Welcome to the FIT Board Review Corner, prepared by Amar Dixit, MD, and Christin Deal, MD, senior and junior representatives of ACAAI’s Fellows-In-Training (FITs) to the Board of Regents. The FIT Board Review Corner is an opportunity to help hone your Board preparedness.

Review Questions

Allergy and Immunology Review Corner: Middleton’s Allergy Principles and Practice, 8th Edition
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Chapter 77b (pages 1246-1255): Anaphylaxis
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1. Patients taking which of the following medications may have enhanced susceptibility to episodes of scombroidosis?
   a. Cephalosporins
   b. Griseofulvin
   c. Isoniazid
   d. Disulfiram

2. Elevated levels of which of the following hormones associated with menses may predispose patients to anaphylactoid reactions to the infusion of luteinizing hormone-releasing hormone (LHRH) and intradermal injections of medroxyprogesterone?
   a. Estrogen
   b. Progesterone
   c. Luteinizing hormone (LH)
   d. Follicle-stimulating hormone

3. Which of the following laboratory tests reaches peak levels at 60-90 minutes after onset of anaphylaxis?
   a. Serum catecholamines
   b. Plasma histamine
   c. Urinary histamine metabolites
   d. Serum tryptase

4. Which of the following medications interfere with endogenous compensatory responses to hypotension during anaphylaxis?
   a. ACE-inhibitors
   b. β-blockers
   c. Monamine oxidase inhibitors (MAOIs)
   d. Tricyclic antidepressants (TCAs)
5. Which of the following is the appropriate range of dosing and concentration of epinephrine to be administered to an adult intramuscularly in the lateral thigh?
   a. 0.1-0.3 mL of 1:10,000 solution
   b. 0.3-0.5 mL of 1:10,000 solution
   c. 0.1-0.3 mL of 1:1,000 solution
   d. 0.3-0.5 mL of 1:1,000 solution

6. What is the drug of choice in treatment of anaphylaxis in patients on β-blockers?
   a. Atropine
   b. Dopamine
   c. Glucagon
   d. Vasopressin

7. Which of the following is the best predictor for a serious recurrence of anaphylaxis?
   a. Asthma
   b. Ability to avoid exposures to triggering agents
   c. Serious symptoms at time of initial event
   d. Amount of allergen necessary to produce reaction

8. Based on a compilation of 1784 patients which were reviewed in a published series entitled “Anaphylaxis and anaphylactoid reactions,” the most common clinical manifestation of anaphylaxis is which of the following?
   a. Cutaneous symptoms
   b. Respiratory symptoms
   c. Gastrointestinal symptoms
   d. Cardiovascular symptoms

9. Which of the following describes non-IgE-mediated events compared to IgE-mediated events that occur in the operating room?
   a. Slightly lower incidence of cutaneous manifestations in operative non-IgE mediated events compared to operative IgE-mediated events
   b. Cardiovascular collapse occurs more often in operative non-IgE-mediated events than IgE-mediated events
   c. Surgical non-IgE-mediated events are more severe than surgical IgE-mediated events
   d. Wheezing and bronchospasm occurs more frequently in operative non-IgE-mediated events than operative IgE-mediated events
10. Which of the following predisposes one to a late phase response in anaphylaxis?
   a. Immediacy of symptoms
   b. Severity of the first response
   c. Delayed administration and underdosing of epinephrine
   d. Lack of corticosteroid administration
Answers:

1. C. Isoniazid, p. 1249 “Restaurant Syndromes and Scombroidosis”

Scombroidosis, which is histamine poisoning caused by ingestion of histamine in spoiled fish may mimic anaphylaxis. Patients taking isoniazid appear to have increased susceptibility to episode of scombroidosis. Alcohol-induced flush may also mimic anaphylaxis and has been linked to drugs including disulfiram, griseofulvin and cephalosporins.

2. B. Progesterone, p. 1250 “Other Differential Diagnoses”

Patients with progesterone-related anaphylactic episodes have anaphylactoid reactions with the infusion of LHRH and intradermal administration of medroxyprogesterone. The mechanism of this disorder is unknown but increased levels of progesterone associated with menses may predispose patients to anaphylactic events. LHRH analog therapy is beneficial. The disorder should be suggested in women, typically over age 35 with recurrent episodes of anaphylaxis with temporal relationship with menstrual cycle.

3. D. Serum Tryptase, p. 1250 “Laboratory Findings”

Serum tryptase levels peak 60-90 minutes after onset of anaphylaxis and persist longer than plasma histamine levels do. Elevated tryptase levels are sometimes seen up to 5 hours after symptom onset and rarely can persist several hours longer. Plasma histamine levels rise within 5-10 minutes of onset of anaphylaxis and remain elevated for 30-60 minutes. Urinary histamine metabolites are elevated for a longer period.

4. A. ACE-inhibitors, p. 1251 “Prevention and Management”

Patients who are at risk for anaphylaxis should not take the following medications if other agents will suffice: β-adrenergic blockers, ACE inhibitors, angiotensin receptor blockers (ARBs), MAOIs and TCAs. ACE inhibitors and ARBs interfere with endogenous compensatory responses to hypotension. β-blockers decrease efficacy of epinephrine whereas MAOIs and some TCAs affect the use of epinephrine through side effects.

5. D. 0.3-0.5 mL of 1:1,000 solution, p. 1252 “Administered by Physician” and Table 77-7 “Drugs and Other Agents Used in Anaphylaxis Therapy”

The concentration of epinephrine for IM administration is 1:1000. The dose for adults is 0.3 to 0.5 mL of 1:1000 solution or 0.3 to 0.5 mg. In children, the dose of IM epinephrine is 0.01 mg/kg up to the maximal adult dose. The dose of epinephrine may be repeated two to three times as needed, at intervals of 5 to 15 minutes.

6. C. Glucagon, p. 1253-1254, Table 77-7 “Drugs and Other Agents Used in Anaphylaxis Therapy” and “Glucagon”

Patients taking β-blockers may demonstrate resistance to standard therapies for anaphylaxis.
(epinephrine). Glucagon is the drug of choice in patients using β-blockers. Atropine is used for bradycardia. Dopamine is a vasopressor and the rate of infusion is titrated to blood pressure response. Vasopressin is an example of another vasoconstrictor besides epinephrine that may be used in cardiovascular collapse from anaphylaxis.

7. C. Serious symptoms at time of initial event, p. 1255 “Prognosis for Recurrence”

Prognosis for patients with recurrent anaphylactic episodes is reasonably good. Prognosis is based on natural history, amount of allergen necessary to produce reaction, and ability to avoid triggering agents. However, the best predictor for recurrence was presence of serious symptoms during initial event. In one study cited, neither asthma nor atopy were risk factors for recurrence of anaphylaxis.

8. A. Cutaneous symptoms p. 1246, “Signs and Symptoms” and Table 77-6 “Signs and Symptoms of Anaphylaxis: Frequency of Occurrence”

The reviewed series included one series of patients with exercise-induced anaphylaxis or idiopathic anaphylaxis, one series limited to pediatric patients and another limited to randomly selected patients of all ages. The most common manifestation in the cases were cutaneous, followed by respiratory, cardiovascular and gastrointestinal.

9. A. Slightly higher incidence of cutaneous manifestations compared to operative IgE-mediated events, p. 1247 “Signs and Symptoms”

Significant differences may exist between surgical IgE-mediated and non-IgE-mediated events. The incidence for cutaneous manifestations for operative IgE-mediated events is 75% and is slightly higher for non-IgE-mediated events. Cardiovascular collapse, wheezing and bronchospasm are significantly more common during IgE-mediated episodes in the operating room. Surgical IgE-mediated events are also more severe than non-IgE-mediated episodes.

10. C. Delayed administration and underdosing of epinephrine, p. 1247 “Signs and Symptoms”

Biphasic anaphylaxis describes an anaphylactic episode that can abate and then recur several hours after symptoms have disappeared. Most biphasic reactions occur within the first 8 hours after the first reaction has resolved, but recurrent episodes have been reported as late as 72 hours. Exact incidence of biphasic reactions is unknown but range from 1 to 20% in reports. The severity of the second response also ranges from mild to severe. Delayed administration and underdosing of epinephrine predisposes to late phase response. No clear evidence shows that recurrent response can be surprised by corticosteroids.