3. Raj PP, Garcia CE, Burleson JW, Jenkins MT: The site of action of intravenous regional anesthesia. Anesth Analg 51:776–786, 1972
4. Grice SC, Morell RC, Balestrieri FJ, Stump DA, Howard G: Intravenous regional anesthesia: Evaluation and prevention of leakage under the tourniquet. (Abstract) ANESTHESIOLOGY 63:A221, 1985

(Accepted for publication November 4, 1985.)

Anesthesiology
64:527, 1986

Use of Pulse Oximetry for Assessment of Collateral Arterial Flow

To the Editor:—Methods to assess collateral blood flow prior to percutaneous cannulation of a peripheral artery include the Allen's test, modified Allen's test, Doppler, and finger pulse analysis.

We have used the pulse oximeter* with the digit oxygen transducer in conjunction with the Allen's test to assess collateral arterial flow *via* the ulnar artery for radial artery cannulation and *via* dorsalia pedis or posterial tibial artery in arterial cannulation at the foot. The digit oxygen transducer is placed on the index finger or thumb for evaluation of ulnar collateral flow. A visual and audible measure of the pulse and saturation is provided by the pulse oximeter after approximately four to six pulsations. The radial and ulnar arteries are occluded with the examiner's fingertips until the pulse readout is absent. The occlusion of the ulnar artery is released, and the time to return of the pulse as detected by the pulse oximeter is noted. As with the Allen's test, times greater than 15 s are considered prolonged, and one may have reservations about cannulating the radial artery on that extremity. A similar examination of the dorsalis pedis and posterior tibial collateral arteries may be performed. Once arterial cannulation is performed, continuous monitoring of the perfusion to that extremity may be achieved by leaving the transducer on the finger or great toe.

Despite conflicting evidence in the literature,[1,2] we believe that an assessment of collateral arterial flow is useful when contemplating arterial cannulation. The pulse oximeter provides an accurate and practical evaluation of adequacy of collateral arterial circulation.

GREGORY S. NOWAK, M.D.
Anesthesia Resident

S. S. MOORTHY, M.D.
Associate Professor

WILLIAM L. MCNIECE, M.D.
Assistant Professor

Department of Anesthesia
Indiana Univeristy School of Medicine
Indianapolis, Indiana 46223

REFERENCES

1. Bedford RF, Wollman H: Complications of percutaneous radial artery cannulation: An objective prospective study in man. ANESTHESIOLOGY 38:228–236, 1973
2. Slogoff S, Keats AS, Arlund C: On the safety of radial artery cannulation. ANESTHESIOLOGY 59:42–47, 1983

(Accepted for publication November 4, 1985.)

* Nellcor Incorporated, Hayward, California 94545.

Anesthesiology
64:527–528, 1986

Morphine-Induced Cardiac Pain?

To the Editor:—Butorphanol is not the only opioid that may produce excruciating right hypochondral pain.[1] Although it is well-known that these drugs may cause biliary spasm,[2–4] the severity of the pain has not received sufficient emphasis. Relief of spasm may be achieved with a narcotic antagonist or, less effectively, nitroglycerin or atropine.[2,4] Dr. Dolan's description of a patient writhing and crying out in agony is exactly what we have seen with morphine in 15 patients over the past 10 years. His patient had previously suffered a similar reaction to morphine.

All except one of our patients had received intramuscular morphine preoperatively. In three patients the pain spread to include the epigastrium and anterior chest and was thought to be of cardiac origin, and surgery was postponed. The most alarming case was that of a 57-yr-old female patient who received morphine postoperatively in the recovery room and actually lost consciousness in the elevator while being taken back to her room. A cardiac arrest was called, although she did have a very slow, weakly palpable pulse; she regained consciousness within a few minutes. She was given nitroglycerin, and the pain eased over the next half hour. She was admitted to the coronary care unit, where investigations were pursued for 3 days. It was finally accepted that the pain had not been cardiac in origin, but from biliary spasm precipitated by morphine.

There have been four consistent features in this syndrome. No patient gave any history of heart disease, but all had previously undergone cholecystectomy. On direct questioning, each said that this pain was similar to, but