Another Better-Product™ from ...
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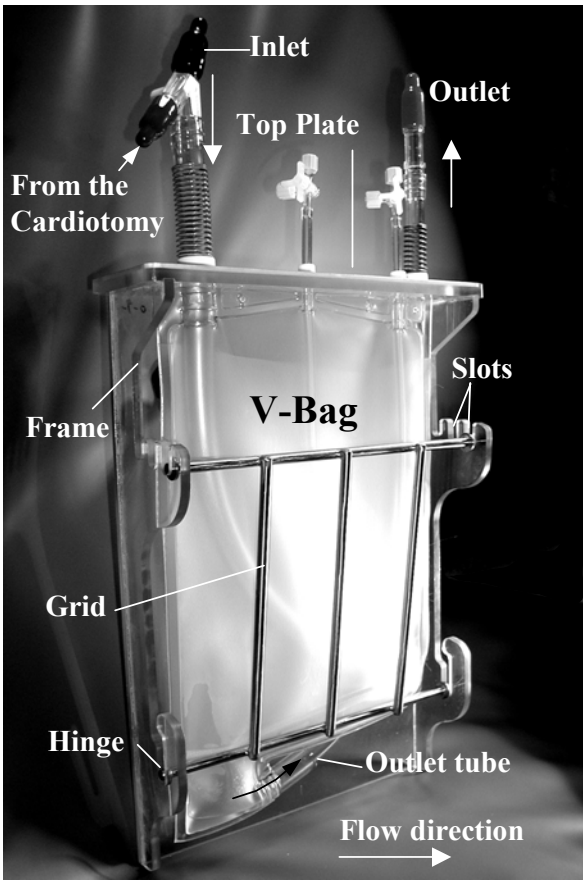
The V-Bag™

The V-Bag is a closed, flexible bag used as a blood reservoir that facilitates removal of air bubbles from venous and cardiotomy blood entering it during surgical procedures requiring extracorporeal support for periods up to six hours. The V-Bag™, in combination with a nondisposable rigid housing, also provides vacuum assisted venous drainage (VAVD), see other side of brochure.



V-Bag's Unique Design

The V-Bag™, is made by welding two polyvinyl chloride films to form an expandable blood chamber with a front and back wall. A polyester screen with a pore size of 105µ is sealed between the two walls along their vertical sides as well as along the front wall at the bottom thereby forming a pouch between the screen and the front wall. The inlet tube enters the blood chamber at its top and extends diagonally to the bottom of the pouch. Blood flows from across the screen to the outlet port. The screen, once wet, allows passage of liquid but rejects most air bubbles. Bubbles in the pouch float up and are removed through the purge line. When other bags are not full, bubble movement may be obstructed by collapse of the front wall against the back wall. The VB has two tubes placed vertically, running from the bottom of the pouch to the top of the blood chamber. Channels formed along the outside diameter of these tubes provide a pathway for bubbles to move upward to the purge port. Another large channel is also formed along the outside of the inlet tube.

V-Bag nominal specifications

Parameter	VB18
Nominal Volume (ml)	1800
Maximum flow (l/min)	7.0
Minimum Volume (ml)*	300
Inlet tube (in)	1/2"
Outlet tube (in)	3/8"

*Greater volume enhances bubble removal

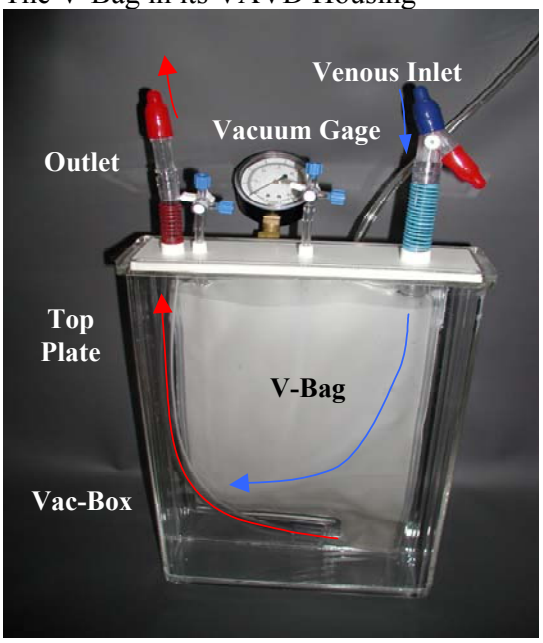
The V-Bag™, unlike other soft shell reservoir, has its inlet, outlet, and gas purge tubes enter from the top of the bag. The outlet port of the VB is placed at the lowest portion of the venous bag, exits in a horizontal direction, and then is externally redirected upward to the top of the venous bag. The three tubes of the VB are threaded through, bonded to, and sealed within a rigid top-plate. Placement of the open ends of all tubes at the top, supported by a single rigid plate, provides significant advantages not possible with prior art devices:

- The VB hangs from its rigid plate by its tubes. It can be dropped into its holder, as is done with existing hard shell reservoirs, without removing the front grid. No need to line up the eyelets of the bag with the hooks of the holder.
- Supporting the VB from the top allows the weight of the blood-filled reservoir to pull it into its holder.
- The bag is unhindered by tubing entering from the bottom, allowing the VB to be placed closer to the floor for greater gravity drainage.
- It is easier to connect the VB to the extracorporeal circuit with all its connections on top.
- It is easier to clamp and unclamp inlet and outlet tubes that are located on top of, rather than below, the bag.
- The length of the inlet and/or outlet tubes required to incorporate the VB into the CPB circuit is shorter than with other venous bags. Shorter tubes allow a lower priming volume as well as a lower resistance to flow.
- Its long purge tubes improve air removal capabilities.

The V-Bag™ for Vacuum Assisted Venous Drainage VAVD

For VAVD, vacuum is applied to V-Bag by enclosing it within a rigid housing (Vac-Box) and applying vacuum to the space surrounding the bag. The vacuum is transmitted across the flexible wall of the bag to the blood— as if the vacuum had been directly applied to the blood, but eliminating the blood/gas interface associated with hard shell reservoirs. A vacuum regulator is used to control the vacuum in the housing just as with a hard shell reservoir.

The V-Bag in its VAVD Housing



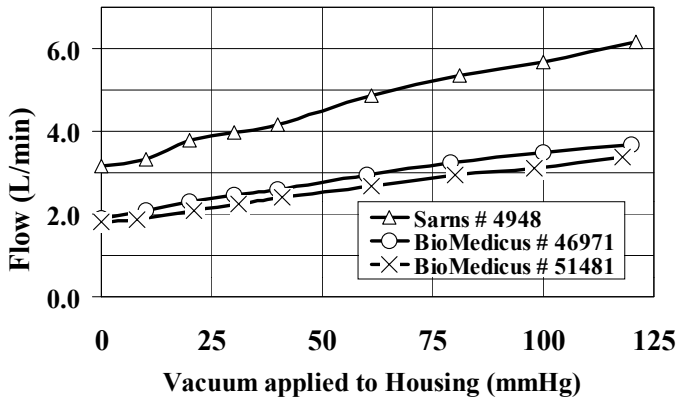
Typical results obtained with the V-Bag™ of increased flow as a function of vacuum applied to the housing for three different cannulae are shown in the middle figure.

Typical results comparing the bubble counts using VAVD (V) versus using kinetic venous augmented drainage, KVAD (K) at a venous flow of 5.5L/min and a vacuum applied to the venous line of –56mmHg are shown in the bottom figure[2].

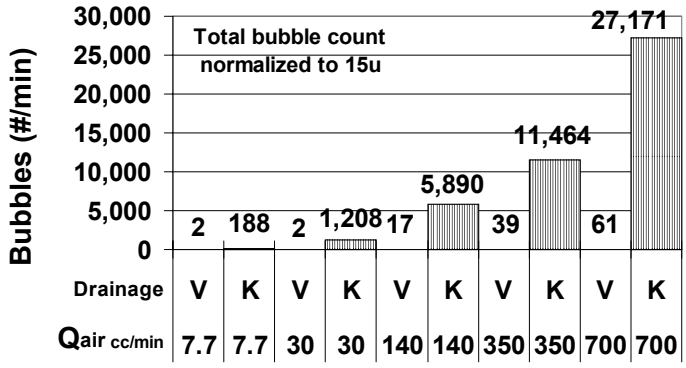
Advantages of the V-Bag™

- Supporting the V-Bag™ from the top allows the weight of the blood-filled reservoir to pull it into its holder. The weight also provides a force that helps seal the top-plate to the rigid housing for VAVD applications.
- The V-Bag™ is the only venous bag with VAVD capabilities. It incorporates simple, effective, and inexpensive means to seal it within a nondisposable rigid housing.
- No vapor trap is required for the vacuum line.
- Vacuum applied to the venous blood without air contacting the blood.

Augmented venous flow using the V-Bag in VAVD



VAVD has significantly lower bubble count than KVAD
Vacuum applied to cannula = -56mmHg, Flow = 5.5L/min



References

1. Tamari Y, Salogub M, Hall M, Beck J, and Mongero L: A New Venous Bag Provides Vacuum Assisted Venous Return. Presented at the AACP meeting 1/30/00 Orlando.
2. Tamari Y, Lee-Sensiba, K, Beck J, Chan R, Salogub M, Hall M, Lee T, Ganju R, and Mongero L: A New Perfusion-Friendly Top Loading Venous Bag Provides Vacuum Assisted Venous Drainage. Presented at the AACP meeting 1/30/01 New Orleans, Submitted to Perfusion.

US Pat. 6,337,049, others pending.