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Potential Deficiencies in Modifying the Dinamap® for Use in the Neonate

To the Editor:—Zmyslowski and Lena describe a "simple modification of the Dinamap®" for monitoring blood pressure in the neonate.¹ Although they cite Showman and Betts' article² relating to the hazards of automatic noninvasive blood pressure monitoring, I believe they fail to appreciate these hazards in children. The Dinamap® 845 is an adult monitoring device capable of generating cuff inflation pressures of 160 mmHg. (If cuff inflation is greater than 275 mmHg, the overpressure switch automatically will deflate the cuff.) These pressures are too high to be tolerated in the neonate. Alternatively, the Dinamap® 845XT measures arterial blood pressure, non-invasively, along with heart rate and mean pressure in the neonate and infants weighing less than 6.8 kg. Initially the monitor will inflate the cuff to 125 mmHg. If cuff inflation pressure is greater than 235 mmHg, the overpressure switch will deflate the cuff. With the Dinamap® 845, after the artery is occluded, the cuff will begin to

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Airway Emergency in a Patient during CO₂ Arthroscopy

To the Editor:—Insufflation of the intraarticular space with CO₂ has improved visualization and identification of internal structures during arthroscopic examination of the knee. The use of this technique is not without hazard to the patient, however. We wish to report a serious complication that developed during elective arthroscopic knee examination.

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deflate in increments of 4 mmHg. This would not be sufficient to detect small changes that occur at lower pressures as in the neonate. On the other hand, using the 845XT, if cuff pressures drop below 35 mmHg, cuff deflation will occur in increments of 2 mmHg. Does the described adaptation outweigh the hazards and the accuracy of using the appropriate monitor?

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REPORT OF A CASE

A young healthy female was anesthetized with thiopental iv and a combination of nitrous oxide, oxygen, and enflurane by mask while breathing spontaneously. A thigh tourniquet was applied to the lower extremity, but its inflation was omitted electively. Trochars for insufflation of CO₂ and examination were positioned in the knee after multiple insertions. After 10 min, the patient became tachypenic. Sys-

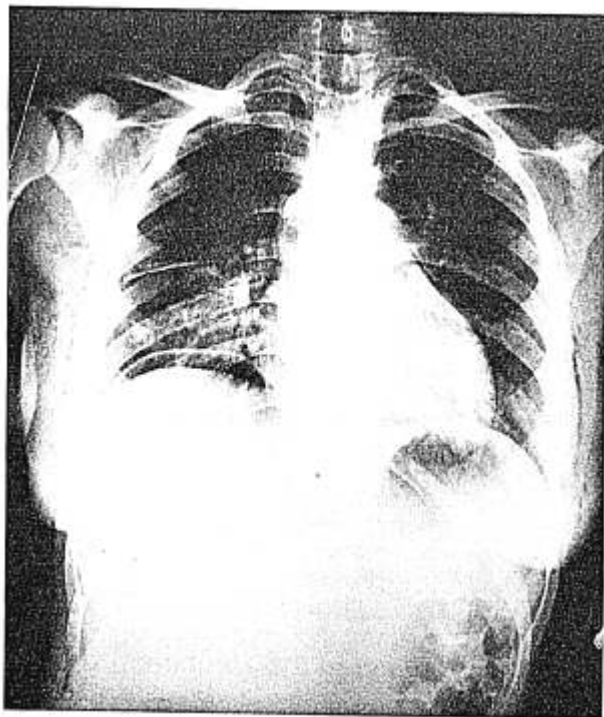


FIG. 1. Chest x-ray reveals diffuse subcutaneous emphysema and gas in the peritoneum and in the pericardium related to CO₂ instillation at the time of arthroscopy.

temic blood pressure and heart rate remained unchanged at 100/60 mmHg and 80 beats/min, respectively. Initially, light anesthesia was suspected, so the concentration of enflurane was increased. After several more minutes, the blood pressure was 160/100 mmHg, and tachycardia of 140 beats/min was present. Hyperpnea and expiratory wheezes became apparent. In addition, subcutaneous emphysema was observed and palpated at chest level. Spreading of gas continued in a cephalad direction, causing significant swelling of the loose tissues of the face. At this time, examination and insufflation of the knee were stopped. Anesthetic gases were discontinued and ventilation was assisted with oxygen. Due to distortion of the airway anatomy by subcutaneous emphysema, intubation of trachea was performed immediately without relaxation. The patient then was hyperventilated with oxygen, and the swelling began to decrease almost immediately. The patient was extubated within 2 h. Radiologic examination demonstrated subcutaneous emphysema and gas under the diaphragm and in the pericardium (see illustration). The patient made a satisfactory recovery but complained of chest pain associated with breathing for several days postoperatively.

This patient developed a sudden life-threatening airway emergency and signs of hypercarbia* during intraarticular CO₂ insufflation of the knee. Because CO₂ insufflation can produce intraarticular pressures of as high as 2.5 psi (129 mmHg), which is about six times higher than the ideal pressure of 0.4 psi (20 mmHg) generated in the abdomen during diagnostic laparoscopy,¹ leakage into surrounding tissues will occur by following paths of least resistance. It is also possible for the insufflation trocar to change position during examination. This can be ascertained by noting any change in intraarticular pressure or joint distension. Cephalad spread of gas beyond the thigh occurred in this case because the tourniquet was not inflated.

We suggest that a tourniquet be applied and inflated above systolic arterial pressure to avoid spread of gas beyond the extremity. Wrapping distal to the tourniquet to provide enough tissue compression to minimize the accumulation of gas in the lower extremity should allow most gas to escape to the atmosphere at the operative site and attenuate the spread of subcutaneous emphysema after deflation of the tourniquet. In addition, anesthesia personnel should be familiar with the function and associated hazards of new operating room equipment. The above precautions should preclude the need for general endotracheal anesthesia in all patients having these procedures.

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* Arterial blood gas analysis was not immediately available.