

FIG. 2.

302) the disc is removable and may be fitted with the nylon tube outside the housing.

The sensitivity, linearity, and speed of response of the cuvette densitometer with the modified lumen are not significantly different from those obtained using the original lumen. The machining of the Ebonite disc takes less than 1 hour and needs only standard workshop tools and techniques. A working drawing is shown in figure 2.

A Convenient and Accurate Nebulizer

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Many suggestions and types of apparatus have been proposed for nebulizing drugs such as bronchodilators during anesthesia and positive pressure breathing.¹⁻⁵ A serious problem with use of all of these nebulizers is that incorrect dosage occurs frequently. In addition, attachment of the nebulizer to inhalation equipment is often inconvenient. Need for a hand bulb or separate source of gas for nebulization and the necessity for keeping the nebulizer horizontal also present significant problems when the common jet orifice type of apparatus is used. Since bronchodilation following the administration of intravenous agents may be less predictable than after the direct inhalation route,⁶ a convenient and inexpensive technique for nebulizing bronchodilator drugs is described.

Recently, pressurized, valved cartridges containing aerosol suspended drugs have become available and provide accurate dose delivery with each valve depression. The cartridge of isoproterenol ** fits into a casing which is particularly suitable for anesthesia and inhalation therapy apparatus. It contains a fine particle suspension of 2.0 mg./ml. isoproterenol sulfate

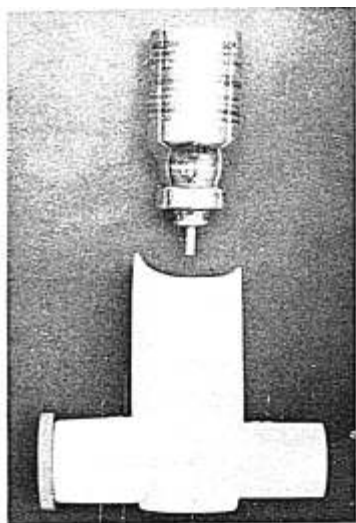


FIG. 1. Pressurized cartridge containing isoproterenol and casing with 15 mm. adapter.

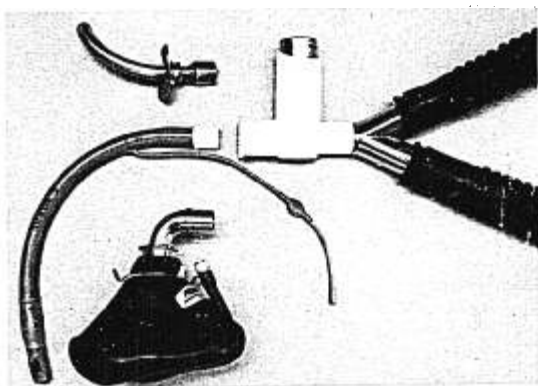
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** Medihaler-Iso.

(USP) in an inert propellant. An exact amount of 0.075 mg. is delivered with each valve depression. The drug is micronized so that the

FIG. 2. Casing and cartridge interposed between endotracheal tube and Y-piece of circle carbon dioxide system with corrugated tubes. Note alternate fitting to tracheostomy or elbow and mask.



mean mass diameter is less than 5μ . Approximately 85 per cent of the particles are within the 0.5 – 7.0μ range. The micronized material is suspended in a freon system and packaged in the pressurized cartridge.

The in-line plastic casing containing the cartridge (fig. 1) is interposed between a conventional anesthesia rebreathing system and an endotracheal tube. The casing may also be interposed between a ventilator with non-rebreathing valve and an endotracheal tube, a mask and elbow or mouthpiece, or a tracheostomy tube with 15 mm. adapter. This casing is close to the airway and the nebulized drug does not "rain out" into the anesthesia equipment. It is easily cleaned and has a dead space of less than 20 ml. Both casing and cartridge have the advantage of versatility, convenience and economy and can be stored in any anesthesia machine for immediate use.

We have utilized this in-line adapter for the nebulization of isoproterenol on 25 occasions within the past year. The following cases illustrate some of our experiences:

Case 1. A patient was anesthetized for cholecystectomy with thiopental, halothane-nitrous oxide-oxygen and the trachea intubated.

† This information and the material tested were supplied by Dr. Fred J. McBreath, Assistant Director, Clinical Investigation, Riker Laboratories.

When the surgeon applied traction to the gallbladder, the anesthetist was unable to inflate the lungs and audible wheezing occurred. The nebulizer was interposed between the Y-piece of a circle carbon dioxide absorption system and the endotracheal tube (fig. 2) and the cartridge valve was depressed five times. Within one minute, the lungs became easy to inflate and within ten minutes, wheezing disappeared.

Case 2. The trachea of a patient in status asthmaticus was intubated and the patient placed on a respirator. Fifty per cent oxygen was administered with adequate humidification. Intermittent injections of intravenous morphine were given to prevent reaction to the endotracheal tube. The nebulizer was interposed between the endotracheal tube and "Q" circle of a Bird respirator. Bronchodilator treatment was initiated and within one hour the airway pressure, indicated on the ventilator manometer, was reduced and the patient gradually awakened. Within the next hour, secretions became watery and profuse. By the following morning, the patient's condition was greatly improved.

Case 3. A patient was anesthetized with cyclopropane via an endotracheal tube and contrast media injected by the surgeon into the portal circulation. Within seconds, audible wheezing occurred, the lungs were virtually

impossible to inflate and the patient became grossly cyanotic. The nebulizer was interposed between the slip joint of the endotracheal tube and the Y-piece of the circle carbon dioxide absorption system (fig. 2). The cartridge was squeezed ten times and within 60 seconds, gas was able to enter the lungs and breath sounds were heard. Five minutes after the initiation of nebulization of isoproterenol, the cyanosis disappeared.

CONCLUSION

The clinical experience with this convenient, effective and accurate nebulizer during the past year has been gratifying.

CASE REPORTS

Management of Hemorrhage Following Induced Hypotension

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Reactionary hemorrhage is one of the frequently reported complications following deliberate hypotension. Hampton and Little, in an extensive review, found an incidence of 1.16 per cent in 6,805 cases of controlled hypotension performed in the United States.¹⁻² Tough (1960) reported that there was no evidence that the risk of reactionary hemorrhage was increased owing to hypotension during anesthesia.^{3,4} Reviewing data published between 1958 and 1963, Larson found that the overall incidence of reactionary hemorrhage was 0.27 per cent in 13,264 patients subjected to deliberate hypotension.² By achieving adequate hemostasis, using pressure dressings, and allowing a slow return of arterial blood pressure to preoperative levels, McLaughlin reported only one instance of reactionary hemorrhage in one thousand consecutive cases of deliberate hypotension.^{3,5}

During 1965-67, we used controlled hypotension in 92 cases for extensive surgery of the

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head and neck and thorax. Following the precautionary measures outlined by McLaughlin, reactionary hemorrhage occurred in only one patient. In this instance, hemorrhage was precipitated by straining in the early post-operative period while changing a tracheostomy tube and after the arterial blood pressure had returned to the preoperative level. The hemorrhage was successfully managed by re-instituting hypotension for a period of three hours.

CASE REPORT

A 54 year old woman, weighing 80 kg., was admitted for treatment of a malignant mixed tumor of the right parotid gland, of 40 years duration. The tumor has been slowly but relentlessly destroying the right side of the face, which presented an open ulcerated area. Her past history included a radical excision of the tumor at the age of 16, complicated by right facial paralysis; total abdominal hysterectomy for a fibroid uterus; right radical neck dissection; first and second stages of chest flaps; and extensive irradiation to the right neck and

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