

## *EMERGENCIES IN GENERAL PRACTICE*

### RESPIRATORY INSUFFICIENCY IN POLIOMYELITIS AND OTHER DISEASES

BY

W. RITCHIE RUSSELL, C.B.E., M.D., F.R.C.P., F.R.C.P.Ed.

*Clinical Lecturer in Neurology, University of Oxford*

The term "bulbar paralysis," or "bulbar involvement," in diseases such as poliomyelitis is correctly used only when the disease in question is affecting brain-stem nuclei in the pons or medulla, especially the nuclei of the motor cranial nerves. Of these latter, the nuclei which cause special anxiety are those which protect the airways from inhaling foreign substances—namely, those which innervate the throat and larynx. The term bulbar paralysis should not therefore be used when the chief disability depends on paralysis of the muscles of respiration—the intercostals and diaphragm—without any difficulty in swallowing.

It should, of course, be appreciated that either paralysis of the throat or paralysis of the muscles of respiration may lead to a very similar picture of respiratory insufficiency; and yet they must be distinguished from each other, as the appropriate treatments for the two conditions are quite different one from the other. There is, moreover, a third type of respiratory difficulty which may develop either from direct involvement of the respiratory centre by disease or, if respiratory insufficiency is not quickly treated, from the effects of anoxia on the respiratory centre. Finally, there may develop any combination of these various causes of respiratory insufficiency, so that the assessment of a complicated case may present great difficulties.

#### Presenting Symptoms and Signs

The patient (child or adult) developing bulbar poliomyelitis soon becomes obviously ill and fevered, with head pain and neck stiffness. Drowsiness may alarm the relatives quickly, but often the patient remains fully conscious. Various visible palsies of cranial nerve muscles may develop, such as those concerned with eye movements, the face or jaw, the palate, pharynx, larynx, or neck. The most dangerous by far are those which affect the throat and interfere with swallowing. There may be a history of choking and subsequent refusal of food or regurgitation of fluid through the nose.

This state of affairs requires careful treatment by the general practitioner if dangerous complications are to be prevented. His task is to recognize the various paralytic and pulmonary complications which may occur, to provide first aid for these, and to supervise the safe transfer to a hospital where the necessary apparatus and skilled personnel are available. Generally that is all he should do, and no attempt need be made to diagnose in greater detail at this stage. It will, of course, be appreciated that cases of bulbar poliomyelitis can only be cared for successfully by nurses and doctors experienced in this difficult condition, and the general practitioner's efforts will be unavailing if the care of the patient after reaching hospital is left in the hands of inexperienced personnel.

#### Clinical Signs and Treatment

The patient is usually found lying in bed on his back (supine), with one or more pillows, and a most essential part of the examination is simply to listen carefully to the breathing before disturbing him in any way. When there is paralysis of the swallowing mechanism the air for each breath often bubbles through a pool of secretions in the

pharynx. This closely resembles the well-known "death-rattle," in which the deep unconsciousness of approaching death leads to a similar state of affairs. The death-rattle of pharyngeal paralysis is, however, modified by the patient's conscious effort to avoid inhaling secretions, but when, as in some cases of bulbar poliomyelitis, the patient is also stuporous, then the development of a death-rattle may cause the doctor great anxiety if the true state of affairs is not promptly recognized. When collapse of a lung has already occurred the condition may closely resemble primary pneumonia.

When this rattle in the throat develops in bulbar poliomyelitis or in some other condition, its recognition calls for immediate action, and for this the principles of postural drainage of the airways require to be understood, as their prompt application will save many lives, not only of patients with poliomyelitis but also of those with poisoning, in drowning, with concussion, and with other neurological diseases which cause either dysphagia or deep coma.

#### Postural Drainage of the Air Passages

As soon as the doctor recognizes that there is a pool of mucus in the pharynx, he must remove all pillows from the bed and turn the patient on his face (prone), with the head to one side (Fig. 1) as for first aid in drowning or

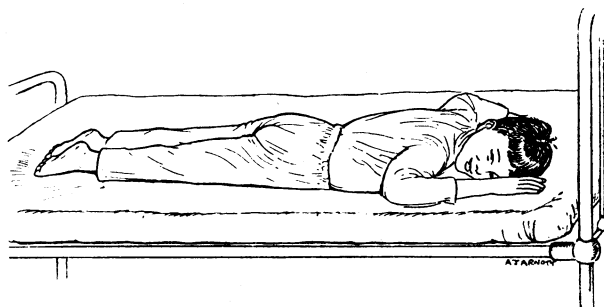


FIG. 1

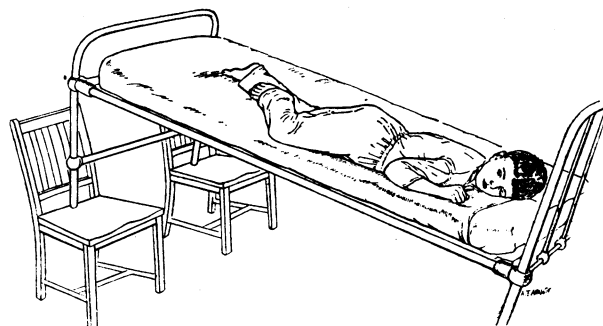


FIG. 2

after throat operations. This simple manoeuvre in itself will often save life in cases of pharyngeal paralysis, and these patients must be prevented from turning on their back into the supine position except under supervision, until the ability to swallow returns.

If, as often happens, secretions have already been inhaled by the time the patient is seen, the foot of the bed should in addition be raised at least 18 in. (45 cm.)—the height

of the average wooden chair (see Fig. 2)—and the chest squeezed manually during expiration to assist the expulsion of inhaled secretions.

The improvement in the patient's condition which follows these simple manœuvres is often most gratifying. Large quantities of secretions may flow from the patient's mouth, so that a towel under the head and plenty of swabs are helpful. Some physicians attempt to establish adequate postural drainage with the patient lying on his back, but this is much less satisfactory than with the patient in the prone or semi-prone postures, and very steep angles of tilting are required to maintain adequate postural drainage in the supine position. The prone position not only allows fluid in the pharynx to flow safely out of the mouth and nose, but also assists drainage of the trachea, as the trachea is placed more anteriorly in the neck than in the chest. The prone or semi-prone posture should therefore be insisted on, but frequent changes of posture under supervision to right and left semi-prone, and to right and left lateral are helpful. The lowest placed lung may accumulate secretions, therefore the foot of the bed should be well raised for a short time before and after changes of posture to ensure that dislodged secretions flow safely out of the lungs, and not into healthy lung tissue.

#### Paralysis of Respiration

The airways having thus been cleared, it is now possible to observe whether the strength of spontaneous respiration is sufficient or whether there is also a developing paralysis of the respiratory muscles. The strength of the respiratory excursions may be judged by inspecting the movements of the chest and abdomen, and by listening with a stethoscope over the trachea. In most cases of bulbar poliomyelitis with paralysis of swallowing sufficient strength of respiration is maintained provided that the airways are clear and the lungs are healthy. If, however, pulmonary atelectasis or other lung complications have been allowed to develop, even a slight degree of respiratory weakness may lead quickly to a critical state of affairs in which artificial respiration as well as postural drainage is required to save life. Bronchoscopy may also be necessary.

Death in poliomyelitis is usually due to respiratory complications, and is only rarely due to the direct effects of the virus on the brain-stem centres—brain-stem lesions are common but will recover sufficiently if life is preserved by protecting the lungs.

Even the healthy individual can choke owing to a failure of the physiological mechanisms which separate what is intended for the oesophagus from what is intended for the trachea and lungs. This separating mechanism is at the best a delicate affair, and when disordered by disease may lead to a very dangerous situation in which secretions, blood, or vomit may be inhaled into the lungs. Of these, vomit is the most dangerous, as the inhalation of acid gastric secretions on a single occasion leads rapidly to necrosis of lung tissue, which is likely to cause circulatory collapse and death a few hours after inhalation has occurred. More commonly, however, the inhalation of secretions leads to collapse of one or more lobes of the lungs. It is thus obvious that the inhalation of vomit and secretions must be carefully prevented by recognizing when this danger exists, and instituting prophylactic treatment before serious damage occurs.

*Other Conditions Requiring Similar Care.*—All severe brain disease, such as meningitis, brain abscess, or head injury, may develop accumulations of secretions in the pharynx which require postural drainage just as urgently as in bulbar poliomyelitis. Paralytic conditions which lead to similar dangers include acute infective polyneuritis (Guillain-Barré syndrome), myasthenia gravis, and botulism.

#### Transfer to Hospital

The transfer to hospital of a patient with bulbar poliomyelitis often requires careful planning. In the first place he must be made fit for transfer by full drainage of the throat and trachea by means of postural drainage as

described above. Vomiting is likely to occur in the ambulance, so the prone or semi-prone posture without pillows must be maintained on the stretcher. A doctor should accompany the patient in the ambulance, and should be prepared to raise the foot of the stretcher to improve postural drainage and to introduce some form of artificial respiration should it be necessary.

#### Artificial Respiration

As has already been emphasized, the major problem in most cases of bulbar poliomyelitis is concerned with the associated paralysis of the pharynx and larynx. However, the development of paralysis of the muscles of respiration or of the respiratory centre may greatly complicate the patient's handling and transfer.

In many of these difficult cases the services of an experienced anaesthetist are required, and the local poliomyelitis centre may be able to send an anaesthetist to accompany a difficult case during transfer. Modern methods of anaesthesia cause both unconsciousness and muscular paralysis, and thus reproduce closely the types of disorder seen in poliomyelitis. The anaesthetist should be prepared to suck out the trachea, and if necessary to pass an endotracheal tube and to maintain positive-pressure breathing during transfer to hospital.\* Mechanical suckers are of great value but are no substitute for postural drainage. Even a simple type of manually assisted respiration during transfer to hospital will greatly relieve the patient who is developing respiratory paralysis.

#### The Unconscious Patient

When the patient is unconscious there may be great difficulty in distinguishing between a disease affecting the brain-stem centres and the effects of cerebral anoxia. These are difficult cases to care for, but it is important to know that patients with bulbar poliomyelitis who become stuporous often make an excellent recovery if life can be preserved for the period of the acute illness. Every effort must therefore be made to tide these alarmingly ill patients over the early days of the acute disease, and such a patient should never be left without an experienced nurse or doctor at the bedside. It may be necessary for some days to listen to every breath. It is better to avoid attempting to reduce throat secretions with drugs such as atropine, as profuse watery secretions flow out freely and cause less harm than sticky mucus, which may soon become dangerous, and for the same reason humidification of the air may be desirable. Children with bulbar poliomyelitis are often very restless, and their clinical condition demands sedation. The use of sedatives, however, may in such cases precipitate failure of the respiratory centre, and so should not be given until mechanical methods of artificial respiration are available under experienced supervision. In such cases restlessness is often a symptom of respiratory insufficiency.

Finally, it should be pointed out that every region requires a nucleus of experts to deal with cases of threatening respiratory insufficiency, and their skill should not be dissipated on the 80% of patients with poliomyelitis whose lives are never in danger.

**Next article on Emergencies in General Practice.**—“Shock,” by Sir Heneage Ogilvie, F.R.C.S.

**Refresher Course Books.**—Copies of the first two volumes of collected articles from the Refresher Course for General Practitioners published in the *Journal* are still available at 25s. (postage 1s.) each. The first volume contains 55 articles and the second 60. Each article has been revised and brought up to date by its author.

These books may be obtained from the Publishing Manager, B.M.A. House, Tavistock Square, London, W.C.1, or through any bookseller.

\*See also *Lancet*, 1954, 1, 939.