Assessment of neuromuscular blockade in man by use of tetanic and single twitch contractions of the adductor pollicis muscle

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Studies were carried out after informed consent had been obtained in patients about to undergo urological surgery. Anaesthesia was induced with thiopentone and endotracheal intubation was carried out after spraying the larynx with 4% lignocaine. Anaesthesia was maintained with nitrous oxide and oxygen supplemented by pentazocine (60-120 mg) and additional doses of thiopentone.

Simultaneous measurements of tetanic and single twitch contractions of the adductor pollicis muscles were measured by Statham force transducers (Figure 1) incorporated in hand grips. Fine needle electrodes were inserted subcutaneously at the wrists and the ulnar nerves were stimulated every 12 s with rectangular pulses of 0.2 ms duration and supramaximal voltage from an isolated stimulator. One ulnar nerve received tetanic pulses at 50 Hz for 1 s, the other single shocks. The temperature of each hand was monitored with a surface probe, any differences were within 1 °C.

The radial artery was cannulated at the wrist exposed to single shocks. Arterial blood samples were taken for analysis of blood gases which were maintained within normal limits by assisted or controlled ventilation.

The responses of the muscles were recorded at a slow chart speed of 5 mm/min on a Brush-Clevite recorder and at a fast speed of 50 mm/s on a Mingograf recorder, together with blood pressure and the electrocardiogram.

Tetanic-tension ratios and tetanic transmissions were determined by an Elliott 903 digital computer from on-line real-time data. The tetanic-tension ratio, which is defined as the percentage magnitude of the tetanic contractions at the end of the 1s tetanus compared with the initial magnitude, reflects the degree of fade produced during neuromuscular block. Tetanic transmission was determined as the percentage of the initial peak tetanic height compared with the control peak height before drug treatment.

These facilities will be demonstrated in the off-line mode using tape recordings to show the effects of known neuromuscular blocking agents.

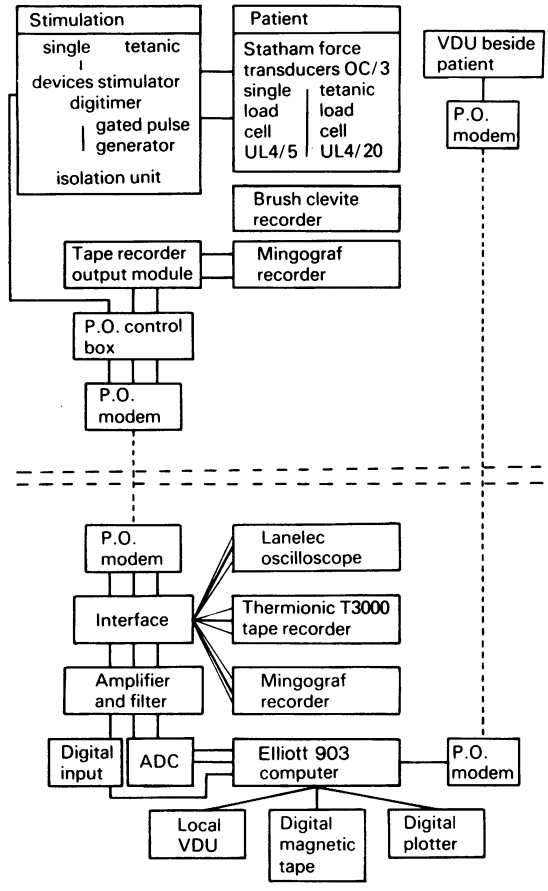

Figure 1 Schematic diagram of the recording equipment and facilities for computer analysis.