the series. These occurred during three years (1943–1945). A few cases which were indefinite and hard to evaluate were not included in the study. From this series of reports the frequency of occurrence of severe damages can be estimated as about 1 : 10,000 or about 0.01 per cent. With percaine the figures would be a little higher. All 6 cases followed the use of percaine.

Experiments on corpses have shown that puncture of a root with intramedullary injection via the root is hardly mechanically possible. Hemorrhages due to puncture must be massive to cause damage. Such injuries are possible but not probable. In autopsy studies of humans there were no definite findings of hemorrhage or residual hemorrhage. Severe nervous symptoms can be explained on the basis of meningeal reactions. In most of the autopsy findings in humans and in experimental studies on animals it was felt that meningeal reactions were harmless and could be accepted as a cause of damage in only a few exceptional cases. Sensitivity reactions, trophic disturbances, prolonged increase of the intradural pressure and osmotic injuries are unlikely to be the causes of injuries. Chemo-toxic effects are probably the cause of the damage. It is hard to explain why so few people are affected and the supposition must be accepted that a rare individual sensitivity exists.

Marked and severe pain occurs during the injection of the anesthetic in rare instances. When pains appear during the administration of a spinal anesthetic it is recommended that the injection should be discontinued. If surgery cannot be postponed another method of anesthesia should be used. In some cases the nervous symptoms are present when the anesthesia disappears. In some cases the symptoms appear in several weeks or in a few months. The symptoms consist of paresthesias, pains and cramps, loss of the sense of touch and mobility. Flaccidity is usual in the beginning and may change into a spastic stage. Bladder and rectal difficulties are serious. Disturbances of the sexual functions may be caused by pains or sensory disturbances. Disturbances of the circulation and of sweating are rarely seen. Decubital ulcers are common. The changes are those connected with the spinal cord and its membranes while nerve roots and spinal ganglia are either very little or not at all involved.

In a few cases all evidence of injury disappears within a few days. Most cases show improvement after months or years but the final result is usually a defective healing process with more or less marked invalidism. A few patients die, usually due to bladder impairment or infections in the decubital ulcers. Respiratory paralysis and pneumonia have been mentioned as causes of death. There is no prophylaxis against injuries which may follow spinal anesthesia. Symptomatic treatment should follow when injury has occurred. The advantages of spinal anesthesia are so great that this type of anesthesia should be retained but the risk of postanesthetic injuries should cause the anesthetist to consider other, less harmful methods when spinal anesthesia is not positively indicated. Approximately 66 references.

F. A. M.

SHERWIN, L. W.: *The Pharyngeal Gasway: Its Use in Exodontia.* Dental Items Interest. **69**: 342–344 (April) 1947.

The pharyngeal gasway has advantages over other means of administering nitrous oxide-oxygen for the extraction of teeth and for minor oral operations. The patient lies on the table and is prepared in the usual man-

ner. Morphine sulfate, 1/8 gr., is given intravenously about fifteen minutes before operation if the operation is to be prolonged. A DePass mouth prop is adjusted and the face piece is removed and the tongue is pulled forward. The bulb of the pharyngeal gasway is passed into the pharynx and the tongue released. Packing is placed around the bulb and the necessary adjustments made in the gas and oxygen valves to maintain good color and regular breathing. The adjustable elbow on the stem of the gasway permits turning to either side to avoid interference with the operator.

F. A. M.

SONE, W. J.: *An Immediate Denture Service for Malformed Dental Arches Under General Anesthesia.* Dental Digest. **53**: 224–227 (May) 1947.

Alveolectomy under pentothal anesthesia was performed. The pentothal was given by the intravenous drop method. An ointment containing an antiseptic and butyn was applied to the surface of the denture. When the patient regained consciousness after the pentothal the denture was applied and removed only for cleansing purposes.

F. A. M.

WAGNER, F. W. E.: *Trichlorethylene Anaesthesia.* Irish J. M. Sc. 6 ser. 717–723 (Oct.) 1946.

Trichlorethylene is normally a colorless liquid, but trilene (the purified form in which it is supplied for anesthetic use) is colored with a trace of waxolin blue so that it can be readily distinguished from other anesthetics. Of many thousands of administrations of trilene by the author there have been no deaths which could be attributed to the anesthetic. The toxicity is extremely low. Certain precautions must be observed. Trilene is liable to decompose in the presence of light; hence it should be kept in amber bottles and stored in a dark place. In the presence of tobacco smoke the vapor decomposes and gives rise to hydrochloric acid and traces of phosgene. Trilene must never be used in closed circuit with carbon dioxide absorption. It has been shown that warm soda lime may decompose trilene into dichloracetylene, which may cause cranial nerve paralysis.

Trilene has a remarkable and powerful analgesic range. It is an excellent anesthetic for children having dental surgery. It possesses the ideal qualities for obstetrics.

Trilene has practically no effect on blood pressure. A transient irregularity and unevenness of the pulse may occur in early stages. In general the tendency is to slow the pulse. As with other anesthetics, electro-cardiographic studies show a great variety of changes during trilene anesthesia. Trilene does not act as an irritant on the respiratory tract. During short administrations, there is no undue secretion of mucus or saliva. An over-dose of trilene will cause an increase in the rate of respiration. With under-dosage the breathing becomes slow and quiet with possible stridor later.

Work of several investigators seems to show that there is little ground for apprehension as to the possibility of liver or kidney damage from trilene. Among the disadvantages of trilene are: (1) difficulty in obtaining full surgical anesthesia, (2) its action on cardiac rhythm is not yet fully explored, (3) the occasional incidence of shallow, rapid breathing awaits further study and, (4) mild convulsions have been reported but the patients recovered spontaneously. 32 references.

F. A. M.