IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 13, Issue 3 Ver. III. (Mar. 2014), PP 04-07
www.iosrjournals.org

An Audit of the central venous catheterization in the University of Maiduguri Teaching Hospital, Maiduguri, Borno state, Nigeria

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Abstract: *To audit the central venous catheterization of patients in the University of Maiduguri Teaching Hosp ital, Maiduguri, Borno state, Nigeria. This was a cross sectional prospective study of all patients scheduled for c entral venous catheterization (CVC) in our centre form January, 2009 – December, 2012. Following counsellin g and consent obtained on either Subclavian vein (SCV) approach or the Internal Jugular vein (IJV) approach was documented. A total of 780 patients were reviewed during the period under review. Two hundred and forty nine (n= 249, 31.9%) patients were males and five hundred and thirty one (n= 531, 68.1%) patients were femal es. The age ranges between 12- 80 years with the mean age of 41.87 (SD= 15.91). Majority of the patients had c hronic kidney diseases (81.3%) and were scheduled for Haemodialysis. Most of the patients (n=612, 78.5%) we re free from complication due to our procedure. Arterial puncture (n=85, 10.9%) was the commonest complicati on observed in our study. CVC is safe, effective, life saving and an excellent means of administering of fluids an d more importantly in the patients scheduled for Haemodialysis (HD) who requires good venous access. We ther efore, recommend and encourage other centres to commence the insertion of the CVC in their centres because o f its importance in the patient care.*

Key words: *Central venous catheterization, Haemodialysis, Complications, Outcomes.*

I. Introduction

Central venous catheterization (CVC) is the placement of catheter into a large vein in the neck (internal jugular vein), chest (subclavian vein or axillary vein), or groin (femoral vein). The use of vascular catheters is common i n both inpatient and outpatient care. In the United States, it is estimated that almost 300 million catheters are use d each year; nearly 3 million of these are central venous catheters (CVCs), also known as central lines. In the Un ited Kingdom, about 250,000 CVCs are used annually. [1] CVCs plays an integral role in modern health care, allo wing for the administration of intravenous fluids, blood products, medications, and parenteral nutrition, as well a s providing haemodialysis access and haemodynamics monitoring; their use, however, is associated with a risk o f arterial puncture, bloodstream infection caused by microorganisms colonizing the external surface of the devic e or the fluid pathway when the device is inserted or in the course of its use.[2] CVCs are the most frequent cause of health care-associated bloodstream infections. [3]

CVCs are commonly used for performance of haemodialysis (HD). They readily availability of the CVCs as a v ascular access (VA) for HD often makes them the access of choice, especially when urgent or emergent HD is re quired either at the time of initiation of renal replacement therapy or when a permanent access becomes dysfunct ional. This report underscores the importance of CVCs and catheterization of patients during haemodialysis and emergencies. It is imperative therefore, to audits the indications, practices and complications of this procedure in our centre and to encourage other centres to commence insertion of central venous catheters because of its impo rtance in HD and emergency management.

II. Materials And Method

This is a prospective cross-sectional questionnaire based study on the central venous catheterization in our centr e from January, 2009 – December, 2012. The research and ethical committee of the hospital approved the study. Questionnaires were filled after detail counselling on the central venous catheterization and signed consent was obtained. No participant declined participation in the study. The information obtained were the name of the pati ent, age, gender, hospital number, in or out-patient, diagnosis, indication for central venous catheterization, site of insertion, either tunnelled or non tunnelled, cannula size, complications, prophylaxis antibiotics given, infecti on, laboratory evidences and intervention if any. All patients were included in the

study except those with the platelets counts of less than 50 x 10^3/ul, prothrombin time greater than 1.5 times the normal limit, Patients with blood coagulation disorders, those on recent anticoagulant therapies and uncooperative and delirious patients. Following consent the patients were cleaned and draped under aseptic condition. The predetermined approach was done either through right or left subclavian vein or right or left internal jugular vein approaches.

The internal jugular central venous catheterization: the apex of the triangle formed by the two bodies of the sternocleidomastoid muscle and their insertion points into the clavicle, the internal jugular vein bound with the carotid artery in the carotid sheath, runs deep to the sternocleidomastoid muscle and emerges between the two heads of this muscle before passing deep to the clavicle to join the subclavian vein; the patient's head was rotated approximately 45^o to the contralateral side and the patient placed in the Trendelenburg position and patient was cleaned and draped; an index and middle fingers are placed at the apex of the triangle directly to the carotid pulse, a 25 G-guage needle with a syringe containing lidoocaine just pass the skin surface immediately lateral to the carotid pulse and backpressure assuring there was no blood return and then lidoocaine delivered to create wheal at the surface of the skin. A 22G "finder" needle was introduced and an empty 10cc syringe was attached. The needle and syringe was advanced along same track, lateral to the carotid pulse, syringe was drowned during the advancement create negative pressure. When the vein was located venous blood will flow easily into the syringe.

The internal jugular vein is often located close to the skin surface when the finder needle successfully locates the vein. The needle was withdrawn and 18G introducer needle was inserted and 10cc syringe along the same path as above. When venous blood flow was again demonstrated, 18G introducer was hold steadily in place and the syringe removed. The guide wire was fed through the 18G introducer needle, when the guide wire is in place the introducer was removed over the wire. Guide an 18G short tip intravenous catheter over the guide wire. When the catheter is hubbed at the proximal end, hold the catheter in place and the wire was withdrawn. The introducer tube was attached to the catheter. If venous access is confirmed, the guide wire was reintroduced and the 18G catheter was removed over the wire. Once venous access was confirmed then proceeds to cannulation. Central venous catheter was introduced over the guide wire and then the tip of the wire was withdrawn. The catheter was advanced to a length that approximates the catheter tip placement in the correct position in the superior vena cava. The guide wire was removed leaving the central venous catheter in place. With a 5cc syringe and 0.9% normal saline, ensure that each port for the central line draws blood and flushes appropriately. Lidocaine was re-applied below the skin surface at a selected suture site. The catheter was sutured in place and appropriate sterile dressing applied.

Subclavian central venous catheterization: The subclavian vein lies directly underneath the clavicle and begins where the axillary vein crosses the lateral border of the first rib. The anterior scalene muscle separates the subclavian vein from the subclavian artery, with the artery posterior. The patient's head was rotated 45^o to the contralateral side and patient placed in the Trendelenburg position. The landmark was identified by locating the mid-point of the clavicle and the sterna notch. The finder needle was guided few centimetres caudal to the midclavicular point. The area was cleaned and draped and local anaesthesia was applied to the area as described above and all stages are followed as indicated above.

The results are presented as frequency and percentages**.** The clinical variables were tested using Chi square test. The level of significance is set at a probability of 0.05

III. Results

A total 780 patients had central venous catheterization within the three years period (January 2009 –December, 2012) of the study. Two hundred and forty nine patients (n= 249, 31.9%) were males and five hundred and thirty one patients (n=531, 68.1%) were females. The ages ranges between 12- 80 years old with the mean age of 41.87 (SD= 15.91). The demographic characteristic of the patients (age and sex distribution) are shown in table 1.

Table 1: Age and gender distribution of patients

Ages (yrs)	Males	Females	Total	(%)
10-20	29	63	92	11.8
21-30	50	107	157	20.1
31-40	23	50	73	9.4
41-50	48	101	149	19.1
51-60	61	130	191	24.5
61-70	27	56	83	10.6
71-80	11	24	35	4.5
Total	**249**	**531**	**780**	**100**

Table 2: shows the clinical parameters of the patients, majority of the patients (n=634, 81.3%) were diagnosed w ith chronic kidney diseases and had haemodialysis (n=634, 81.3%) were the main indication for central venous c atheterization in our centre. Four hundred and fifty seven (n=457, 58.6%) of the patients were in-patient and the remaining three hundred and twenty three (n= 323, 41.4%) patients were out-patients.
Majority of the patient had cannulation at the Subclavian vein approach (n= 481, 61.7%) while the remaining we re through the Internal jugular approach. We used most of size 12G catheter (n=438, 56.2%) and tunnelled (n=4 92, 63.1%) than size 8G Catheter and non-tunnelled catheters. Most of our patients (n= 612, 78.5%) were free fr om any complication following the procedure, however, arterial puncture (n=85, 10.9%) was found to be the ma jor complication seen in our patients.

Table 2: Clinical parameters of the patients reviewed (n=780)

Parameters	n	(%)
Diagnosis:		
CKD	634	81.3
Severe Burns	46	5.8
Septicaemia	48	6.2
Polytrauma	32	4.1
Malignancies	20	2.6
Indications for cannulation:		
Haemodialysis	634	81.3
Resuscitations	146	18.7
Site of Cannulation:		
RSV	442	56.7
RIJV	256	32.8
LIJV	43	5.6
LSV	39	5.0
Size of Catheter		
12G	438	56.2
8G	342	43.8
Type of Catheter:		
Tunnel	**492**	**63.1**
Non- tunnel	288	36.9
Complications of the procedures:		
No complications	**612**	**78.5**
Arterial puncture	85	10.9
Haematoma	13	1.7
Pneumothorax	11	1.4
Infections	45	5.8

Table 3 shows the complications with used of common site of technique. The commonest complication was arte rial puncture (74.1%) with the subclavian approach and venous thrombosis (74.6%) was found to be the commo nest complication with the internal jugular approach. The complications (X^2 =1.88, P=0.17) had no significant di fferences in the two techniques.

Table3: Shows the complications in different site of technique.

	Site			
Complications				
	SV	**IJV**	**Total**	**Odds ratio**
Arterial puncture	22(25.9%)	63(74.1%)	85	1.00
Haematoma	8(61.5%)	5(38.5%)	13	1.49
Pneumothorax	11(100%)	0(0%)	11	0.00
Infections	33(73.3%)	12(26.7%)	45	1.03
Venous Thrombosis	3(21.4%)	11(74.6%)	14	3.04
Total	**118**	**5**	**168**	

X^2 =1.88, P= 0.17

IV. Discussions

CVCs remain an important method to obtain venous access (VA) as a bridge to the placement and matu ration of an arteriovenous fistula (AVF) or arteriovenous graft (AVG), pending renal transplantation, and as the sole access in many patients. The use of CVCs has several advantages in the short term: it does not require the i ntegrity of the peripheral blood vessels, a number of the sites are available for immediate insertion, it can be use d immediately and for prolonged periods, and it provides painless access. [4]

This study shows that in most of our patients for central venous catheterization are patients with chronic kidney diseases (n=634, 81.3%) and they were scheduled for Haemodialysis, this is in agreement with the study by Piso ni et al [5] who reported 81% of patient initiated dialysis using a CVCs in the United State of America.
This procedure is not without complications however, we found the complication rates of 21.5% with the arteria l puncture top of the list; this is similar to the result obtained by Sznajder et al [6] who reported a complication of 1

5% which include arterial puncture, haematoma, and pneumothorax. It was also reported Robert et al [7] that both internal jugular and the subclavian cannulation attempts have similar overall risk of complication, this is agreem ent with our study which we found that there was no statistical differences between the complications among the two approaches. The internal jugular site is more likely to be associated with arterial puncture (common carotid) than the subclavian site. This complication is usually very well tolerated, provided that it is recognized early in the procedure and proper pressure is applied to control bleeding.

The subclavian vein site is more commonly associated with pneumothorax and haemothorax than the internal ju gular site. To prevent this complication, the operator should never let the introducer needle drop below the horiz ontal plane. Timsit et al [8] reported that internal jugular site has association with venous thrombosis approximatel y four times greater than that of subclavian vein cannulation. This is similar to our finding in this study. It was re ported that with the use of subclavian site is associated with fewer catheter related infections than the internal ju gular or the femoral sites, making it a preferred site many patients [9, 10, 11, 12] as is shown above in our study.

V. Conclusion

CVCs can be lifesaving, safe, efficient in fluids and drug administration with minimal complication of 21.5% however, with the operator experiences, familiarity of the advantages and disadvantages of the various sit es, strict aseptic technique and proper catheter maintenance decreases the frequency of the complications. We th erefore, encourage centre that are not familiar with the procedure to start because practice make perfects, consid ering it importance in the patient's resuscitation and for patient scheduled for Haemodialysis.

References:

[1] Edgeworth J. Intravascular catheter infection. J Hosp Infect. 2009; 73(4): 323-330
[2] Mermel LA. What is the predominant source of intravascular catheter infections? Clin Infect Dis. 2011; 52(2): 211-212.
[3] Maki DG, Kluger DM, Crnich CJ. The risk of bloodstream infection in adults with different intravascular devices: A systematic review of 200 published prospective studies. Mayo Clin Proc. 2006; 81(9): 1159-1171.
[4] KDOQ1. Clinical practices guidelines for vascular access. Am J Kidney Dis. 2006; 48: 248-257.
[5] Pisoni RL, Young EW, Dykstra DM. Vascular access use in Europe and the United States: Results from the DOPPS. Kidney Int 2002; 61: 323-330.
[6] Sznajder JI, Zveibil FR, Bitterman H. Central vein catheterization: Failure and complication rates by three percutaneous approaches. Arch Intern Med. 1989; 146: 259-261.
[7] Robert W, Taylor MD, Ashok V, Palagiri MD. Central venous catheterization. Crit Care Med. 2007; 35(5): 1390-1396.
[8] Timsit JF, Farkas JC, Boyer JM. Central vein catheter –related thrombosis in intensive care patients: Incidence, risk factors and relationship with catheter- related sepsis. Chest 1998; 114: 207-213.
[9] Mansfield PF, Hohn DC, Forenges BD. Complications and failures of subclavian- vein catheterization. N Engl J Med. 1994; 331: 1735-1738.
[10] Merrer J, De Jonghe B, Golliot F. Complications of femoral and subclavian venous catheterization in critically ill patients: A randomized controlled trial. JAMA. 2001; 286: 700-707.
[11] Vitale P, Stefani S. Vascular catheter- associated infections: A microbiological and therapeutic update. J Chemother. 2006; 18: 235-249.
[12] Heard SO, Wagle M, Vijayakumar E. Influence of triple- lumen central venous catheters coated with chlorhexidine and silver sulfadiazine on the incidence of catheter- related bacterimia. Arch Intern Med. 1998; 158: 81-87.