

# Breathing Circuits In Anaesthesia

## 2016 - 2017

# Key concepts

- Because insufflation avoids any direct patient contact, there is no rebreathing of exhaled gases. Ventilation cannot be controlled and the inspired gas contains unpredictable amounts of entrained atmospheric air.
- Long breathing tubes with high compliance increase the difference between the volume of gas delivered to a circuit by a reservoir bag or ventilator and the volume actually delivered to the patient.
- The adjustable pressure limiting (APL) valve should be fully open during spontaneous ventilation so that circuit pressure remains negligible throughout inspiration and expiration.
- Because a fresh gas flow equal to minute ventilation is sufficient to prevent rebreathing, the Mapleson A design is the most efficient Mapleson circuit for spontaneous ventilation.
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# Con.

- The Mapleson D circuit is efficient during controlled ventilation, because fresh gas flow forces alveolar air away from the patient and toward the APL valve.
- The drier the soda lime, the more likely it will absorb and degrade volatile anesthetic.
- Malfunction of either unidirectional valve in a circle system may allow rebreathing of carbon dioxide, resulting in hypercapnia.
- With an absorber, the circle system prevents rebreathing of carbon dioxide at fresh gas flows that are considered low ( $FGF \leq 1$  L) or even FGF equal to the uptake of anesthetic gases and oxygen by the patient and the circuit itself (closed system anesthesia).

# Con.

- Because of the unidirectional valve, apparatus dead space in a circle system is limited to the area distal to the point of inspiratory and expiratory gas mixing at the Y-piece. Unlike Mapleson circuits, the circle system tube length does not directly affect dead space.
- The fraction of inspired oxygen ( $FIO_2$ ) delivered by a resuscitator breathing system to the patient is directly proportional to the oxygen concentration and flow rate of the gas mixture supplied to the resuscitator (usually 100% oxygen) and inversely proportional to the minute ventilation delivered to the patient.

## DEFINITION

It primarily consists of

## REQUIREMENTS OF A BREATHING SYSTEM

Classification

Mapleson systems

Circle system

Functional analysis

Nonrebreathing system

Ambu Non-rebreathing Valve

Ambu Hesse