Survival and Hydraulic Function of the Ash Split Cath™ Hemodialysis Catheter

S.R. Ash[1,2], R.A. Mankus[1] and J.M. Sutton[1]

[1]Arnett Clinic and Greater Lafayette Health Services, Lafayette, Indiana;
[2]Purdue University and HemoCleanse, Inc., West Lafayette, Indiana

Introduction

The Ash Split Cath™ is a dual-lumen tunneled hemodialysis catheter with a single double-D transcutaneous portion connecting to multi-holed cylindrical tips in a central vein. Blood enters and exits from the entire circumference of the tips, similar to Tesio® catheters, but insertion is through a single venous puncture rather than two:

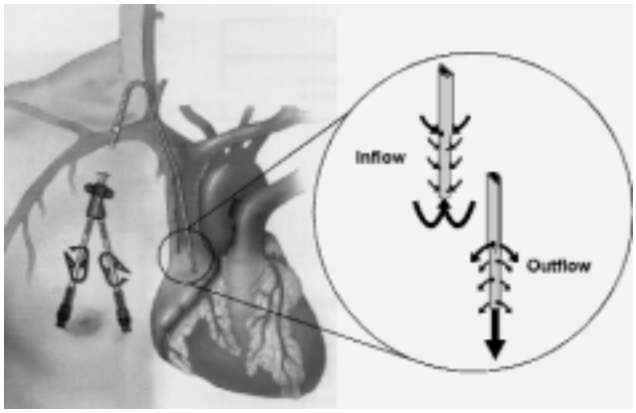

Fig. 1: Placed Ash Split Cath catheter with enlargement of catheter tips.

Methods

From 1995 to 1998, Nephrologists in Lafayette, Indiana (USA) placed Tesio® catheters in the internal jugular vein for blood access in patients initiating dialysis without an AV graft or fistula, using ultrasound. In 1998 and 1999, Nephrologists placed Ash Split Cath catheters, while Radiologists continued to place Hickman® catheters. Catheter complications were recorded in the SmartChart® program, and blood flow and venous and arterial pressures were automatically recorded by Cobe CenturyNet and Velos programs and averaged over the entire dialysis procedure. In vitro studies were performed with artificial blood (SeraSub) for comparison of hydraulic function.

Results

In Vitro Hydraulic Studies of Split Cath

Flow and pressure drop were determined for the Ash Split Cath, Quinton PermCath, and Vas-Cath Soft Cell as demonstrated:

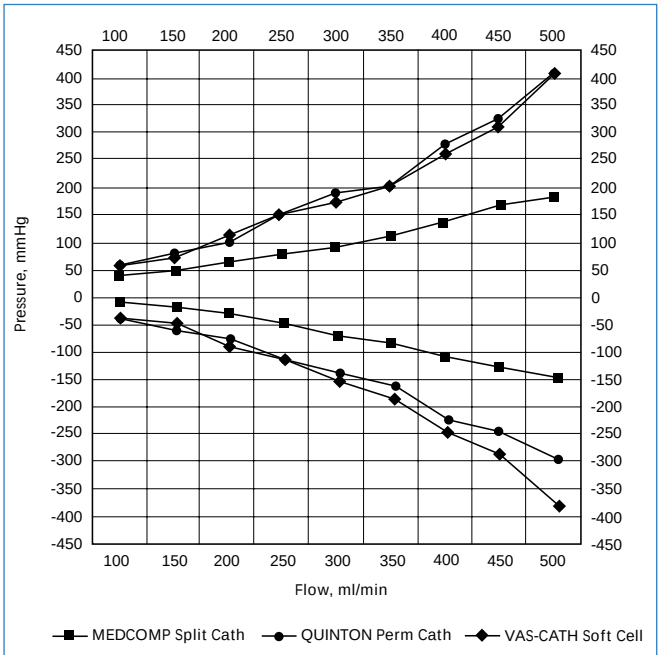

Fig. 2: Flow rate comparison of Split Cath, PermCath, and Soft Cell.

Clinical Hydraulic Studies of Split Cath

Arterial-side pressures indicated that the Split Cath provided the same blood flow rate at the same negative pressure as needles in a graft or fistula. Other catheters also provided blood flow, but at a lower average flow rate:

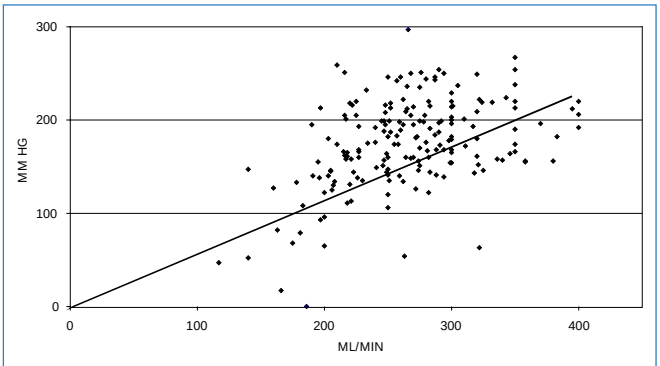

Fig. 3: Split Cath arterial pressure vs flow.

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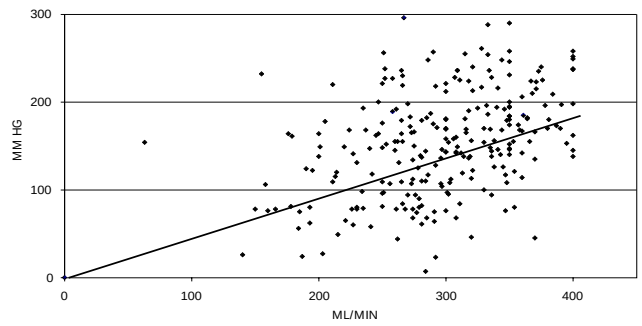

Fig. 4: Graft and fistula arterial pressure vs flow.

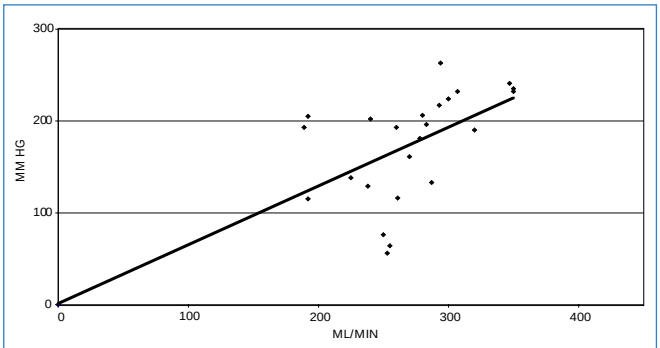

Fig. 5: Graft and fistula arterial pressure vs flow.

Venous-side pressure indicated that the Split Cath provided the same blood flow rate at the same negative pressure as needles in a graft or fistula. Other catheters also provided blood flow, but at a lower average flow rate:

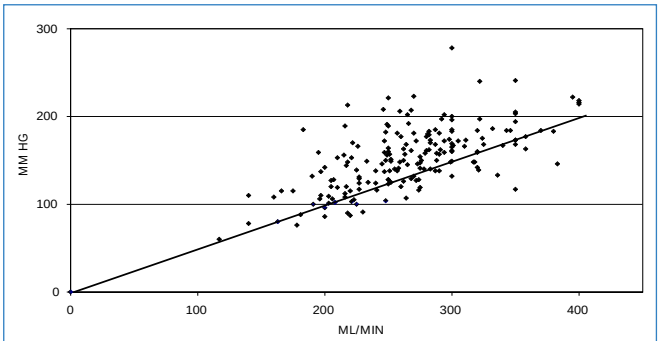

Fig. 6: Split Cath venous pressure vs flow.

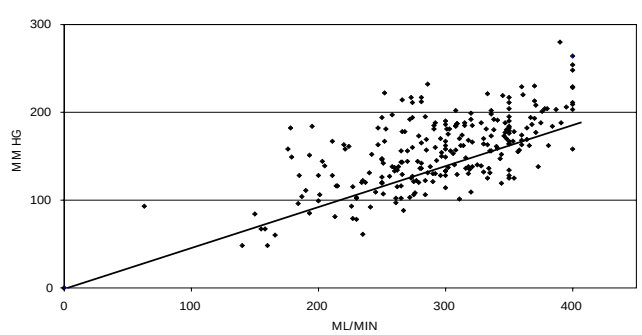

Fig. 7: Graft and fistula venous pressure vs flow.

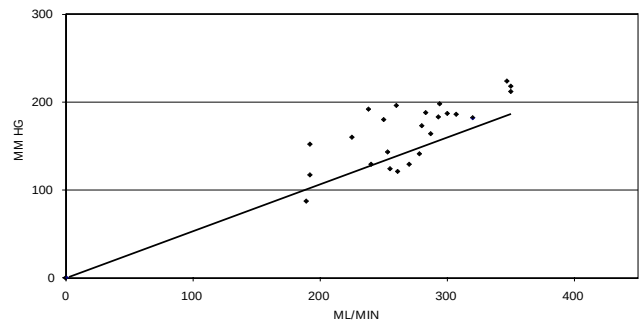

Fig. 8: Davol and tesio venous pressure vs flow.

Recirculation percentage was measured routinely by Trans-Sonic method, and was rarely above zero for the Split Cath.

Longevity of Split Cath

Since 1998, 125 Split Cath catheters were placed in ESRD patients in our practice, mostly by Nephrologists, with average follow-up of 1-18 months (mean 8). Citrate has been the most common catheter lock (10-47%, mostly 23%). Only a few Split Caths were removed due to septicemia, exit site infection, or loss of blood flow rate, and interventions have been rare. Lifetable analysis indicates 83% one-year catheter survival.

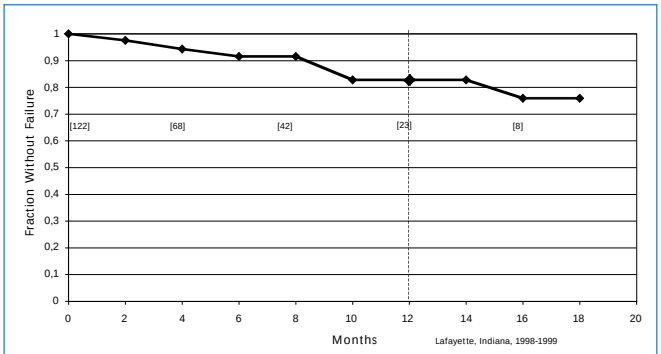

Fig. 9: Longevity of Ash Split Catheters.

Conclusions

1. The fistula is the best chronic access method for ESRD patients. For patients in whom fistulas are not workable, catheters such as the Split Cath can provide longevity and hydraulic function at least equal to A-V grafts.

2. The Ash Split Cath catheter provides the simplicity of placement and removal of a single-bodied catheter, with hydraulic advantages of blood flow into multiple circumferential ports of each individual limb in the vein.

3. Split Cath average blood flow rate and venous and arterial pressures are identical to those for grafts and fistulas. Higher average flows are obtained than with other single-bodied catheters, over a longer period.

4. Split Cath longevity at one year is 83%, considerably better than A-V grafts and rivaling that of fistulas.

5. Use of 23% citrate as an anticoagulant/antibacterial lock in this study may be partially responsible for the prolonged function and use of Split Cath catheters.

Address of correspondance :

S.R. Ash, MD, FACP
HemoCleanse, Inc.
2700, Kent Avenue
West Lafayette
IN 47906 USA
E-mail : sash@hemocleanse.com