ON THE TEACHING OF ANÆSTHESIA TO MEDICAL STUDENTS.

By WESLEY BOURNE, M.D., C.M.,
Lecturer in Pharmacology, McGill University.

To advance anaesthesia in medicine we believe that those interested in the subject must do more research work and better teaching. The quality of the latter is affected by the former. Realising these, we have, during the past three years, made some improvement at McGill University.

In research the anæsthetists work individually, but in teaching collectively for the purpose of establishing unanimity of doctrine. The student is given his first instruction in anaesthesia in the fourth year during the course in pharmacology. Here, after the theory of anaesthesia has been discussed and the behaviour of certain narcotics has been studied in the laboratory, Professor Barbour allows the anæsthetists to conduct the activities of one week in which there are two lectures of one hour each, one laboratory period of two hours, one demonstration, and, lastly, one conference of one hour. The two lectures are didactic, and deal with the details of the pharmacological actions of the general anæsthetic agents commonly used.

At the laboratory period the students, in groups of four, do the work themselves under the supervision of demonstrators. Dogs are used, half of which have had no preliminary medication, the other half being under the influence of morphine (10 mg. per kg.). It has been customary to induce anaesthesia with ether given by a cone and continued by a tracheotomy tube, a branch of which was connected to a tambour for tracings. Carotid blood pressure was also recorded on the kymograph. Now that the Department of Pharmacology has moved to the new biological building, the procedure for this present session is planned in which the observations will all be made by bloodless methods and mortality reduced to a minimum. The students will be able to maintain anaesthesia by intra-pharyngeal insufflation, and
British Journal of Anaesthesia

will follow the circulatory changes by auscultation, as well as by tracings on the kymograph, using a modified Kolls blood pressure cuff recently devised by Dr. Joseph Kaufmann and the author.

With the aid of a synopsis the students are allowed to study the pulse and respiration of normal or morphinized dogs, to induce anaesthesia with ether, using a wooden cabinet which has one side of glass and two openings. One admits air under pressure which carries with it anaesthetic vapour, and the other acts as an exit. Here they note the behaviour of the animal, the reflexes, the movements and position of the eyeballs and movements of the larynx, they mark the stages of anaesthesia and locate the strata of the third stage, and observe the time required for complete anaesthesia.

The animal is now removed from the cabinet and tied on a heated table and anaesthesia maintained by pharyngeal insufflation by passing the tube, which was attached to the cabinet, through a wooden mouth gag to the pharynx. A pneumograph is now adjusted for respiration tracings, and the blood pressure cuff placed on a hind leg, so connected that tracings may be recorded. And now detailed observations may be made under the following conditions:—Light ether anaesthesia, insufficient aeration, a change from light ether anaesthesia to chloroform, deep ether anaesthesia, insufficient aeration again, a change from deep ether anaesthesia to chloroform, after which insufficient aeration once more and then deep chloroform anaesthesia. We avoid the usual instructions of chloroform poisoning. However, should respirations cease, methods of resuscitation are done, such as stretching of the anal sphincter, artificial respiration, cardiac massage, intravenous injection either of epinephrine, 0.1 mg. per kilo mixed with 50 cc. normal saline, or caffeine sodio-benzoate, 50 mgms. per kilo.

The students are called upon to tabulate the observations made under the various conditions enumerated, and to compare as well the differences between the morphinized dogs and those without morphine. Further emphasis is laid upon a comparison of ether with chloroform.

At the demonstration they are shown how anaesthesia may be smoothly induced and conducted in a dog even without
preliminary medication. The animal is placed in a large glass case which has two openings. One permits of connection to an insufflation apparatus, the other acts as an outlet. Air is pumped in to which ether vapour is gradually added. The student becomes impressed with the quietude of this induction, for the animal becomes anaesthetized without struggle and with comparatively little increase in muscular movement in from two to four minutes. It is then quickly removed and placed on a heated table, and with the aid of a Chevalier Jackson laryngoscope intubation is done and anaesthesia maintained by continuous intra-trachael insufflation under low pressure. Blood pressure is observed, as mentioned above. Tracings of respiration are made by a T-tube connection to the intra-tracheal tube. This demonstration affords a further opportunity for explanations of many important details of anaesthesia.

The conference consists in a review of the week's work, when the students are asked and allowed to ask questions. The practical applications of anaesthesia are taken up in the following fifth year during the course in Clinical Pharmacology. Two lectures are devoted to anaesthesia and such matters are discussed as the choice of anaesthetic agents and methods, the preparation of the patient, the details of conduction of the anaesthetic period and after care. Lantern slides are used to illustrate Guedel's sign chart, some typical anaesthesia charts and several of the more important anaesthetic implements and machines. One gas-oxygen machine is demonstrated in detail.

Practical work is exacted of the students during the final year. Each student must administer anaesthesia himself at least four times, and make in each case a full report to his instructors on what is known as the McGill anaesthetic record here illustrated. Again, in each large hospital an anaesthetic clinic is given once during the session when several short operations are performed and as nearly as possible all of the various anaesthetic agents and methods demonstrated, the surgeons allowing the anaesthetists to hold the floor. The students are encouraged to participate further in the giving of anaesthetics as opportunity offers, and many graduate with fifty or more anaesthesias to their credit.
### McGill Anaesthetic Record

**Name**: W.

**Surgeon Dr.**: A.

**Age**: 32

**Sex**: M

**Date**: 23-8-22

**Ward**: B

**Operation**: Hysterectomy + Appendectomy

**Special Conditions Present**: Fibroid

**Anaesthetic**: 

<table>
<thead>
<tr>
<th>Method</th>
<th>Apparatus</th>
</tr>
</thead>
<tbody>
<tr>
<td>N₂O + O₂</td>
<td>Med. Morph. 1/6, Atrop. 1/50 Scop. o</td>
</tr>
</tbody>
</table>

**Given at 8 o'clock am.**

**Duration Anaesthesia**: 1 hr. 10 min.

**Duration Operation**: Same

**Position**: Trendelenburg's

**Stim**: None

**Infusion**: Intravenous None

**Subcutaneous**: None

**Remarks**

Anæsthetist.

---

**Graph**

- **Pupil**
- **Eye**

**Code**

- Pupil
- Small-S
- Medium-M
- Dilated-D
- Widely Dil-W
- Eye Moving- E
- B.P.

**Graph Details**

- **Graphs**
  - Cardiac Output
  - Pulse
  - Respiration
  - Blood Pressure
  - Blood Sugar
  - Temperature
  - Oxygen Saturation
  - Alkaline Phosphatase
  - Bilirubin
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
  - Urate
  - Calcium
  - Phosphate
  - Sodium
  - Potassium
  - Chloride
  - Protein
  - Albumin
  - G.L.U.
For the routine administration of ether we use in all of our hospitals the McGill modification of the Ferguson mask, and for which Dr. W. B. Howell deserves most of the credit. For reference text-books we recommend Solmann’s “Pharmacology,” Cushney’s “Pharmacology,” and works on anaesthetics by Buxton, Gwathmey, Flagg, Hewitt and Silk. In this connection, in the near future, we hope to have prepared a small book on anaesthesia to be used as a practical guide by students and to be known as the McGill Handbook of Anaesthesia.

To us it is particularly encouraging to note the increasing interest shown by the majority of students, some of whom are now asking to be admitted as house anaesthetists at graduation. This should offer a real solution to the difficulty in obtaining qualified graduates in medicine to administer anaesthetics.

---

**A Diploma in Anaesthesia.**

With the steady advance of our speciality the time is rapidly approaching when its status, after the completion of a satisfactory course of higher instruction, would warrant the granting of a Diploma in Anaesthesia.

For those who desire to prepare themselves properly to undertake the uncommon and intricate procedures necessary in what may well be called the higher grades of the practice of anaesthesia, a special course of instruction of from three to six months in a well equipped hospital and university would be more than worth the time and expense, especially if the reward of close application proved the attainment of a diploma.

The first three months could be spent at certain specified hospitals where special demonstrations might be arranged, but the final three months should probably be confined to one such centre as the University of Cambridge.

Candidates for the diploma would, of course, hold a medical qualification, and be required to do a certain amount of practical anaesthetic work.