

Eddy D. Palmer

H. Worth Boyce, Jr.

Manual of
GASTRO-
INTESTINAL
ENDOSCOPY

Manual of GASTROINTESTINAL ENDOSCOPY

EDDY D. PALMER

*Colonel, MC, Chief, Department of Medicine, Brooke
General Hospital, Fort Sam Houston, Texas: Consultant
in Gastroenterology to the Surgeon General*

H. WORTH BOYCE, Jr.

*Major, MC, Chief, Gastroenterology Service, Madigan
General Hospital, Tacoma, Washington*

Sponsored by the William Beaumont Society of the
United States Army

BAILLIERE, TINDALL AND

7 AND 8 HENRIETTA ST., COVENT GARDEN,

LONDON, W.C.2

Copyright ©, 1964

THE WILLIAMS & WILKINS COMPANY

428 East Preston St., Baltimore 2, Md., U.S.A.

Made in the United States of America

Library of Congress Catalog
Card Number 64-12254

Composed and printed at
WAVERLY PRESS, INC.
Mt. Royal & Guilford Aves.
Baltimore 2, Md., U.S.A.

Preface

Inspection is perhaps the most helpful part of physical examination. Endoscopy is no more than an extension of inspection with the help of instruments to areas which cannot otherwise be seen. It is simply part of the physical examination. Unfortunately, the gastrointestinal endoscopic approach has somehow been forced into the position of a super-specialty, with the result that many doctors have been discouraged from making personal use of the technics. All physicians use ocular endoscopy—ophthalmoscopy—as part of their physical examination routine and dare to make the difficult interpretations required for retinal diagnosis. Yet few carry out sigmoidoscopic examination, in spite of the utter simplicity of this important part of the physical examination.

This manual concerns itself with the mechanics of the endoscopic technics, stopping short of pathology and interpretation. There is room, of course, for differing opinions on many matters, such as pre-examination preparation of the patient, manipulation of the instruments, selection of instrumental design, and others. Quite naturally, we have emphasized our own preferences. We have, however, indicated alternate methods and second choices at many points.

We must admit that we don't feel entirely right about discussing mechanics and technics apart from their clinical applications. We fancy ourselves to be clinicians, and we staunchly deny that an intelligent medical setup permits any such individual as an "endoscopist." We feel strongly that every gastroenterologist ought to do his own endoscopic examinations, that every chest physician ought to do his own bronchoscopies, and so on. We believe that endoscopic procedures must be freed of past implications that they are very specialized and difficult activities so that the clinician will be encouraged to learn the technics and the interpretations and to take better advantage of the clinical help they can furnish.

E. D. P.
H. W. B., JR.

Contents

Preface.....	v
1. Introduction.....	1
2. Peroral Endoscopy: General Matters.....	6
3. Esophagoscopy.....	18
4. Transesophagoscopic Manipulations.....	30
5. Gastrosocopy.....	41
6. Duodenoscopy.....	67
7. Peroral Jejunoscopy and Coloscopy.....	69
8. Endophotography.....	71
9. Dangers of Peroral Endoscopy.....	73
10. Peritoneoscopy.....	82
11. Endoscopy Related to Surgery.....	101
12. Peranal Endoscopy.....	106
13. Endoscopic Literature.....	122
Index.....	131

CHAPTER 1

Introduction

Physical examination is the most ancient method for studying sick people; yet it is far from a completed art. The physician is, of course, cheered by every new chemical or immunologic test devised to make his diagnostic efforts more effective, however complex and expensive it may be. But, to maintain his perspective, he must also note the steady flow of reports of simple new bedside signs that reveal such homely abnormalities as ascites, acute appendicitis, and hypothyroidism.

The endoscopic approach to physical examination is as dynamic as any effort in medicine. In part, this fact is due to technical improvements in optical systems, illumination equipment, and photographic technics, but much of the current resurgence of interest in gastrointestinal endoscopy can be explained simply by a growing appreciation of the clinical value, ease, and safety of the procedures employed. Increasing interest has brought into the field more and more physicians with new ideas, new technics, and new interpretations. There has been, as a consequence, a distinct tendency during the past few years to review critically the classical understandings of endoscopic pathology in the light of newer clinical and histopathologic knowledge.

A rebel spirit ordinarily proves a healthy stimulus to progress in medical endeavors, and so it has been in this field. Professional confidence in endoscopic opinion is growing. There is every reason to suppose that the endoscopic approach will play an increasingly significant role in clinical diagnosis as time goes on.

ENDOSCOPIC TRAINING

Instruction in the gastrointestinal endoscopic procedures is available in scattered centers throughout this country, in the form of both personal

tutelage and formal courses. A list of the latter is published at intervals in the *Journal of the American Medical Association*. In addition, the American Society for Gastrointestinal Endoscopy, established as the American Gastrosopic Club in 1941, has as its avowed purposes the furthering of "knowledge of gastrointestinal diseases through the use of endoscopic instruments and [establishment of] the proper use of these methods" and the furthering of "teaching of the gastrointestinal endoscopic method of examination." The Society assists the doctor interested in learning the procedures by publishing a bulletin devoted to the subject, by inviting all physicians to attend its annual scientific session, and by offering active membership after establishment of qualification.

But to learn endoscopy requires the close personal attention of a teacher and many hours of supervised study of many patients. This is because the ability to make accurate interpretations of endoscopic pathology is very difficult to acquire. It cannot come from pictures or written descriptions. In fact, the tyro can only make a start at understanding endoscopic abnormalities while he is working under supervision. The mechanics of the instrumentations themselves are easily learned, assuming that the regional anatomy is well known. They can be quickly understood from written descriptions and a few observations of examinations carried out by experienced endoscopists. But one's success as an endoscopic clinician depends, not on the technical skill with which he handles the instruments, but on his understanding of the pathology of the organs he examines.

There are certain didactic matters which the student can largely work out for himself. The importance of learning normal regional anatomy and physiology cannot be overemphasized. There is neither shortcut nor substitute for this requisite. The tyro should review all available literature on endoscopy early in his career. He should become entirely familiar with various opinions regarding indications, contraindications, limitations, and potential dangers of the methods. He must study the instruments themselves and understand their mechanism before being permitted to make his first endoscopic effort.

The larger laboratory animals make good subjects for familiarization study, although unfortunately few students have the opportunity to work with animals. Esophagoscopy and gastroscopy with the ordinary clinical instruments can be practiced very satisfactorily with anesthetized dogs even though some of the anatomic features are quite unique. Dogs, goats, and sheep make good subjects for gaining experience with transesophagoscopic manipulations, especially the extraction of foreign bodies. The adult cat's esophagus is similar enough to that of

the human neonate to furnish manipulative experience for pediatric esophagoscopy.

The fresh human cadaver on the autopsy table offers a fine opportunity for familiarization with peritoneoscopic anatomy. Parenthetically, it should be mentioned that peritoneoscopic manipulations are considerably more difficult under these circumstances than in clinical practice. Autopsy also furnishes a good opportunity for practicing choledochoscopy technic:

BEHAVIOR IN THE ENDOSCOPY ROOM

The physician who is in charge of an endoscopy clinic has a heavy responsibility in terms of patient safety, patient comfort, and patient convenience. His work will be of interest to many colleagues, medical students, student nurses, and ward attendants. He must expect to put up with many strangers in the endoscopy room from time to time. For this reason he must lay down and enforce certain simple rules of behavior for all endoscopy room personnel.

One of the important rules is that every moment an endoscope is in a patient someone must be looking through it. It is a crime for the endoscopist to be looking elsewhere—to be perhaps in a huddle with his colleagues over the findings—while the patient lies transfixed with an uncomfortable instrument.

Another important rule of the endoscopy room concerns discussions that the patient is able to hear. One might think that mention of this point would hardly be necessary, but it is so important that it needs to be emphasized. The danger is not so much that of saying something unfortunate about the patient's condition, but that of letting the conversation slip to subjects which have nothing to do with the patient or the examination. Visitors and observers are usually responsible for this sin, as interest flags among those who have no responsibilities or procedural matters to tend to. To the patient, he and his plight are the center of interest at the moment, and every effort must be made to confirm his feeling. It is cruel to permit him to hear in the background the doctors discussing current events or other patients during his examination.

A third rule concerns the teaching responsibilities of the endoscopist and the problems they create. The rule can perhaps be simply stated: the experienced endoscopist has the responsibility to permit every genuinely interested individual a fair opportunity to look through the instrument. Just how "fair" had best be defined is difficult to say. There is an important responsibility to see to it that the simply idly curious do not take up time at the endoscopy table. It is also important that the

student realize that every moment he spends looking through the instrument detracts a little from the effectiveness of the master's examination and, consequently, from help for the patient.

There is no solid answer to the problem created when a long line of interested observers are waiting to take a look. Endocinematography is proving more and more helpful in the teaching of those who do not intend to practice endoscopy, and endotelevision will no doubt eventually become available as a favorable substitute for a part of endoscopy-room teaching.

The visitor is able to cause considerable havoc in the endoscopy room, no matter how thoughtful he may appear to be. Mere inspection of the instruments by the inexperienced visitor may lead to serious damage, such as, for example, that caused by "testing the flexibility" of the gastroscope. If the endoscopist is not alert, a stranger may pick up the gastroscope and exercise it as though it were a fly rod. It seems hard for visitors to resist screwing in the ocular of the Eder-Hufford telescope so that it becomes hopelessly out of focus. Casual playing with a rheostat may cause a lamp to be blown at the start of the next examination. The fourth rule, therefore, is that everyone except the endoscopist and his immediate assistant must keep his hands off the instruments.

The fifth rule concerns the natural tendency of visitors to try to be helpful during the examination. The visitor regularly identifies with the patient. He is very likely to let his empathy slip and to become a serious hindrance through oversolicitous sympathy, especially by giving words of instruction and encouragement to the patient. If a visitor takes the patient's hand and says, "Here, you can squeeze my hand if it hurts too much," that visitor has, with a few words, ruined every bit of the endoscopist's effort to make the examination successful and easy for the patient. Almost as destructive is the experienced colleague who insists on firing instructions at the patient even though someone else is doing the examination. We have visited endoscopy rooms where four or five people were, in solo and in chorus, commanding the patient to relax, to bend his legs, to breathe through his mouth, and so forth. The rule is simple: after the patient has reached the examination room, only the endoscopist and his immediate assistant may assist and converse with him.

LEGAL RISKS

The endoscopist warrants, merely by assuming to render medical diagnosis and care, that he has the qualifications of his specialty and that he will exercise his ability with due caution. This warranty implies that the endoscopist is well trained in technics of endoscopic examination

and in their possible complications and that he is fully capable of endoscopic interpretation and diagnosis.

There is no question about the importance of a close and genuine doctor-patient relationship prior to any diagnostic or therapeutic procedure, and we will emphasize repeatedly during the discussion that such a relationship is essential to endoscopic practice. If the proper relationship exists, the endoscopist is able to adjust his explanation and discussion of the proposed procedure to the patient's personality and individual requirements for reassurance. Contrariwise, the patient's reaction to the explanation furnishes the observant physician with important information by which to predict possible cooperation problems during the procedure. The endoscopist should explain the specific indications for the proposed examination and the importance of anticipated findings for both diagnosis and treatment. The extent to which such an explanation is carried is governed by the nature of the examination, as well as by the endoscopist's evaluation of his patient's level of anxiety. Rather than alarm the patient, the discussion should lead him to realize that his doctor knows his business and is well aware of the problems which could arise. A thoughtful discussion precludes most of the disappointments and misunderstandings out of which lawsuits arise.

The possibility of complications should be brought to the patient's attention, but there appears to be no legal requirement to discuss problems other than those most likely to arise. The patient must be made to understand that complications are in most instances not the result of poor technic, but that they are a remote statistical threat during even an easy, successful examination.

Although not a specified requirement, a signed permission slip for every endoscopic procedure is recommended by all authorities on medicolegal matters. It makes the patient cognizant that he is having the examination because he has expressly signed his willingness to have it done. The document should state in popular descriptive terms the nature of the proposed examination and, specifically, that a biopsy specimen may be taken, if such is the case. It is also advisable to ascertain that the description of the procedure is general enough to authorize the endoscopist to proceed according to sound medical principles in any possible emergency or unforeseen contingency.

CHAPTER 2

Peroral Endoscopy: General Matters

THE MECHANICAL SETUP FOR PERORAL ENDOSCOPY

An important principle controlling effective peroral endoscopy is simplicity in both administration and physical setup. Everyone is better off if there is no connection whatever with the hospital operating room or an operating schedule. The endoscopist should have complete control over the instruments, either as the owner of private property or as the party responsible for an institution's instruments. Many endoscopists prefer to carry out all of their outpatient procedures in their private offices; to do so simplifies things considerably.

Esophagoscopy, gastroscopy, and duodenoscopy are outpatient procedures. There is no advantage in overnight hospitalization for the examination; instead there are the important disadvantages of increased expense, patient inconvenience, and unnecessary tying up of a hospital bed. Satisfactory outpatient endoscopy, however, requires facilities for patients to rest about 4 hours following the examination and also a way for them to get home without having to drive.

For work in the hospital, the most convenient arrangement is to have a specifically designated endoscopy room—perhaps the hospital's proctoscopy room, the gastroenterology outpatient clinic room, or an examining room in the medical clinic, among other possibilities. On the other hand, the feature of mobility must be stressed for all the peroral endoscopic technics, and the patient's own bed is an entirely satisfactory spot. It should be noted soberly that an effective endoscopy clinic has been carried on in a tent with only battery electrical power.

It is, of course, best if the institution can spare a room exclusively for

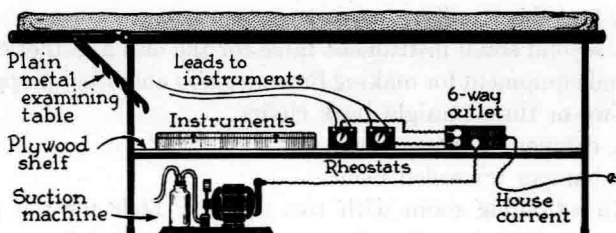


FIG. 1. The esophagogastroscope table, showing attachments arranged to avoid wires on the floor.

this purpose. The characteristics of a good hospital peroral endoscopy room are these:

1. Dimensions of at least 11×18 feet.
2. Convenience to the wards.
3. Arrangements permitting darkening of the room (heavy curtains over the windows, for example).
4. A sufficiently wide door to accommodate a litter or, preferably, a hospital bed.
5. A large deep sink ($18 \times 24 \times 8$ inches) with a large drain board in one corner of the room or adjoining room.
6. A toilet directly off the examining room.
7. Electrical wiring which will permit four (better, six) outlets at the head of the examining table; and electrical outlets in the floor under the examining table, or covered wire running over the floor to a multiple socket outlet under the head of the examining table (*i.e.*, no wires to be tripped over).
8. A simple, standard metal examining table with pad, low stool, and examiner's stool. (If the facility is to be used for peritoneoscopy, a tipping table should be obtained.)
9. A shelf under the head of the examining table to hold instruments.
10. A standard electric suction machine on the floor under the examining table.
11. A long instrument table with a standing gooseneck lamp.
12. A large lock cabinet or cupboard which will accommodate all of the clinic's equipment.

Other equipment one may wish includes:

13. A stool for the headholder.
14. A small desk and chair.

15. A four-drawer filing cabinet.
16. A second small instrument table for the oral anesthetic, basins, and equipment for making Papanicolaou and other preparations.
17. Two or three straight-back chairs.
18. A cabinet for clean linen.
19. A hamper for soiled linen.
20. An adjoining room with two or three beds for the patients' pre- and postexamination rest, in lieu of a ward.

CONTRAINDICATIONS TO PERORAL ENDOSCOPY

Contraindications to peroral endoscopic examination must necessarily be relative ones, controlled to an important extent by the need to obtain the information the examination can give. The only absolute contraindication is the patient's refusal to have the procedure after the indication for the examination has been fully explained. Social mores in some lands, such as Greece, Turkey, and some of the Arab countries, hold that endoscopic procedures, like other forms of physical examination, constitute an unpardonable invasion of privacy. It may be impossible to get support for endoscopy among the older folk in such regions. A mechanical contraindication may be the patient's age or size; gastroscopes devised for infants and children have not proved very successful, and the age of about 13 years is ordinarily the lower limit of acceptability for this examination. Esophagoscopy, on the other hand, may be carried out on the neonate.

In this connection, those who understand psychodynamics worry about peroral procedures in young girls because the implications are somewhat similar to those of rape. A young girl commonly connects conception with something taken into the mouth. She knows that Mother's stomach gets fat when she is going to have a baby, she hears her friends giggling about kissing men, and now the doctor is going right down into her stomach.

Certain acute or chronic, local or generalized diseases may at times preclude or necessitate postponement of peroral endoscopy. Almost all represent only relative contraindications. Their presence will be known to the endoscopist through his physical examination and the upper gastrointestinal roentgen study, which are part of the routine pre-examination preparation.

Rarely, kyphosis is so severe that it constitutes a mechanical barrier to any peroral manipulation. The presence of some acute infectious process, such as pneumonia, peritonitis, or perinephric abscess, ordinarily precludes instrumentation for the moment. Myocardial infarction within the past month or so is a relatively good reason for postponing the pro-

cedure; however, if the infarction is a complication of acute upper gastrointestinal hemorrhage and the bleeding source is unknown, one may well decide to go ahead with gastroscopy within a day or so of infarction to render most efficient an emergency operation required to stop the hemorrhage. Similarly, simple pharyngitis usually necessitates postponement, but if penetrating gastric ulcer, for example, is suspected, the need for immediate endoscopic information may encourage one to proceed.

Zenker's diverticulum is a special hazard; ordinarily its presence makes blind peroral manipulations impossible, although direct vision instrumental passage may be quite easy. As the diverticulum enlarges, the weight of its contents and the resistance of the spine posteriorly cause its fundus to drop downward, and there is pharyngeal rotation at its site of attachment. The result is that the axis of the diverticulum comes to lie in the axis of the pharynx. If an instrument is passed blindly into the pharynx, it must necessarily enter the diverticulum and cause a perforation. With direct vision esophagoscopy, the course of the esophagus in most cases can be followed past the diverticulum, and the trans-esophagoscopic gastroscope may therefore safely be passed through the esophagoscope and into the stomach.

Mid-esophageal diverticula ordinarily constitute no threat. Their presence is known from the roentgen examination, and the endoscopist is alert for the slightest resistance as the instrument's tip passes the diverticular segment. Epiphrenic diverticula are somewhat more of a hazard because of the dependency of the fundus in many instances. The advancing gastroscope may enter and perforate the sac unless it is guided past the diverticular segment with the esophagoscope.

Thoracic aortic aneurysm becomes a relative contraindication when it significantly distorts the course of the esophagus. The same is true of other mediastinal masses. The danger of causing rupture of an aneurysm with esophagoscope or gastroscope, however, is very slight.

Endoscopic practice in mental hospitals raises special problems, and here certainly the psychiatrist must ordinarily make the decisions regarding contraindications. Very often general anesthesia is required for hyperactive psychotic patients, and it is best to omit all pre-examination medication for greatly depressed people.

Pregnancy, whatever its stage, is no contraindication, although some of the complications of pregnancy may preclude thought of the procedure. Predominant among such complications are the toxemias, especially if they are accompanied by severe paroxysmal hypertension or convulsions.

Peroral endoscopy is ordinarily ill-advised soon after abdominal

surgery because the patient's straining may lead to evisceration. If endoscopy must be done anyway, as when the immediate postoperative course is complicated by hematemesis, a fair degree of incisional protection can be furnished by tight abdominal binding.

PREPARATION FOR PERORAL ENDOSCOPY

There are many satisfactory regimens for preparing patients for peroral endoscopy. It can be fairly said that the success of endoscopy, for both the patient and the doctor, depends largely on the effectiveness of these pre-examination efforts. It can also be fairly said that emotional preparation is by far the most important part of the regimen.

It is essential that the emotional preparation be free of all falderal, that it be honest, and that the patient be talked to like the sensible adult he no doubt is. Nothing is quite as sickening to the patient who is approaching a brief medical procedure which he knows to be unpleasant than to have nurses, other attendants, or the doctor himself tell him that "there's nothing to it" or "you won't mind it a bit." The patient knows this is a lie. Most important, he is infuriated at this ostentatious pat on the head from people who in all probability have never been through the procedure themselves and don't have to face it now.

The most important part of preparation for the patient who is at least reasonably mature is a recitation of exactly what is going to happen, step by step. The number and functions of attendants and perhaps of observers and students, in particular, should be discussed. Then during the procedure the doctor should allow the patient to anticipate each of his moves by referring to their previous discussion.

A small proportion of patients, particularly elderly women, cannot be prepared in this way. These patients want to hear nothing about what is going to happen to them. They usually insist that they be told nothing. These are the patients who ordinarily plead that they be put to sleep during the examination. Parenthetically, it should be noted that these are ordinarily excellent, cooperative patients, and the examination usually goes off very well.

This technic of full pre-examination explanation can be carried a step further if the endoscopy room is of sufficient size. The patients may be invited to observe the procedure being carried out on other patients the day before they themselves are scheduled for endoscopy. We have had considerable experience with this approach and found that it works out very well indeed. We no longer use it only because it adds considerably to the confusion of a large endoscopy clinic.

The endoscopist must be certain that the patient understands the importance of relaxation and cooperation to the success of the examina-

tion and the importance of the examination to the success of treatment. The patient must be given genuine assurance that the medical personnel realize the procedure is going to create an emotional problem for him and that they have a sincere interest in making the procedure as painless, easy, and quick as possible.

Suggested Preparation Routine

There is no question, of course, that drug preparation can make the examination easier for the patient and more satisfactory for the doctor, but it must be emphasized that drugs can be no more than complementary to psychologic preparation. Any endoscopy clinic must necessarily have a pre-examination preparation routine that is varied only occasionally, according to the estimated needs of individual patients. It would be better if each patient could be prescribed for individually, but moves to make the running of a clinic more complicated have a way of backfiring in confusion. Much depends on the size of the clinic. The smaller it is, the more individualization is practicable.

After trying many preparation routines, we have settled on the following regimen for adults. We individualize our routine for approximately 10 per cent of the patients we manage.

Step 1. Examination permit to be signed.

2. If patient is hospitalized, perhaps Nembutal, 0.1 gm., orally at bedtime.
3. Nothing by mouth after midnight.
4. One hour before examination, sodium luminal, 0.2 gm., intramuscularly.
5. One-half hour before examination, atropine SO_4 , 1.3 mg. (gr. $\frac{1}{50}$), subcutaneously.
6. Ten minutes before examination, prolonged gargle with 5 ml. of 1 per cent aqueous pontocaine with adrenalin.
7. If any reason to suspect gastric retention, gravity drainage of stomach through Fr. #30 Ewald tube.

Alternatives and Discussion

Steps 2 and 4

The barbiturates work well for sedation, and one's favorite is the proper variety. For inpatients, one may wish to give an oral dose the evening before. A dose of barbiturate about an hour before the examination has for many years been considered important as a means of preventing reaction to the local anesthetic, but there is considerable question as to how important it really is. In any case, on the morning of the ex-

amination the barbiturate should be given parenterally, or if the oral route is preferred, in solution, perhaps as the elixir. Sometimes when the capsule or tablet form is given as long as an hour and a half prior to gastroscopy, white paste representing the drug is found in the stomach. This paste interferes with the examination and also indicates that the patient has not had a chance to be helped by the drug.

Intravenous Demerol or morphine, given immediately prior to the examination in place of or in addition to a barbiturate, has become popular for preparation in many centers. Many experienced endoscopists use it as the only pre-examination medication. When the dose is moderate, it assures a relaxed examination and tends to leave the patient somewhat amnesic for the procedure.

Step 5

Atropine helps the patient by decreasing his oral secretions. This aid is most important because a major concern of the patient who has an instrument in his throat is fear of choking over the material he feels collecting there. To the physician, atropine seems necessary because it blocks vagovagal reflexes, which may affect cardiac rhythm and coronary flow. To be effective in blocking these reflexes, atropinization must be complete. For the adult the dose of atropine should be at least 1.3 mg. (gr. $\frac{1}{50}$).

Step 6

Oral anesthesia gives the patient an important morale boost, but as it is usually applied, it does little more for him. The best technic for anesthesia is the use of a simple gargle, although it permits contact of the anesthetic agent only with the tongue, the buccal mucosa, and to a minor degree, the oropharynx. The gag reflex is obtunded but seldom abolished. The hypopharynx can be included if the patient swallows the gargle, but because the physician wants to minimize absorption of the anesthetic, he ordinarily prefers the patient to spit out the material.

Application of the anesthetic by swab to the oral and pharyngeal structures is time-consuming and very unpleasant for the patient, and it accomplishes nothing that use of a gargle cannot.

The Schindler pharyngeal anesthetizer is a short, perforated rubber tube. It is passed into the hypopharynx, and the anesthetic solution is injected so that it flows liberally through the area. The method is not widely used because, paradoxically, it effects a too thorough anesthesia of the hypopharynx. A portion of patients so managed have trouble with swallowing their secretions and show a certain tendency to aspirate and choke.