pounds of pressure. After sterilization, the equipment may be kept in its transparent envelope for an indefinite period of time; bacteriological studies at the end of nine months demonstrated that the content was still sterile. There is no need to fear contamination as long as the cellophane tubing is mechanically intact since, even when wet, it is impermeable to all forms of bacterial life.

In our hands this method was entirely satisfactory over a period of many months. With the use of this sterilizing tubing the problem of care of rubber, plastic and metal equipment is solved.

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PROLONGED SPINAL ANESTHESIA
(SEVEN, ELEVEN AND FOURTEEN DAYS)

Spinal anesthesia for surgical procedures has not been prolonged for more than several hours for the obvious reason that the human organism could not withstand the combination of surgical trauma and "anesthesia shock" beyond a limited period of time. By "anesthesia shock" is meant the altered physiology induced by anesthesia which, if combined with "surgical shock," within a few hours leads inevitably to an irreversible condition that is conducive to death.

For therapeutic purposes, when spinal anesthesia is not combined with surgery, it may be prolonged far beyond the ordinary lengths and the patient will manifest few, if any, evidences of such altered physiology. Hence, it becomes apparent that under well regulated spinal anesthesia, the homeostatic mechanism of the body is able to adjust if no further serious alterations, such as those produced by surgical trauma, are added.

We have found continuous spinal anesthesia and later continuous epidural anesthesia of great aid in treating patients with vascular and pain problems involving the body below the level of the tenth thoracic dermatome. Continuous blockade by spinal (or epidural) anesthesia affords a really effective method of subduing pain and improving the vascular supply to the pelvis, genitalia and lower extremities.

In 3 of our longest cases of continuous spinal anesthesia there have not been any alarming symptoms referable to it for as long as fourteen days and none afterward, and the conditions for which it was insti-
tuted were relieved in all cases. There was no evidence of hypotension and hence no need for vasopressor drugs.

We decided to try the method because of the previous experience of Smith and Rees (1), in 1948, who successfully combated peripheral embolism and occlusion by this means.

TECHNIQUE

The Tuohy catheter (2), a modification of Lemmon's (3) method, was used. The catheter was inserted through a needle in the interspace between the second and third lumbar vertebrae and advanced 5 cm. Gauze dressings and adhesive strapping held the catheter in place. The anesthetic solution, which was made up as needed, was contained in a 10 cc. syringe. Injections were made through the catheter every four hours, day and night. Anesthesia was lightened occasionally so that the patient could void and evacuate the bowels.

Nupercaine (α-hydroxyethycaine acid diethyl, ethylene diamide) was considered best for this procedure because of its prolonged action and relative nontoxicity. It was not necessary to change the solution at any time during the procedure. The onset of anesthesia was prompt and it lasted approximately four hours after the injection of 2 cc. of the solution which contained 4 mg. of nupercaine, 1 to 200, and 100 mg. of procaine hydrochloride. Ephedrine 30 mg., was added to prolong the action of the anesthetic agents and glucose was added to make the solution
TABLE I

<table>
<thead>
<tr>
<th>Case</th>
<th>Age, Sex, and Race</th>
<th>Diagnosis</th>
<th>Anesthetic Agents</th>
<th>Amount Given at Each Injection</th>
<th>Duration of Each Injection</th>
<th>No. of Days</th>
<th>No. of Spinal Doses Given</th>
<th>Total Dose</th>
<th>Neurological Complications</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Negro, M, 32</td>
<td>Priapism</td>
<td>Nupercaine, 1200, Procaine</td>
<td>4 mg. 400 mg. with 30 mg. epinephrine in 2 cc. 10% glucose</td>
<td>Approx. 4 hrs.</td>
<td>14</td>
<td>85</td>
<td>Nupercaine, 340 mg, Procaine, 8,600</td>
<td>On 14th day: Fever, stiff neck, backache, spinal fluid cell count increased. Culture negative. Subsided after removal of catheter.</td>
</tr>
<tr>
<td>2</td>
<td>White, M, 49</td>
<td>Popliteal artery injury</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>11</td>
<td>72</td>
<td>Nupercaine, 288 mg, Procaine, 7,200</td>
<td>None</td>
</tr>
<tr>
<td>3</td>
<td>White, F, 46</td>
<td>Femoral embolism</td>
<td>Same</td>
<td>Same</td>
<td>Same</td>
<td>7</td>
<td>40</td>
<td>Nupercaine, 160 mg, Procaine, 4,000 mg</td>
<td>None</td>
</tr>
</tbody>
</table>

heavier so that its height in the subarachnoid space could be controlled (table 1).

**Report of Cases**

*Case 1.* (Anesthesia from June 26 through July 10, 1949). On June 17, 1949, a Negro, age 32, came to the hospital because of priapism of two days’ duration which by that time was extremely painful and could not be controlled by narcotics. On June 26, as a means of determining whether the condition was neurogenic in origin, continuous spinal anesthesia was instituted. This was ineffective in reducing the erection but it did stop the pain. Fourteen days later, a high fever (103.3 F.), severe pain in the back and a stiff neck developed. Spinal fluid which had been essentially normal during the first thirteen days, contained a “few pus cells but no organisms.” The catheter was withdrawn and more intensive antibiotic therapy was instituted. The next day, however, all symptoms, including priapism, had abated and the spinal fluid was sterile on culture. Eighty-five injections of anesthetic agent were given through the catheter. The patient had no further trouble and left the hospital three weeks later.

*Case 2.* Anesthesia from May 23 through June 3, 1949, reported previously (4). A 49 year old, white longshoreman, sustained a crushing injury to the right popliteal space which involved the popliteal artery. After a tunneling operation, the extremity remained cold and cyanotic and to avoid gangrene, which occurs almost inevitably after such injuries, continuous spinal anesthesia was instituted. It was discontinued eleven days later when the viability of the extremity was assured. Seventy-two injections of anesthetic agent were given through the catheter. The patient had no symptoms referable to the spinal anesthesia either before or after this procedure. Anticoagulants and antibiotics were given during this time.

*Case 3.* (Anesthesia from March 7 to March 14, inclusive, 1950). A woman, 46 years old, with a history of rheumatic heart disease, had had severe pain in her leg for four hours before admission. Continuous spinal anesthesia was instituted, which relieved the pain. Femoral embolectomy was performed and postoperatively, anticoagulants and antibiotics were administered. Anesthesia was continued for seven days and the circulation improved to such a degree that it was not necessary to amputate the leg. She had no complaints referable to the spinal anesthesia.

**Summary**

These 3 cases and others in which anesthesia was of shorter duration indicated to us the value of spinal anesthesia (and later of epidural anesthesia) in treating acute vascular conditions of the lower extremity in which the effects of ultimate dilatation of the collateral circulation are essential. The method is also useful in controlling severe pain below the level of the umbilicus.
as demonstrated in the case of priapism. It was not necessary to catheterize any of the patients during the procedure. The anesthesia was allowed to “wear off” for a short time (usually an hour) and evacuation of the bladder and the bowel took place with the conscious effort of the patients. Aside from the incident on the fourteenth day in case 1, there were no neurological signs during or after the anesthesia.

CONCLUSIONS

Three cases are reported in which spinal anesthesia was continued for seven, eleven and fourteen days, respectively.

Transient neurological sequelae were observed in only one patient on the fourteenth day.

The utility of nupercaine in regard to its duration and its safety is emphasized.

Complete relief of pain below the umbilicus and the ultimate in collateral vascular dilatation are demonstrated by this procedure.

The same results may be effected with more safety by employing continuous epidural anesthesia in appropriate dosage.

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MASSIVE BILATERAL PULMONARY ATELECTASIS DURING INHALATION ANESTHESIA—A CASE REPORT

There is a tendency in some hospitals to regard preoperative bronchoscopy as a necessary procedure only when the chest is to be opened for a pathologic condition that is known to exist within the respiratory organs. A case is reported of massive bilateral pulmonary atelectasis occurring during inhalation anesthesia when the right side of the chest was opened for removal of a cancerous lesion. This lesion was considered to be separate from the respiratory tract and therefore preoperative bronchoscopy was not required. The results on the operating table were almost disastrous.

REPORT OF CASE

A 65 year old white man in good physical condition was operated on for a cancer of the esophagus. Physical examination and laboratory studies were preoperatively normal except for the esophageal neoplasm. He was normotensive. A right-sided approach to the lesion was decided upon by the surgeons. Anesthesia consisted of a pentothal-nitrous oxide-oxygen-ether sequence. Intubation was easily performed with a 35 French cuffed endotracheal tube; however, it was noted after intubation that the cuff was leaking. The resident administering the anesthetic decided to continue using the tube because the leak was moderate, and to utilize higher flows of oxygen. A plane 2 level of anesthesia was maintained with ether as the thoracotomy was performed. The patient was in the left lateral decubitus position. Throughout this period the blood pressure was about 120 mm. systolic and 80 mm. diastolic and the pulse rate was 80 to 90. When the right pleural cavity was opened and the right lung deflated the patient became markedly cyanotic. The attendant in anesthesia was immediately called and informed of the preceding events. The blood pressure rose to 200 mm. systolic and 130 mm. diastolic and the pulse became bounding at a rate of 40.