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How to Make Tape Stick to Sandpaper

To the Editor:—Although the literature on how to properly tape an endotracheal tube to a patient's face is plentiful, we would like to add another report and a self-explanatory pertinent illustration on this subject.

Whenever a patient's skin is either greasy, hairy, or otherwise so uneven that normal plastic or cloth tape will not adhere properly, we use the following technique.

Once endotracheal intubation has been performed and proper tube position is confirmed, two small rectangles (3 × 7 cm) of transparent dressing (Tegaderm™, 3M, St. Paul, Minnesota) are placed on the skin overlying the cheeks or the zygomatic arch, forming a "second skin." The endotracheal tube can then be secured by the operator in the usual fashion, with the adhesive tape applied to the Tegaderm™. Contrary to regular tape, adhesion of the Tegaderm™ "second skin" does not deteriorate with time. Even after prolonged intubation, contact remains excellent and tube displacement is very unlikely to occur. For extubation, tape is easily removed together with the Tegaderm™.

We recommend this as an efficient and clean technique to make tape stick to any patient's skin.

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A Method of Facilitating Intravenous Regional Bretylium

To the Editor:—Ford *et al.*[1] recently described intravenous (iv) regional bretylium for treatment of patients with reflex sympathetic dystrophy (RSD). We have used this technique several times with varying success. However, major problem in utilizing this technique is difficulty in establishing venous access due to the hypersensitivity and venoconstriction caused by the RSD. We describe an approach to facilitate iv access in these patients.

A young woman presented to our Pain Clinic with a 2-month history of RSD of the right foot following an industrial accident. An iv bretylium blockade of her leg was accomplished only after great difficulty in establishing iv access. The patient had excellent pain relief for 36 h, and a repeat block was planned for the following week. Multiple attempts, including the use of nitro-paste ointment, to start an iv were unsuccessful. After appropriate consent was obtained and adequate prehydration given a 17-gauge Tuohy needle was inserted into the epidural space *via* the L_{3-4} interspace. Ten milliliters of .25% Marcaine was administered with the patient in the sitting position. The patient developed partial pain relief of her foot and minimal vasodilation. A 22-gauge angiocatheter was inserted and an iv bretylium block was done resulting in complete analgesia.

In summary, establishing an iv in a limb afflicted with reflex sympathetic dystrophy is often difficult because of hypersensitivity and venoconstriction. Epidural sympatholytic block producing venodilation and some analgesia facilitates obtaining iv access for a regional block. A possible extension of this technique for an upper extremity would be sympatholysis *via* stellate ganglion blockade.

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69:148, 1988

Detecting Cyanosis in Children

To the Editor:—The effect of the hemoglobin concentration on the ability to detect cyanosis was not mentioned by Coté *et al.*[1] in their article describing the efficacy of pulse oximetry in children. In that study, the majority of clinicians failed to detect cyanosis before it was detected by the pulse oximeter.

Detection of cyanosis depends on the absolute, rather than the relative, amount of reduced hemoglobin. Cyanosis becomes apparent when the mean capillary concentration of reduced hemoglobin exceeds 5 g/dl. Thus, in a patient with a hemoglobin concentration of 10 g/dl, there would have to be 50% reduced hemoglobin for the detection of cyanosis, whereas a patient with a hemoglobin concentration of 15 g/dl would have 33% reduced hemoglobin (oxygen saturation of 67%) before cyanosis could be detected.

Although Coté *et al.* do not list the hemoglobin concentrations of the children in the study, it is likely that they ranged from 10–15 g/dl. Therefore, it is not surprising that the clinicians participating in the study were not able to detect cyanosis with the levels of oxygen saturation described.

Fortunately, except for atelectasis, the cited causes for the arterial oxygen desaturation (airway obstruction, laryngospasm, hypoventilation, and endobronchial intubation) are all likely to be detected by an astute clinician before hemoglobin oxygen saturation reaches the low levels needed to produce detectable cyanosis. The pulse oximeter, as proven by the study, is an invaluable adjunct to the skills of the clinician.

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In Reply:—Dr. Johnson's comments regarding hemoglobin concentration, oxygen saturation, and detection of cyanosis are appreciated and technically correct, but miss the point. Our study demonstrated the efficacy of a new technology (pulse oximetry) in diagnosing arterial desaturation prior to the *late* signs of desaturation (cyanosis and bradycardia). The early studies of cyanosis *versus* hemoglobin saturation found that 4–6 g/dl of desaturated hemoglobin are required to produce cyanosis. The amount of circulating hemoglobin is the major determinant of visible cyanosis, *i.e.*, one needs to have a hemoglobin above 5 g/dl.[1–4] There is no question, therefore, that the pulse oximeter is far superior and much more reliable than the human eye and, as Dr. Johnson correctly points out, able to detect desaturation prior to clinically apparent cyanosis.

The clinical ability to diagnose cyanosis is also modified by many factors, including thickness of the epidermis, skin pigment, and pigment associated with jaundice or Addison's disease.[1–5] Additionally, it has been well established that other factors, including lighting conditions and variability among individual observers, affect clinical diagnosis of cyanosis.[6] Indeed, Comroe and Botelho, in a large, well-controlled study, found that "visual impressions of cyanosis are unreliable. Serious grades of arterial anoxemia may be unrecognized by many physicians."[6]

We did not report hemoglobin concentration because we did not regard it as a contributory factor; serious life-threatening desaturation was diagnosed sooner by oximetry than by the clinician on 17 occasions. The hemoglobin values in these children ranged from 10 to 20 g/dl. In eight patients, cyanosis was not diagnosed, despite oxygen saturations ranging from 44% to nonrecordable. Several of these events occurred in newborn infants with hemoglobin values between 16 and 20