

A Re-evaluation of Guedel's Stages of Anesthesia

With particular reference to the ambulatory dental general anesthetic patient

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■ In 1937, Arthur Guedel gave medical science his classic table of anesthetic stages and signs (1), based on the use of di-ethyl ether for general anesthesia. In the ensuing twenty years, new drugs, new technics, and new philosophies of anesthesia have evolved. Although Guedel's basic theories are still tenable, his classification is in need of revision in terms of modern knowledge. This is particularly true as it relates to ambulatory anesthesia for short dental procedures.

Stage I (Analgesia)

The patient descends, from an awake state at the start of induction, into analgesia. The speed of descent depends upon the nature and concentration of the agent and the reaction of the patient. Heretofore, Stage I has been considered a period of "altered consciousness". However, since it is impossible to determine the point at which a patient becomes unconscious, the stage of analgesia should include the entire period of descent into Stage II or, if there is no ex-

citement stage, Stage III. *This analgesic period includes unconsciousness.*

Plane I—The lightest plane of analgesia during which the patient is still conscious, aware of his surroundings, but in which pain stimuli are obtunded. Some operative dental procedures can be accomplished in this plane without pain or with minimal discomfort.

Plane II—The middle plane of analgesia in which the patient "lingers" between consciousness and unconsciousness. In this plane, signs of pain might be exhibited during an operative or surgical procedure, but there is no recollection of the pain in the post-analgesic state.

Plane III—The plane in which some minor surgical procedures of short duration can be undertaken without pain, but in which the patient may react to particularly painful stimuli with sluggish movements. The reactions may be oriented or disoriented, depending upon the individual patient. There is not adequate relaxation to perform any extensive oral surgical procedures unless the analgesia is supplemented with local anesthesia. *A combina-*

(1) Guedel, A. E. *Inhalation Anesthesia*, Macmillan Co., N.Y., 1937.

tion of Stage I, Plane III anesthesia and local anesthesia is often the most effective general anesthetic technic for the ambulatory dental patient. The eyelid, swallowing, gag, and cough reflexes are present in this plane. The patient who undergoes operative or surgical treatment in this plane awakens with the feeling that he has been under total anesthesia.

Stage II (Excitement)

This stage of anesthesia was called "delirium" by Guedel. It is usually referred to as the "excitement stage". The patient's reactions during this stage are completely disoriented. The excitement stage rarely occurs with ultra-short-acting barbiturates, but is more common with nitrous oxide-oxygen and the inhalation synergists. It is because of this stage that the operating chair or table should be equipped with restraining straps. If the straps are applied automatically as the patient enters deeper planes of analgesia, he will be unaware of their presence and postanesthetically not realize that they were used. It is rarely sound practice to attempt to "push" a patient through the excitement stage into surgical anesthesia. When disoriented movements begin, it is generally wise to add oxygen to the anesthetic mixture to return the patient to Stage I, Plane III. If

there is no contraindication to the use of local anesthesia, the experienced anesthesiologist does not hesitate to use it as a supplement to the general anesthetic or analgesic procedure.

The operator who is experienced in anesthetic and analgesic technic can maintain a patient in any plane of analgesia without difficulty, and contention with bouts of excitement is relatively rare.

The patient should never be deprived of physiological percentages of oxygen at any stage of the procedure. It is unsound and unnecessary ever to lower oxygen percentages below 20 per cent in an attempt to acquire surgical anesthesia. This can be accomplished effectively by adding synergistic agents such as trichlorethylene or, if feasible, by adding oxygen to the breathing mixture and injecting the operative area with a local anesthetic.

The preceding explanation of Stages I and II is essentially inapplicable to the average anesthesia induced with soluble barbiturates. Hypnotics actually induce "sleep" by central nervous system depression, but a comparison of the states produced by intravenous barbiturates and inhalation anesthetic agents like di-ethyl ether and cyclopropane is outside the scope of this paper.

Stage III (Surgical Anesthesia)

Most reflexes disappear in this stage. If a rubber mouth prop is placed in position prior to induction (or during light analgesia), the fact that there is little, if any, muscular relaxation in the early planes of Stage III will not affect the average dental anesthesia. A carefully placed throat curtain should be used to avoid irritation of the pharynx and aspiration of foreign material. A suction apparatus, in the hands of a trained assistant, should also be available.

Respirations are the most reliable signs during Stage III. In Plane I, which is the deepest plane necessary for any dental procedure on an ambulatory patient, breathing may be even or slightly uneven. The anesthesiologist should watch the patient's reactions to surgical manipulation. If there is no response to the surgery; if respirations are relatively smooth and even; if the eyelid reflex is absent; and the patient's color is good, the anesthesiologist is justified in feeling that the patient is in the stage of surgical anesthesia and that everything is proceeding smoothly.

Deeper planes of Stage III and Stage IV are rarely used in short ambulatory dental procedures. Endotracheal intubation and muscle relaxant drugs are also rarely applied

to these procedures. Detailed elaboration of these technics may be found in most medical texts on anesthesiology.

Discussion

Guedel's original classification has been used as a basis for a revised guide to analgesic and anesthetic depth. It should not be difficult for the experienced dentist-anesthesiologist to accept this qualification of the stage of analgesia, since it has been said in many ways for many years. Since nitrous oxide is still the most frequently used agent in the dental office and this reclassification applies particularly to nitrous oxide with oxygen, it is felt that this revision can help to serve as a basis for interpreting patient reactions during analgesia.

The anesthesiologist must accept the fact that a patient in the analgesic stage need not be conscious. This is important because there has been a void in the interpretation of the period beyond consciousness, when the patient is neither in the excitement stage nor in the stage of surgical anesthesia. This period should be included in the stage of analgesia, even if the patient is merely "asleep" from fatigue or central nervous system depression.

The type of disoriented reaction which is seen in the excitement stage is much less common in the hands

of the experienced anesthesiologist, especially if recognized early. In such instances, the patient is lightened by means of giving more rather than less oxygen.

Conclusion

Although the experienced anesthesiologist may not need a graphic picture of stages and signs to help him interpret a patient's depth in general anesthesia or analgesia, a classification is necessary for the teacher and student of anesthesiology as it applies to ambulatory dental patients.

Summary

Guedel's stages and signs of analgesia and anesthesia (up to and including Stage III, Plane I) have been reclassified as follows:

Stage I—Analgesia

Plane I—Consciousness with obtundation of pain.

Plane II—Reaction to, but inability to recall, pain.

Plane III—Unconsciousness, absence of pain in most dental procedures of short duration, retention of most reflexes, without muscular relaxation.

Stage II—Excitement

Stage III—Surgical Anesthesia

Plane I—Unconsciousness, total absence of pain, elimination of many reflexes (although care should still be taken in manipulations in and about the pharynx), and relatively little muscular relaxation.

Component Societies Advised to Choose Delegates for A.D.S.A. House of Delegates Meeting in Dallas, Texas

■ Each component society of the American Dental Society of Anesthesiology is advised to choose one delegate and one alternate delegate to participate in the meeting of the House of Delegates in Dallas, Texas on November 8 and 9, 1958.

Further news of this meeting will appear in future issues of *The Journal*.

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Secretary