Original Article

Superior Vena Cava Syndrome: Clinical Presentation and Treatment Outcome

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Objective: Superior vena cava syndrome [SVCS] is a disease, which has high morbidity and mortality. The aim of the present study is to evaluate clinical presentation, treatment outcome, and prognostic factors of SVCS patients.

Materials and Methods: The present study is a retrospective study. 81 patients with new diagnosis of SVCS using clinical diagnosis in Srinagarind University Hospital were enrolled during January 2001 to December 2010. Clinical data and treatment outcome were analysed by using uni- and stepwise multivariate analysis.

Results: There were 81 SVCS patients were included and, 79.01% were male. The mean age of patients was 52.72±16.4 years. The most common first clinical presentation of SVCS patients was swelling on the face and upper arm (77.78%). The majority cause of SVCS was mediastinal mass with unknown pathology (30.86%), followed by bronchogenic carcinoma (18.52%) and SVC thrombosis (13.58%). The most common treatment modality was combined therapy (corticosteroid and radiotherapy) (43.21%). There were 59.26% of all patients, who had good response of treatment. Median overall survival time of SVCS patients was 2.2 (95% CI, 1.18 to 3.21) months. Results analysed by univariate analysis and multivariate analysis showed that receiving treatment ($p = 0.10$) trended to be a good prognostic factor.

Conclusion: SVCS is the critical disease leading to short survival time. Early diagnosis, receiving treatment will provide good prognosis.

Keywords: SVCS, Superior vena cava syndrome, Clinical presentation, Treatment outcome, Prognostic factors

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Superior vena cava syndrome [SVCS] is a group of symptoms, which obstructs the flow of blood in superior vena cava draining blood to the right atrium and this causes localized edema such as face, chest wall, and upper extremities[1]. SVCS is an urgency condition in oncology, however, some SVCS patients possibly present with emergency condition, which leads to high mortality[2]. Common clinical presentations of emergency condition are loss of consciousness and airway compromised. Patients with this emergency condition immediately need specific treatment. SVCS are commonly caused by mediastinal malignant tumor such as lung cancer, lymphoma, and metastatic mediastinal lymph nodes[3]. In addition, the common non-malignancy cause of SVCS is venous thrombosis[4,5].

Previous studies revealed that bronchogenic carcinoma is the most common etiology of SVCS followed by mediastinal tumor[3,6], however, non-malignancy cause of SVCS is increasing due to increasing rate of venous catheter procedure in patients[7,8]. Poor performance status and smoking history were the poor prognostic factors found in previous reports[6]. Therefore, the aim of this study is to evaluate clinical outcome of SVCS patients in Srinagarind University Hospital and to identify the prognostic factors of SVCS.

Materials and Methods

A retrospective study was conducted among SVCS patients, who received treatment in Srinagarind Hospital, Khon Kaen University (a 1,000-bed University

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Hospital), Khon Kaen, Thailand, during January 2000 to December 2011. The study was reviewed and approved by the institutional ethics committee (HE 561237).

SVCS was definitely diagnosed by making the judgment on clinical manifestation or CT chest. The enrolled patients had age more than 15 years, who were newly diagnosed and had available medical records.

Demographic data of SVCS patients including sex, age, smoking history, types of cancer, the first clinical presentation, treatment modalities, and treatment response were recorded. The treatment modalities of these patients were radiation, chemotherapy, and steroid. Treatment response was defined as clinical improvement or radiographic response after the complete course of treatment in SVCS patients.

The objective of the present study was to determine clinical outcomes and prognostic factors in SVCS patients. The survival time was defined as a period of time since the date of diagnosis for SVCS to the date of patients' death from any causes. Patients' characteristics and cancer data were summarized as mean and percentage.

The cumulative survival rates were calculated by using the Kaplan-Meier method. To compare the difference between the Kaplan-Meier curves, the log-rank test was used. Variable factors were analyzed for prognostic factors including sex, age, types of cancer, and receiving treatment. Univariate analysis was performed using Chi-squared test. A stepwise multivariate analysis was performed with Cox proportional hazard model. Results were concerned to have statistically significant, when they had *p*-value less than 0.05 and 95% confidence interval [CI] was also presented. The statistical analyses were performed by using Stata software version 11. The data were complete for analysis in August 2014.

Results

Demographic data and clinical presentation

Eighty one of SVCS patients were enrolled. The patients' characteristics are presented in Table 1. There were more male participants compared to female. The age group of these patients, who had the highest incidence of SVCS, was 41 to 60 years old. The mean age of patients was 52.72±16.4 years. The majority of patients had history of smoking or active smoking.

The common primary causes of tumor, which lead to SVSC, were unclassified mediastinal mass, bronchogenic carcinoma, and SVC thrombosis, respectively. Mediastinal mass, bronchogenic carcinoma, thrombosis, and lymphoma were the most common etiologies of in male patients, whereas, the

Table 1. Demographic data and clinical presentation of 81 superior vena caval syndrome patients

Variable	n (%)
Sex	
Male	64 (79.01)
Female	17 (20.99)
Age group	
≤20 year	6 (7.41)
21 to 40 year	12 (14.81)
41 to 60 year	38 (46.91)
≥61 year	25 (30.86)
Mean age	52.72±16.4
History of smoking	
Smokers	35 (43.21)
Ex-smoke	10 (12.35)
Non-smokers	36 (44.44)
Etiology	
Mediastinal mass	25 (30.86)
Bronchogenic cancer	18 (22.22)
Thrombosis	12 (14.81)
Metastatic cancer	10 (12.34)
Lymphoma	6 (7.40)
Infection	1 (1.23)
Unknown	9 (11.11)
First clinical presentation: symptoms	
Facial swelling	63 (77.77)
Dyspnea	50 (61.72)
Cough	27 (33.33)
Weight loss	14 (17.28)
Chest discomfort	11 (13.58)
Fever	10 (12.34)
First clinical presentation; signs	
Swelling of upper extremities and face	66 (81.48)
Superficial vein dilatation	55 (67.90)
Hoarseness	14 (17.28)
Horner's syndrome	4 (4.93)
Treatment	
Corticosteroid alone	26 (32.09)
Radiotherapy alone	7 (8.64)
Heparin alone	4 (4.93)
Corticosteroid + radiotherapy	35 (43.20)
Corticosteroid + heparin	1 (1.23)
Corticosteroid + radiotherapy + chemotherapy	4 (4.93)
Corticosteroid + radiotherapy + heparin	2 (2.46)
No treatment	1 (1.23)
Response of treatment	
Yes	48 (59.25)
No	33 (40.74)

most common causes in female were thrombosis, breasts cancer, bile ducts, and lungs.

The common presenting symptoms of SVCS patents were facial swelling, dyspnea, cough, and fever. Swelling of face and upper extremities, superficial vein dilatation, hoarseness were the most common findings detected by doctor from physical examination. Most of SVCS patients received radiation and corticosteroid treatment, followed by corticosteroid only. Only 7 SCVS patients received radiotherapy alone. More than half of all patients (59.26%) had good clinical improvement after treatment.

Prognostic factors of SVCS patients

The median overall survival time of all SVCS patients was 2.2 months (95% CI, range 1.18 to 3.21 months) (Figure 1). Six-month and 1-year survival rate were 55.5% and 19.7%, respectively. Univariate analysis and multivariate analysis showed that prognostic factors, only receiving the treatment trended to be a good prognostic factor in SVCS patients.

Discussion

SVCS is resulted from obstruction of blood flow in SVC. The common presenting symptoms are facial swelling, dyspnea, fever, chest discomfort, and weight loss. Physical signs are swelling at upper extremities and face, superficial vein dilatation, Horner's syndrome and hoarseness[1]. The present study showed that the most common presenting symptoms of SVCS patients were facial swelling followed by dyspnea, and cough, respectively. In addition, common signs of clinical presentation were superficial vein dilatation and Horner's syndrome. These signs reflect severe symptoms of SVCS and patients normally come to see the doctor at this stage (the late stage of disease) because patients generally tolerate to mild abnormal symptoms of the early stage of disease.

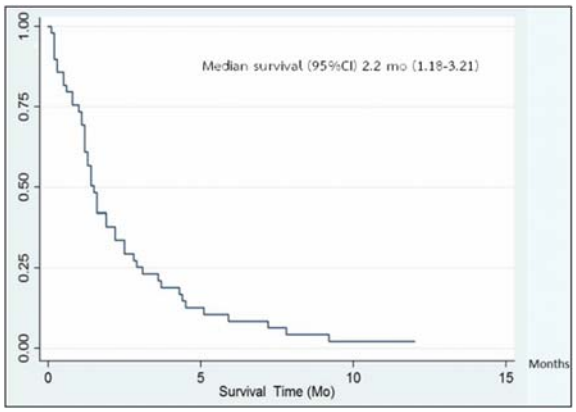

Figure 1. Kaplan-Meier survival curve for the overall survival time of 81 patients with superior vena caval syndrome.

Recently, the previous study found that the commonest etiology of SVCS was bronchogenic carcinoma and the second most common was anterior mediastinal mass followed by lymphoma[3]. The present study showed that the principle etiology was mediastinal mass, followed by bronchogenic carcinoma, and thrombosis. These finding possible explain that when patients have SVCS; this normally indicates that the disease has advanced stage and poor prognosis. Therefore, when patients are aware that they have advanced disease, they usually refuse doing further investigation and/or receiving specific treatment. Interestingly, thrombosis, which is the third most common cause of SVCS, were found at incredibly high incidence compared to previous studies[3,6]. This is because central catheterization is increasingly used for performing further investigation and giving treatment. There were not much data of the definite pathological findings of the mediastinal mass in this study because it took a long period of time to get the pathological reports. In addition, patients had poor performance status; consequently, tissue biopsy could not be performed resulting in no tissues for pathological process. Some patients refused to do tissue biopsy. Occasionally, patients had emergency condition and required immediate treatment, therefore, tissue biopsy of the mediastinal mass could not be obtained. These all resulted in not much pathological findings provided in the present study. In addition, to make the final diagnosis and know the definite cause of SVCS, tissue biopsy is essential required to provide the pathological findings. Tissue biopsy is obtained from bronchoscopy, ultrasound guiding or CT guiding biopsy[3,6]. These medical procedures had such a long waiting list; therefore, these patients who had advanced state with severe illness cannot wait for that long to do these investigations.

The specific treatment for SVCS depends on the cause of obstruction, the severity of disease, which relies on the stage of disease and the point of obstruction, and the emergency condition of patients requiring immediate treatment[1,9]. Previous study revealed that the first treatment of choice for SVCS patients was the combination therapy comprising corticosteroid and radiotherapy (63.6%) followed by radiotherapy alone (11.2%) and corticosteroid

Table 2. Prognostic factors of 81 superior vena caval syndrome patients

Variable	Univariate			Multivariate		
	Median survival (months)	95% confidence interval	*p*-value	Hazard ratio	95% confidence interval	*p*-value
Age			0.19	0.19	0.80 to 2.91	0.18
≤40 years	7.83	0.18 to 15.42				
>40 years	1.90	1.21 to 2.58				
Sex			0.59	0.63	0.32 to 1.24	0.16
Male	2.9	0.90 to 4.89				
Female	7.8	1.28 to 16.88				
Etiology			0.53	0.72	0.26 to 2.01	0.51
Lymphoma	2.2	0.92 to 3.40				
Non-lymphoma	7.8	0.58 to 22.18				
Receiving treatment			0.09	0.56	0.27 to 1.13	0.10
Yes	2.5	1.17 to 3.82				
No	1.6	0.84 to 2.35				

treatment alone (10.3%). These results were consistent with the results found from this study. The results from this study presented that the majority of SVCS patients received combining therapy between corticosteroid and radiotherapy (43.21%). Almost one third of patients (32.10%) received corticosteroid treatment alone and only 8.64% of all SVCS patients received radiotherapy alone[3]. Intriguingly, SCVS patients in this study, who received corticosteroid treatment alone, had higher proportion compared to the results from previous study. More than half of patients (59.26%) had good response of treatment and this result was fairly consistent with the previous study.

Previous report studied about the prognostic factors, which had an influence on survival time of SVCS patients. The results revealed that no smoking history of patients and patients with lymphoma, which causes the obstruction of SVC, significantly play an important role in survival time of SVCS patients[6]. However, the present study presented that both the response of treatment and receiving treatment significantly affected the survival time but other factors including no smoking history of patients, malignancy causes of SVCS, age and other choice of treatment did not significantly have an influence on the survival time of SVCS patients.

The present study included 81 patients, who were diagnosed as SVCS, during January 2000 to December 2011 in Srinagarind Hospital. This study has several limitations of study. The present study is retrospective study, therefore, patients, who were fulfilling the inclusion criteria and enrolled in the present study, had too small number.

Conclusion

SVCS is the critical disease leading to short survival time. Early diagnosis, receiving treatment trended to be a good prognostic factor.

What is already known on this topic?

Superior vena caval syndrome [SVCS] relates to advanced stage of cancer and associates with short survival time. The most common causes of SVCS were mediastinal mass and lung cancer.

What this study adds?

The results of this study revealed that thrombosis was the common cause of SVCS. In addition, the earlier receiving treatment in SVC patients, the better treatment outcome and good prognosis.

Potential conflicts of interest

The authors declare no conflict of interest.

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