SINGLE-NEEDLE CROSS OVER SOLUTION FOR COMPLICATED VASCULAR ACCESS

DANA PRUŠKOVÁ

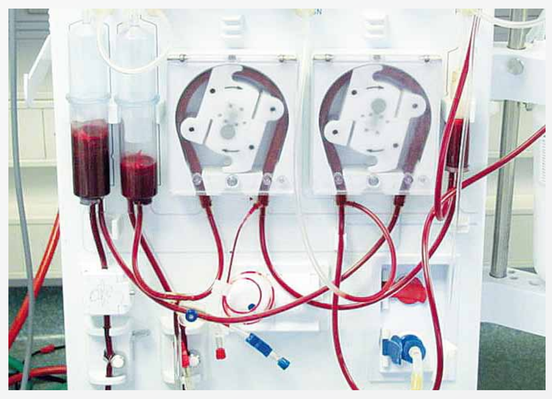
B. BRAUN AVITUM AUSTERLITZ | IVANČICE | CZECH REPUBLIC

INTRODUCTION

A number of patients who are on dialysis have a complicated vascular access. Dialysis treatment using the method of the Single-Needle Cross-Over developed by B. Braun is a temporary solution in case vascular access is not working well, while maintaining high efficacy of the hemodialysis treatment.
In certain cases, the effect of the dialysis treatment carried out by using SN-CO approximates the values obtained by using the common methods of two needle accesses.

METHODS

It is a highly effective method of a single-needle dialysis with better outcomes of the dialysis treatment in patients compared to the standard single-needle methods. The method uses a special feature of the dialysis machine based on correctly set control pressures (in a cross over way), which open and close the arterial and venous clamp. We distinguish the suction phase and the return phase. After setting up the desired pressure value in the venous or arterial expansion chamber one clamp closes and the other one opens.



BENEFITS OF THE SN-CO METHOD

- Method of controlled pressure – pressure principle
- Thanks to a simultaneously working system of two blood pumps constant flow of blood through the dialyzer is maintained
- Almost constant pressure in maintained in the dialyzer, PBS sensor controls the pressure
- There is minimal recirculation
- It has a minimal impact on AVF
- Higher effectiveness (70-80% compared to the two-needle method) than other SN systems (one-pump with clamp or two-pump system – of about 50% compared to the other one-needle systems)

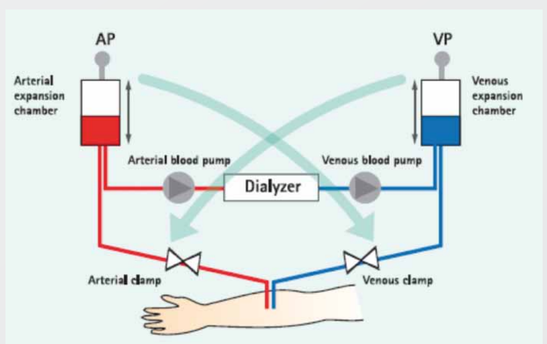
Drawbacks:

- requires the "two-pump" dialysis monitor
- greater volume of blood in the extracorporeal circulation - a greater loss of blood through clotting in the sets
- no monitoring of A and V pressures in the fistula
- in case of a vein rupture the monitor responds with about 10 seconds delay
- more time-consuming (especially at the beginning)

INDICATIONS FOR THIS METHOD ARE ALWAYS TEMPORARY

- closure of one of the dialysis cannula directions
- immature arteriovenous fistula
- swelling, hematoma or pain at the site of AVF
- poor AVF with difficult puncture
- after reconstructive surgery on AVF

The Single-Needle Cross-Over (SN-CO) name is derived from the control's special feature: When reaching a certain control pressure, the opposite tube clamp closes and the respective other phase begins. Hence, the clamps' control is carried out crosswise: Cross-Over.



SN-CO scheme

FUNCTION DESCRIPTION

We distinguish between the arterial and venous phases:

Arterial phase

- The arterial clamp is open, the venous clamp is closed.
- Blood flows from the patient into the arterial expansion chamber and then on through the dialyzer into the venous expansion chamber.
- Blood collects in the venous expansion chamber as the venous tube clamp is closed; the venous pressure rises.
- When a certain venous control pressure is reached, the clamps are switched: the arterial clamp is closed and the venous clamp is opened.
- The venous phase begins.

Venous phase

- The venous pressure falls again.
- Blood is released from the arterial expansion chamber and flows through the dialyzer into the venous expansion chamber and back to the patient.
- As the arterial clamp is closed, the arterial pressure falls. When a certain arterial control pressure is reached, the clamps are switched: the venous clamp is closed and the arterial clamp is opened. The arterial pressure rises again.
- A new arterial phase begins.

RELATED TERMS

Phase volume

It is the amount of blood delivered to the expansion chambers during one cycle. It loads with delay. The machine displays the current value of phase volume after two to three cycles. The recommended value should be around 30 to 35 ml. The value depends on the blood pump revs and eventual stopping of the pump due to alarm activation. Recommended blood flow is about 150 ml/min when using a central venous catheter and about 100-120 ml/min when connected to the fistula.

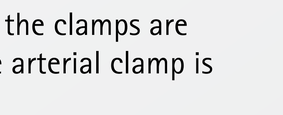
TAB. NO.1
RECOMMENDATIONS FOR THE CONTROL PRESSURES

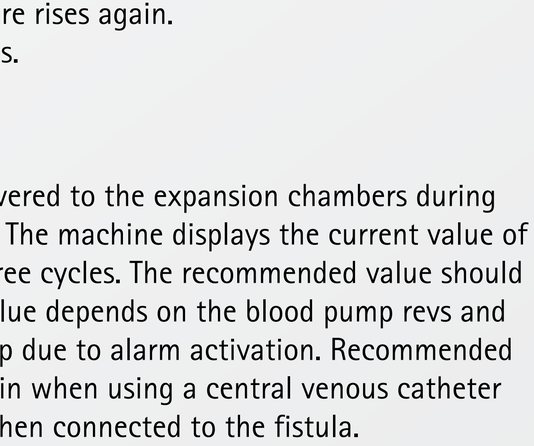
Optimum control pressures:	Arterial mmHg	Venous mmHg
Central catheter / Good fistula	up to -200	360 to 390
Delicate fistula	up to -150	300
Initial punctures	-120 to -150	250 to 300

Attention must be payed to the risk for the patient related to reduced efficiency caused by high recirculation at low phase volume.

Control pressure

Phase volume can also be adjusted by regulating the control pressures. The phase volume increases with increasing difference between control pressures and reduces with reducing the difference. To change the phase volume the control pressures can be set within the fixed limits according to the patient's vascular access.





CONCLUSION

SN-CO has no ambition to fully replace other standard methods of care that can be used in cases of patients with permanent catheter or patients in whom two-needle access can be used without difficulties. Every dialysis center can use this method in certain patients. Alternatively, the patient can be dialyzed using the two-needle method. It is only necessary to deactivate the SN-CO mode and remove the venous segment of the pump, then the patient can undergo the two-needle dialysis.

Our priority is well dialyzed and satisfied patient.

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