Short Circuit in the Operating Room

To the Editor.—Recently a short circuit occurred in an operating room when a battery pack was plugged into a wall receptacle to be recharged. As the electrical plug was being inserted into the receptacle, the metal receptacle face plate came loose, resulting in a short circuit between the hot and neutral blades of the plug. Although there was a loud noise and a light flash, the person inserting the plug was not injured.

The proximal cause of this incident was that the screw that secures the receptacle faceplate was missing. When the hot and neutral blades of the plug made contact with their respective electrical power lines, they were short-circuited by the falling metal face plate before they could be completely covered by full insertion into the receptacle.

It used to be that electrical plugs came out of receptacles because the fit was too loose. Now, in our relatively newly constructed facility, it is just the opposite. Sometimes it is too difficult or just too much trouble to fully insert a plug. It is not uncommon to walk through an operating suite or ward and see electrical appliances operating with their electrical plugs halfway out of the receptacles. We know of similar incidents. In one, a metal-head window-shade pull-chain short-circuited a lamp when the shade was lowered. In another, a metal needle rolled off a table and short-circuited a monitor plug. The needle actually melted away before the circuit breaker had time to trip, leaving behind only a pair of ghostly grooves vaporized in the blades of the plug.

Another factor that may have acted to facilitate this event was the orientation of the receptacle mounting. The three slots of the receptacle form a triangle, the rounded slot being for the ground blade of the plug. In this case, the receptacle was installed with the ground-blade slot in the 6-o’clock position (pointing down). If this slot had been in the 12-o’clock position (pointing up), the ground blade on the plug (which is made the longest so that it is first to connect and last to disconnect) might have blocked the metal plate from slipping down and thus short-circuiting the other two blades. At present, there is no standard that addresses the orientation of receptacles. It would appear that the 12-o’clock position offers at least some protection, without potential adverse effects. The National Fire Protection Association should consider this question in the next revision of the National Electrical Code* (Article 517), where electrical construction in health-care facilities is discussed.

Although there were no adverse effects from this incident, we submit this report to call attention to the constant need for concern with all aspects of electrical safety. The user of electricity in the operating room should realize that plugs must be inserted fully into receptacles. Perhaps most important, personnel inserting a plug should observe the physical condition of the plug and receptacle (as well as the equipment itself). Only through education, constant vigilance, and concern of all personnel can untoward events be prevented.

Alvin Wald, Ph.D., C.C.E., F.A.I.M.B.E.
Associate Professor and Technical Director
Department of Anesthesiology
Columbia-Presbyterian Medical Center
630 West 168th Street
New York, New York 10032

(Accepted for publication March 28, 1994.)


Total Spinal Anesthesia during Cesarean Section Hours after Previous Unintentional Dural Puncture

To the Editor.—Total spinal anesthesia is an unpredictable and, fortunately, unusual complication during routine spinal anesthesia. Many patient variables have been suggested as influencing the spread of spinal anesthesia. These include age, weight, height, and body mass index. Accidental dural puncture during epidural local anesthetic administration also has been associated with total spinal anesthesia.4,5

I recently treated a parturient (36 yr old, 82 kg, 168 cm) in whom total spinal anesthesia occurred during subarachnoid administration of hyperbaric bupivacaine for cesarean section. This occurred 7 h after two unintentional dural punctures during attempted labor analgesia at two consecutive lumbar segments (L2–L3 and L3–L4). No local anesthetics (except to the skin) were administered during the attempted epidural analgesia. An urgent cesarean section was scheduled 7 h later because of persistent occiput posterior position of the fetus and arrest of the second stage of labor. I decided to perform a spinal anesthetic for this procedure because of the difficulties encountered during attempted labor epidural analgesia. With the patient...
sitting, spinal anesthesia was established with 1.5 ml 0.75% bupivacaine in 8.25% glucose (11.25 mg bupivacaine) through a 25 G Quincke spinal needle. Injection was performed over 15 s and between uterine contractions. Free flow of cerebrospinal fluid (CSF) was observed. The patient was gently placed supine in a left-lie position using a folded blanket under the right hip. The operating table was kept in a horizontal position.

Within 2 min, she began to develop upper extremity analgesia. This rapidly progressed over the next 30 s to motor weakness of both hands and respiratory distress. Hypotension was not noted. Because of the obvious respiratory distress, mechanical ventilation of the lungs was instituted with 100% O₂ via mask. The trachea was subsequently intubated without the use of hypnotics or muscle relaxants. Anesthesia was maintained for the cesarean section with 60% N₂O and 0.3% isoflurane in oxygen. A healthy male infant was delivered with Apgar scores of 7 and 9.

The patient fully recovered from the effects of the spinal anesthetic in 2 h, and the trachea was extubated without complications. Postoperatively, she developed a severe post-dural puncture headache, which was treated with two epidural blood patches and resolved in 1 week.

It was surprising to me that 11.25 mg subarachnoid bupivacaine produced a total spinal anesthetic in this patient. Indeed, Norris found that 15 mg hyperbaric subarachnoid bupivacaine provided adequate anesthesia in parurients presenting within wide ranges of age, height, weight, body mass index, and vertebra column length. Nevertheless, my patient displayed the effects of a massive subarachnoid overdose of local anesthetic; despite use of a hyperbaric mixture that was administered while the patient was in the sitting position. Dose, positioning, and baricity alone would make a total spinal anesthetic unlikely in this patient.

In this instance, I believe our dose was injected into a relatively much smaller volume of CSF, leading to a much higher than expected level. This smaller volume of CSF occurred secondary to the two unintentional dural punctures produced during attempted epidural analgesia. The decreased volume of subarachnoid spinal CSF was potentially due to direct loss of CSF through the dura. Additionally, a collection of CSF in the epidural space could compress the now deformable dural sac, resulting in a smaller volume of subarachnoid spinal CSF and unexpected total spinal anesthesia.

Dennis L. Wagner, M.D.
Clinical Associate Professor of Anesthesiology
Indiana University School of Medicine
1120 South Drive, FH 204
Indianapolis, Indiana 46202

References

(Accepted for publication March 28, 1994.)

The Bullard Laryngoscope and Size of the Endotracheal Tube

To the Editor.—The development of an introducing stylet for the Bullard laryngoscope (BLS) has simplified the procedure of tracheal intubation. The introducing stylet duplicates the shape of the BLS blade, and it bends to the left at an approximate angle of 20° near the distal end of the fiberoptic housing, providing guidance of the endotracheal tube (ETT) into the trachea. Before attempting intubation, the ETT is “loaded” onto the stylet, which is fastened to the BLS in its respective slot, bringing the vertical part of the stylet behind and on the right side of the laryngoscope in the groove formed by the blade anteriorly and by the lens housing medially. The depth of the groove is only 5 mm, permitting the use of ETTs in sizes ranging up to 7.5 mm ID without displacing the introducing stylet posteriorily. This allows the endoscopist to visualize the distal 8 mm of the stylet through the eyepiece of the BLS and determine whether the stylet’s tip faces the middle third of the left vocal cord, which is an ideal position for successful passage of the ETT (fig. 1).

A size-8.0 mm ID ETT will displace the stylet posteriorly because of its larger diameter. This displacement occurs in such a way that only 1–2 mm of the distal end of the stylet can be viewed through the eyepiece and the tip of the stylet is usually facing the interarytenoid fold (fig. 2). Intubation of the trachea is still possible if care is taken not to allow the stylet’s tip to drift posteriorly during advancement of the ETT, which would result in an esophageal intubation. Larger ETTs (8.5 and 9.0 mm ID) displace the stylet even more posteriorly, thus losing the benefit of being able to view the tip of

Anesthesiology, V 81, No 1, Jul 1994