

500 ml./minute of the 1-liter flow of oxygen. The use of 500 ml./minute of nitrous oxide under these conditions was therefore equivalent to the use of 11 ml./hour of liquid furoxene. Our previous results have shown this method to provide adequate oxygenation.

The Ohio Chemical Company furnished the Fluoromar used in these studies.

#### REFERENCES

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## Continuous Intercostal Blocks

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To our knowledge, continuous intercostal blocks have never been reported previously. We performed this block on four patients with severe thoracic pain: three had pleuritis and one had fractured ribs. Intradermal wheals are raised over the lower edge of the selected ribs in the midaxillary line and the underlying costal periosteum is generously infiltrated. A 15 G Tuohy needle is introduced through the wheal until it reaches the bone. While pressure on the shaft of the needle retracts the skin downward, the tip is gently walked off the lower border of the rib. As soon as bony contact is lost, the needle is advanced about 0.5 cm. A distinct "release" is felt when the curved bevel snaps through the fascia of the intercostalis externus and enters the narrow compartment running between the internal and external intercostal muscles and fascia and containing the intercostal nerve and vessels. Paresthesias are usually elicited.

As soon as sensation of "give" and paresthesia suggest penetration of the correct plane, the needle is halted, its bevel rotated dorsally and a rigid BD 16 G vinyl catheter is introduced and advanced 2-3 cm. beyond tip of the needle. Easy insertion of the catheter is added evidence of good positioning. We have found soft or curled catheters difficult to implant.

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The epidural needle is then removed; a 25 G needle is inserted at the tip of the tube and covered with the blue rubber cap of a Venopak venoclysis set.

A silk suture is placed in the skin wheal and tied to the tube, some "Aeroplast" sprayed and the catheter taped to the thorax. A wide elastic bandage is wrapped around the chest to prevent the tubes from being rubbed off by the patient while he sleeps. In our experience, these precautions are necessary because the catheter is poorly anchored in the thin and loose intercostalis externus, its fascia and the subjacent skin.

Three to six catheters were simultaneously implanted in our patients; in each catheter, the intern on call injected 3 ml. of 1.5 per cent lidocaine with 1:200,000 epinephrine and 1:1,000 tetracaine at six hour intervals.

In every instance, complete pain relief occurred within three to five minutes of the first injection and persisted uninterrupted for forty-eight hours. An injection-free period of eight to ten hours was then maintained; if the pain warranted it, serial injections were resumed for another forty-eight hours. Our catheters were removed after two to four days.

Theoretical complications are infection, pneumothorax and damage to nerve and vessels. None of these was observed but more experience is necessary before the technique be adopted without reservation.