The Regional Use of Muscle Relaxants

T. A. G. Torda, M.B., and D. H. Klonymus, M.D.*

A method is described for the regional use of muscle relaxants. It is applicable to surgical procedures performed on the extremities whenever tourniquets are used. The technique provides profound muscular relaxation with complete freedom from the systemic effects of the relaxant.

METHOD

After placement and before inflation of the tourniquet a no. 21 scalp vein needle, with its tip directed distally, is introduced into a suitable vein. The needle is placed distal to the tourniquet and as far as possible from the site of operation, taped securely in place, flushed with normal saline and clamped to prevent reflux of blood. During surgical preparation and drainage of blood from the limb, care is taken to prevent the needle from being dislodged. After inflation of the tourniquet and prior to the start of operation, the selected relaxant diluted with 0.9 per cent saline is injected through the extension tubing of the scalp vein needle. The recommended doses of the various relaxants and the volumes of the diluents used for the production of regional neuromuscular block in the upper or lower extremity are presented in table 1. Frequently satisfactory relaxation can be achieved with lower doses and volumes.

Profound neuromuscular block occurs within three to five minutes after the administration of the relaxant. With d-tubocurarine chloride and gallamine triethiodide the block persists as long as the tourniquet remains inflated. After its release gradual recovery occurs over a period of 60–90 minutes. With succinylcholine chloride slight recovery is apparent after 30 minutes, and there is rapid return of neuromuscular transmission after the release of the tourniquet. If during prolonged operation the tourniquet is released repeatedly, it may become necessary to repeat the injection of the relaxant.

The neuromuscular effect of 1 mg. d-tubocurarine dissolved in 20 ml. saline is demonstrated in figure 1. The tracing shows the force of contraction of the adductor pollicis muscle in response to supramaximal stimulation of the ulnar nerve. The recording was made with a force-displacement transducer.

COMMENT

This technique is an adaptation of the principle used for the provision of intravenous local analgesia originally described by Bier1 and recently popularized by Holmes.2 It is especially suitable for the production of muscular relaxation for operations on tendons and joints of the extremities. It is technically less difficult and potentially less dangerous than the method of closed arterial injection described by Jones3 for the production of regional neuromuscular block. The possibility of using considerably larger doses (5 mg.) of d-tubocurarine for the supplementation of intravenous regional analgesia has been suggested by Atkinson et al.4 Since the doses used in our studies have no detectable systemic effects after the release of the tourniquet.

*Division of Anesthesiology, Montefiore Hospital and Medical Center and the Department of Anesthesiology, Albert Einstein College of Medicine, New York City.

<table>
<thead>
<tr>
<th>Volume of Diluent (ml)</th>
<th>Dose (mg.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>d-Tubocurarine</td>
</tr>
<tr>
<td>Upper extremity</td>
<td>30</td>
</tr>
<tr>
<td>Lower extremity</td>
<td>50</td>
</tr>
</tbody>
</table>

Downloaded From: http://anesthesiology.pubs.asahq.org/pdfaccess.ashx?url=/data/journals/jasa/931613/ on 11/11/2018
they are equally suitable for the supplementation of regional or light general anesthesia. We have used this technique in 21 cases (d-tubocurarine, 10 subjects; gallamine, 6 subjects, and succinylcholine, 5 subjects) of whom 4 were awake, having operation performed under regional block. The technique of regional intravenous administration of relaxants is also potentially a useful research tool for the investigation of the pharmacology of neuromuscular blocking agents.

REFERENCES


Knee Jerk Reflex for Evaluating Effectiveness of Sciatic Nerve Block

STEPHEN H. JACKSON, M.D.*

Evaluating the knee jerk reflexes is offered as a simple method for evaluating the effectiveness of a sciatic nerve block in patients whose subjective response to neurological examination is unreliable or whose advanced peripheral vascular disease and or diabetes mellitus makes pin-prick or temperature testing ill-advised or unrewarding. Anesthesiologists are frequently presented with the elderly patient with organic mental syndrome who, because of peripheral vascular disease, requires an operative procedure involving the distal portion of his lower extremities. These patients are usually poor-risks for whom regional anesthesia in the form of sciatic nerve block (posterior approach) is preferred. Once the sciatic nerve block is performed, it may be difficult to establish its adequacy.

A hyperactive knee jerk on the side of the sciatic nerve block, as compared with the contralateral knee jerk, is a simple, objective method for evaluating the block’s effectiveness. The hyperactivity is effected by the unopposed contraction of the knee extensors, the sciatic nerve innervating the knee flexor (antagonist) muscles. This test is swift, rapid, comfortable for the patient and simple. The general principle of hyperactive reflexes due to unopposed muscles (their antagonists having been blocked) might be applied to evaluation of other types of regional nerve blocks.

* Anesthesia Laboratory of the Harvard Medical School at the Massachusetts General Hospital, Boston.