General Anesthesia in Bronchoesophagology,
A Review of Its Use in 4,000 Endoscopic Procedures
Over a Ten Year Period

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It is well recognized that local anesthesia is used by most endoscopists on this continent and in England. It is the method of choice recommended in all textbooks dealing with bronchoesophagology and diseases of the chest; Jackson and Jackson, in 1934 stated, “General anesthesia is never used in our Clinic for endoscopic procedures.” In recent years, however, with continuing improvements in methods and drugs used in general anesthesia, this method has gained some increase in favor, particularly in esophagoscopy and is even recommended for beginners in esophagology, by Jackson, in 1950. Holinger also suggests its use in certain instances.

Although local anesthesia has proved to be extremely valuable in endoscopy it has limitations and dangers. Some of these have been referred to by Thomas and Fenton, Weisel and Tella, and Lierle.

While serving overseas in a 600 bed hospital, the author did bronchoscopies and esophagoscopy under local anesthesia, as previously taught and practiced. However, our anesthetist, the late Dr. A. St. C. Rumble, was responsible for my initial interest in general anesthesia for endoscopic procedures. We used pentothal anesthesia (sodium thiopentone) many times, but as many others have found, we also observed that pentothal alone or in conjunction with local anesthesia was not satisfactory. We encountered many cases of laryngospasm and the patients had to be in a dangerously deep stage of anesthesia before they were sufficiently relaxed, particularly for bronchoscopies. We found that ether even without preliminary local gave excellent relaxation, but as these patients were all active, young, and usually healthy men, ether anesthesia was too time consuming in a busy military hospital. We eventually abandoned the idea, but happily fate brought us together again in Winnipeg, following hostilities, when we were both appointed to the staff of Deer Lodge Veterans’ Hospital at the beginning of January, 1946. We eventually developed a method mutually satisfactory to both of us. The paper published by Cassels and Holinger, in 1946 on “Points of Mutual Interest in Bronchology and Anesthesiology” brings back many fond memories and adequately describes our associations of that time. Our experience at Deer Lodge was confined to adults but at the same time the author was appointed to the staff of the Winnipeg General Hospital, and a little later to the Children’s Hospital of Winnipeg, so that ample opportunity was provided to use

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general anesthesia for endoscopic procedures at all three hospitals, and I am very grateful to the anesthesiologists in all of these hospitals, who have been most cooperative and helpful, with useful suggestions and criticisms. More articles appeared in the literature,\textsuperscript{14-23} describing the use of pentothal and curare, or allied relaxants. These were studied with interest and many of them appear in the bibliography.

\textit{Clinical Material}

This review covers a period of approximately 10 years, from January 1946 to the end of September 1956 with personal records of 5,578 bronchosopagogical procedures, and of these 4,212 were carried out under general anesthesia. The remainder were done under local or without anesthesia, but are not considered in this review.

The choice of anesthetic depends on many factors, particularly the availability of an anesthetist and one that is willing and anxious to give anesthesia for endoscopy. It is also advantageous to have adequate recovery room space, and personnel to watch these patients until they have reacted sufficiently from the anesthetic. This has necessitated some changes in our plans and methods from time to time, since as is well known there is becoming a greater shortage of hospital space and it is not possible sometimes to observe the patients in a recovery room close to the operating room. When this condition arises we often use local anesthesia alone or with nisentil, to expedite the procedures and accommodate the hospital staff. It is not the intention to suggest that people who are familiar and satisfied with local anesthesia should change to general anesthesia. It is merely the purpose to present these cases that have been done under general anesthesia to illustrate that the method is as safe as local anesthesia alone.

The necessity of having an anesthetist who is interested and anxious to give anesthesia for endoscopy must be emphasized.

\begin{table}
\centering
\begin{tabular}{|c|c|c|c|c|c|}
\hline
\textbf{Year} & \textbf{Number of Procedures} & \textbf{Male} & \textbf{Female} & \textbf{Bronchoscopy} & \textbf{Esophagoscopy} \\
\hline
1946 & 140 & 126 & 14 & 129 & 11 \\
1947 & 343 & 295 & 48 & 300 & 43 \\
1948 & 383 & 332 & 51 & 303 & 80 \\
1949 & 425 & 336 & 89 & 313 & 112 \\
1950 & 355 & 286 & 69 & 272 & 83 \\
1951 & 442 & 319 & 123 & 317 & 125 \\
1952 & 488 & 326 & 162 & 377 & 111 \\
1953 & 493 & 343 & 150 & 382 & 111 \\
1954 & 508 & 320 & 188 & 406 & 103 \\
1955 & 364 & 206 & 158 & 293 & 71 \\
1956 & 274 & 163 & 108 & 230 & 41 \\
\hline
\textbf{TOTAL} & 4,212 & 3,025 & 1,160 & 3,321 & 891 \\
\hline
\end{tabular}
\caption{TOTAL PROCEDURES DURING A TEN-YEAR PERIOD (1946-1956) CLASSIFIED AS TO YEAR, SEX AND TYPE}
\end{table}
Table I illustrates the incidence according to year, sex and type of procedure. The ratio of three men to one woman is only partially explained by the fact that in a veterans' hospital most of the patients are men. Those done in the Veterans' Hospital constituted only about one-third of the total procedures. About one-quarter were esophagoscopies, the remainder bronchoscopies. In some cases both procedures were done, although these are not shown in the Table. In these cases the esophagoscopy is done first. Also, some patients have been done repeatedly. One girl who was 18 months old at the first bronchoscopy was done 25 times for the purpose of tracheal dilatation. One man had been bronchoscoped 31 times under local, pentothal and curare.

Table II divides the cases into three age groups. This was done to show that a fair number of children were given general anesthetics. All of these children under 10 (450), were given ether alone, or in combination, except one child of eight who was bronchosoped under pentothal and flaxedil. The Table also illustrates that there were a considerable number of elderly people (386) over 70 years. The eldest receiving pentothal was 89 years. The largest group was from 10 to 69 years of age (3,376), and it was in this series that pentothal and curare gained prominence and proved to be most useful.

**Preoperative Medication**

Almost all patients were admitted to hospital the evening before operation, except emergency cases, particularly foreign bodies, which were done immediately. Adults were usually given barbiturate sedation the night before. Breakfast was withheld in the morning and all adults were given a hypodermic one hour preoperatively. At the Winnipeg General Hospital, morphine gr. \(\frac{1}{8}\), gr. \(\frac{1}{6}\) or gr. \(\frac{1}{4}\) was given according to the usual methods of assessment. This is usually given along with atropine gr. 1/150. However if the individual is asthmatic or has many secretions that we wish to aspirate we do not give atropine. We also omit morphine

<table>
<thead>
<tr>
<th>Year</th>
<th>Under 10 Years</th>
<th>10 - 69 Years</th>
<th>70 Years and Over</th>
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<td>4</td>
<td>129</td>
<td>7</td>
</tr>
<tr>
<td>1947</td>
<td>3</td>
<td>323</td>
<td>17</td>
</tr>
<tr>
<td>1948</td>
<td>38</td>
<td>322</td>
<td>23</td>
</tr>
<tr>
<td>1949</td>
<td>52</td>
<td>338</td>
<td>35</td>
</tr>
<tr>
<td>1950</td>
<td>36</td>
<td>281</td>
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<td>35</td>
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<td>268</td>
<td>40</td>
</tr>
<tr>
<td>1956</td>
<td>53</td>
<td>194</td>
<td>24</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>450</strong></td>
<td><strong>3,376</strong></td>
<td><strong>386</strong></td>
</tr>
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</table>
in asthmatics. At Deer Lodge Veteran's Hospital a combination of pantopon, gr. 1/3 and scopolomine gr. 1/150 is used one hour preoperatively. This dosage may be adjusted up or down as necessary. Infants are given no preoperative hypodermic. Children under 10 are sometimes given atropine preoperatively and occasionally a small dose of one of the barbiturates. Adrenalin by hypodermic, intravenous or rectal aminophyllin or hydrocortisone may be given to asthmatics preoperatively when indicated.

For a short period a barbiturate was given to adults two hours preoperatively but this was soon discontinued as it was felt that not only was it not necessary, but occasionally it made the patient too drowsy and it was felt that we had to keep some of these patients too long in the recovery room following pentothal in addition to the previously given oral barbiturate. Intravenous pentothal is an excellent antidote to any adverse reaction one may encounter from the topical agent.

Postoperatively we leave routine orders for nothing orally for two hours. However, usually by the time the patient has reacted from the general anesthetic it is safe for him to take water if he so desires.

Preliminary Topical Anesthesia

Almost all of our patients receiving pentothal first have topical anesthesia in the form of a spray and direct application by pledget into the pyriform fossae. These pledgets are wet enough to allow excess local to run into the larynx and therefore into the trachea. Occasionally if the mucosa appears sensitive we instil one cc. by cannula into the larynx. At Deer Lodge Hospital the anesthetic staff is partial to transtracheal local, and in this hospital after the patient has had the spray and applicators the anesthetist instils 1 or 2 cc.'s of the local by needle transtracheally. I personally feel that this is not necessary when one is using a

<table>
<thead>
<tr>
<th>Year</th>
<th>Pentothal</th>
<th>Local and Pentothal</th>
<th>Pentothal and Curare</th>
<th>Local Pentothal and Curare*</th>
<th>Ether**</th>
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</thead>
<tbody>
<tr>
<td>1946</td>
<td>5</td>
<td>16</td>
<td>76</td>
<td>38</td>
<td>5</td>
</tr>
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<tr>
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<td>1</td>
<td>6</td>
<td>90</td>
<td>248</td>
<td>38</td>
</tr>
<tr>
<td>1949</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>362</td>
<td>56</td>
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<td>390</td>
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<td>34</td>
<td>118</td>
<td>385</td>
<td>3,087</td>
<td>616</td>
</tr>
</tbody>
</table>

*This includes Curare and Curare-like drugs. See Table IV.
**This includes Ether alone and in combination. See Table V.
general anesthetic. However we have had no ill effects from it, and I therefore do not object.

Type of Local Anesthesia.—To the end of January 1952, 2 per cent pontocaine (tetracaine) was used in the spray, and 1/2 per cent pontocaine on the local applicators and for the intratracheal instillations. Cyclaine (hexyclaine) 5 per cent then became available and since February 6, 1952 we have used it almost exclusively. It appears to act more rapidly, is more effective. According to Orkin and Rovenstine,24 it is safer than pontocaine.

Anesthetic Agents and Methods

Table III shows the trend by year of the different methods used. Pentothal was used only when the patient was old, debilitated, or extremely ill, where he objected to having a local spray or was known to have a sensitivity to local but where it was deemed advisable to have him asleep.

The second column in Table III shows that 118 cases were given local and pentothal only. Of these, sixteen were in 1946, when we were first starting to use curare and the number of cases again increased in 1954, 1955 and 1956. The reason for this is that we have found in some of our older patients, where we formerly used pentothal alone, we are now using local and just enough pentothal to have the patient asleep, and getting along well. Curare is not necessary in many of these elderly patients if preliminary local is used.

The third column in Table III shows our early attempts to use pentothal and curare without preliminary topical. This method was given a fair trial (206 times in 1947), but as stated previously larger quantities of pentothal and curare were required to achieve adequate relaxation, and consequently the reaction period following anesthesia was prolonged, and this method was therefore abandoned for the local, pentothal, curare combination.

Local Pentothal and Curare-like Drugs.—Table IV is a more detailed breakdown of the various types of muscle relaxants used in combination with local and pentothal. Curare is marketed by E. R. Squibb and Company under the name of Intocostrin, which is a purified extract of crude curare (purified chondodendrom tomentosum extract), and is packaged 20 units to the cc. We used this originally, and then later used d-Tubocurarine chloride, 3 mgm. to the cc. which is equivalent to 20 units of intocostrin. This is a pure substance and assayed by weight. In February 1952 we started to use flaxedil, tri (B-diethylaminoethoxyl) 1, 2, 3, benzene triodoethylate. This is synthetic curare marketed by Poulenc, Limited, 20 mgm. per cc. When succinylocholine chloride was marketed we first used it in 1952 under the trade name of anectine chloride, Burroughs Wellcome & Company, 20 mgm. to the cc. Succinylocholine is also marketed by Abbott under the trade name of Quelicin, and by Baxter under the name of rubilexin. When the anectine drip is referred to, a solution was made of 500 mgm. of succinylocholine in 500 cc.'s of 5 per cent glucose and saline.
Preferably we first apply the local as previously described. The 2½ per cent pentothal is then started intravenously and when the patient becomes unconscious the relaxant is injected separately into the tubing or the vein. We prefer curare or flaxedil; 1 or 2 cc.'s is given. We then wait two or three minutes and if further relaxation is required the relaxant is given in no greater quantity than 1 cc. at a time. If more pentothal is required, it too is given slowly. It is important that the pentothal and relaxant be kept in different syringes. Once the jaw is properly relaxed and the bronchoscope or esophagoscope is introduced we rarely require any more relaxant, just enough pentothal is used to keep the patient asleep or anesthetized only sufficiently for the endoscopist to continue his operation. Oxygen may be given continuously through the sidearm of the bronchoscope, and the concentration may be increased by closing the end of the bronchoscope with the thumb. We try to inform the anesthetist when we expect to be finished so that he will have the patient almost awake by the time the instrument is withdrawn.

Anectine 20 mgm. to the cc. in a syringe, and by the drip method was given a trial but we found that the margin of safety between proper relaxation and complete apnoea was too small. The actual dose by drip method was difficult to assess or control. On occasions we would have to withdraw the bronchoscope and either have to intubate or use oxygen by mask and bag to control respirations. In other words, although it is safe where the patient is previously intubated so that controlled respiration can be carried out, this is not practical where one requires to use the airway for the bronchoscope. Its use in esophagology was discontinued because it is rarely necessary to intubate a patient during esophagoscopy under pentothal or ether anesthesia. A large Roberts type esophagoscope is used and it is much easier to introduce if the patient does not have an endotracheal tube. Only occasionally, where pressure on the larynx may interfere with respiration, is intubation done and this is usually only necessary when one is working at the distal end of the esophagus.

### TABLE IV

**TYPE OF MUSCLE RELAXANT USED IN COMBINATION WITH LOCAL AND PENTOTHAL IN 3,087 CASES**

<table>
<thead>
<tr>
<th>Year</th>
<th>Curare</th>
<th>Flaxedil</th>
<th>Anectine</th>
<th>Anectine Drip</th>
</tr>
</thead>
<tbody>
<tr>
<td>1946</td>
<td>38</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1947</td>
<td>130</td>
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</tr>
<tr>
<td>1948</td>
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<td></td>
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</tr>
<tr>
<td>1949</td>
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<td>1950</td>
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<tr>
<td>1952</td>
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<td>17</td>
<td>5</td>
<td></td>
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<tr>
<td>1953</td>
<td>129</td>
<td>279</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>1954</td>
<td>50</td>
<td>305</td>
<td>12</td>
<td>23</td>
</tr>
<tr>
<td>1955</td>
<td>5</td>
<td>215</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>1956</td>
<td>0</td>
<td>140</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>2,057</td>
<td>956</td>
<td>35</td>
<td>39</td>
</tr>
</tbody>
</table>
Presently then we are using cyclaine 5 per cent topically, pentothal and flaxedil intravenously. It must be emphasized that these reagents are potent and must be used with great care. We have very occasionally encountered laryngospasm or bronchospasm postoperatively, but these are usually overcome with an oxygen mask or by lying the patient on his side or allowing him to sit up. If one waits for proper depth of anesthesia and relaxation before attempting to instrument the patient, laryngospasm will rarely if ever occur pre- or postoperatively. It has rarely been necessary to use curare antagonists,25 prostigmine or tensilon chloride (edrophonium chloride) marketed by Hoffmann-La Roche, Inc. Asthma is a contraindication to the use of pentothal and curare and curare should be used sparingly, if at all in elderly and debilitated patients. It might also be reiterated that one must be on the lookout for myasthenia gravis where curare is of course contraindicated. Again we arbitrarily use 10 years of age as a minimum for the use of combined local pentothal and curare. Pentothal is not inflammable or explosive. It is an excellent antidote for any reactions one may get from the topical and in fact must reduce the incidence of such reactions.

To summarize then, curare or one of the curare-like drugs was used in combination with local and pentothal in 3,087 procedures, and used in combination with pentothal but without local in 385 procedures. In this series there was one death, in June 1949. This was a 25 year old man who had been in the hospital almost continuously for three years with severe asthma. When first seen the morning of his death he had been in status asthmaticus and severe respiratory acidosis for two weeks. It appeared he had irreversible pulmonary damage and bronchoscopy was not done. Early that evening however at the insistence of his attending physician he was to have been bronchoscoped under ether which might have relieved his persistent bronchospasm. Unfortunately the anesthetist was not prepared to give ether and instead gave him 1.7 cc of curare and 0.17 gm of pentothal. Cardiac and respiratory arrest followed immediately and he could not be revived. Microscopy revealed over distended lungs and most of the small bronchioles were occluded with bronchiolar casts. Subsequently ether has been insisted upon in these cases and no operative death has occurred. Certainly if pentothal and curare or even local are to be used in a patient with history of asthma or who is having an asthmatic attack, one must be extremely cautious.

**Ether**

Ether still has an important place in bronchoesophagology. It is the only safe anesthetic for general anesthesia in infants. It is the anesthetic of choice in children under 10 years of age. The youngest in this series was five weeks old. It is also a safe anesthetic in elderly people. In the middle age group we use ether almost exclusively for asthmatics. Local is not necessary in these patients because adequate relaxation can be produced with ether alone. Although it takes a little more time and patience to anesthetize an adult asthmatic with ether, one does not run the risk of
TABLE V
TOTAL CASES IN WHICH ETHER WAS USED ALONE
OR WITH PENTOTHAL INDUCTION

| Ether Only          | 465 |
| Ether and Rectal Pentothal | 116 |
| Ether and I.V. Pentothal    | 22  |
| Ether, Local, and I.V. Pentothal | 3  |
| Ether and Local           | 9   |
| Ether and Nitrous Oxide   | 1   |
| **TOTAL**                | 616 |

reaction to local. Table V illustrates the various ether combinations employed.

*Ether and Pentothal.—Rectal pentothal* was used as an induction agent in children 116 times. It is useful where the child is apprehensive or if the procedure is being repeated on many occasions. It may be given on the ward but preferably in the anesthetic room, and is followed with ether. We had a girl, 18 months old, with tracheal stenosis following intubation for acute laryngotracheobronchitis associated with measles. She was bronchosoped a total of 25 times over a period of several years. She was always induced with rectal pentothal and then given ether by mask. She never had fear about the procedure. Likewise a boy, two years old, with severe stricture of the esophagus due to chemical burns was esophagosced and dilated directly through the esophagoscope 60 times in a period of seven years.

*Ether and Intravenous Pentothal.—*Rarely is induction done by pentothal intravenously in children. This method is usually reserved for adults who object strenuously to the smell of ether or prefer a needle to a mask. These people are sometimes given a small amount of pentothal intravenously and then continued with ether. Intravenous pentothal was used as the induction agent for only 22 procedures. In three of these local was also used. Ether and local alone were used in only nine cases, and in one case the child was induced with nitrous oxide.

Ether not only is the safest anesthetic for asthmatics, but it also benefits them therapeutically in that it produces relaxation of the bronchi and liquefaction of the secretions, thus allowing easier removal of secretions and bronchiolar casts.

Ether by its excellent relaxation of the larynx and cricopharyngeus also facilitates removal of foreign bodies from the tracheobronchial tree and esophagus in infants and children.

**SUMMARY**

This report includes 4,212 bronchoesophagological procedures under general anesthesia in a 10 year period.

Intravenous pentothal was given in 3,624 instances, and ether in 616.

Local anesthesia pentothal and a muscle relaxant (a curare-like drug) was the preferred method in adults. The relaxant drug was omitted in
some elderly and debilitated persons. Preoperatively morphine or pantopon was given, usually combined with atropine or scopolamine. Pontocaine was used as the topical agent until February 1952 after which time 5 per cent cyclaine was substituted. Flaxedil was also substituted for curare at this time.

Pentothal gives a pleasant induction, prevents and counteracts reactions from local agents, rarely produces postoperative nausea or vomiting, and if properly gauged the patient is usually reacting before leaving the operating room. It may be repeated many times without apprehension by the patient. It is not inflammable.

Pentothal and the relaxant must be given separately, induction must not be hurried and the patient must be at the proper depth of anesthesia and relaxation before attempting to introduce the endoscopic instrument.

Pentothal and curare are dangerous in asthmatics. The only death in this series occurred in an asthmatic person who had received these drugs.

Ether is the safest anesthetic for infants and was used routinely for children under ten. It is preferable in adults with severe emphysema, or asthma or tenaceous secretions. It may be used with pentothal as an induction agent either rectally or intravenously.

RESUMEN

Esta información corresponde a 4,212 maniobras broncoesofagológicas llevadas a cabo en diez años. En 3,624 se usó el pentotal intravenoso como anestésico general, y en 616 se usó del éter. Las drogas relajantes se omitieron en algunos ancianos y debilitados.

Preoperatoriamente se dieron morfina y pantopón, generalmente asociados a la atropina y la escopolamina. Se usó la pantocaína como tópico hasta Febrero de 1952, y a partir de entonces se substituyó por la ciclaina al 5 por ciento. Se usó también desde entonces el Flaxedil en lugar del curare.

El pentotal proporciona una inducción agradable, evita y contrarresta las reacciones a los agentes locales, rara vez produce náusea postoperatoria o vómitos y si se dosifica bien, el enfermo ya reacciona antes de abandonar la sala de operaciones.

Puede usarse muchas veces sin que el paciente manifieste apreensión. No es inflamable.

El pentotal y el relajante deben darse por separado, la inducción no debe ser apresurada y el enfermo debe ser llevado a la profundidad de anestesia apropiada así como a la relajación, antes de introducir el instrumento endoscópico.

El pentotal con curare es peligroso en asmáticos. La única muerte en esta serie, ocurrió en un asmático que había recibido otras drogas.

El éter es el anestésico más seguro para los infantes y se usó como de rutina en los menores de diez años. Es de preferirse en los adultos con enfisema o asma o con secreciones muy espesas. Puede usarse con el pentotal como agente de inducción ya sea rectal o intravenosamente.
RESUME

L'auteur rapporte 4.212 examens broncho-ösophageologiques pratiqués sous anesthésie générale pendant une période de dix ans. Le pentothal intraveineux fut utilisé dans 3.624 cas, et l'éther dans 616 cas. On négligea la médication calmante chez certaines personnes âgées ou débilitées. Avant l'opération, on administra de la morphine ou du pantopon, généralement associé à de l'atropine ou à de la scopolamine. La pontocaine fut utilisée comme agent local jusqu'au mois de février 1952, date après laquelle la cyclaine à 5% lui fut substituée. Le flaxedil fut aussi substitué au curare à ce moment.

Le pentothal provoque un état agréable, empêche et combat les réactions des produits utilisés localement, produit rarement des nausées post-opéra- toires, ou des vomissements, et s'il est convenablement administré au malade, a généralement cessé son action avant que le malade ait quitté la salle d'opération. Il peut être répété plusieurs fois sans danger. Il n'est pas inflammable.

Le pentothal et les produits calmants doivent être donnés séparément, l'administration des produits doit se faire lentement, et le malade doit être suffisamment anesthésié et relaxé avant qu'on tente d'introduire l'instrument endoscopique.

Le pentothal et le curare sont dangereux chez les asthmatiques. Le seul décès dans ce groupe survint chez un asthmatique qui avait reçu d'autres médications.

L'éther est l'anesthésique le plus sûr chez les bébés, et il a été utilisé d'une façon habituelle chez les enfants de moins de dix ans. Il doit être préféré chez les adultes atteints d'émphysème sévère, d'asthme ou en-combrés de sécrétions. Il peut être associé au pentothal, utilisé comme prémédication par voie rectale ou intraveineuse.

ZUSAMMENFASSUNG


Pentothal und das Relaxans müssen getrennt gegeben werden, die Ein-leitung der Narkose darf nicht überstürzt werden, und der Kranke muss
einen entsprechenden Grad von Schmerzunempfindlichkeit und Entspannung erreicht haben, ehe der Versuch der Einführung des endoskopischen Instrumentes unternommen wird.

Pentothal und Curare sind gefährlich bei Asthmaticern. Der einzige Todesfall in dieser Serie ereignete sich bei einem Asthmaticer, der andere Medikamente erhalten hatte.

Ather ist das sicherste Mittel Anaestetikum bei Kindern und wurde routinemässig bei Kindern unter 10 Jahren benutzt. Es ist vorzuziehen bei Erwachsenen mit schwerem Empysem oder Asthma oder zäher Sekretbildung. Es kann zusammen auf Pentothal zur Narkose-Einleitung gebraucht werden entweder rectal oder intravenös.

REFERENCES