THE POLISHED CARBON BUTTON — PRIVILEGED ACCESS TO THE BLOODSTREAM (THROUGH ATTACHMENT TO AN EXPANDED PTFE CONDUIT OR ARTERIALISED FISTULA VESSEL)

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The utilisation of synthetic arteriovenous conduits has become necessary where standard arteriovenous fistulas cannot be created. The Gore-tex polytetrafluoroethylene graft has been used to provide such an arteriovenous conduit. Most often it is used as a subcutaneous loop in the forearm for repeated haemodialysis by intermittent needle insertion [1]. The repeated needle sticks are inconvenient and may be impractical where patients are required to insert their own needles or should more frequent (daily) dialysis become popular. We have begun animal experimentation using the combination of highly polished carbon (bio-Carbon, Bentley Laboratories) as a transcutaneous ‘button’ portal of entry to the polytetrafluoroethylene (Gore-tex, W. L. Gore and Associates) graft. In a similar fashion we have also used the carbon ‘button’ outlet for attachment to the arterialisied vein of A-V fistulas (Figure 1).

The PTFE arteriovenous conduits were placed from carotid artery to jugular vein in either dorsal or ventral neck position of the animals. The buttons were attached through anastomosis of the button’s fused fabric skirt to the side of the high-flow graft. Where the buttons were attached to arterialisied veins of a previously formed fistula, the skirt was anastomosed to the side of the enlarged vein. Sample animals were exposed to dialysis by single portal injection-withdrawal systems [2] and no difficulty was encountered in performing the dialysis procedures.

The button outlet-arterialised vessel combination remained patent for three, four, and seven months in three animals tested, whereas the combination of the button outlet with the polytetrafluoroethylene graft remained patent for two months. Infection was not a complication.

Just as bio-Carbon appears to resist infections when placed in transcutaneous fashion for other uses[3], the button outlet’s attachment to the blood vessel or graft in these animals was not complicated by infection in spite of its transcutaneous location and internal continuity with the bloodstream. The high-flow systems (an arterialisied fistula vessel or the Gore-tex PTFE arteriovenous conduit) remained patent even when attached to a transcutaneous polished carbon button.
Figure 1. A. BioCarbon button outlet. B. Valve system. C. Anastomosis of outlet to side of artificial vein or Gore-tex PTFE conduit. D. Transcutaneous location. E. Attachment of BioCarbon outlet to arteriovenous fistula vessel or Gore-tex PTFE conduit in dogs. F. Possible future application in man.

The combinations appear in these preliminary experiments to have the advantages of the arteriovenous shunt without the disadvantageous requirement of repeated needle sticks necessary where the arteriovenous fistula is employed. After more extensive animal experimentation these combinations may be found applicable to human implantation both for dialysis and total parenteral hyperalimentation.

Acknowledgment

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References

1 Buseelmeier, TJ, Rynasiewicz, JJ, Sutherland, DER, Howard, RJ, Davin, TD, Mauer, SM, Simmons, RL, Najarian, JS and Kjellstrand, CM (1978) *Dialysis and Transplantation*, 6, 48-49
3 Kahashi, MR (1977) *Urology Times*, 5, 55-56