

A NOTE ON PRIMING THE DEWALL OXYGENATOR

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In a previous communication we described in detail the assembly and priming of the helix-reservoir bubble oxygenator.¹ The methods used, though satisfactory in their end results, are time-consuming. Since the report of Faggella *et al.*,² however, describing the use of saline at 90°C, and with our own further experience with this oxygenator, we have reduced the time of this operation to a few minutes.

METHOD

(a) Initial Priming with Saline

A vacolitre of normal saline is placed in a boiling sterilizer for 30 minutes, and the helix, blood filter and arterial line are assembled as we previously described.¹ The vacolitre is then removed from the sterilizer and its contents, which we have found to have a temperature of approximately 90°C at this stage, are poured into the top end of the helix.

The hot saline flows through the helix and filter and, once the latter has been filled, a clamp is applied to the arterial line distal to the filter. Filling is then continued until the helix contains approximately 800 ml. of fluid, when a second clamp is applied to the arterial line proximal to the filter, and the saline in the system is inspected for bubbles.

It is found that few bubbles form when hot saline is employed for priming, and any bubbles present are easily dislodged by tapping the helix and filter with a patella hammer. Once the helix and filter have been cleared of bubbles, the clamps on the arterial line are removed and the saline is allowed to flow slowly through the remainder of the system. The metal connectors and opaque section of latex tubing in the circuit are beaten to dislodge any bubbles which may have been trapped, and a clamp is applied to the distal end of the arterial line.

If the temperature of the priming fluid is below 90°C, bubble formation is increased and, if the temperature of this fluid is allowed to fall appreciably before de-bubbling is commenced, it is found that bubbles are more difficult to dislodge. It is therefore important to perform the priming as swiftly as possible, and to complete the whole operation in a few minutes.

Calibration of the arterial pump and pump occlusion are carried out as described before.¹

(b) Priming with Compatible Donor Blood

As soon as the pericardial sac has been opened and the necessity for direct-vision surgery confirmed by the surgeon, priming is commenced. Donor blood is pumped from a blood bottle, by means of the venous pump, into the mixing chamber, where it is mixed with 100% oxygen. The venous pump is adjusted so that it is only just propelling the blood forward. The oxygen flow through the mixing chamber is regulated so that the oxygen bubbles are seen only just rising in this chamber. The blood-oxygen mixture therefore enters the de-bubbling chamber, where the bubbles are broken down very slowly, and a stream of blood trickles gently into the helix, causing no turbulence, and thus no bubbles form on the blood surface within the helix.

Once the helix contains approximately 800 ml. of blood, free of bubbles, both the venous pump and the oxygen flow rate are stepped up, and the remainder of the priming volume of blood is pushed through the system more rapidly. Should bubbles form now, they are of no significance, and will tend to gravitate upwards when perfusion is commenced.

CONCLUSION

Priming the oxygenator with normal saline at 90°C takes but a few minutes, does not affect the transparency of the Mayon tubing, and appears to be entirely satisfactory.

Priming the oxygenator with blood as described prevents bubble formation within the helix, and hence prevents consequent unforeseen delay during surgery.

SUMMARY

The problem of bubble formation during the operation of priming the helix-reservoir bubble oxygenator is discussed. A method of obviating this complication is described.

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REFERENCES

1. McKenzie, M. B. and Barnard, C. N. (1958): *S. Afr. Med. J.*, **32**, 1145.
2. Faggella, M. L., Zuhdi, M. N., Greer, A. E., Carey, J. M. and Schilling, J. A. (1958): *Amer. J. Surg.*, **96**, 696.