,13}

Severity/symptoms	Clinical symptoms	Plasma histamine
I - Cutaneous	erythema, urticaria, pruritus, angioedema	< 1 ng.mL ⁻¹
II - Systemic	generalized cutaneous reaction, tachycardia, arrhythmia, mild hypotension, difficulty breathing	> 1 ng.mL ⁻¹
III - IV – Life risk	bronchospasm, severe hypotension, tachycardia, bradycardia, ventricular fibrillation, cardiorespiratory arrest	> 12 ng.mL ⁻¹

Table II – Treatment of Anaphylactic Reactions, Drugs, Doses, and Route of Administration¹⁴

Drug	Route of administration	Recommended dose
Adrenaline	intravenous	0.1 $\mu\text{g.kg}^{-1}$ (10 μg in adults) 0.01 mg.kg^{-1} (cardiac arrest)
	subcutaneous	300 μg (in the absence of intravenous access)
	tracheal	5 to 10 times the intravenous dose or 50 to 100 μg in adults (10 mL of the 1:10,000 solution)
Antihistaminics		
Diphenidramine	intravenous/muscular	1 mg.kg^{-1} (maximal dose of 50 mg)
Ranitidine	intravenous	1 mg.kg^{-1} (maximal dose of 50 mg).
Corticosteroids		
Hydrocortisone	intravenous	5 mg.kg^{-1} (bolus) + 2.5 mg.kg^{-1} every 6h
Methylprednisolone	intravenous	1 mg.kg^{-1} (bolus) + 0.8 mg.kg^{-1} every 4 or 6h
Persistent bronchospasm		
Aminophylline	intravenous	5 a 6 mg.kg^{-1} (bolus) + 0.4 a 0.9 $\text{mg.kg}^{-1}.\text{h}^{-1}$
β_2 -agonist	inhalational	
Vasoactive drugs to maintain the blood pressure		
Adrenaline	continuous infusion	0.02 a 0.05 $\mu\text{g.kg}^{-1}.\text{min}^{-1}$
Noradrenaline	continuous infusion	0.05 $\mu\text{g.kg}^{-1}.\text{min}^{-1}$
Dopamine	continuous infusion	
Isoproterenol	continuous infusion	0.02 a 0.05 $\mu\text{g.kg}^{-1}.\text{min}^{-1}$

protocol to handle those patients should be instituted in the admission unit.

In case of anaphylaxis, the sequence of conducts for the specific treatment should be standardized, aiming at a speedy and effective treatment. The ASA suggests the following protocol: a) immediate suspension of the administration or reduction of the absorption of the inciting agent; check the route of contact, including mucous membranes and inhalational; b) remove all latex from the surgical field (change latex gloves by silicone gloves); c) discontinue the administration of antibiotics and/or blood and blood products; d) discontinue all anesthetic agents; e) maintain ventilation with 100% oxygen; f) tracheal intubation, if necessary; g) administer 25 to 50 mL.kg^{-1} of crystalloids; h) administer adrenaline and secondary therapy (Table II); g) place warnings of latex allergy at the entrance of the operating room and limit the flow of personnel, material, and equipment^{14,15}.

Since latex allergy has become a public health problem, knowledge of specific and standardized treatment conducts allows immediate care and, therefore, more effective treatment. Multidisciplinary teams involved in patient care should seek the knowledge on prevention and diagnosis and they should be able to adopt multidisciplinary conducts that, when united in a protocol, contribute to reduce the risk of allergic accidents as a consequence of latex exposure.

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RESUMEN

Potério GMB, Braga AFA, Santos RMSF, Gomes IFSFB; Luchetta MI — Reacción Anafiláctica Durante Transplante Renal Intervivos en Niño Alérgico al Látex. Relato de Caso.

JUSTIFICATIVA Y OBJETIVOS: La alergia al látex ha venido alcanzando a menudo a pacientes y a profesionales de la salud. El objetivo de este relato, fue presentar un caso de niño alérgico al látex que debutó con una crisis anafiláctica durante la anestesia para transplante renal, y destacar algunas conductas multiprofesionales usadas para reducir el riesgo de choque anafiláctico después de la reperusión del transplante.

RELATO DEL CASO: Niño del sexo masculino, con 5 años y 10 meses, P3 por la clasificación de la ASA, con historial de alergia al látex diagnosticado después de haber tenido contacto con globos de fiesta y confirmado por tests Rast específico para el látex y Prick test. Se le sometió a transplante renal intervivos, por insuficiencia renal terminal, como consecuencia de una malformación urológica. Los cuidados para evitar la exposición del niño al látex, secundaron los Protocolos para paciente Alérgico al Látex, adoptados por el Servicio de Anestesia y de Enfermería del Hospital de las Clínicas de la UNICAMP. Esos cuidados fueron iniciados en la víspera de la operación, con la limpieza terminal de las salas quirúrgicas, y el reemplazo de todos los productos médico hospitalarios, por productos exentos de látex. Los equipos y materiales utilizados durante el procedimiento poseían un laudo técnico, de exención completa de látex, suministrado por el fabricante. La operación fue realizada bajo anestesia general con ventilación controlada mecánica. Al final de la operación, necesitó una transfusión de concentrado de hematíes, administrado con la ayuda de presurizador, presentando rash cutáneo, se suspendió la transfusión, se le administró hidrocortisona y se le aumentó la infusión de cristaloideos. La respuesta al tratamiento fue satisfactoria e inmediata.

CONCLUSIONES: La alergia al látex se convirtió en un problema de salud pública y el conocimiento de conductas terapéuticas específicas, posibilita la rápida atención y un menor riesgo para los pacientes.