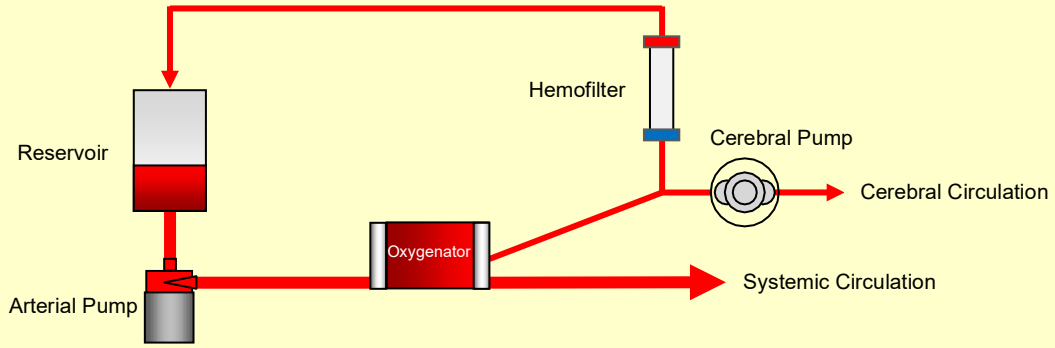
Measures to Prevent Recurrence of Air Embolism Accidents from Selective Cerebral Perfusion Circuit

In May 2009, Safety Information on the risk of drawing air from the oxygenator during selective cerebral perfusion was issued. This issue will be presenting measures to prevent recurrence of such an incident, in which air was mistakenly drawn in from the hemofiltration circuit, causing air to be erroneously drawn into the selective cerebral perfusion circuit. Clarify the precautions for separate cerebral perfusion procedure at each facility and consider specific countermeasures to ensure safe extracorporeal circulation.

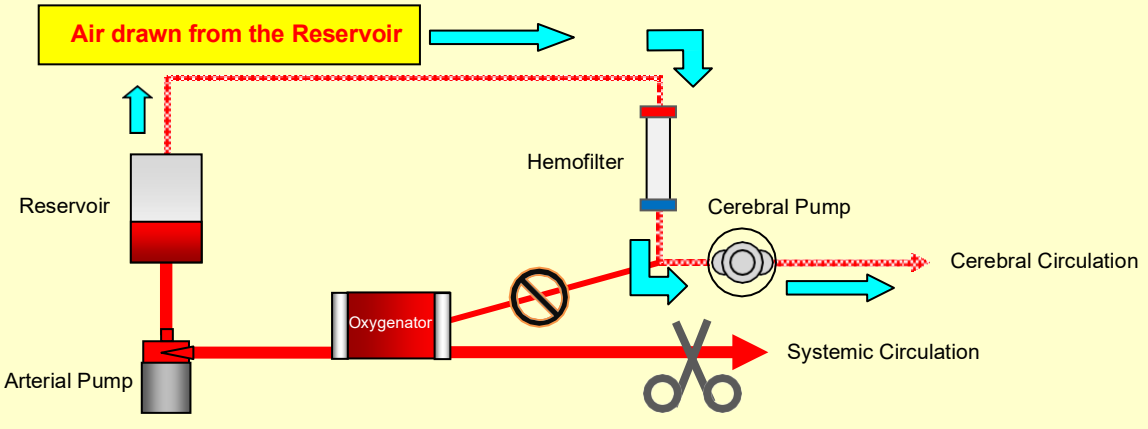
【Circuit configuration of the air misfeed case】

Using centrifugal pump, the hemofiltration circuit and the separate cerebral perfusion circuit were branched from the oxygenator outlet, and the hemofiltration circuit was circulated with the main circuit's perfusion pressure.



【Occurrence of air misfeed】

Due to a bending of the hemofiltration circuit before the junction between the hemofiltration circuit and the separate cerebral perfusion circuit for some reason, blood from the oxygenator could not be pumped from the cerebral pump, and air was drawn into the separate cerebral perfusion circuit through the hemofiltration circuit connected to the reservoir.



Points to note

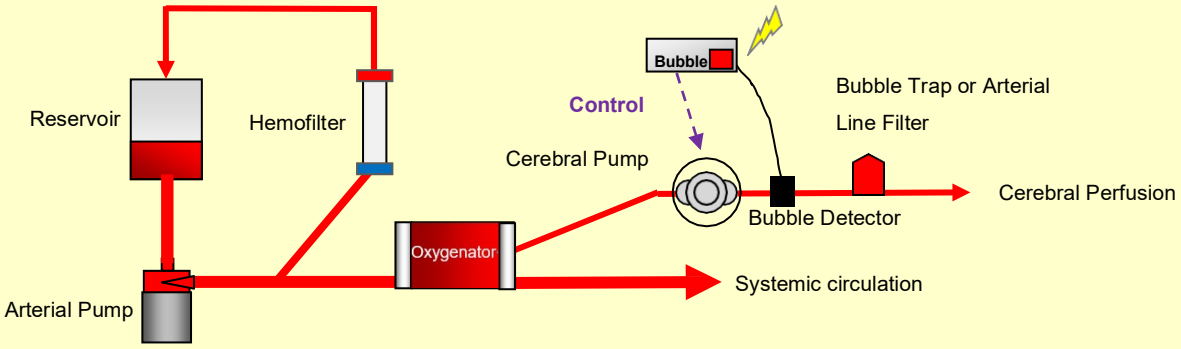
- Separate cerebral perfusion circuits are often complex and may have multiple branches from a single circuit.
- Branch circuits from the main circuit often use circuits with small diameter tubings, which may result in low tubing strength to maintain its shape.

Handling

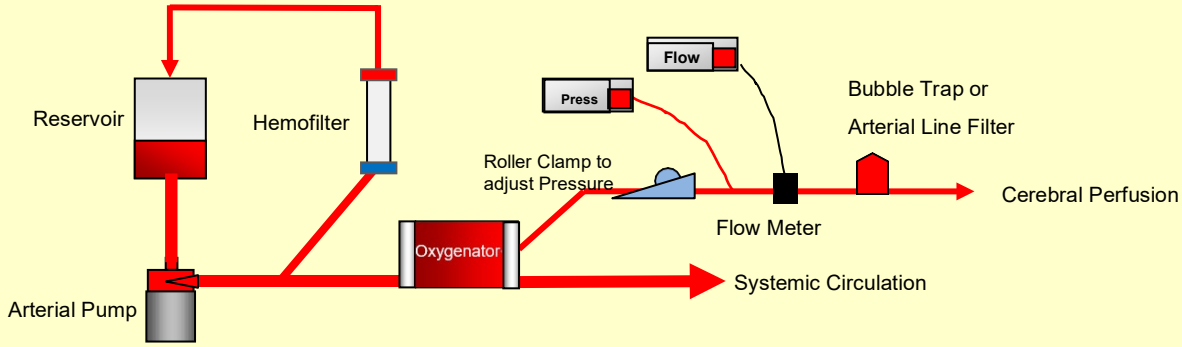
If in case air is drawn into the separate cerebral perfusion circuit, stop the circulation immediately, place the patient in Trendelenburg position for air elimination, and eliminate the air by removing the cerebral perfusion cannula. Perform retrograde perfusion with cooling.

Countermeasures

- When circulating the hemofiltration circuit with the perfusion pressure of the main circuit, it is possible to make it as one circuit by branching from the outlet of the arterial pump and circulating to the reservoir.
- Install a bubble detector to the separate cerebral perfusion circuit. It is safer to have a function that automatically stops the cerebral pump in addition to the audible alarm when bubbles are detected.
- It is also effective to install a bubble trap or an arterial line filter in the separate cerebral perfusion circuit.



- A method of sending blood by branching the arterial line without using a pump in the selective cerebral perfusion circuit.



Reference

1） JaSECT Safety Information (May, 2009)