Combustion of a Nasal Catheter Carrying Oxygen


The occasional occurrence of fires and explosions associated with flammable anesthetics is well documented. The essential ingredients for such accidents are the presence of an explosive mixture and a source of energy sufficiently powerful to cause ignition. In the hospital situation the main potential source for ignition is electrosurgical equipment and static electricity.

The case we describe involved conflagration of an oxygen-carrying nasal catheter occurring under circumstances in which there appeared to be no danger.

**REPORT OF A CASE**

A 54-year-old man was hospitalized for treatment of severe heart failure. He received oxygen therapy, 5 L/min from central supply. The oxygen was led from a wall socket through a humidifier connected to a plastic double-nasal catheter. The patient, who had been sleeping, awoke suddenly to find the catheter alight. He succeeded in extinguishing the fire with his hands, but not before he suffered second-degree burns to the nostrils and left cheek (fig. 1). The catheter disintegrated from the heat (fig. 2). There was no explosion. It should be pointed out that there was no flame, hot surface, or electrical apparatus in the vicinity of the patient, and that no lubricating jelly had been applied to the catheter.

**COMMENT**

The incidence of hospital fires and explosions has significantly decreased within recent years. This is attributable to the marked reduction in the use of flammable gas mixtures, coupled with the widespread implementation of safety regulations. Such accidents have also been reported to occur from the use of oxygen without any volatile agent, either in conjunction with electrosurgical apparatus or where abrupt pressure increases generated very high temperatures. In our case neither of these situations prevailed, and it seems likely that a spark generated by a static electrical charge ignited the combustible catheter in the oxygen-enriched atmosphere at the catheter tip. On the day of the accident (August 17, 1975), the temperature in Jerusalem was 28.6°C and the relative humidity 28 percent (mean relative humidity in Jerusalem in the month of
August is 41 per cent.** As patients’ rooms are not air-conditioned, the humidity inside the room is close to that outside. The patient’s bed stood on non-conducting rubber wheels which effectively insulated it from the floor. The accumulation of static charges in patients’ beds is a well-known phenomenon in our hospital, and on very dry days nurses and patients frequently experience minor electrical shocks on touching the beds. We assume that due to the circumstances described, the patient’s body became charged with static electricity. The nasal catheter, on the other hand, through the humidified stream of oxygen, served as an effective conductor to the grounded oxygen outlet. The difference between electrical potentials provided the circumstances for the generation of a spark, which jumped the gap between the body and the tip of the nasal catheter, leading to ignition of the plastic material in the oxygen-enriched atmosphere.

In 1941, Greene reported 63 operating room explosions that were attributed to static electricity. As most of these had occurred when the atmospheric humidity was less than 50 per cent, it was recommended that relative humidity in operating rooms be maintained above 60 per cent.** It would be unreasonable to apply such a recommendation to wards or rooms of patients receiving oxygen therapy. However, simple antistatic precautions should be adopted when oxygen therapy is applied in combustible atmospheres.

REFERENCES


** Data supplied by the Israel Meteorological Institute, Department of Climate, Tel Aviv, Israel.