Automatically Controlled Air-Bubble Trap for use in Haemodialysis

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Air embolism is the major hazard of pumped haemodialysis. The currently available monitors which detect air in the extracorporeal blood system and prevent it from reaching the patient are far from infallible (Grainger & Eisinger, 1971; Kolff, 1971; McGeown et al, 1970; Manley, 1969; Ward et al, 1971). We developed an alternative system (Figure 1). It consists of an air-bubble trap shaped as communicating tubes, a large reservoir to take up froth, a connection between both ends of the tubes, the usual connections for blood inlet, blood outlet with filter, venous blood pressure, ventilation, and a photoelectric detector.

While blood flows through one part of the tubes, the frothless blood level in the other part is checked by the photoelectric detector. If air or froth reaches the air-bubble trap, the blood level descends in both tubes. However, no froth can reach the tube, that is checked by the photoelectric detector, the blood level descends and the detector gives the alarm. At the same time the blood pump is stopped and the arterial and venous blood lines are closed by electromagnetic valves (Figure 2).

Compared with other control systems our automatically controlled air-bubble trap offers the following advantages:

1. Reliable reaction even to finest dense froth,
2. No alarm with smallest air-bubbles unless they accumulate to a critical level of approximately 4 ml in volume,
3. Minimal amount of technical equipment,
4. Use of sterile disposable articles thrown away after being used only once.

REFERENCES

Kolff, W. J. (1971) Nebraska State Medical Journal, 56, 57
Figure 1. Air-bubble trap with photoelectric detector

Figure 2. Air-bubble alarm