A unique method of intermittent positive pressure ventilation of the lungs during general anaesthesia for bronchoscopy, which leaves the view and access of the endoscopist unhampered, has been described by Sanders (1967). A venturi effect is created at the open end of a Negus bronchoscope by passing oxygen at a pressure of 50 Lb./sq.in. through an 0.043-inch diameter nozzle. Sufficient pressure is generated within the chest to inflate the lungs of an apnoeic patient. Periodic interruption of the flow of oxygen results in intermittent positive pressure ventilation. Blood-gas studies by various authors have demonstrated the efficiency of this impressive technique (Morales et al., 1969; Pender et al., 1968; Sanders, 1967; Spoerel, 1969).

Sanders' apparatus consists of a specially made injector unit, a pressure line connected to a piped oxygen source or oxygen cylinder with an adjustable regulator, and a manually operated shut-off valve in the pressure line. Spoerel (1969) has simplified the injector unit by using a 16 s.w.g. needle mounted on a screwclamp as the injector, and further, he uses a Bird ventilator Mark II to provide an intermittent flow of oxygen.

The apparatus described here incorporates Spoerel's modification of the injector unit but simplifies the method of providing an intermittent flow of oxygen, by employing as a pressure line, light compressible tubing normally used for angiography. Details of the entire apparatus are supplied to put its assembly within easy reach of anyone wishing to do a personal trial of this valuable technique. All the components used are available in many hospitals or can readily be obtained at little expense.

The following items are required for assembly of the apparatus, the essential part of which is shown in figure 1.


FIG. 1
The modified apparatus for pulmonary ventilation during bronchoscopy. The oxygen cylinder and adjustable regulator are not shown.
The injector.
A 16 s.w.g. 2-inch Luer needle (bore 0.043 inch) bent proximally to an angle of about 110 degrees.
The distal 1½ inches of the needle lie within the bronchoscope during endoscopy.

Attachment of the injector to the bronchoscope.
An open-sided tubing clip (once used with the old blood transfusion sets) cut as illustrated in figure 2.
If the needle is bent to the angle suggested above, the hub will not impinge against the clip which is soldered to the needle.

The tubing.
Some lengths of 10-inch Luer-Lok connection tubing for angiography.
This tubing is soft, light and flexible, has an internal diameter of 0.118 inch and withstands pressures up to 100 Lb./sq.in. The number of lengths required will depend upon the proximity of the oxygen supply source. Unlike other types of tubing which withstand higher internal pressures, this tubing can be occluded by simple compression. Each length has built-in Luer-Lok connections, and is easily renewable.

Intermittent interruption of the oxygen flow.
A disposable plastic drip clamp.
The type supplied with the Capon Heaton recipient infusion set gives good occlusion and is preferred. The milled roller sits well up in the casing and can easily be manipulated to and fro with one hand. The clamp should be placed so that the movement to the “off” position is in the direction of the flow of oxygen. When the clamp is shut, the pressure of oxygen in the tubing will then lie behind the roller and tend to keep it in place. At a given pressure, breath-by-breath control of ventilation is achieved by using the plastic drip clamp to vary the frequency and time during which oxygen flows through the injector. Adequacy of pulmonary ventilation is judged by movement of the chest wall. Blood gas studies on six patients are presented in table I.

![FIG. 2](image)
Open-sided tubing clip. For use with a bronchoscope the clip is cut as illustrated by the broken lines.

Table I
Pulmonary ventilation during bronchoscopy in six patients using the apparatus described.

<table>
<thead>
<tr>
<th>Patient</th>
<th>PaCO₂ (mm Hg)</th>
<th>PaO₂ (mm Hg)</th>
<th>Time interval (min)</th>
</tr>
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<tr>
<td></td>
<td>A</td>
<td>B</td>
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</tr>
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</tr>
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<td>65</td>
</tr>
<tr>
<td>6</td>
<td>40</td>
<td>34.5</td>
<td>94</td>
</tr>
</tbody>
</table>

* Severe bleeding from left lung.
A. Before induction.
B. Before removal of bronchoscope.
Anaesthesia: thiopentone, suxamethonium.

Attachment of the tubing to oxygen source.
A Schrader check valve, a safety keyed plug, an adjustable regulator, an adaptor to fit the valve to the regulator, an oxygen cylinder and one or two “O” clips.
The male Luer-Lok fitting is cut and discarded from the length of connection tubing to be attached to the safety keyed plug. Part of the keyed plug must be ground down for insertion into the narrow bore tubing. An “O” clip (or two) gives a gastight union.
The use of a cylinder with an adjustable regulator allows for greater flexibility in the technique of pulmonary ventilation than piped oxygen. It is desirable in certain patients to be able to set the pressure at which oxygen flows through the injector to a level above or below the 60 Lb./sq.in. provided by piped oxygen. Patients with uncompliant lungs or with a large gas leak around the bronchoscope will require a higher pressure, while patients with small airways, such as children, will require a lower pressure. Also,
by placing the oxygen cylinder near the patient, the inconvenience of having a long length of light tubing with a high gas pressure inside, crossing from the wall to the patient, is avoided.

The adjustable regulator for use with oxygen does not differ in construction from that used with compressed air. However, the compressed air regulator may not always have been used or tested with oil-free air. Oil or grease must never be used with any part of the apparatus.

ITEM INDEX


"O" Clips (1-inch light duty) obtainable from Matchless Machines Ltd., "O" Clip and Coupling Division, 13 Tottenham Street, Tottenham Court Road, London W.1.

CORRESPONDENCE

ANAESTHESIA IN SALICYLATE OVERDOSAGE

Sir,—Anaesthesia in the severely poisoned is a problem not often encountered. When it does arise, an accurate history coupled with rapid investigation of the circumstances may have an important bearing on the management of the case.

In a recent case a 30-year-old semiconscious male was discovered slumped over the wheel of his car in a lay-by, with his throat cut. He was brought into hospital. He had a half-empty bottle of pills in his pocket but denied having taken any. Because of the presence of hyperventilation and a mild hypotension (100/60 mm Hg), he was treated with transfusion of a litre of blood.

The tablets were identified as trifluoperazine (Stelazine); the chemist who had supplied them gave the date of dispensing and a rough calculation showed that if he had been taking them as directed then his statement that he had taken none of them with suicidal intent was correct. His doctor, contacted via the chemist, confirmed that only Stelazine had been prescribed, and said the patient was a known schizophrenic. This explained the bizarre incisions, all down only to subcutaneous fat, on the abdomen, back of the calves and wrists.

At this stage it was decided to discuss the case with the Poisons Reference Service, Guy’s Hospital (Tel. No. 01-407 7600) who offered the useful suggestion that the hyperventilation might be caused by salicylate overdose. Because of the extensive throat wound and considerable patient opposition, a stomach tube was passed with difficulty, and a thick white paste, which the hospital laboratory identified as salicylate, was aspirated. Adequate gastric lavage had to be abandoned.

An e.c.g. revealed sinus tachycardia. Arterial blood on analysis gave: pH 7.35; PaCO2, 34.5 mm Hg; base excess —5.8 m.equiv/l; salicylates 20 mg/100 ml blood.

The police now confirmed that they had found two empty “aspirin” bottles in the car, and his wife who had been contacted said she had disturbed the patient the day before whilst he was scaling up a room in preparation of attempting to achieve his ends with coal-gas.

It was decided to anaesthetize the patient in order to repair the throat wounds, and whilst a cuffed endotracheal tube was in situ, perform adequate gastric lavage. An intravenous drip of one-sixth molar lactate preparation of attempting to achieve his ends was instituted.

Premedication with atropine sulphate 0.6 mg 30 minutes before induction was followed by preoxygenation for 3 minutes. Thiopentone 200 mg intravenously was followed by suxamethonium chloride 50 mg, Sellick’s manoeuvre and a 9.5 mm cuffed endotracheal tube inserted. Spontaneous respiration returned normally, and the patient was connected to a Mapleson A circuit fed with a 50:50 mixture of nitrous oxide and oxygen; halothane was added from a Fluotec vaporizer.

After 1 hour of uneventful anaesthesia, the blood pressure had dropped from 120 to 100 mm Hg, the surgeon had repaired the throat wound, performed a tracheostomy below it, and had inserted a large cuffed [continued on p. 82