Dextran 40: Another Cause of Drug-induced Noncardiogenic Pulmonary Edema

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Drug-induced noncardiogenic pulmonary edema occurred in a previously healthy patient receiving dextran 40. Dextran 40 should be considered another etiologic factor of drug-induced noncardiogenic pulmonary edema when this syndrome occurs in the absence of known precipitating causes such as shock, aspiration, and overwhelming pneumonia.

Drug-induced noncardiogenic pulmonary edema has been reported in association with heroin,1 methadone,2 propanolol,3 and salicylates in excess dosage.4 Our experience with bilateral diffuse lung infiltrates, severe hypoxemia, decreased lung compliance requiring volume cycled respiration and positive end-expiratory pressure associated with dextran 40 (Rheomacrodex) has led us to conclude that this drug is another agent capable of producing drug-induced noncardiogenic pulmonary edema that might lead to the adult respiratory distress syndrome.

CASE REPORT

A healthy, nonallergic, 220 pound, 30-year-old fireman fell from a motorbike, sustaining minor soft tissue injuries of both lower extremities. No fractures occurred, and the patient did not lose consciousness. On admission, his legs were tender, but no definite phlebitis was present. The lungs were clear to percussion and auscultation. An x-ray film of the chest was clear. Arterial blood gas analysis was not performed. Routine laboratory work including complete blood count, chemistry profile, and urinalysis were within normal limits. Despite negative venograms of the lower extremities, heparin, and subsequently dextran 40 (Rheomacrodex) 2000 mg per day, were administered intravenously for suspected phlebitis in swollen and painful legs. Four days after the initiation of dextran 40, the patient became tachypneic and dyspneic. Pneumothorax were absent. Auscultation of the lungs revealed diffuse rales bilaterally. Arterial blood gas analysis with the patient breathing ambient air revealed pH 7.47, Po2 33, Pco2 37. There were no significant changes in the complete blood count or chemistry profile. The urine was free of fat. Diffuse alveolar infiltrates without cardiomegaly were noted on chest x-ray examination (Fig 1A). After failure to oxygenate the patient adequately with an inspired oxygen concentration of 80 percent administered via a rebreathing mask, the patient was intubated and placed on a volume-cycled respirator (Emerson) at 8 cm H2O positive end-expiratory pressure. Heparin and dextran 40 were withheld. Adequate oxygenation was achieved with inspired oxygen concentrations of 50 percent at 8 cm positive end-expiratory pressure. Within 12 days, the patient had been completely weaned from the respirator and on room air, blood gases revealed pH 7.41, Po2 90, Pco2 37. The chest x-ray film showed complete clearing (Fig 1B).

DISCUSSION

Although hemodynamic measurements such as central venous pressure and pulmonary wedge pressures were not determined, it is unlikely that the pulmonary edema pattern noted on the x-ray film was cardiogenic in nature in view of the absence of abnormal auscultatory findings, electrocardiographic or enzyme changes. Inspection of the patient's intake and output ruled out fluid overload as a possible cause of the bilateral alveolar infiltrates. Data and Nies,5 in their recent extensive review, noted that dextran 40 does cause plasma expansion that can

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precipitate congestive heart failure in borderline situations. It is unlikely that this was the cause of the pulmonary edema in view of the excellent cardiac status of this man. At no time in the patient’s hospital course were any of the well-known conditions associated with the picture of edema of the adult respiratory distress syndrome such as shock, aspiration, overwhelming pneumonia, pulmonary embolism, hemorrhage, or hypoxemia detected prior to the onset of the tachypnea and dyspnea. Additionally, none of the compounds associated with drug-induced noncardiogenic pulmonary edema such as heroin, methadone, proprpyphene, or salicylates were administered to this patient.

It is uncertain which mechanism leads dextran 40 to other drugs to produce capillary leakage in the lungs which manifests itself as noncardiogenic pulmonary edema. Such pulmonary capillary leakage and subsequent pulmonary edema were not included among the adverse reactions to dextran 40 noted by Data and Nies. Sensitivity to the dextran polymer itself or to possible bacterial contaminants in commercial dextran have been associated with various allergic reactions including anaphylaxis. It is unlikely that the allergic mechanism was operative, as this was the patient’s first apparent exposure to dextran 40. Bailey and colleagues have reported that subtle exposure to dextran, such as might occur with contamination of commercial sugar, could serve as a potential source of sensitization in patients who later react to dextran. Whether or not such previous sensitization occurred in our patient cannot be determined. Anaphylaxis is ruled out as the cause of the pulmonary edema because of the four-day period between the initial dose of dextran 40 and the development of tachypnea and dyspnea. It is most likely that the drug had a direct toxic effect upon the pulmonary capillaries similar to that described for the pulmonary edema seen with methadone.

Heparin potentiates the effect of dextran 40. It is recommended that the dosage of dextran 40 be lowered when it is administered concomitantly with heparin. There was no readjustment of the dextran 40 dose in our case. It is conceivable that heparin potentiated the dextran 40 and facilitated the chain of events that caused the alveolar capillary leakage.

In view of the absence of any of the usual etiologies associated with drug-induced noncardiogenic pulmonary edema, this patient demonstrates that dextran 40 should be considered a possible etiologic factor when pulmonary edema and the syndrome of adult respiratory distress occur when this drug is being administered.

REFERENCES


Saphenous Vein Graft from Aorta to Coronary Vein with Production of Continuous Murmur

A Complication of Coronary Artery Bypass Surgery

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A saphenous vein graft was inadvertently placed from the aorta to the coronary vein adjacent to the proximal left anterior descending coronary artery in a 53-year-old man with symptomatic coronary artery disease. The postoperative finding of a continuous murmur led to cardiac catheterization and successful surgical correction. The postoperative finding of a continuous murmur must alert the clinician to this possible technical error.

Complications of coronary artery bypass surgery, which include loss of graft patency, myocardial infarction, and death, are well documented in the literature. The inadvertent placement of a saphenous vein graft from the aorta to a coronary vein has not been reported previously. The discovery of a new continuous murmur in the postoperative state must alert the clinician to this possibility since surgical correction is indicated.

CASE REPORT

Six weeks prior to admission, a 53-year-old man underwent coronary artery bypass surgery with saphenous vein grafts placed from the aorta to the left anterior descending, obtuse marginal, and posterior descending coronary arteries. Prior to surgery, there was left ventricular antero-apical hypokinesis with an ejection fraction of 53 percent and circumferential fiber shortening rate of .71 circumferences/second. At the time of admission, he complained of chills and fever of two days’ duration.

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SAPHEous VEIN Graft