

5. Macdonald AG, Graham IH: Suxamethonium apnea in a pregnant patient. *Br J Anaesth* 40:711-712, 1968
6. Blitt CD, Petty WC, Alberternst EE, et al: Correlation of plasma cholinesterase activity and duration of action of succinylcholine during pregnancy. *Anesth Analg (Cleve)* 56:78-83, 1977
7. Aguilar JA, Boldrey EB: The effect of Arfonad on the monkey. *ANESTHESIOLOGY* 21:3-12, 1960
8. Deacock AR deC, Davies TDW: The influence of certain ganglionic blocking agents on neuromuscular transmission. *Br J Anaesth* 30:217-225, 1958
9. Deacock AR deC, Hargrove RL: The influence of certain ganglionic blocking agents on neuromuscular transmission. *Br J Anaesth* 34:357-362, 1962
10. Dale RC, Schroeder ET: Respiratory paralysis during treatment of hypertension with trimethaphan camsylate. *Arch Intern Med* 136:816-818, 1976
11. Wilson SL, Miller RN, Wright C, et al: Prolonged neuromuscular blockade associated with trimethaphan: A case report. *Anesth Analg (Cleve)* 55:353-356, 1976
12. Tewfik GI: Trimethaphan—its effect on the pseudocholinesterase level of man. *Anaesthesia* 12:326-329, 1957
13. Sklar GS, Lanks KW: Effects of trimethaphan and sodium nitroprusside on hydrolysis of succinylcholine *in vitro*. *ANESTHESIOLOGY* 47:31-33, 1977
14. Lewis PE, Cefalo RC, Naulty JS, et al: Placental transfer and fetal toxicity of sodium nitroprusside. *Gynecol Invest* 8:46, 1977

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## Prevention of Anaphylaxis to Contrast Medium

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Anaphylactic reactions to the injection of contrast medium are rare, but potentially catastrophic. This is a report of the prevention of an anaphylactic reaction in a patient who had had documented anaphylaxis in response to contrast medium only eight hours earlier.

### REPORT OF A CASE

A 50-year-old white woman who had a history of progressive angina was admitted for diagnostic cardiac catheterization. She specifically denied allergies to iodine and iodine-containing products. After premedication with meperidine, 75 mg, and promethazine, 25 mg, im, a left ventriculogram was performed through a catheter inserted via the right femoral artery. A pressure-injected 45-ml bolus of meglumine diatrizoate was given, after which the patient complained of a "cold, clammy feeling," and a diffuse maculopapular rash developed. The patient was treated with diphenhydramine, 50 mg, and methylprednisolone, 100 mg, iv, which relieved her symptoms. Catheterization of the coronary arteries was then performed, and 10 ml contrast medium injected. The patient immediately became dyspneic, and wheezing was heard over the lung fields. Arterial blood pressure was 40/0 torr. The patient was placed in Trendelenburg position and iv fluids were given rapidly. Oxygen was administered by face mask, and 10 ml epinephrine (1:10,000) were administered iv. Blood pressure improved and the wheezing subsided. The study was terminated.

Eight hours after the episode of anaphylaxis, the patient's right leg was discovered to be cold and pulseless. The decision was made to perform a femoral-artery thrombectomy with

local anesthesia. Because of difficulty in locating the thrombus, angiography was necessary. Methylprednisolone, 1 g, iv, was given 30 min, and diphenhydramine, 25 mg, 5 min prior to injection of the contrast medium. Meglumine diatrizoate, 30 ml, was injected into the femoral artery, with no change in arterial blood pressure or other vital signs. The patient's chest remained clear to auscultation and no rash appeared. Two subsequent injections of 50 ml of each contrast medium were preceded by diphenhydramine 25 mg, iv, and likewise resulted in no evidence of a reaction. The patient was discharged from the hospital on the fourth postoperative day.

### DISCUSSION

Anaphylaxis to contrast medium was first attributed by Mann<sup>1</sup> to histamine release. Subsequent work has shown that additional chemical mediators, such as serotonin, plasma kinins (kallidin I, kallidin II) and slow-reacting substance (SRS-A) play major roles in this reaction.<sup>2</sup> Manifestations of anaphylaxis characteristically may include urticaria, bronchospasm, laryngeal edema, hypotension, nausea, vomiting, diarrhea, and motor convulsions.<sup>3,4</sup> The treatment of anaphylaxis includes administration of epinephrine, aminophylline, fluids, corticosteroids and vasopressors, when necessary. Upper-airway obstruction from laryngeal edema may necessitate tracheal intubation. Pathologic studies by James and Austen<sup>5</sup> showed that upper airway edema and obstruction were the predominant abnormalities in fatal cases of anaphylaxis.

Until recently, this reaction was not reproducible in an animal model as a response to a specific contrast medium,<sup>6</sup> although it was well known as a clinical entity. Although the reaction to contrast medium has not been shown to be IgE-mediated<sup>7</sup> and no antibody has been identified, histamine is released.<sup>8,9</sup> Pretreatment with antihistamines will prevent some of the symptoms of anaphylaxis, but antihistamines

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are not effective after the reaction has begun, nor will they alter the responses due to other chemical mediators.<sup>2,10,11</sup> General anesthesia with ether or cyclopropane does not prevent anaphylaxis, although the reaction may be modified by these agents.<sup>12</sup> The prophylactic benefit of corticosteroids has not been well established. Schatz *et al.*<sup>13</sup> showed that 5 of 42 (11.8 per cent) patients who had histories of anaphylactoid reactions to contrast media had repeat reactions when re-exposed to the media despite antihistaminic pretreatment. Zweiman *et al.*<sup>14</sup> pretreated patients with histories of anaphylactoid reactions to contrast media with high-dose orally administered steroids for 18 hours before re-exposure. Repeat reactions were seen in one of nine (11 per cent) patients. Miller *et al.*<sup>9</sup> reported a case in which high-dose oral steroid pretreatment for 72 hours was used successfully to prevent anaphylaxis on re-exposure to the contrast medium in a patient with a well-documented previous anaphylactic reaction.

Our patient had had a major anaphylactic reaction eight hours prior to her operation, and had been appropriately and successfully resuscitated. Although methylprednisolone, 100 mg, iv, used to treat the initial rash during catheterization, failed to prevent the subsequent anaphylaxis, a much larger dose of corticosteroid given intraoperatively with an antihistaminic agent prevented all clinical manifestations of a reaction to three injections of contrast material. The results in this case suggest that pretreatment with a large dose of corticosteroid and antihistamines may be beneficial in preventing anaphylaxis in patients known to have idiosyncratic reactions to contrast media. When emergency proce-

dures requiring contrast studies are necessary for these susceptible patients, pretreatment in this fashion should be considered.

#### REFERENCES

1. Mann MR: The pharmacology of contrast media. *Proc R Soc Med* 54:473-476, 1961
2. Scheffer AL: Therapy of anaphylaxis. *N Engl J Med* 275:1059-1061, 1966
3. DeNosquo N: Reactions to contrast media. *Radiology* 91:92-95, 1968
4. Kelly JF, Patterson R: Anaphylaxis. *JAMA* 227:1431-1436, 1974
5. James LP, Austen KF: Fatal systemic anaphylaxis in man. *N Engl J Med* 270:597-603, 1964
6. Lasser EC, Sovak M, Lang JH: Development of contrast media idiosyncrasy in the dog. *Radiology* 119:91-95, 1976
7. Patterson R, Schatz M: Administration of radiographic contrast medium after a prior adverse reaction. *Ann Intern Med* 83:277, 1975
8. Lasser EC, Walters A, Reuter SR, et al: Histamine release by contrast media. *Radiology* 100:683-686, 1971
9. Miller WL, Doppman JL, Kaplan AP: Renal arteriography following systemic reaction to contrast material. *J Allerg Clin Immunol* 56:291-295, 1975
10. Brocklehurst WE: Slow reacting substance and related compounds. *Prog Allerg* 6:539-558, 1962
11. Morrow DH, Luther RR: Anaphylaxis: Etiology and guidelines for management. *Anesth Analg (Cleve)* 55:493-499, 1976
12. Carron H: Anaphylaxis and anesthesia: A preliminary report. *ANESTHESIOLOGY* 8:625-636, 1947
13. Schatz M, Patterson R, O'Rourke J, et al: The administration of radiographic contrast media to patients with a history of a previous reaction. *J Allerg Clin Immunol* 55:358-366, 1975
14. Zweiman B, Hildreth EA: An approach to the performance of contrast studies in contrast material-reactive persons. *Ann Intern Med* 83:159-162, 1975

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## Ventricular Tachycardia Terminated by Extubation of the Trachea

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Although cardiac control is often explained in terms of intrinsic myogenic mechanisms, there is good experimental and clinical evidence that the sympathetic

and parasympathetic nervous systems exert profound and immediate control over cardiac rate, rhythm, fibrillation threshold and contractility.<sup>1</sup> Arrhythmias are commonly seen in patients with endotracheal tubes in place. Ventricular tachycardia terminated by removal of an endotracheal tube has not yet been reported. We report such a case and discuss possible mechanisms in terms of current theories of airway reflexes and neurogenic cardiac control.

#### REPORT OF A CASE

A 45-year-old white man was admitted to the hospital with a history of incapacitating angina. His medications included nitro-

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