

Probable walnut-induced anaphylactic reaction in a dog

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Background – Anaphylaxis due to nuts is frequent in humans; to the best of the authors' knowledge, it has not been reported previously in dogs.

Case report – A 5-year-old female, intact, Vizsla dog was presented with acute diarrhoea, vomiting, respiratory distress and erythematous wheals. The dog had eaten walnuts, which she had been fed in small amounts for years, hours before the onset of clinical signs. A diagnosis of generalized anaphylaxis was made. Skin testing and Western blotting revealed positive results with walnuts and hazelnuts.

Conclusions and clinical importance – This case report illustrates the need for a thorough food history and for recognition that a dog may experience severe allergic reactions to unusual and regularly fed food items. It also shows that allergen specific tests may help to confirm the diagnosis and help in planning the dog's future dietary regime.

Introduction

Anaphylaxis is a systemic allergic reaction that is rapid in onset and has the potential to cause death.¹ Anaphylactic reactions are IgE-mediated, and the major triggers in humans and animals include food, medication and insects.^{1–3} In humans, some of the most frequent causes of food-induced anaphylaxis are peanuts and tree nuts.⁴ The prevalence of tree nut allergy in humans is reported to be around 0.38%.⁵ In veterinary medicine, there is only one report of an experimentally induced walnut allergy resembling atopic dermatitis and one report of a putative peanut-induced urticarial reaction in a dog.^{6,7} The present case describes the clinico-pathological features and the immunological investigation of a probable adverse reaction to walnuts in a dog.

Case description

A 5-year-old female, intact, Vizsla dog was presented with the complaint of acute diarrhoea, vomiting, respiratory distress and skin swellings. The diarrhoea and vomiting ceased after symptomatic treatment with anti-emetics and anti-inflammatory dosages of prednisolone, but the

skin lesions persisted. There was no history of prior skin disease or recent insect or drug/vaccine exposure. The owner reported feeding the dog walnuts (100 g) 3 h prior to the onset of clinical signs. The dog had been fed walnuts and hazelnuts for several years.

The dog was examined 3 days after onset of clinical signs. The rectal temperature was 39.3°C, and respiratory and heart rates were within normal limits. The conjunctivae were mildly congested and the abdomen was painful upon palpation. The dermatological examination revealed generalized erythematous hives, which ranged from 0.1 to 0.5 cm in diameter. Angio-oedema of the eyelids and lips also was noted. The pinnae were bilaterally severely erythematous and moderately oedematous (Figure 1).

On the basis of the history and clinical findings, a diagnosis of cutaneous anaphylaxis was made and walnuts were considered a possible trigger. The severity of anaphylaxis was graded as moderate, using a previously reported grading scheme.⁸ The dog was hospitalized and treated with intravenous (i.v.) omeprazole 0.7 mg/kg once daily (Omeprazol Teva, Teva Pharma AG; Basel, Switzerland), oral diphenhydramine 2 mg/kg twice daily (Benocten, Medinova AG; Zürich, Switzerland), dexamethasone 0.5 mg/kg i.v. once daily (Dexadreson, MSD Animal Health; Luzern, Switzerland) and fluid replacement (Ringer-Lactat, Fresenius Kabi; Oberdorf, Switzerland). The findings from additional tests (abdominal ultrasound, thoracic radiographs, haematology and serum clinical chemistry) were normal. The dog recovered within 4 days and the owner was advised not to feed any types of nuts to the dog.

Two weeks after discharge, the dog underwent skin prick (SPT) and intradermal (IDT) tests with hazelnut and walnut extracts (Alyostal© hazelnut 100 IR/mL and Alyostal© walnut 1000 IC/mL, Stallergenes; Switzerland). The SPT and IDT were carried out and evaluated according to reported methods in human and veterinary medicine, respectively.^{9,10} For the SPT undiluted and for

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Figure 1. Dermatological signs in a dog with anaphylaxis with probable walnut food allergy. The dog had generalized wheals, as shown on the head and neck (a), shoulder and thorax (c), and hind legs (d). In addition, smaller erythematous wheals were noticed in the inguinal and perianal region (e,f). The pinnae were bilaterally oedematous and thickened.

IDT 1:10 diluted allergens (as determined with allergen titration in two healthy dogs) were used. For SPT (Stallerpoint®, Stallergenes) a reaction was considered positive when the largest diameter of the wheal of each particular test was ≥ 3 mm.⁹ The IDT reactions were graded subjectively as described previously.^{9,10} The SPT result was positive for walnut allergens (wheal size was 4 mm), and IDT was positive for walnut and hazelnut allergens (Figure 2). Additionally, a Cyno-DIAL© Western blot-based test^{8,‡} was performed and showed serum

IgE to walnut and hazelnut proteins larger than 20 kDa; antibodies were still detected several months later (Figure 3); the owner declined repeat IDT testing. An oral challenge was not performed because of medical-ethical concerns. The owner agreed not to re-introduce nuts into the dog's diet and 18 months after presentation the dog remained normal.

Discussion

To the best of the authors' knowledge, this is the first case demonstrating probable walnut-induced anaphylaxis in a dog. Walnuts, in addition to almonds, hazelnuts, Brazil nuts and cashews, are frequently associated with systemic allergic reactions in humans.⁵ In dogs, clinical signs of food allergy can present with

‡Editor's note

Validation of the western blot technique has not been formally reported and the specificity and sensitivity of the reagents used to detect IgE have not been declared.

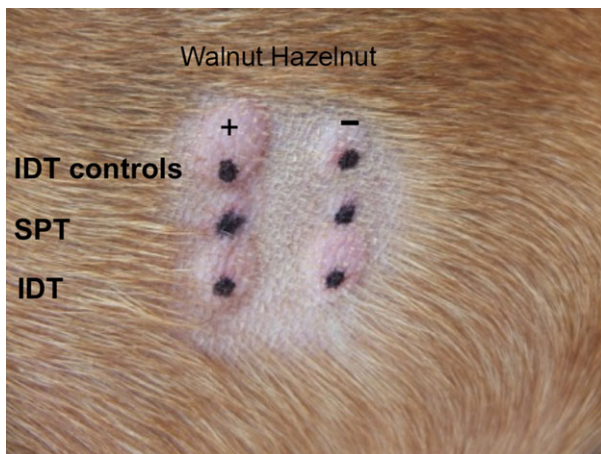


Figure 2. Results of the skin prick test (SPT) and intradermal test (IDT) reactions in a dog with anaphylaxis with probable walnut food allergy. The SPT was positive only for walnut (4 mm wheal diameter), and the IDT was positive for both, walnut and hazelnut.

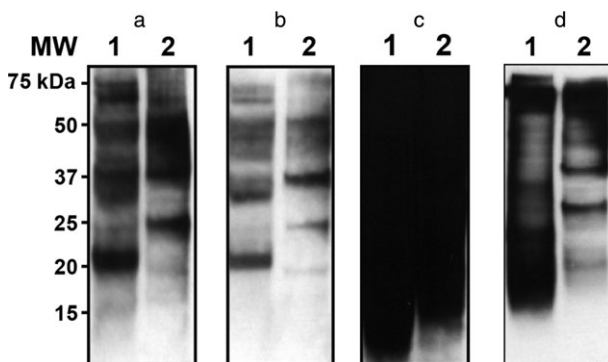


Figure 3. Results for IgE detection with immunoblotting in a dog with anaphylaxis with probable walnut food allergy. The blots show presumed IgE-reactive bands using enhanced chemiluminescence on autoradiography films for walnut (panels 1) and hazelnut (panels 2). The more antibody present in the serum, the stronger the intensity of reactive bands. In panels a to c the exposure for autoradiography was 30 min at time 0 (a), at 4 months (b) and 12 months (c) after presentation; in panel d the exposure was 5 min for the sample in panel c. MW, molecular weight.

either skin and/or gastrointestinal signs.¹¹ It has been shown that food also is associated with urticaria and anaphylaxis in dogs.⁸

In humans, tree nut and/or other food allergies commonly develop in early childhood (median age 3 years) and dogs may be similar.^{5,11} In the canine nut allergy experimental model, the dogs were immunized within the first 11 weeks of life and the first signs of sensitization were noted as early as of 6 months of age and persisted for up to 3 years.⁷ Interestingly, our case experienced the first episode at 5 years of age. In humans, anaphylaxis can be triggered by only 0.1–1 g or in the experimental canine atopic model by 5–20 g of nut allergen.^{4,7} The authors note that in the present case the amount of allergen (100 g) was a possible risk factor, as consumption of smaller amounts in the past was not associated with an allergic event.

Immunopathology in these reactions is characteristically IgE-mediated and several major allergens have been

described for walnut allergic human individuals including Jug r 1 (10–14 kDa), Jug r 2 (47 kDa) and Jug r 3 (10 kDa).⁴ Cross-reactive proteins among edible nuts are well described.⁴ In the present case, as suggested by serological and cutaneous reactivity, a cross-reactivity to both walnut and hazelnut could exist. Therefore, the owner was advised not to feed any types of nuts, to avoid possible clinical cross-reactivity.

The clinical signs of nut allergy in humans include pruritus, cutaneous erythema, urticaria, angio-oedema, chest tightness, nausea/vomiting and abdominal pain progressing to severe respiratory and/or cardiovascular dysfunction.⁴ In dogs, the main organs affected by anaphylactic shock are the liver/gastrointestinal tract and the skin, which were also affected in our case.² In comparison with other food allergies, allergic reactions to nuts tend to be particularly severe in humans and show a high fatality rate.^{4,5} Data in dogs are sparse; however, in our case, signs were moderately severe.

The diagnosis of anaphylaxis is based on clinical findings and ruling out possible differential diagnoses. In human medicine, SPT and serum IgE for food allergens are the first-line tests to assess an IgE sensitization, but their low positive predictive value makes elimination diet and oral food challenge necessary to confirm the diagnosis.⁴ However, SPT and serum IgE measurement still remain primary diagnostic modalities employed in human medicine.^{12–14} In veterinary medicine, the measurement of food serum IgE has not been recommended for establishing a diagnosis of food allergy and currently the gold standard is considered to be allergen avoidance with provocative oral challenge.¹⁵ Herein, we have shown that demonstration of IgE by immunoblotting was useful in the case of an immediate-type allergic reaction, as was SPT and IDT. It is important to consider that skin testing or serum IgE concentrations reflect exposure and neither provide prognostic information nor predict disease severity.¹³ It also is important to emphasize that the diagnostic methods used in this case report are currently not validated in the dog, and that original studies are needed to confirm and standardize these tests in the diagnosis of canine food-induced anaphylaxis.

Currently, the standard management of food-induced anaphylaxis in human and veterinary medicine includes avoidance of the offending food and emergency treatment of adverse reactions (intramuscular epinephrine as first-line treatment for severe cases; fluid therapy, oxygen, glucocorticoids, antihistamines and bronchodilators as second-line support).^{2,16} Quick recognition of anaphylactic signs is essential for a favourable prognosis.

In humans, spontaneous resolution of nut allergy tends to be low (9%).¹⁷ Western blot testing showed positive serological responses to walnuts and hazelnuts during a 1 year follow-up, despite strict allergen avoidance. The intensity of the Western blot signal appeared more pronounced with time. This could be explained by the fact that continuous elimination of a food component may have led to decreased oral tolerance and, in some cases, to elevated IgE levels.¹⁸ Therefore, it is debatable whether the immune system preferably needs an

ongoing small allergen exposure to maintain tolerance rather than complete avoidance.¹⁷

The present case report aims to raise the awareness that dogs may experience severe allergic reactions when eating unusual foods and that a thorough food history is needed to identify the trigger. In addition, it demonstrates that SPT, IDT and Western blotting might be useful adjunct tests when the gold standard – provocative challenge – is not possible.

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Résumé

Contexte – Les réactions anaphylactiques dues aux fruits à coque est fréquente chez l’homme; à la connaissance des auteurs, elle n’a pas été rapportée chez le chien.

Cas clinique – Une chienne Vizla entière de 5 ans a été présentée avec une diarrhée aiguë, des vomissements, une détresse respiratoire et des plaques érythémateuses. Dans les heures précédant le début des symptômes, la chienne avait mangé des noix, qu’elle consommait déjà en petite quantité depuis des années. Le chien a présenté de la diarrhée, des vomissements et de l’urticaire; un diagnostic d’anaphylaxie généralisée a été posé. Des tests cutanés et un Western blot ont révélé des résultats positifs pour les noix et noisettes.

Conclusions et importance clinique – Ce cas illustre le besoin d’une minutieuse recherche des habitudes alimentaires et met en évidence qu’un chien peut présenter de sévères réactions allergiques à des aliments inhabituels et distribués régulièrement. Il montre également que les tests spécifiques d’allergie peuvent être utiles pour confirmer le diagnostic et aider dans la gestion du futur régime alimentaire du chien.

Resumen

Introducción – La anafilaxia debida a frutos secos es frecuente en los seres humanos; basado en la información recopilada por los autores, no se ha publicado previamente en perros.

Caso clínico – Se presentó a una perra Vizsla de 5 años de edad, intacta, con diarrea aguda, vómitos, dificultad respiratoria y pápulas eritematosas. El perro había comido nueces, que había sido parte de su alimentación en pequeñas cantidades durante años, horas antes de la aparición de los signos clínicos. La perra desarrolló diarrea, vómitos, dificultad respiratoria y urticaria; y hizo un diagnóstico de anafilaxia generalizada. Las pruebas cutáneas y de Western blot indicaron resultados positivos frente a nueces y avellanas.

Conclusiones e importancia clínica – Este caso clínico ilustra la necesidad de un historial nutricional completo y el reconocimiento de que un perro puede experimentar reacciones alérgicas graves a alimentos inusuales y regularmente ingeridos. También muestra que las pruebas específicas de alérgenos pueden ayudar a confirmar el diagnóstico y ayudar en la planificación de un futuro régimen dietético del perro.

Zusammenfassung

Hintergrund – Eine Anaphylaxie aufgrund von Nüssen kommt bei Menschen häufig vor; nach bestem Wissen der Autoren wurde dies bisher bei Hunden nicht berichtet.

Fallbericht – Eine 5 Jahre alte Vizsla Hündin wurde mit akutem Durchfall, Erbrechen, Atembeschwerden und erythematösen Blasen vorgestellt. Der Hund hatte Stunden vor dem Auftreten der klinischen Zeichen Walnüsse gegessen, die ihr in kleinen Mengen über die Jahre immer gefüttert worden waren. Die Hündin entwickelte Durchfall, Vomitus, Atembeschwerden und Urticaria; es wurde die Diagnose einer generalisierten Anaphylaxie gestellt. Hauttests und Western Blots zeigten positive Ergebnisse mit Walnüssen und Haselnüssen.

Schlussfolgerungen und klinische Bedeutung – Dieser Fallbericht verdeutlicht die Wichtigkeit einer guten Futteranamnese und der Erkennung der Tatsache, dass ein Hund eine schwerwiegende allergische Reaktion auf unübliche und regelmäßig gefütterte Nahrungsbestandteile haben kann. Er zeigt auch, dass Allergen-spezifische Tests dabei helfen können, die Diagnose zu bestätigen sowie die Planung der zukünftigen Diät des Hundes erleichtern können.

要約

背景 — ナッツによるアナフィラキシーは人では頻繁に認められるが、著者らの知る限り、これまで犬では報告されていない。

症例報告 — 5歳齢、未避妊雌のビズラが、急性の下痢、嘔吐、呼吸困難および紅斑性膨疹を呈して来院した。患犬は臨床症状の発現する数時間前にクルミを摂取した。クルミはここ数年間、少量を与え続けられていたものだった。患犬は下痢、嘔吐、呼吸困難および蕁麻疹を呈し、全身性のアナフィラキシーと診断された。皮膚検査およびウェスタンブロットリング検査にて、クルミとヘーゼルナッツが陽性を示した。

結論および臨床的な重要性 — 本症例報告は、詳細な食事歴の聞き取りの必要性和、犬が日常的に与えられている一般的ではない食べ物に対して、重度のアレルギー反応を示す可能性があることを認識する必要性を示した。また、アレルギー特異的試験は、診断の確定や、その犬の今後の食事内容を決める手助けとなることが示された。

摘要

背景 — 对人而言,坚果引起的过敏十分常见;但在作者的认知范围内,之前并没有犬在这方面的报告。

病例报告 — 一只健康未绝育的五岁维兹拉母犬,出现了急性腹泻、呕吐、呼吸困难、红斑状风团的症状。而在临床表现开始出现的几小时前,该犬吃了一些核桃,最近几年内曾少量喂过的那种。该犬表现出的腹泻、呕吐、呼吸困难以及荨麻疹症状;可诊断为全身性过敏。皮肤试验和免疫印迹法对核桃和榛子显示出了阳性结果。

结论和临床意义 — 本病例报告表明,需要详细的食物史,了解不常吃或常吃的各类食物,才能识别犬的严重过敏反应。也显示出过敏原特异性试验能够帮助确认诊断,并可帮助设计犬今后的食谱。

Resumo

Contexto — A anafilaxia causada por castanhas é frequente em humanos. De acordo com o conhecimento do autor, esta reação não foi ainda relatada em cães.

Relato de caso — Uma cadela da raça Vizsla de cinco anos de idade, foi apresentada manifestando diarreia aguda, vômitos, dispneia e pápulas eritematosas. Horas antes do surgimento do quadro clínico, a cadela havia ingerido nozes, alimento ao qual há anos era habitualmente exposta, em pequenas quantidades. O animal desenvolveu diarreia, vômitos, dispneia e urticária, destarte, o diagnóstico de anafilaxia generalizada foi concluído. Teste alérgico cutâneo e western blotting revelaram resultados positivos para nozes e avelãs.

Conclusões — Este caso ilustra a necessidade de histórico alimentar detalhado e do reconhecimento de que o cão pode apresentar reações alérgicas graves a alimentos que ingerem habitualmente. Ademais, isto demonstra que testes alérgicos com alérgenos específicos podem auxiliar no diagnóstico e no planejamento da dieta do animal.