inches deep, and both have hinged lids.

The arrangement of the panel is a personal matter and probably no two anesthesiologists would design identical panels. The sphygmomanometer and the water manometer might well be included.

Another possibility is an ampule rack for the more frequently used drugs.

JAMES F. B. ZWEIGAFT, M.D.,
Attending Anesthetist,
Richmond Memorial Hospital,
Staten Island, N. Y.

CART WITH NONDETACHABLE RESTRAINT STRAP

This cart is made by taking the ordinary hospital operating room cart and having the hospital engineer cut a rectangular hole ½ inch by 2½ inches between the ends and on each edge of the cart. A belt buckle arrangement is made, as illustrated, and riveted to the cart. The advantages are as follows:

1. The belts are never lost, used for other purposes, or left in the patient's room.

2. Heavily medicated patients are reminded the guerney is narrow and are mildly restrained on the cart, thus preventing falls and injuries.

3. If the anesthesiologist administers the anesthetic in an anesthetic room he may do so on the cart with some control during the excitement period.

4. Postanesthetic excitement stages which occur when the patient regains his reflexes in the operating room are more easily restrained on the way to the room.

DANIEL C. MOORE, M.D.,
Dept. of Anesthesiology,
Mayo Clinic,
Seattle, Washington

THE COUGH TEST FOR DETERMINATION OF LEVEL OF SPINAL ANESTHESIA

I have been using the cough as a means of determining the height of abdominal muscle relaxation under spinal anesthesia for the past two years. In the absence of any mention of this test in the literature on spinal anesthesia for which I have searched, I believe this clinical note might be helpful and new to many anesthesiologists. It is the sort of idea, however, which many experienced anesthetists must have discovered for themselves. Therefore, no claim for originality is intended by this report.
The usual means of following a rising level of spinal anesthesia is to skin test for analgesia or hypalgiesia. I have found this method faulty for the following reasons:

(a) The patient must be sufficiently cooperative and alert to compare skin sensations. Premedication, fear, or language difficulty may make a patient’s response unreliable. Repeated skin testing causes some patients and surgeons to feel that the anesthetist is uncertain of his technique.

(b) The level of analgesia which is usually at least several dermatoomes cephalad to the level of muscle relaxation is detected when one uses the common spinal anesthetic techniques with hyperbaric or isobaric solutions. In some instances the level of analgesia may be sufficiently high but the level of relaxation too low. If the anesthetist does not test for relaxation he may fail to realize its absence until the surgeon tells him, and then it is too late to move the level up. Furthermore, if relaxation is not determined by the anesthetist, he is unable to know with certainty when the surgeon is wrong, as occasionally he is, when he complains, "the patient is as rigid as a board," while attempting to work in a narrow epigastrum with the retractors against the costal arch.

A cough depends on the propulsive power of the contracting anterior abdominal wall and the intercostal muscles acting through a relaxed diaphragm. The cough test uses the fact that the paralyzed portion of the anterior abdominal wall bulges outward during a cough in contrast with the inward contraction of the nonparalyzed part. When relaxation ends at the umbilicus the cough test clearly shows a sharp line of demarcation between the bulging lower half and the contracting upper half of the anterior abdominal wall.

If the entire anterior abdominal wall is flaccid but the lower six intercostal spaces can undergo some expiratory contraction, the patient usually can produce a weak cough, even though he may claim that he cannot feel himself coughing. The cough suffices, however, to show bulging of the entire abdominal wall up to the xiphoid process.

If the patient is totally unable to cough, the level of muscle relaxation has affected the major portion of intercostal muscle power as well as the entire anterior abdominal wall.

The advantages of the cough test are:

1. The level of relaxation rather than of analgesia is demonstrated. If the relaxation is high enough for the operation, the anesthetist may be sure of adequate skin analgesia, which always extends several segments more cephalad than the level of relaxation with the usual spinal anesthetic techniques.

2. Even the very drowsy patient is capable of obeying the request to cough.

3. The cough test quickly and easily demonstrates a level of relaxation to the experienced eye. The cough test can be applied without touching the abdomen. The anesthetist may therefore continue his other duties about the patient while watching the cough response. The test can be tried while the abdomen is draped or when a patient, responding to the pressure of the surgeon’s scalpel, raises the question of adequate height of spinal anesthesia.

Incidentally, the coughing is beneficial to the patient in clearing his tracheobronchial tree after an hour or two of premedicated sleep and before undergoing an abdominal incision which will limit his coughing ability and cooperation.

A theoretical disadvantage of the cough test might be the tendency of a cough to produce a pulsion wave up the spinal subarachnoid space and so spread the level of anesthesia cephalad. This does not really matter as long as the rising level is watched. The patient is raised from the Trendelenburg position and no longer asked to cough once the desired level has been obtained. Furthermore, the use of the cough test in over 3,500 cases has not been followed by a single instance of apnea caused by excessively high spinal anesthesia, nor has undue cephalad spread been more frequently in my experience than among fellow anesthesiologists in the same hospitals who have not used the test.

The only contraindication to the use of the cough test is a surgical condition which might be aggravated by coughing, for ex-
ample, strangulated hernia and perforated peptic ulcer. The cough test is frequently indecisive in those conditions which cause marked distention or debility of the anterior abdominal wall, for example, full term pregnancy, ascites, extensive ventral hernia and severe intestinal obstruction.

For the majority of cases, however, the cough test serves admirably for the accurate and easy determination of the optimal abdominal effect of spinal anesthesia. It has been readily learned by every resident in anesthesia.

**Summary**

The use of the cough is described as a means of easily and reliably determining the level of abdominal muscular relaxation under spinal anesthesia. Its advantages and disadvantages are discussed. The cough test for relaxation is preferred to the skin test for analgesia in most cases.

**Barnett A. Greene, M.D.,**
**Attending Anesthesiologist,**
**Unity, Adelphi and Brooklyn Women’s Hospitals, Brooklyn, N. Y.**

---

**CASE REPORT**

The following case report describes paralysis of the third and sixth cranial nerves following spinal anesthesia. The report is submitted because of the relative rarity of this complication.

A white woman, aged 53 years, had known gallstones for eight years and vague substernal and left precordial pain related to exertion and excitement. The attacks of pain became progressively more frequent but the pain continued to be mild. Cholecystectomy was advised.

Inquiry revealed that the patient frequently had frontal headaches in the morning which tended to disappear during the day. A roentgenogram revealed a “soft shadow” defect which on re-check was considered to be a cyst or polyp in the right sphenoid sinus. Deafness in the right ear had followed typhoid fever (1919).

Physical examination revealed that the patient was obese. The pulse was 72, respirations 20 and blood pressure 150 mm. systolic and 90 mm. diastolic. The pupils were regular and equal and reacted to light and accommodation; there was slight lid lag. Examination of the fundi gave negative results.

Spinal anesthesia was induced with 14 mg. of pontocaine naphthoïd, 0.5 cc. of ephedrine and 10 per cent dextrose to make 4 cc. The injection was made between the second and third lumbar vertebrae. Anesthesia was obtained to the fourth thoracic segment. The operation lasted eighty-five minutes and there were no significant changes during the course of anesthesia. The initial blood pressure was 150 mm. systolic and 100 mm. diastolic and the pulse was 100; the final pressure was 138 mm. systolic and 90 mm. diastolic and the pulse was 98. This pressure decline was gradual. The patient was given 50 mg. of demerol intravenously after the first thirty minutes of anesthesia and twenty minutes after the operation began. Oxygen was administered throughout.

At 4 a.m. of the first postoperative day or about twenty hours after the administration of the spinal drug, the patient complained that she could not open her right eye, and had severe generalized headache. The blood pressure was 174 mm. systolic and 96 mm. diastolic. Examination revealed complete ptosis of the right upper lid. The pupil was dilated and fixed; there was only downward motion of eyeball. There was no impairment of vision or corneal sensation. Ophthalmologic and neurologic consultants agreed that the third and sixth cranial nerves were paralyzed. A spinal tap gave negative results. On the third postoperative day slight improvement was noted, with slight motion of the lid and eyeball. On the fifth postoperative day she was able to open the lid; there was a slight lag. The right pupil was the same size as the left and reacted sluggishly to light and accommodation. Improvement was rapid thereafter and the patient was discharged on the eighteenth postoperative