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## Characteristics of central vein stenosis patients at Abdoel Wahab Sjahranie Hospital Samarinda



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### ABSTRACT

**Background:** Central vein stenosis (CVS) is a common complication in using a central venous catheter in hemodialysis (HD) access, and its incidence in Indonesia has not been obtained. This study aims to evaluate the characteristics of CVS patients in Abdul Wahab Sjahranie Hospital, Samarinda.

**Methods:** This cross-sectional descriptive study was conducted by collecting CVS patients' data from the medical records between January 2018 to August 2021. The demographic data and the characteristics of CVS patients were collected. The data obtained were analyzed in descriptive form and displayed in a table.

**Results:** This study involved 23 subjects. The characteristics of CVS patients included: Highest sex group was males (61%); Age group was in the range 51-70 years (60%); Clinical feature was swelling (83%); Site of stenosis was in the subclavian vein (87%), on the left side (57%), type of occlusion were partial (67%) and single (87%), and the result of angioplasty was a success (61%).

**Conclusion:** This study showed that CVS was male predominant, in the range 51-70 years, the most complaint was swelling in the arms that were mostly on the left side, and the location of the most stenosis was in the subclavian vein, with partial and single occlusion, as well as good treatment with angioplasty.

**Keywords:** central vein stenosis, hemodialysis, vascular access.

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## INTRODUCTION

Chronic Kidney Disease (CKD) is a condition where there is a chronic and progressive disorder of kidney structure and function for at least three months, irrespective of the cause.<sup>1,2</sup> The current therapy for CKD that is considered optimal and widely used in developing countries is renal replacement therapy or hemodialysis (HD). In HD therapy, central venous stenosis (CVS) is common.<sup>1,3</sup>

CVS can happen because of indwelling cardiac wire, upper extremity peripherally inserted central lines, and central venous catheter in the vein.<sup>4</sup> In using a central venous catheter (CVC), CVS is a common complication in HD patients.<sup>3</sup> CVC placement can be inserted through the jugular, subclavian, and femoral veins. Clinical manifestations include pain; superior extremities and facial edema; dilatation of collateral veins in the face, neck, and chest; tissue damage and ulceration.<sup>5</sup> The incidence of CVS in the

population routinely undergoing HD is 14% in the United States, and in Canada is 23%-29%, but the data have not been obtained in Indonesia.<sup>6</sup>

The risk factors for CVS include the location of the CVC, the type and material of the catheter, the length of time the catheter was inserted, a history of the previous CVC placement, and a long duration of catheter insertion (> 6 weeks). The use of intravascular access or CVC as HD access mostly causes peripheral venous hypertension, which is related to the process of CVS.<sup>1,7,8</sup>

The diagnosis of symptomatic CVS can be established by anamnesis and physical examination in the form of enlargement of the arm circumference both subjectively and based on the examination of the arm circumference. In addition, supporting examinations in the form of Doppler ultrasound and venography can also assist in establishing the diagnosis. Venography can determine the location and length of stenosis. Once diagnosed, the treatment

for CVS is venoplasty.<sup>1</sup>

This study aims to evaluate the characteristics of patients with central venous stenosis in Abdul Wahab Sjahranie Hospital, Samarinda.

## METHODS

This study is a cross-sectional descriptive study. The study was conducted by collecting data based on medical records data of CVS patients at Abdul Wahab Sjahranie Hospital between January 2018 to August 2021. The data was used to provide a demographic description and characteristics of CVS patients.

The inclusion criteria in this study were subjects diagnosed with upper central venous stenosis (subclavian vein, internal jugular vein, brachiocephalic/innominate vein, and superior vena cava) with a history of using hemodialysis access. Exclusion criteria in this study were CVS patients under the age of 30 years and patients with incomplete medical record

data. Analysis of the data in this study was using Microsoft Excel 2010. The data was analyzed in descriptive form and displayed in a table.

## RESULTS

The total samples were 39 patients. Sixteen subjects were excluded due to incomplete medical report data. The total subjects who met the study requirements were 23 patients. Characteristics of assessment in CVS include sex, age, complaints, location of the stenosis, type of occlusion, and the angioplasty result are presented in Table 1 and Table 2.

Table 1 shows the demographic data of the research subjects. In the demographic distribution of patients, there were more males than females (61% vs. 39%), and the highest age was found in the age range of 51-70 years. In this study, there were 5 (22%) subjects aged 30-40 years, 4 (18%) subjects 41-50 years old, 7 (30%) subjects 51-60 years old, and 61-70 years, 7 (30%) subjects.

The characteristics of the subjects are shown in Table 2. The most common clinical feature was swelling of the arms in as many as 19 (83%) subjects. The most frequent site of stenosis was in the subclavian vein in 20 (87%) subjects, with the left side being more frequent in 13 (57%) subjects. The most common type of occlusion was partial occlusion in as many as 16 (67%) subjects, with a single type in as many as 20 (87%) subjects. Success results of angioplasty reached 61% in 14 subjects.

## DISCUSSION

Since 2018, the Thoracic, Cardiac, and Vascular Surgery Division of Abdul Wahab Sjahranie Hospital has started working on Venoplasty as therapy for CVS subjects. This study evaluates the characteristics of central venous stenosis in the population of Samarinda, particularly in Abdul Wahab Sjahranie General Hospital. The subject is a patient with CKD who has routinely undergone HD. Epidemiologically, most CKD patients (40%-60%) require HD twice per week and often have problems with inadequate venous access.<sup>8</sup> In this study, 23 CVS subjects met the study requirements.

**Table 1. Subject demographic**

Characteristic	Frequency (n = 23)	Percentage (%)
Sex		
Male	14	61
Female	9	39
Age		
30-40 years old	5	22
41-50 years old	4	18
51-60 years old	7	30
61-70 years old	7	30

**Table 2. Subject characteristics**

Characteristic	Frequency (n = 23)	Percentage (%)
Clinical features*		
Pain	2	9
Swelling	19	83
Itchy	1	4
Breathless	1	4
Stenosis location (I)		
Jugular vein	0	0
Subclavian vein	20	87
Innominate vein	3	13
Stenosis location (II)		
Right	10	43
Left	13	57
Occlusion type (I)		
Partial	16	67
Total	7	33
Occlusion type (II)		
Single	20	87
Multiple	3	13
Angioplasty successful rate		
Success	14	61
Failed		
Failed to Angioplasty	7	30
Normal	2	9

CVS is the most common complication after HD catheter insertion in the central venous system. Several studies have stated that the incidence of CVS in patients with CVC placement can reach 19%, and the prevalence is up to 50%. However, the true prevalence and incidence of CVS are difficult to assess because a) CVS is often asymptomatic due to the increased blood flow caused by the formation of arteriovenous Fistula; b) Establishing an accurate diagnosis of CVS requires a venographic examination which is only performed when the patient shows clinical symptoms.<sup>8</sup>

In this study, the location of the most stenosis is in the subclavian vein, this is suspected to be due to the anatomical location that is more torturous than the

internal jugular vein so that intraluminal blood flow turbulence is more frequent so that the risk of thrombosis formation is greater, and because the intraluminal surface is wider, it is more prone to endothelial injury.<sup>1</sup>

Our findings are that CVS location is more common on the left side, although the selection of HD access sites is rarely made because generally permanent HD access with the arteriovenous shunt (AV Shunt) is performed on the non-dominant side if temporary and permanent venous catheter access is placed on the left side, it will increase the risk of CVS.<sup>9,10</sup>

From the Angioplasty procedure in 23 patients, it was recorded that 14 subjects were successful, whereas 9 patients failed, 7 of which were due to total occlusion,

so AV shunt ligation was performed, and the other 2 did not have occlusion. This can occur due to venous hypertension, where blood flow pressure is high but no stenosis/occlusion.

The results of this study can be concluded that CVS is more common in the male sex, the most range of age is 51-70 years, the most common complaint is swelling in the arm, and most complaints are on the left side, the location of the most stenosis is in the subclavian vein, with partial occlusion and single, as well as a success rate with angioplasty.

### Limitations of the study

In this study, the data were taken retrospectively based on medical records, where there were data that were not recorded completely, so they could not be studied further. This makes the sample presented smaller than the number of patients who have experienced CVS at Abdul Wahab Sjahranie Hospital between January 2018 and August 2021.

### CONCLUSION

This study showed that CVS was male predominant, in the range 51-70 years, the most complaint was swelling in the arms, mostly on the left side, the location of the most stenosis was in the subclavian vein, with partial and single occlusion, as well as good treatment with angioplasty. This research is expected to provide an overview and basis for further research with a larger sample size.

### ETHICAL CLEARANCE

This research has received approval from the Ethics Committee of Abdul Wahab Sjahranie Hospital Samarinda.

### AUTHOR CONTRIBUTION

All authors of this article have contributed equally to the making of this article.

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### CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this article.

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