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HEAMODIALYSIS PATIENTS;

CENTRAL VEIN STENOSIS FOLLOWING TEMPORARY DOUBLE LUMEN CATHERIZATION IN INTERNAL JUGULAR AND SUBCLAVIAN VEINS

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ABSTRACT… Background: Internal jugular vein is considered the preferred site of insertion. Prevalence of central vein stenosis following temporary double lumen catheterization at different sites seems to be different in Asian countries. **Objectives:** To evaluate the number of cases having catheterization and stenosis after being subjected to central vein catheterization (CVC) among Pakistani population. **Study Design:** Cross sectional study. **Period:** 6 months period. **Setting:** Admitted in the Department of Nephrology or already undergoing maintenance hemodialysis fulfilling the inclusion criteria were included in the study. **Material and Method:** The sample which was considered suitable for this study was 150 cases after checking the inclusion criteria carefully. The patients were advised to undergo color Doppler ultrasonography of IJV and SCV of both sides. Demographics and outcome variables were noted and recorded for the analysis purposes. Data was analyzed used SPSS 20.inc **Results:** The frequency of catheterization of catherization at IJV was found to be 128(85.3%) and frequency of catheterization at SCV was 22(14.7%). The frequency of CVS at IJV was found to be 43(29.68%) and the frequency of CVS at SCV was 81(54.54%). The frequency of stenosis at SCV was found to be significantly higher with a p value of 0.029 (<0.05). **Conclusion:** Internal jugular vein is the most frequent and preferred site of temporary double lumen catheterization for haemodialysis as it is associated with significantly lower rate of stenosis as compared to subclavian vein.

Key words: Central vein stenosis (CVS), internal jugular vein (IJV), Subclavian vein (SCV), Temporary double lumen catheter, Dialysis.

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INTRODUCTION

Central vein catheters (CVC) are an essential part of treatment plan in many conditions like parental nutrition, malignancy and end stage renal diseases (ESRD). Around three to four million CVC's are passed annually. In the domain of nephrology these CVC's are usually temporary non tunneled, non cuffed double lumen catheters. These catheters are passed usually in internal jugular (IJV) / Subclavian vein (SCV) in cases of emergency dialysis, immature or malfunctioning arteriovenous fistula (AVF)/ graft (AVG). Two major complications of these catheters are central vein stenosis (CVS) and infection.[1] Central vein stenosis is commonly associated with placement of central venous catheters. Central vein stenosis can jeopardize the future of arteriovenous fistula and arteriovenous graft in the ipsilateral extremity. Endothelial injury with subsequent changes in the vessel wall results in development of microthrombi, smooth muscle proliferation and central vein stenosis. Central vein stenosis is often asymptomatic in non-dialysis patients but can result in edema of ipsilateral extremity and breast when challenged by increased flow from an AVF or AVG.[2]

The association between SCV cannulation for HD access and subsequent CVS was identified in the 1980s, when the SCV approach was widely regarded as the safest and easiest method. The early 1990s witnessed a move away from the SCV toward the jugular veins. A seminal study by Schillinger et al. angiographically compared the subclavian-brachiocephalic vein of 50 patients dialyzed by SCV catheter to those of 50 patients

dialyzed by IJV catheters. The angiographic study revealed a stenosis of the vein in 42% of the SCV and in 10% of the IJV. This dramatic observation argued persuasively in favor of the internal jugular route, the superiority of which has with stood the test of time.[3]

Prevalence of CVS at different sites seems to be different in different Asian countries. Prevalence of central venous thrombosis in Chinese in Chinese HD patients with indwelling catheterization was estimated. Color Doppler ultrasound revealed that thrombosis of the superior vena cava and auxiliary branches occurred in 33 of 54 HD patients with an indwelling internal jugularvenous catheter. The prevalence of thrombosis of the superior vena cava and auxiliary branches was 61.1% in Chinese HD patients undergoing dialysis with an indwelling internal jugular venous catheter. [4] The most quoted evidence of symptomatic subclavian vein thrombosis/ stenosis are lower in Nepalese patients. These CVS appear quite low and well comparable to IJV vein access as reported in the literature.[5] Treatment options to date include percutaneous balloon angioplasty, bare metal stents and surgical bypass. Unfortunately, all the available treatment options have poor long-term patency, requiring repetitive intervention.[6,7,8] and sometimes due to stenosis patient has to undergo special and costly imaging to undergo catherization at atypical sites.[9]

Few studies conducted on various type of populations has been conducted and data on the prevalence of central venous stenosis following catheterization in Pakistan. Recent studies have thrown the debate of preferred site of insertion into a controversy.[2,4,5] Hence we performed this study to ascertain the frequency of catheterization and prevalence of stenosis for the support of those studies in order to reach on a decision.

MATERIALS AND METHODS

150 adult patients who were admitted in the Department of Nephrology or already undergoing maintenance hemodialysis from Shaikh Zayed Hospital Lahore fulfilling the inclusion criteria were included in the study. Patients with age between 18 to 80 years of both gender enrolled for hemodialysis having at least double lumen catheterization for 2 to 4 week. While all those patients who had large vessel vasculities and on aspirin were excluded. An informed consent was taken in the language they understand best. Frequency of catheterization of SCV and IJV was determined. After this the patients were advised to undergo color Doppler ultrasonography using Technus-MP device of IJV and SCV of both sides. Doppler was performed in department of Radiology Sheikh Zayed Hospital Lahore by a specified radiologist with Doppler ultrasonography machine (G.E. VOLUSON 730 EXPERT). Descriptive statistics was calculated and presented in the forms of mean and percentage. Inferential statistics was calculated using chi square test at a p-value of <0.05 as significant.

RESULTS

We studied 150 adult patients who were admitted in the Department of Nephrology or already undergoing maintenance hemodialysis from Shaikh Zayed Hospital Lahore fulfilling the inclusion criteria. There were 77(51.3%) male and 73 (48.7%) female patients. Mean age of patient was 46.55±14.06 years.

The frequency of catheterization at IJV was found to be 128(85.3%) and frequency of catheterization at SCV was 22(14.7%). (Figure-1)

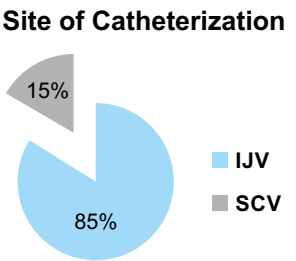

Figure-1. Site of catheterization in the study population

The frequency of CVS at IJV was found to be 29.68% and the frequency of CVS at SCV was 54.54% .The chi square test was used to compare CVS at both sites. The frequency of stenosis at subclavian vein was found to be significantly

higher with a p value of 0.029 (<0.05). Male and females had similar patterns in the frequency of stenosis. Frequency of stenosis was comparable in different age groups (Table-I).

n=150				
		STENOSIS		Total
		STENOSED	NOT STENOSED	
Site of Cathe-trization	IJV	38	90	128
	% within	29.7%	70.3%	100.0%
	SCV	12	10	22
	% within	54.5%	45.5%	100.0%
Total		50	100	150
%		33.3%	66.7%	100.0%

Table-I. Comparison of frequency of stenosis at ijv and scv
P-value of 0.029 (<0.05).

DISCUSSION

CVC placement is unavoidable and CVS is common cause of morbidity in haemodialysis patient with temporary double lumen catheter. Most studies favor IJV over SCV catheterization. Our study was intended to find out our local trends. In our study mean age was 46.55±14.02 which was similar to previous data available. Middle aged patient were in larger proportion with 56%.There were 48.7% females and 51.3 % males in our study. Similar study done in Nepal had 48.3% females and 51.7% males.[5]

The frequency of catheterization at IJV was found to be 85.3% and frequency of catheterization at SCV was 14.7%. These frequencies are comparable to internationally accepted frequencies documented in literatures, which is 86.5% at IJV and 13.5 % at SCV. The higher proportion of patients in IJV catheterization is found in many studies and institution. IJV is easy to approach and associated with less complications as compared to SCV. IJV is superficial large and easily visible by USG.[3]

The frequency of CVS at IJV was found to be 29.68% and the frequency of CVS at SCV was 54.54%. These findings are also consistent with the general consensus that SCV catheterization is more likely to lead to stenosis than SCV. According to one study, angiography revealed a stenosis of the vein in 42% of the SCV and in 10% of the IJV.[3] in our study gender did not have an impact on the rate of stenosis. Though, there was slightly increased rate of stenosis in elderly population above 60. This might be due to the fact that, old vessels have more chances of atherosclerosis and stiffness of vessel wall.[1,3,6]

On the contrary there are studies which have shown another side of the picture. One of these studies done in Nepal showed only 2% CVS following SCV catheterization.[5] Prevalence of CVS at different sites seems to be different in different Asian countries. Prevalence of central venous thrombosis in Chinese HD patients with indwelling catheterization was estimated. Color Doppler ultrasound revealed that thrombosis of the superior vena cava and auxiliary branches occurred in 33 of 54 HD (61.1%) patients with an indwelling internal jugular venous catheter.[4]

The overall rate of stenosis compels us to avoid central venous catheterization. But in reality, these central venous catheters are necessary in certain situations. In settings of acute haemodialysis CVCs are unavoidable part of treatment protocol. According to Dialysis outcome and patient pattern study (DOPPS), only 25.0% patients in Europe and 46.0% in the United States arrive at the first dialysis session with a permanent vascular access. So passing CVC for haemodialysis is life saving in these patients.[5]

The importance of CVS cannot be fully understood if we don't understand the future implications of stenosis. This subclinical stenosis becomes evident when the vein is subjected to high pressures by ipsilateral AVF or AVG. This leads to ipsilateral swelling, pain, cellulitis, AVF and AV graft failure. Patient has to go through costly treatment options to relieve those symptoms like percutaneous transluminal angioplasty, bare metal stenting or covered stents. All these options often prove to be a temporary solution to the problem and repeated interventions might be needed. This exercise can cause significant psychological, physical and financial trauma to patient.[6,7,8]

There are few limitations to the present study. Firstly, it is a single center study. Secondly, this is not a case controlled study, so the evidence obtained is not strong. Thirdly, the number of patients with SCV catheterization is relatively small in this study. Lastly, the diagnosis of venous thrombosis/stenosis in this series is primarily based on Doppler ultrasonography. The sensitivity of Doppler ultrasonography is 80%.[1] This means that few cases of CVS might have been missed.

The preferred site of catheterization needs further studies especially in our population. Conflicting results of studies from Nepal and China has proved that all Asian countries may not have similar pattern of CVS. The local practices and genetic makeup may be playing a role in the frequency of CVS. Our study reviled that IJV is the most frequent and the preferred site of insertion of temporary double lumen catheter for haemodialysis because associated decreased risk of CVS. Considering the grave consequences of CVS, further studies are needed in order to confirm these findings and make recommendations according to our population.

CONCLUSION

In conclusion, internal jugular vein is the most frequent and preferred site of temporary double lumen catheterization for haemodialysis as it is associated with significantly lower rate of stenosis as compared to subclavian vein.

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REFERENCES

1. Minoo N. Dariush S. Asieh R. **Prevalence of central vein stenosis following catheterization in patients with end-stage renal disease.** Saudi J Kidney Dis Transpl. 2010; 21(5):975-8.

2. Agarwal AK. **Central vein stenosis: current concepts.** Adv Chronic Kidney Dis. 2009; 16(5):360-70.

3. Yevzlin AS. **Hemodialysis catheter associated central venous stenosis.** Semin Dial. 2008; 21(6):522-7.

4. Han L, Wang SX, Wang W, Chen X, Shen S, Ling Y et al. **Thrombosis of the superior vena cava and auxiliary branches in patients with indwelling catheterization of the internal jugular vein.** Chin Med J. 2009; 122(6):692-96.

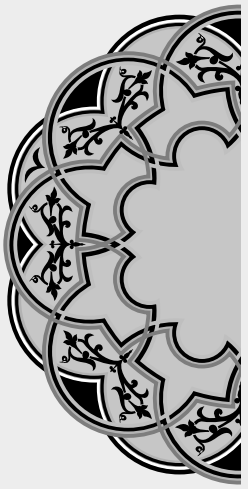
5. Karkee DV. **Subclavian vein dialysis access catheter complications are low Nepal.** Med Coll J. 2010; 12(4): 248-52.

6. Kundu S. **Central venous disease in hemodialysis patients: prevalence, etiology and treatment.** JVA. 2010; 11:1-7.

7. Uwe G, Maliha S, Kathrin K, Urs B, Kurt H, Bernhard KK, et al. **Central vein stenosis in a dialysis patient: a case report.** JMC 2012; 6:189.

8. Gonsalves CF, Eschelman DJ, Sullivan KL, DuBois N, Bonn J. **Incidence of central vein stenosis and occlusion following upper extremity PICC and port placement.** Cardiovasc Intervent Radiol. 2003; 26(2):123-7.

9. Messina M, Morale W, Viglianesi A, Malfa P, L'Anfusa G, Mandalà ML, et al. **Atypical placement of hemodialysis catheters in patients with complete and irreversible obstruction of central venous vessels.** J Vasc Access. 201; 12(1):21-7.



"Time doesn't heal anything..
It just teaches us how to live with the pain."

Unknown

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