Technical method

Post-mortem inflation and fixation of human lungs—a modification of available apparatus

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Several forms of gas inflation-fixation apparatus have been described, some of considerable complexity. One apparatus has a commercially available derivation, the Codoc Lung Inflation and Fixation (PIFL) apparatus. When used in this establishment however, a number of drawbacks were noted. Large pleural tears could be adequately oversewn, but more than a few small tears, often not readily visible, rendered inflation unsatisfactory. The pressure available seemed inadequate for some pathological specimens. Fairly heavy fumes were produced from around the lid, mainly during the heating phase of the operation. A considerable proportion of vapour circulated outside both tank and lung, energy from the pump thus being wasted.

Some simple, quick and inexpensive modifications of the apparatus are described with a resultant increase in versatility and virtual elimination of unwanted toxic fume production. Under normal conditions fixation is probably quicker. Adjustments during operations are reduced.

Material and methods

Modifications to the tank
A seal was constructed around the rim of the tank. This consisted of a water filled channel 4 cm depth, 1.7 cm width, made of Perspex strip glued (by Tensol cement No 12) to the sides. To complete the seal Perspex strips were attached around the edges of the lid, using heavy duty 5 cm wide PVC tape. This ensured flexibility, especially to the rear, when loading/unloading (Fig. 1). Two 1.0 cm holes were drilled through the upper tank wall. Two portions of 1.0 cm O/D Perspex tube were glued therein (connections for PVC tubing). From one a tube was attached ducted to a suitable exterior or extraction duct, this being the only communication to the atmosphere whilst in normal operation. The other was for the return of vapour from the lungs via the boss on the lid. This boss was modified by drilling a 1.0 cm passage adjacent to the existing tube connection and gluing therein a portion of 1.0 cm O/D Perspex tube (Fig. 2). A soft rubber gasket was added (ex-surplus tourniquet bandage) between the cannula locating nut and the lid to ensure a gas-tight joint. The small (1/16") (1.6 mm diam) orifice at the base of the water trap within the tank was restricted by approximately 75%. A handle was attached to the lid.

Modifications to the vapour circulation and control box
One further tube was inserted through the control box case. All components therein were retained in

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Fig. 1  Lid seal detail: (1) Tank lid, (2) PVC tape, (3) Lip attached to lid, (4) Water trap side. (5) Water, (6) Tank interior, (7) Tank side wall.

Fig. 2  Modified boss (cannula and retaining nut omitted): (1) Rubber gasket, (2) Lid, (3) Boss, (4) Original tube, (5) Additional tube, (6) Countersunk fixing screws.
place, but reconnected as in Fig. 3. Condensation is lost in the internal trap and blow-by increases the rate of vapour saturation. From the modified boss (3) and lungs vapour returns via the connector (5), and is intermittently interrupted by the valve (7). Should excessive pressure build-up the external water-trap is fitted. After the valve (7) vapour passes to the air control (8) where there is an additional inlet from the tank, thus balancing blow-by from the water-trap (2).

**OPERATION AND RESULTS**

The mode of operation is essentially similar to the original. Inflation and ventilatory excursion is varied by means of the air control and interrupter valves. Under normal operating conditions vapour should not escape through the external water trap. Here the level of water within the dip-tube varies accordingly with the respiratory cycle and gives an indication of ventilatory pressure. The circulation differs fundamentally from the original apparatus (Fig. 4), in that all of the vapour is circulated either via the boss or the tank. This increases the rate of saturation. The reduction in the internal trap blow-off orifice increases available ventilatory capacity, effort, and reserve. The pump, in this circulation, has a considerable excess of capacity, thus facilitating inflation and fixation. Many lungs in which there is increased rigidity or which are otherwise pathological can be satisfactorily inflated and fixed. Relatively normal lungs are satisfactorily fixed in approximately 3½ hours at operational temperature. Siting the apparatus in a well ventilated room during normal operation seems unnecessary, as fume production is negligible. Fixation is entirely satisfactory for normal histological procedures.

**References**


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**Letters to the Editor**

**A rapid method for identification of surface antigens on fixed cells using monoclonal antibodies**

A relatively large number of cells is necessary for the identification of surface antigens using live cell staining. The following method has been developed to allow testing with multiple antibodies in cases where only a small number of cells has been obtained and also to allow testing of imprints from lymph nodes, trephine biopsies etc, especially where efforts to obtain cell suspensions have failed or resulted in loss of the cell population one most wishes to examine.

**Material and methods**

Cyto centrifuge preparations of live cell suspensions from peripheral blood or tissues, or imprints from tissues, are either processed immediately or wrapped in tinfoil and stored at −20°C to −70°C. The latter samples are allowed to equilibrate with room temperature before the foil is removed. In the case of imprints the area to be tested is chosen by examining a Leishman stained consecutive imprint and marked with a diamond. An indirect