

Title: USE OF OXYGEN ENRICHED GAS MIXTURES DURING ANESTHESIA FOR PATIENTS TREATED WITH BLEOMYCIN

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Introduction. Patients undergoing surgery with general anesthesia after receiving bleomycin therapy, are reported to have an increased risk of developing the adult respiratory distress syndrome (ARDS) postoperatively.^{1,2} This has been attributed to an interaction between the bleomycin sensitized lung and increased FIO₂ used intraoperatively.¹ The use of minimally oxygen enriched (less than 26 percent) gas mixtures has been advocated. In an attempt to confirm the necessity of such a potentially hazardous management scheme, we performed a retrospective analysis of this patient group at our institution.

Methods. The hospital records of all patients from 1977-1981 receiving a general anesthetic subsequent to bleomycin therapy for testicular carcinoma at the Hospital of the University of Pennsylvania were studied retrospectively. Each one received combination chemotherapy, including high doses of bleomycin preoperatively. The intraoperative anesthetic management was determined by the staff anesthesiologist involved in the case. Inspired gas tensions were monitored polarographically in all cases. For the analysis, patients were divided into two groups, where Group I had received a gas mixture containing 30 percent, or more, oxygen, and Group II had received less than 27 percent oxygen. The P(A-a)O₂ was calculated, both pre and postoperatively, where blood gas data was available using an alveolar air equation with a respiratory quotient of 0.9 at an FIO₂ of 0.21. The paired determinants were compared within each group using a student's t-test for paired data. The level of significance used was p<0.05.

Results. The data is presented in the tables. The operations performed were, in most cases, retroperitoneal lymph node dissections with resection of residual malignant, benign, or necrotic tissue. These operations required an average anesthetic duration of 7.4 hours in Group I. During this time, the patients were exposed to a mean FIO₂ of 0.38. The P(A-a)O₂ in both groups of patients did not change significantly after surgery. No case of respiratory failure was noted. All patients recovered and left the hospital within two weeks.

Discussion. The mean dose of bleomycin administered to Group I was intermediate to that received by the patients that succumbed to ARDS in Goldiner's¹ (426+181mg) and Nygard's² (120+0mg) series. The interval between bleomycin therapy and surgery

in Group I was intermediate between the intervals reported by the other two groups.^{1,2} The patients in Group I were exposed to oxygen concentrations of similar magnitude and for longer periods of time than the patient reported by Goldiner¹ who developed ARDS; none developed respiratory failure. There were no increases in P(A-a)O₂ postoperatively. This measurement becomes elevated early during oxygen toxicity³ and during ARDS. In conclusion, 1) the data presented do not indicate an increased incidence of ARDS when patients who have received high doses of bleomycin undergo general anesthesia with oxygen enriched gas mixtures; 2) the available evidence does not support the use of low inspired oxygen concentrations during anesthesia in this patient population at risk of hypoxemia.

References.

1. Goldiner PL, et. al.: Factors influencing postoperative morbidity and mortality in patients treated with bleomycin. *Br Med J*, 1:1164 1978
2. Nygard, Knut, et. al.: Pulmonary complications after bleomycin, irradiation and surgery for esophageal cancer. *Cancer*, 41: 17 1978
3. Caldwell, Peter RB, and Weibel ER: Pulmonary oxygen therapy in pulmonary diseases and disorders. Edited by A. P. Fishman, McGraw-Hill (1980).

Table I		Table II						
Group	Age (Years)	Bleomycin Dose (mg)	Interval Between Bleomycin and Surgery (months)	Group	Duration of Anesthesia	Intraoperative FIO ₂	P(A-a)O ₂ (mmHg) Preop.	P(A-a)O ₂ (mmHg) Postop.
Group I n=11 mean±SEM	26±0.2	394±6	11±5	Group I n=11 mean±SEM	7.4±0.8	0.38±0.02	36±14	27±6
Group II n=3 mean±SEM	30±2	534±8	4±1	Group II n=3 mean±SEM	6.6±0.9	0.24±0.01	7±2	19±2