INCOMPATIBILITY OF INTRAVENOUS AMIODARONE WITH A SWAN-GANZ CATHETER

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BACKGROUND

Patients in intensive care units [ICU] often receive many continuous infusions of drugs on a limited number of intravenous lines. In our ICU, one frequent combination of drugs administered together is :

Dobutamine-Norepinephrine-Amiodarone [DU-NE-AM]

During a 24-hours *in vitro* simulated Y-site administration of DU-NE-AM through a Swan-Ganz catheter [SGC] (figure 1), the measured concentration of AM at the extremity of the SGC was abnormally low until 2 hours after start and returned to normal afterwards. This phenomenon was more obvious when the administration rate was low. The DU and NE concentrations were normal.

Fig. 1 – example of a Swan-Ganz Thermodilution Catheter used in our ICU

Based on literature data, we suspected an incompatibility of AM with the SGC, made of a mixture of PVC and plasticizer and internally coated with heparin. [1-2]

PURPOSE

To find the cause of this low AM concentration and compare the results when administered through a SGC with or without heparin.

MATERIAL AND METHODS

- Simulation of Y-site administration (figure 2) of :
  - Cordarone® (amiodarone) diluted (12.5 mg/ml) in Dextrose 5% 1 ml/h

  and
  - Gluco-Saline (3.3% Dextrose and 0.3% NaCl) 1 ml/h

  through :
  - an heparin-coated SGC (Edwards Lifesciences, model n° 831HF75)
  - an uncoated SGC (Edwards Lifesciences, model n° 831F75)

- HPLC measurement (table 1) of AM concentration at the end of the SGC after :

  - 2 hours - 3 hours - 4 hours of simulation

  (AM concentration was not measured after 1 hour because the result would not be reliable due to the starting inertia of the syringe pumps).

AM concentration was considered as "expected" if it reached 90-110% of the theoretical concentration (6.25 mg/ml).

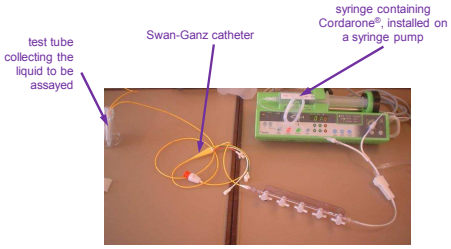

Fig. 2 – example of an *in vitro* simulation of Y-site administration

Table 1 – HPLC parameters for amiodarone (Waters 2695 with DAD)

Column	Chromolith® Performance RP-8e (100 x 4.6 mm) from Merck with Sentry® Guard Column (Symmetry® C18) from Waters
Temperature	room temperature
Phase A	sodium octanosulfonate 2.6 gr + trolamine 3.0 ml ad 1000.0 ml water; pH adjusted to 2.5 with phosphoric acid 85%
Phase B	Methanol
Phase C	Acetonitrile
Gradient	80% A – 15% B – 5% C from 0 to 6 minutes 10% A – 75% B – 15% C from 6 to 11 minutes 80% A – 15% B – 5% C from 11 to 14 minutes
Flow	1.0 ml/min
Injection volume	10 µl
Detection	DAD 280 nm

RESULTS

uncoated SGC

the measured AM concentration was as expected (figure 3)

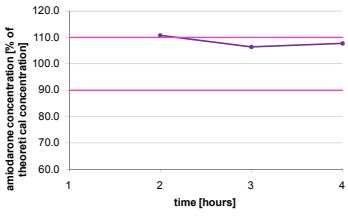

Fig. 3 – amiodarone concentration at the end of an uncoated SGC as a function of time

⇒ the PVC seems to play no role

⇒ AM seems to interact with the heparin coating the inside of the catheter

heparin-coated SGC

it took approximately 4 hours for AM administered through the heparin-coated SGC to reach expected concentration (figure 4)

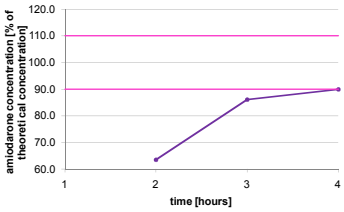

Fig. 4 – amiodarone concentration at the end of a heparin-coated SGC as a function of time

CONCLUSION

Literature reports incompatibility between AM and PVC as well as heparin. Our results show that no significant interaction seems to occur with PVC whereas the heparin contained in SGC can interact with administered drugs, such as AM. A close attention must be paid to this risk.

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références : [1] Weir SJ, Myers VA, Bengtson KD, Ueda CT. Sorption of amiodarone to polyvinyl chloride infusion bags and administration sets. AJHP 1985; 42(12):2679-83
[2] Maqueda-Palau M, Pérez-Juan E, Arévalo-Rubert MJ, Amorós-Cerdá SM, Ribas-Nicolau B. Physical compatibility of amiodarone in continuous infusion. Enferm Clin. 2010 (Aug 11 (epub ahead of print)