

Time to Get Off the Button-Hole Bandwagon ? - A Single Center Experience of Staph Aureus Infection and Vascular Access Type

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Introduction – There is little doubt that for the vast majority of haemodialysis patients an arterial-venous fistula is the access of choice. Since the technique was first described, the ‘button-hole’⁽¹⁾ method of cannulation has become increasingly popular with both nursing staff and patients. Decreased pain, bleeding and fewer aneurysmal fistulas are the reported benefits^(2,3). The UK guidelines recommend this technique is the method of choice⁽⁴⁾. Our unit has adopted this technique for a number of patients especially for those in self care or on home haemodialysis. However after a number of cases of septicemia especially staphylococcus aureus leading to endocarditis and one case of a mycotic aortic aneurysm (Fig1), we decided to look at this complication in the haemodialysis program and to see whether there was indeed a benefit of less bleeding in our population.



Figure 1 - CT - Abdomen showing mycotic aneurysm

Figure 2 - Outcomes and demographics of Staphylococcus Aureus infection in patients with buttonhole AVF

	Age	sex	IP days	Complications	Comments
Patient 1	50	m	1	none	well controlled HIV
Patient 2	29	m	13	required surgery	home haemodialysis patient, pus and collection at AVF
Patient 3	67	m	3	none	Type 2 diabetes
Patient 4	40	m	15	septic arthritis requiring washout	Type 2 diabetes, previous episode of streptococcal septic arthritis
Patient 5	48	m	5	pneumonia	type 2 diabetes
Patient 6	59	f	23	mycotic aortic aneurysm	well controlled HIV
Patient 7	37	m	5	none	home haemodialysis patient with 2 previous episodes one complicated by discitis
Patient 8	60	m	62	endocarditis	type 2 diabetes, had recurrent SBE, had valve replacement complicated by fatal calciphylaxis
Patient 9	28	m	15	required surgery and skin graft to infected AVF excision site	
Patient 10	56	m	4	none	
Patient 11	53	m	3	none	

Results – There were approximately 1900 patient years and 52 episodes of staph aureus bacteremia. 11 cases of bacteremia were felt to be a blood stream infection secondary to introduction via the AVF. In all eleven cases the AVF was being cannulated using the button hole technique (fig2). In 40 cases (in 28 patients with some patients having multiple episodes despite line exchange)the infection had been introduced via a tunneled haemodialysis line into the blood stream (fig3), and one case was via an infected PTFE graft. In the two year period there were no blood stream infections with staph Aureus in patients using the rope ladder technique.

We found that there was no difference in bleeding between types of AVF needling and the vast majority of major bleeding was in patients with PTFE grafts or on anticoagulation with an AVF .

Overall infections due to button hole lead to a total of 149 inpatient bed days in a two year period (average of 13.5 days vs 14.0 days per episode with tunneled lines) and one patient died after he developed calciphylaxis after a mitral valve replacement. One patient has ongoing infection after her mycotic aneurysm was stented with subsequent stent infection. The ethnic mix of the button group was 2 Caucasian , 2 Pakistani and 7 Afro-Caribbean. With one of the Caucasian group being the home dialysis patient.

Discussion – In our study we found that policy of button hole for all technique was potentially a cause of serious, and in one case fatal, staphylococcal blood stream infections. Other groups have also reported this concern⁽⁵⁾. The button hole technique is probably a valid method to needle fistulas as long a certain safe guards are put in place⁽⁶⁾, these include avoidance of button hole in patients more prone to skin infection (diabetics or patients with impaired immune systems such as HIV – we have seen two episodes in HIV +ve patients).

Our policy is now to avoid button hole in these groups and increased surveillance of fistulas with a low threshold to convert to rope ladder technique. Interestingly only two of the button hole cases were Caucasian, it might be that in this group it was easier to observe erythema around the button hole , whereas in the 7 Afro-Caribbean patients surrounding cellulitis may have gone un-noticed, leading to delayed intervention. We suggest that a blanket policies of button hole needling should be re-thought.

Methods - Using our database we identified all positive cultures in our haemodialysis patients over a two year period (2012-2014). Data collected included dialysis access, other possible sources of infection, infecting organisms and complications of the infection. All cases of Staph Aureus we studied with regard to access and complications. We also analyzed our database looking for dialysis related bleeding, episodes of significant bleeding requiring admission, transfusion or surgical intervention with regard to type of access.

Figure 3 - Outcomes and demographics of Staphylococcus Aureus in patients with tunneled hemodialysis lines (Some patients had multiple episodes of infection and are therefore recorded as such)

	AGE	sex	IP days	complication	comments
Patient 1	41	m	7	SBE and septic pulmonary emboli	intravenous drug user , possibly injecting into line
Patient 1			10	SBE and septic pulmonary emboli	intravenous drug user , possibly injecting into line
Patient 1			1	none	intravenous drug user , possibly injecting into line
Patient 1			6	none	intravenous drug user , possibly injecting into line
Patient 2	77	f	7	none	>16years RRT few access options left
Patient 2			1	none	>16years RRT few access options left
Patient 3	52	m	6	none	>10years RRT multiple access attempts
Patient 4	66	m	6	possible pneumonia	cardiac transplant previously, crash lander
Patient 5	26	m	6	none	refused surgery, died of hyperkalaemia due to non-attendance at dialysis
Patient 6	62	m	38	yes	diabetes and osteomyelitis
Patient 6			10	yes	diabetes and osteomyelitis
Patient 7	50	f	12	yes	died while in radiology attempting SVC plasty for access
Patient 7			7	no	>12years RRT , refusing further access
Patient 8	53	f	10	no	diabetes for 38 years ESRF for 19 years difficult access
Patient 9	60	m	35	none	myeloma on therapy
Patient 10	51	m	12	none	diabetes
Patient 11	27	m	106	none	crash landed with hip fractures due to renal tubular acidosis and nephrocalcinosis
Patient 12	65	f	17	SBE	on immuno-suppression for extra renal vasculitis
Patient 13	45	f	46	SBE	diabetes. Infection may have been via infected foot - subsequently amputated
Patient 13			21	SBE	diabetes. Infection may have been via infected foot - subsequently amputated
Patient 14	30	M	7	none	crash landed hence started with line
Patient 15	37	F	1	none	non-attender at vascular access clinic
Patient 15			15	none	non-attender at vascular access clinic
Patient 16	39	f	5	none	diabetes
Patient 17	60	m	2	none	crash landed and diabetic
Patient 18	49	m	8	none	diabetes
Patient 18			9	none	diabetes
Patient 18			5	yes	diabetes
Patient 19	38	m	9	none	intravenous drug user , possibly injecting into line
Patient 20	38	m	15	SBE and died	had CVA secondary to septic emboli
Patient 21	50	f	21	died	had cardiac event while having new line inserted trans-hepatically - no other access options
Patient 22	44	f	30	none	refusing access attempts
Patient 23	77	m	5	none	diabetes and poor access options also not for surgery
Patient 24	34	m	0	died	died of septic shock , longstanding ESRF no access options
Patient 25	62	f	5	none	occurred after DCD transplant while having delayed graft function
Patient 26	50	f	9	none	could not have AVF created until after cardiac bypass surgery
Patient 27	57	m	19	no	possibly infected ICD or hip prosthesis
Patient 27			10	no	possibly infected ICD or hip prosthesis
Patient 28	56	m	7	no	unfit for surgery

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