

A PORTABLE SUCTION PUMP AND ITS USES

M. A. NICHOLSON, M.D., F.A.C.A.*

MECHANICAL suction apparatus is now standard equipment in most operating and recovery rooms for the use of the anaesthetist. During the last few years many elaborate mechanical respirators and resuscitators have been made available with attached suction. These have a wide range of usefulness but their costs may be prohibitive for general use and their operation may require specialized mechanical and technical knowledge, as well as the medical personnel familiar with the pathology of the respiratory disturbance. Constant supervision and co-operative services overload budgets and, if not in frequent use, equipment may be out of order when urgently needed. Power failures, mechanical defects, non-available electric outlets, or insufficient units give a wide range of usefulness for a simple suction pump operated by hand. The illustrated photograph provides such a piece of equipment. The construction is a large-size tire pump with a reversed valve. Surgical rubber tubing connects it with an ordinary throat suction bottle with a catheter tip that can be adapted to a metal or rubber tip. The end is mounted on a hardwood base. It is sturdy, easily transported, and can be dismantled quickly for cleansing and sterilization. The total weight is about 5 lb. Pumping against a closed system pressure is reduced to 10 cm. of mercury in three or four strokes.

RANGE OF USEFULNESS

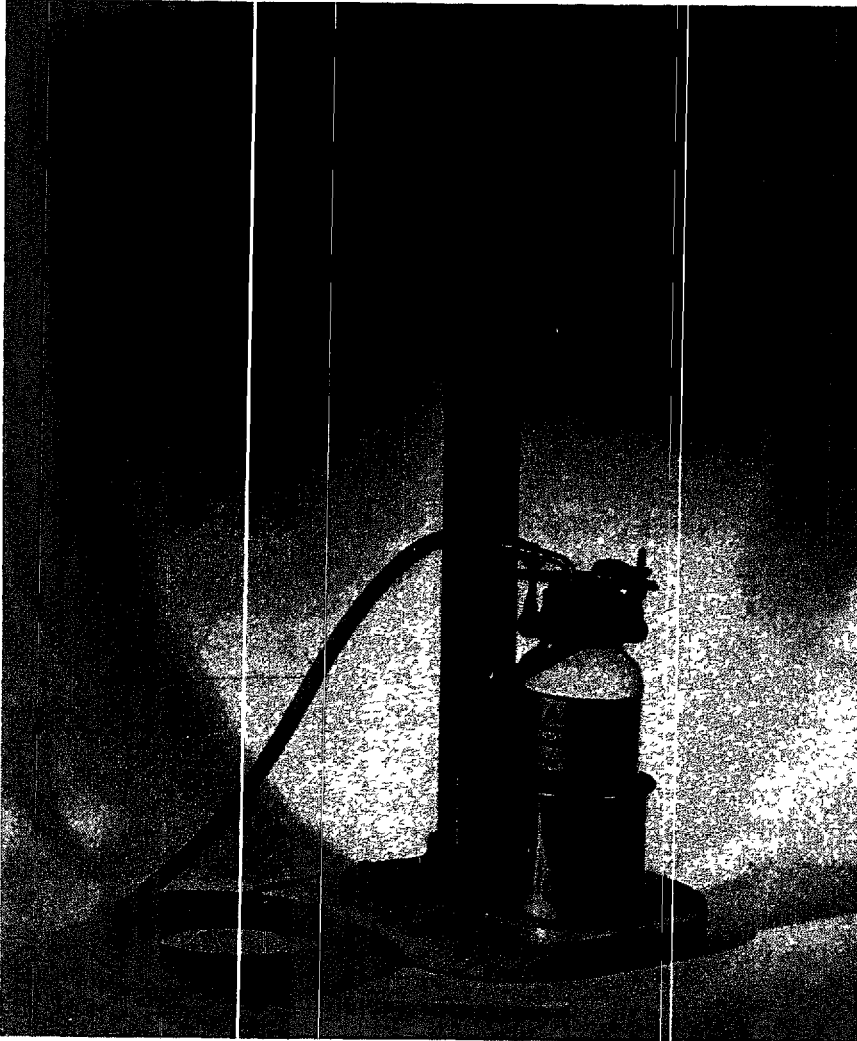
The apparatus serves as an auxiliary for the usual routines in surgery and obstetrical theatres, i.e., the removal of secretions from unconscious patients when medication is inadequate or improperly timed and balanced, or when unexpected vomitus, blood, or pus floods the respiratory tract, also, in head injuries and surgery of the head and respiratory tract. It can be used for resuscitation of the newborn.

Many diagnostic procedures are now carried out in dressing rooms or X-ray departments away from usual motor suction. The use of endoscopic instruments, orthopaedic manipulations, or the setting of fractures require brief anaesthesia. Psychiatrists frequently use intravenous barbiturates for shock therapy or diagnosis. Anaesthesia for any of these may occasionally produce an unexpected laryngospasm with various degrees of anoxia that may damage brain cells or be fatal if not readily corrected. Available suction, endotracheal tubes, and an oxygen mask provide good protection for the simplest procedures involving the use of anaesthetic agents, as well as for the treatment of medical or surgical patients in coma if secretions are obstructing the airway.

The medical uses of a practical suction apparatus are multiple. The larynx has been well termed the "death zone" by Chevalier Jackson with the epiglottis the "watch dog." The anatomical and physiological variations at different age levels, the variations in balance of central and autonomic nervous systems, and

*Saskatoon, Saskatchewan

FIGURE 1



variable responses to the multitude of drugs and their combinations can produce unpredictable situations. "Just a little pentothal" for a supposedly minor procedure may be a hazardous experience for patient and physician, and remind us how futile it is to be over-specialized in clinical medicine. Many systemic diseases including the familiar chronic respiratory infections result in coughing or impairment of swallowing. The acute infections include the obscure virus diseases (poliomyelitis being the most familiar), tetanus, and diphtheria; the many chronic degenerative lesions or new growths in the central nervous system impair muscle tone, and normal secretions accumulating in the throat crevices may be a source of infection to the respiratory tract—a source of reflex irritation, a mechanical obstruction in the airway, or a combination of all three

Many of these cases require long-term nursing, and terminal care involves some method of assisting patients to rid themselves of irritating secretions. The bedside nurse is often more aware of this than the physician. Prophylactic suction can conserve much of the patient's reserve and often helps to temporize in the harrowing decision of an elective rather than an emergency tracheotomy.

A small portable motor suction may be noisy and unavailable, and a simple available one may give the nurse and apprehensive patient assurance and prevent additional fatigue and distress. Many patients can endure much discomfort, but panic at the irritation of a nasal feeding tube which may encroach on the airway and set up trigger reflexes in the larynx. Throat suction can decrease the amount of sedation that further depresses the respiratory centre. The statisticians confront us with an increasingly large number of older people. This provides us with a changing picture of illness and will mean more nursing care for cerebral accidents, degenerative lesions, and malignancies. A recent survey reports that in Saskatchewan, one of Canada's younger provinces, the number of persons over 65 increased from 3.4 per cent to 8 per cent between 1931 and 1951.

EMERGENCY USES

Distinctions between civilian and military casualties decrease. Modern living involves exposure to violence. "It is safer for a woman to have a baby than to cross the street in traffic," was a recent comment by a well-known American obstetrician. Motor car accidents involve pedestrians of all age groups. Injuries to occupants tend to involve the head and neck, to pedestrians fractures of the extremities. All may have respiratory depression and obstruction. Increased usage of barbiturates and alcohol add to diagnostic problems of patients in coma. First-aid teaching stresses technical methods of artificial respiration and neglects the emphasis of a non-obstructed airway before mechanical aids are used. This unit resembles a fire extinguisher and could be a unit in safety equipment for firemen, policemen, and first-aid workers.

The unit was made for the writer in the workshop of the Anaesthesia Department at Charity Hospital, Louisiana, a few months ago. A full-time mechanic who had a special interest in medical equipment helped to make this Department unique. Here many simple aids were improvised for polio patients according to individual needs. A suction similar to this model was made and installed in the station wagon of a young man with a permanent tracheotomy. This enabled him to spend weekends at home or attend a drive-in theatre.

Appreciation is expressed to Dr. John Adriam and various departments of Charity Hospital for many courtesies extended to me, and to Mr. G. A. Morgavi, who assembled the portable suction pump.

SUMMARY

A simple and economical portable suction pump is described, which is suitable for hospital, first-aid, or home-nursing use. Its operation is simple and contrasts with much elaborate and costly equipment which is rarely used.

RÉSUMÉ

Une pompe portative *simple* à suction et peu dispendieuse est décrite. Elle répond aux besoins de l'hôpital et du "nursing" à la maison et peut servir à administrer les premiers soins aux blessés. Cette pompe emploie une pompe à automobile dont les clapets sont inversés. L'assemblage est illustré dans le schéma. L'opération de la pompe est simple et offre un contraste à l'équipement compliqué et coûteux dont on se sert rarement.