Table 1. Summary of the most common clinical manifestations, the most frequently involved allergens and the prognosis of *de novo* food allergies after liver transplant.

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| --- | --- | --- | --- | --- | --- |
| **Authors** | **Number of children** | **Clinical manifestations of food allergy** | | **Allergens** | **Outcome in terms of number (%) of food allergy outgrowth; follow up (mean)** |
| *Sinitkul R et al.* | 46  (54% de novo FA; 39% confirmed FA) | 52% GI symptoms  Skin clinical manifestations (angioedema, urticaria, eczema)  Anaphylaxis  Anaemia  Respiratory (stridor) | 49% IgE mediated  29% Mixed  21% Non-IgE mediated | Cow’s milk  Shellfish  Egg white  Wheat  Soy  Peanut  Coconut  Fish  2/3 multiple food allergies | 66%  **3 years** |
| *Shoda T et al.\** | 106  (14% de novo FA) | urticaria and angioedema (80%) GI signs and symptoms (50%) | Non-IgE-mediated gastrointestinal allergy was suspected in two patients | egg (50%) | n.i. |
| *Lee Y et al.* | 93  (35 children=36% de novo FA; 28 children confirmed) | Not specified | 55% eosinophilia | Cow’s Milk  Egg white  Soy  Wheat  peanut | 69%  **10 years** |
| *De Bruyne R et al.* | 49  (13 children=26;5% de novo FA) | 767% GI signs and symptoms (diarrhoea with faltering growth, blood in stools and vomiting)  1/13 EoE  46% cutaneous/systemic (angioedema, urticaria, anaphylaxis)  severe atopic dermatitis  23% treatment-resistant cheilitis with oral mucosal lesions | 3/13 (23%) IgE mediated  8/13 (61%) mixed  2/13 (15%) non IgE mediated | Cow’s milk  Egg white  Peanut  Soy  7/13 multiple FA | 1/13 (7%)  **72 months** |
| *Wisniewski J et al.* | 352  (30 children= 8% de novo FA) | 12/30 urticaria and/or angioedema  4/30 anaphylaxis  11/30 GI symptoms (abdominal pain, bloody stools, vomiting and diarrhoea, failure to thrive, odynophagia) | 5/10 lower endoscopies eosinophilic infiltrates | Cow’s milk  Hen egg  Peanut  Soy  Tree nut  Beef  Fish  Sesame  Wheat  Corn | 14/30 maintained food avoidance  10/30 followed an unrestricted diet  6/60 lost to FU  **10 years** |
| *Oztürk H et al.* | 60  (4 children = 6.6% de novo FA) | 2 (3%) eosinophilic gastroenteritis; EoE (Diarrhea)  Atopic dermatitis;  2 (3%) food allergy (anaphylaxis) | | Sesame oil  Cow’s milk | n.i. |
| *Maarof G et al.* | 7 children with de novo FA | 5/7 angioedema  2/7 Quincke oedema  generalized urticaria or gastrointestinal signs and symptoms (diarrhoea). | | (3/7) hazelnut;  (3/7) peanut;  (2/7) egg white  (3/7) yolk; (2/7) lentil; (1/7) fish; (1/7) almond; (1/7) pistachio;  (1/7) mustard;  4/7 two allergens  3/7 three allergens | 7/7 (100%)  **37 ± 27 months** after the immunosuppressive switch and diet restriction |
| *Levy Y et al.* | 65  (4 children=6% de novo food allergy) | Urticaria  Angioedema  Stridor | | Fish  Egg Sesame, Peanut, Soybean  Milk  Apple  3/4 multiple FA | 0  **2-4 years** |
| *Atkins FM et al*.  *Lykavieris P et al.* | 121 children  (12=10% de novo food allergy) | 12/12 Angioedema  2/12 Hoarseness  2/12 Shorten of breath  1/12 Anaphylaxis  9/12 Recurrent diarrhoea  10/12 Peripheral blood eosinophilia | | Egg (50%)  Cow’s milk (33%)  Peanut (33%)  Soy (33%)  Wheat (25%)  Almond (17%)  Lentil (17%)  Fish (17%)  Beef (8%)  Chicken (8%)  Hazelnut (8%)  Lamb (8%)  Kiwi (8%) | 8/12  Only in those on ED who switched from Tacrolimus to Cyclosporine  **3.75 years** |
| *Lebel MJ et al.* | 154 children  (12=8% de novo FA) | 6/12 (50%) Immediate GI hypersensitivity  5/12 urticaria3/12 angioedema  2/12 Eosinophilic enteropathy | Eosinophilia 77% under Tacrolimus)  52% under cyclosporine | Cow’s milk  Eggs  Peanuts  Nuts  Lentil  Beef  Horse  Lamb  Fish  Legumes  5/12 Multiple FA | 2/9 (under tacrolimus)  **5 and 8 years** |
| *Marcus N et al* | 111 children  (17=15.3% de novo FA) | 3/111 (2.7%) anaphylactic shock  8/111 (7.2%) Eosinophilic GI disease (diarrhoea, vomiting, failure to thrive)  Pruritus, rash | | Not specified | 97 PTAA (not only FA)  11% followed conservatively  71% conventional therapies for allergy or autoimmune disease  18% change in immunosuppressive therapy (7/17 improvement of PTAA; 7/17 complete resolution of PTAA; 13/17 not affected)  **>6 months** |
| *Mavroudi A et al.* | 3 children | 1 Mucoid bloody stools; eczema, eosinophilia  1 abdominal pain and discomfort and occasionally nausea and vomiting  1 lip swelling, facial angioedema and hoarseness of voice | | Cow’s milk  Sesame seeds,  white fish and egg proteins | 8 years  2 years  2 years |
| Frischmeyer-GuerrerioPA et al | 25 children with FA after organ transplantation (23/25 liver transplant) | 15angioedema  15 urticaria  6 eczema  10 lower respiratory tract symptoms  3 upper respiratory tract symptoms  20 gastrointestinal symptoms 15/ 25 patients’ biopsy-confirmed eosinophilic GI disease,  14 persistent GI symptoms  12/ 15 patients with eosinophilic gastroenteropathy also had acute food reactions | | Egg (19)  milk (19), peanut (10),  soy (9), wheat (9), ‘‘other’’ (14)  **25 multiple FA (mean 4.5 foods)** | 3/25 (12%)  **2.4 years (mean time in the clinic)**  **6.1 years (mean time by phone)**  7/25 children were able to reintroduce at least 1 food at a median of **30.6 months** |
| *Noble C et al.* | 60 children  (12=20% de novo FA) | 6/12 (50%) anaphylaxis  4/12 (33%) EoE | 8 immediate  2 delayed  2 mixed | Eggs  wheat  nuts  soy  Cow’s milk  Seafood  **9/12 multiple FA** | n.i. |
| *Ozbek OY et al. 2009* | 28 children  (6=21% de novo FA) | 3/6 Eosinophilic GI disease  5/6 Diarrhea,  5/6 vomiting  6/6 hypereosinophilia | | 6/6 Cow’s milk  6/6 Egg  5/6 Wheat  1/6 Lentil  1/6 Peach  **6/6 multiple FA** | n.i.  **25.4 months (mean time)** |
| *Ozbek OY et al. 2015* | 28 children | / | | / | 4/6 (7-38 months)  6 ED  2 switches to cyclosporine (1/2 FA resolution)  1 switch to sirolimus (1/1 FA resolution)  3/6 continued Tacrolimus (2 complete recover  1 partial recover)    **5 years** |
| *Käppi T et al.* | 43 children (8=18% de novo FA) | 1 EoE  1 anaphylaxis  3 angioedema  1 urticaria  1 pruritus  1 bronchial obstruction  3 abdominal pain  1 diarrhea | 6 immediate  2 mixed/delayed | Cow’s milk  Beans  Hazelnuts  Egg, soy, wheat, peanuts,  Date plum,  Pistachio nuts,  Fish  **2/8 multiple FA** | n.i. |
| *Mori F et al.* | 12  (7=58% de novo FA) | (3/7) Anaphylaxis, Urticaria  OAS, Angio-oedema,  Vomiting, abdominal pain, diarrhea, | | Peanuts,  Egg, Hazelnuts,  Lentil, Wheat,  Sole,  Code,  Soy, Cow’milk,  Peach  **5/7 multiple FA** | 3/6  **10 years** |
| *Mitsui M et al.* | 206 children  (42= 20.4% de novo FA) | 86.7% Urticaria/angioedema  63.3% GI symptoms | 30 (71.4%) IgE mediated  10 (23.8%) non IgE-mediated  2 mixed | Egg  Cow’s milk  Fish,  Soy,  Wheat,  Sesame,  Peanuts,  Buckwheat  Scallops  **21/42 (50%) multiple FA** | n.i. |
| *Brown C et al.* | 50 children  (12=24% de novo FA) | Angioedema, vomiting,  Eczema, pruritis,  Urticaria,  Enteropathy with eosinophilic colitis, | | Egg  Cow’s milk,  Peanuts,  Prawns,  Soy,  Sesame,  Hazelnut,  Cashew,  Fish,  Walnut,  Mango  **4/12 multiple FA** | n.i. |

\*Abstract

Legend:

n.i.= not investigated

FA= food allergy

GI= gastrointestinal

FU = follow up

EoE= eosinophilic oesophagitis

ED= elimination diet

PTAA= post-transplant allergy, autoimmunity, and immune-mediated disorders

OAS= Oral Allergy Syndrome