STATES OF AWARENESS DURING GENERAL ANAESTHESIA

Preliminary Communication

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SUMMARY

Ten patients were exposed during deep surgical anaesthesia to a suggestion indicative of an anaesthetic crisis. One month later the patients were hypnotized and regressed to the operation. Four were able to reproduce the words spoken by the anaesthetist. Four became anxious and woke from hypnosis. Two did not reproduce the suggestion.

This preliminary communication describes a method of investigating the nature of awareness during anaesthesia. It is based on the application of a memory stimulus during anaesthesia, the depth of anaesthesia being monitored by electroencephalography, and patients' recollection of the stimulus being investigated later under hypnosis.

METHOD

Ten patients over 21, in whom hypnosis could be induced, volunteered to take part in this study. They were all told that their brain waves would be examined during their anaesthetic and that hypnosis would be used to explore their feelings about the operation. Thiopentone, nitrous oxide, oxygen and ether were used to anaesthetize the patients, all of whom were undergoing dental operations.

Encephalography was used to monitor the depth of anaesthesia throughout each operation and when the record consisted entirely of irregular slow high-voltage waves indicating very deep anaesthesia, the anaesthetist stopped the operation with the following words: "Just a moment! I don't like the patient's colour. Much too blue. His (or her) lips are very blue. I'm going to give a little more oxygen." The anaesthetist then paused, hyperventilated the lungs and then after a moment or two said, "There, that's better now. You can carry on with the operation." The theatre and ward staff were warned not to discuss any aspect of the operation with any patient.

One month after operation the patients were interviewed. All could remember entering the anaesthetic room and receiving an injection, but none of them could recall anything of the operation and their first memories were of waking in the ward. The patients were then hypnotized and regressed to the actual operation. A tape recording was made of the patient's description of the events during anaesthesia.

RESULTS

Of ten patients, four were able to repeat almost exactly the words used by the anaesthetist. Four patients remembered hearing something or somebody talking, and some identified the speaker as the anaesthetist. All this group displayed marked anxiety and either woke from hypnosis or blocked any further investigation. The remaining two patients denied hearing anything.

DISCUSSION

It would seem that patients who are deeply anaesthetized retain memories of events occurring during anaesthesia which can be described under hypnosis at some time after the anaesthetic. It is interesting that the patient's encephalogram indicates a response to a suggestion during anaesthesia (fig. 1). It can be seen that as the suggestion was given there was suppression and subsequent augmentation of slow waves. The irregular slow waves seen just before the suggestions indicate third-plane third-stage surgical anaesthesia. It is also interesting to observe that the change in the record occurred before the anaesthetist began to speak, in the silence when the theatre staff waited for him to read his script. The change in record increased as he spoke and persisted for many minutes after he had finished.
An eight-channel electroencephalogram recorded during third-plane anaesthesia. This section of the record is cut at the point when the signal is given to the anaesthetist to read his script. The first few seconds show the slow high-voltage waves of deep anaesthesia. The theatre is suddenly silent. At this point the record changes markedly in all eight channels. A moment later the anaesthetist announces with alarm that the patient's lips are too blue. There is an augmentation of high-voltage slow waves throughout the anaesthetist's announcement. The section is cut and continued beneath the first part. In spite of the anaesthetist being satisfied and allowing the operation to proceed, the altered electroencephalogram continues for many minutes. It slowly returns to the usual third-plane pattern. This recording is of one of the patients who could not recall the words of the anaesthetist under hypnosis. This patient became anxious and awoke from the trance.
The following is a transcription of the hypnosis session of one of the subjects. She was deeply hypnotized and indicated to me that she could hear someone talking. "Who is it who's talking?" "Dr. Viljoen. He's saying that my colour is grey." "Yes?" "He's going to give me some oxygen." "What are his words?" Long pause following this question. "He said that I will be all right now." "Yes?" "They're going to start again now. I can feel him bending close to me."

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BOOK REVIEW
Physiology of Respiration: an Introductory Text. By Julius H. Comroe jr., M.D., Director, Cardiovascular Research Institute, and Professor of Physiology, University of California Medical Center, San Francisco. Published by Year Book Publishers Inc., Chicago. Pp. 245. Price 64s.

Few textbooks are continuously interesting, but this one is—simply because of its author's consummate ability to convert seemingly difficult aspects of scientific theory and practice into a comprehensive and meaningful whole. Professor Comroe set out to write an introduction to respiratory physiology and he intends it for students of medicine. Anaesthetists will do well to accept the challenge and read this book. From it they will learn how the process of planned research with its subsequent scientific and clinical evaluation can ultimately become an accepted part of everyday clinical practice. They will also discover that many seemingly simple problems remain to be solved. In a chapter on the transport and elimination of carbon dioxide Professor Comroe discusses the limitations of acid-base diagrams and adds the happy comment that in such a situation "there is at the moment no solution except to be a good physician".

To many clinicians, keeping abreast of modern medical thought is often difficult, even when the necessary time is available and the mental effort forthcoming; indeed, to some it may seem on occasions that, like Alice in Wonderland, one must run hard to stay where one is. But now Professor Comroe has done us an invaluable service and compounded a very wide range of up-to-date respiratory physiology in the compass of a relatively small volume. Anaesthetists have better opportunities than many clinicians to observe aberrations of respiration, some the consequence of disease, others the result of undistinguished therapeutic practice. In the pages of this book they will find much of special interest to them in the elucidation of such problems, particularly in the chapters on the matching of gas and blood, on respiratory adjustment, and on manifestations of pulmonary disease.

This is a book that contains something for both those who want to know and those who already know. It deserves the success it will undoubtedly achieve.

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