ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 8, Issue, 06, pp.32777-32782, June, 2016

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

SUPERIOR VENA CAVA OBSTRUCTION IN CA BRONCHUS: BRONCHOSCOPIC AND RADIOLOGIC EVALUATION IN IRAQI PATIENT IN BAGHDAD TEACHING HOSPITAL

[1]Hamza AL Sabah, [2]Ahmed Basher, M., [2]Hussein Adnan Mohammed and [3,*]Ali, S. Dawood

[1]Council of Arab Board of Medical Specializations, medical city, Baghdad, Iraq
[2]Department of Internal Medicine, College of Medicine, Wasit University, Wasit, Iraq
[3]Department of Anatomy and Medical Biology, College of Medicine, Wasit University, Wasit, Iraq

ARTICLE INFO

Article History:
Received 17th March, 2016
Received in revised form
17th April, 2016
Accepted 06th May, 2016
Published online 15th June, 2016

Key words:

SVCO,
Lung cancer,
Prebronchoscopy,
Postbronchoscopy,
Bronchoscopy

ABSTRACT

Superior vena cava syndrome (SVCS) is obstruction of blood flow through the superior vena cava (SVC). It is a medical emergency and most often manifests in patients with a malignant disease process within the thorax. A total of 286 patients (218 male and 68 female) were diagnosed with CA bronchus. 253case (192 male and 61female) with an age mean ± SD (62.00 ± 11.896), (29 nonsmoker, 203 smoker, 21 ex- smoker) were diagnosed without SVCO, and 33 case (26 male and 7 female) with an age mean ± SD (62.76 ± 9.959), (5 nonsmoker, 27 smoker and 1 ex- smoker) were diagnosed with SVCO and CA bronchus (primary and or metastatic). Pre-bronchoscopy sputum cytology investigation of cases, Post bronchoscopy sputum investigation of cases and bronchoscopic evaluation of cases was done as well as, also the pleural biopsies and or fine needle aspirate were studied when available during the course of investigation. Otherwise radiological study was done in form of CXR and CT scan of the chest with and without contrast and according we divide the site of the lesion as upper left, lower left, upper right, lower right and others. Our results showed the smoking status within SVCO cases was non-significant difference as the p value was (0.257). According to the site of pathology the results suggested there was highly significant difference regarding the site of pathology in association with SVCO and highest rate with right upper lesion P value was (0.000). Also we compared the results regarding the type of pathology, and the results showed highly significant difference statistically the highest incidence of SVCO was with squamous cell CA and the P value was (0.007). The prebronchoscopic sample was statically significant P value was (0.000), also the results of postbronchoscopic sample showed no significant according to statistical analysis, P value was (0.321) within SVCO cases. Otherwise, the finding of the lesion by bronchoscopy was highly significant as it was positive in all 33 cases of SVCO P value was (0.000). And outcome is studied in all 33 patient within one year to see their survival, within one year from 33 cases of SVCO 21 were died ,6 survive and 6 lots to be followed. In conclusion from data derived from this study we concluded that SVCO is not uncommon within cases of CA bronchus.

Citation: Hamza AL Sabah, Ahmed Basher, M., Hussein Adnan Mohammed and Ali, S. Dawood, 2016. "Superior vena cava obstruction in ca bronchus: bronchoscopic and radiologic evaluation in Iraqi patient in baghdad teaching hospital", *International Journal of Current Research*, 8, (06), **32777-32782.**

INTRODUCTION

Superior vena cava (SVC) syndrome results from any condition that leads to obstruction of blood flow through the SVC. Obstruction can be caused by invasion or external compression of the SVC by adjacent pathologic processes involving the right lung, lymph nodes, and other mediastinal structures, or by thrombosis of blood within the SVC. In some cases, both external compression and thrombosis coexist (Garcia Monaco *et al.,* 2003).

****Corresponding author: Ali, S. Dawood,***
Department of Anatomy and Medical Biology, College of Medicine, Wasit University, Wasit, Iraq.

Also the block of SVC causes enlargement of the axillary, subclavian, and jugular veins. The obstruction can increase edema in the luminal diameter of the pharynx and larynx, which causes the patient to develop stridor. Cerebral edema, which may result in headache and confusion, could occur and lead to cerebral ischemia and possible death (Lewis, Hendrickson, and Moynihan, 2011). In 1954, Schechter reviewed 274 well-documented cases of SVCS reported in the literature; 40% of them were due to syphilitic aneurysms or tuberculous (Schechter, 1954). In the preantibiotic time, syphilitic thoracic aortic aneurysms, fibrosing mediastinitis, and different entanglements of untreated infection were frequent reasons for the SVC disorder. In the postantibiotic era, malignancy became the most common cause, accounting

for 90 percent of cases. An intrathoracic malignancy is responsible for 60 to 85 percent of cases of SVC syndrome, and SVC obstruction is the presenting symptom of a previously undiagnosed tumor in up to 60 percent of these cases(Rice, Rodriguez, and Light, 2006; Schraufnagel *et al.,* 1981; Yellin *et al.,* 1990). Non-small cell lung cancer (NSCLC) is the most common malignant cause of SVC syndrome, accounting for 50 percent of all cases (Markman, 1999; Rice, Rodriguez, and Light, 2006; Yellin *et al.,* 1990). followed by small cell lung cancer (SCLC, 25 percent of all cases) and non-Hodgkin lymphoma (NHL, 10 percent of cases). Together, lung cancer and NHL are responsible for approximately 95 percent of cases of SVC syndrome that are caused by malignancy (Rice, Rodriguez, and Light, 2006). Lung cancer approximately 2 to 4 percent of patients with lung cancer develop SVC syndrome at some point during their disease course (FA, 1987; Rowell and Gleeson, 2002). SVC syndrome is more common with Small Cell Lung Cancer (SCLC), occurring in approximately 10 percent of cases at presentation (Dombernowsky and Hansen, 1978; Rowell and Gleeson, 2002; Sculier *et al.,* 1986; Spiro *et al.,* 1983; Urban *et al.,* 1993; Wurschmidt, Bunemann, and Heilmann, 1995). This is presumably because SCLC develops and grows rapidly in central rather than peripheral airways. Fewer than 2 percent of patients presenting with Non-small cell lung cancer (NSCLC) have SVC syndrome as a complication, but because of the higher incidence, NSCLC is a more frequent cause of SVC syndrome than is SCLC (Rowell and Gleeson, 2002). The aim of this study was to evaluate the Superior Vena Cava Obstruction in CA Bronchus in Iraqi Patients in Baghdad teaching Hospital.

MATERIALS AND METHODS

A total of 286 patients (218 male and 68 female) were diagnosed with CA bronchus(primary and or metastatic) according to the roentgenography assessment, were enrolled from the January 2009 till January 2011 included in our study and recruited at Baghdad teaching hospital, medical city, Baghdad, Iraq. 253case (192 male and 61female) with an age mean ± SD (62.00 ± 11.896), (29 nonsmoker, 203 smoker, 21 ex- smoker) were diagnosed without SVCO, and 33 case (26 male and 7 female) with an age mean ± SD (62.76 ± 9.959), (5 nonsmoker, 27 smoker and 1 ex- smoker) were diagnosed with SVCO and CA bronchus(primary and or metastatic).The Ethics Committees of participating universities and university hospitals approved the study, and informed consent was obtained from all participants

Pre-bronchoscopy sputum cytology investigation of cases

The patient instructed to give deep cough sputum specimens before breakfast after washing mouth as primary approach to investigate the CA bronchus.

Bronchoscopic evaluation of cases

Bronchoscopice valuation in the bronchoscopy unit in Baghdad teaching hospital was done to the patients, with fiberoptic flexible bronchoscopy under local anesthesia, by the following steps:

a. **Bronchial washing:** The aspirated material before and after the introduction of normal saline solution through the bronchoscope, were collected in conical flask to insure larger amount of fluid collection. When blood was aspirated, heparin added to the specimen to prevent clotting that may affect quality. The aspirated fluid is submitted directly without prior fixation.
b. **Bronchial brushing:** The brush introduced through the bronchoscope and directed over the surface of a well-defined lesion or suspicious area, sometimes it is directed blindly into an airway of peripheral lesion. If we believe that this lesion is ready to bleed we avoid brush.

Post bronchoscopy sputum investigation of cases

a. Immediate all coughed sputum produced by the patient after the withdrawal of the bronchoscope and within the few hours afterwards.
b. Another single morning sample obtained 24-48 hr. later.
c. Sometimes more postbronchoscopic sputa were asked but prephere samples before day 2or after day 5 as these are the least expected to have atypical cells of tissue repair after bronchoscope

Other materials of pleural aspirates

Pleural biopsies and or fine needle aspirate were studied when available during the course of investigation and following up the patient.

Radiological study

All the patients underwent radiological investigation in form of CXR and CT scan of the chest with and without contrast and according we divide the site of the lesion as upper left, lower left, upper right, lower right and others. The diagnosis of SVCO as we said mainly is clinical but some radiological reports of CT scan with contrast had been confirming the problem.

Statistical Analysis

Statistical analysis done by using statistical package for social studies (SPSS 10). Associations between different variables were measured by using the T- test. P value of <0.05 considered as level of statistically significance. Odds ratio and 95% confidence interval (95% CIs) were calculated for different studied parameters. The confidence interval (CI) at 95% was used to describe the amount of uncertainty associated with the samples.

RESULTS

A non-randomize cross sectional study is conducted through 286 case of CA lung 218 male and 68 female ,from those 286 case 33 case were had SVCO .So the prevalence is 11.5%. Regarding the smoking status within SVCO cases we subdivide the variable as smokers who were 81.8% and nonsmokers who were 15.2% and Ex-smokers who were 3% and the statistical analysis show non-significant difference as the p value was (0.257).

Table (1): The relation, frequencies and association between nonsmokers, smokers, ex- smokers and CA bronchus patients with SVCO or not

SMOKING		SVCO		Total	Significance	OR (95% CI)
		YES	NO			
NON SMOKER	Count	5	29	34		
	% within SMOKING	14.7%	85.3%	100.0%		
	% within SVCO	15.2%	11.5%	11.9%		
SMOKER	Count	27	203	230		
	% within SMOKING	11.7%	88.3%	100.0%	X2 = 1.283 P = 0.257	(0.263 - 1.375)
	% within SVCO	81.8%	80.2%	80.4%		
EX- SMOKER	Count	1	21	22		
	% within SMOKING	4.5%	95.5%	100.0%		
	% within SVCO	3.0%	8.3%	7.7%		
	Count	33	253	286		
Total	% within SMOKING	11.5%	88.5%	100.0%		
	% within SVCO	100.0%	100.0%	100.0%		

X2: Chi-Square test *significant at P≤0.05

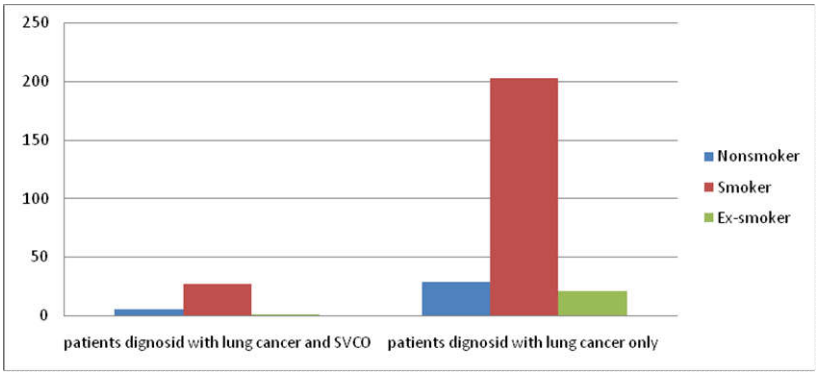

Figure 1. The frequencies of nonsmokers, smokers and ex-smokers among patients diagnosed with both CA bronchus and SVCO and patients diagnosed with CA bronchus only

Table 2 The disruptions of sites of pathology among patients with CA bronchus only and the patients with both CA bronchus and SVCO

SITE OF PATHOLOGY		SVCO		Total	Significance	OR (95% CI)
		YES	NO			
LEFT	Count	3	75	78		
UPPER	% within SITE OF PATHOLOGY	3.8%	96.2%	100.0%		
	% within SVCO	9.1%	29.6%	27.3%		
RIGHT	Count	30	74	104		
UPPER	% within SITE OF PATHOLOGY	28.8%	71.2%	100.0%	X2 = 15.911 P = 0.000	(0.02 - 0.38)
	% within SVCO	90.9%	29.2%	36.4%		
RIGHT	Count	0	64	64		
LOWER	% within SITE OF PATHOLOGY	.0%	100.0%	100.0%		
	% within SVCO	.0%	25.3%	22.4%		
LEFT	Count	0	40	40		
LOWER	% within SITE OF PATHOLOGY	.0%	100.0%	100.0%		
	% within SVCO	.0%	15.8%	14.0%		
	Count	33	253	286		
Total	% within SITE OF PATHOLOGY	11.5%	88.5%	100.0%		
	% within SVCO	100.0%	100.0%	100.0%		

X2: Chi-Square test *significant at P≤0.05

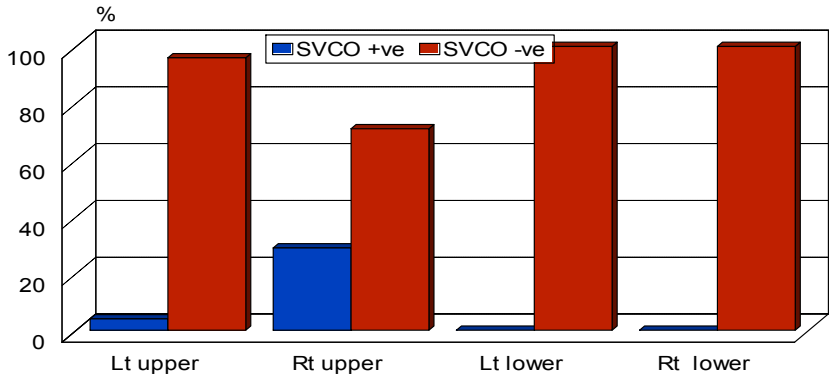

Figure 2. The frequencies among patients diagnosed with both CA bronchus and SVCO and patients diagnosed with CA bronchus only according to lesion site

Table 3. The disruptions of types of pathology among patients with CA bronchus only and the patients with both CA bronchus and SVCO

TYPE OF PATHOLOGY		SVCO		Total	Significance	OR (95% CI)
		YES	NO			
SEQ.CELL CA	Count	18	95	113		
	% within TYPE OF PATHOLOGY	15.9%	84.1%	100.0%		
	% within SVCO	54.5%	37.5%	39.5%		
SMALL.CELL CA	Count	13	33	46		
	% within TYPE OF PATHOLOGY	28.3%	71.7%	100.0%		
	% within SVCO	39.4%	13.0%	16.1%	X2 = 7.320 P = 0.007	(0.200- 0.554)
LARGE.CELL CA	Count	1	30	31		
	% within TYPE OF PATHOLOGY	3.2%	96.8%	100.0%		
	% within SVCO	3.0%	11.9%	10.8%		
ADENO.CELL CA	Count	1	90	91		
	% within TYPE OF PATHOLOGY	1.1%	98.9%	100.0%		
	% within SVCO	3.0%	35.6%	31.8%		
UNDIFFERENTIA	Count	0	3	3		
TED.CELL CA	% within TYPE OF PATHOLOGY	.0%	100.0%	100.0%		
	% within SVCO	.0%	1.2%	1.0%		
OTHERS	Count	0	2	2		
	% within TYPE OF PATHOLOGY	.0%	100.0%	100.0%		
	% within SVCO	.0%	.8%	.7%		
Total	Count	33	253	286		
	% within TYPE OF PATHOLOGY	11.5%	88.5%	100.0%		
	% within SVCO	100.0%	100.0%	100.0%		

X2: Chi-Square test *significant at P≤0.05

Table 4. Showed the disruptions of patients with CA bronchus only and the patients with both CA bronchus and SVCO while pre bronchoscopy examination

PREBRONCHOSCOPY		SVCO		Total	Significance	OR (95% CI)
		YES	NO			
+VE	Count	1	6	7		
	% within PREBRONCHOSCOPY	14.3%	85.7%	100.0%		
	% within SVCO	3.0%	2.4%	2.4%	X2 = 169.982 P = 0.000	(0.01 - 0.06)
-VE	Count	32	247	279		
	% within PREBRONCHOSCOPY	11.5%	88.5%	100.0%		
	% within SVCO	97.0%	97.6%	97.6%		
Total	Count	33	253	286		
	% within PREBRONCHOSCOPY	11.5%	88.5%	100.0%		
	% within SVCO	100.0%	100.0%	100.0%		

X2: Chi-Square test *significant at P≤0.05

Table 5. The disruptions of patients with CA bronchus only and the patients with both CA bronchus and SVCO while pre bronchoscopy examination

BRONCHOSCOPY		SVCO		Total	Significance	OR (95% CI)
		YES	NO			
+VE	Count	33	219	252		
	% within BRONCHOSCOPY	13.1%	86.9%	100.0%		
	% within SVCO	100.0%	86.6%	88.1%	X2 = 24.750 P = 0.000	(0.357 - 0.643)
-VE	Count	0	34	34		
	% within BRONCHOSCOPY	.0%	100.0%	100.0%		
	% within SVCO	.0%	13.4%	11.9%		
Total	Count	33	253	286		
	% within BRONCHOSCOPY	11.5%	88.5%	100.0%		
	% within SVCO	100.0%	100.0%	100.0%		

X2: Chi-Square test, *significant at P≤0.05

Table 6. The disruptions of patients with CA bronchus only and the patients with both CA bronchus and SVCO while post bronchoscopy examination

POSTBRONCHOSCOPY		SVCO		Total	Significance	OR (95% CI)
		YES	NO			
+VE	Count	13	53	66		
	% within POSTBRONCHOSCOPY	19.7%	80.3%	100.0%		
	% within SVCO	39.4%	20.9%	23.1%	X2 = 0.985 P = 0.321	(0.42 - 1.33)
-VE	Count	20	200	220		
	% within POSTBRONCHOSCOPY	9.1%	90.9%	100.0%		
	% within SVCO	60.6%	79.1%	76.9%		
Total	Count	33	253	286		
	% within POSTBRONCHOSCOPY	11.5%	88.5%	100.0%		
	% within SVCO	100.0%	100.0%	100.0%		

X2: Chi-Square test, *significant at P≤0.05

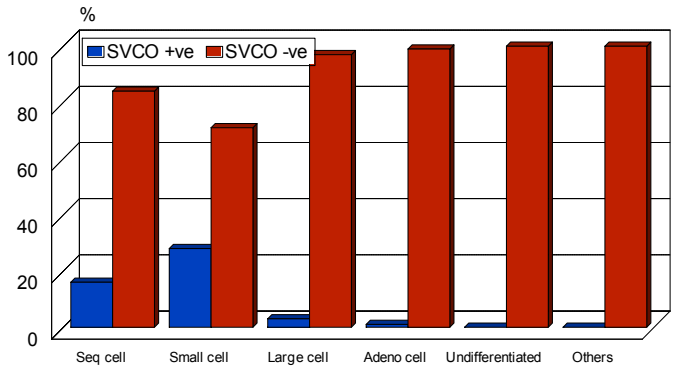

Figure 3. The frequencies among patients diagnosed with both CA bronchus and SVCO and patients diagnosed with CA bronchus only according to the type of pathology

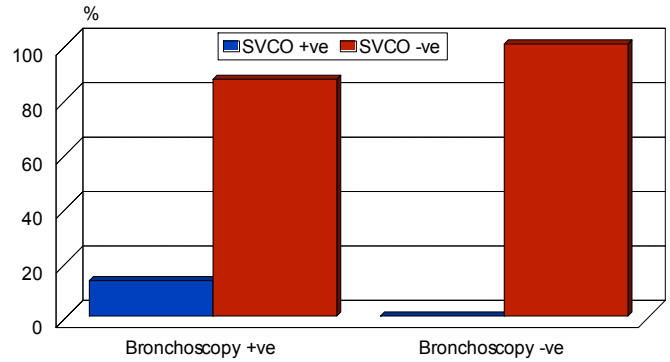

Figure 4. The frequencies among patients diagnosed with both CA bronchus and SVCO and patients diagnosed with CA bronchus only according to the bronchoscopy examination

Table 7. The outcome of patients among the study

Outcome	Number	%
Dead	21	63.6
Survive	6	18.2
lost to follow up	6	18.2
Total	33	100

According to the site of pathology we depended on radiological appearance and divided as upper and lower according to the level of the lesion above or below the D4 (sterna angle)and right and left so we got upper left lower, left upper right and lower right and by statistical analysis there was highly significant difference regarding the site of pathology in association with SVCO and highest rate with right upper lesion P value was (0.000). Also we compared the results regarding the type of pathology i.e. cytological study, so we compared all types that we got: small cell CA, sequamous cell, CA, large cell, Ca, undifferentiated, CA, adenocarcinoma, and others like lymphoma and metastatic carcinoma and the analytic study had highly significant difference statistically the highest incidence of SVCO was with squamous cell CA 54.5% and the P value was (0.007). also the sputum study performed in all patient and the design was as prebronchoscopic sample and post bronchoscopic samples; the pre bronchoscopic sample was statically significant P value was (0.000),also the results of post bronchoscopic sample showed no significant according to statistical analysis, P value was (0.321) within SVCO cases. Otherwise, the finding of the lesion by bronchoscopy was highly significant as it was positive in all 33 cases of SVCO P value was (0.000). And outcome is studied in all 33 patient within one year to see their survival ,within one year from 33 cases of SVCO 21 were died ,6 survive and 6 lots to be followed.

DISCUSSION

Superior vena cava syndrome (SVCS) is associated to a malignant tumor in more than 90% of cases; being the lung cancer the most frequent (80%). SVCS has a benign cause in less than 5% of cases (Garcia Monaco *et al.,* 2003). Approximately 2 to 4 percent of patients with lung cancer develop SVC syndrome at some point during their disease course (Armstrong *et al.,* 1987; Rowell and Gleeson, 2002; Salsali and Cliffton, 1969). SVC syndrome is more common with SCLC, occurring in approximately 10 percent of cases at presentation(Dombernowsky and Hansen, 1978; Rowell and Gleeson, 2002; Sculier *et al.,* 1986; Spiro *et al.,* 1983; Urban *et al.,* 1993; Wurschmidt, Bunemann, and Heilmann, 1995). This is presumably because SCLC develops and grows rapidly in central rather than peripheral airways. Fewer than 2 percent of patients presenting with NSCLC have SVC syndrome as a complication, but because of the

higher incidence, NSCLC is a more frequent cause of SVC syndrome than is SCLC(Rowell and Gleeson, 2002).In our study squamous cell carcinoma was the highest frequency followed by small cell carcinoma, and the large and adenocarcinoma have the same 3% occurrence. The clinical diagnosis of SVC syndrome is made on the basis of characteristic signs and symptoms of central venous obstruction. Regardless of etiology, dyspnea is the most common symptom (Bell, Woods, and Levi, 1986; Elhassani, 1987; FA, 1987). In addition, patients frequently complain of facial swelling or head fullness, which may be exacerbated by bending forward or lying down. The majority of patients with SVC syndrome have an abnormal chest radiograph since malignancy is the most common underlying disorder. In an early series of 86 patients with SVC syndrome, 84 percent had an abnormal chest film (Parish *et al.,* 1981). The most common findings were mediastinal widening and pleural effusion, occurring in 64 and 26 percent of cases, respectively. In our study the radiology take important position in conducting the study according to site of pathology the right upper position account90.9% in relation to SVCO. The primary risk factor for the development of lung cancer is cigarette smoking, which is estimated to account for approximately 90 percent of all lung cancers (Yellin *et al.,* 1990). The risk of developing lung cancer for a current smoker of one pack per day for 40 years is approximately 20 times that of someone who has never smoked. In our study the smoking status had insignificant statistical value in all smoker, nonsmoker and Ex-smoker categories regarding to risk of SVCO. In our study the one year mortality was so high in SVCO cases reach63.6% which is even higher than that with CA bronchus in general so it was statistically significant. Bronchoscopy is often the method of diagnosis and is essential in the evaluation of patient for surgery(Spiro, 1984). We were visualize all cases associated with SVCO by FFB, and this similar to other studies that the diagnostic yield more with FFB than open tube bronchoscope.

The diagnosis of lung cancer is made in around 90%bronchoscopically visible tumors, and around 70%of suspicious lesions in FFB (Marsh *et al.,* 1973). Diagnostic role in our study via pre bronchoscopic sputa was statistically significant, regarding other studies in relation to the CA lung in general, the value of multiple samples has been well established (Johnston and Bossen, 1981; Rosa, Prolla, and Gastal Eda, 1973). Post Bronchoscopic Sputa (PBS), in our study was non-significant. Although some authors concluded that PBS did not significantly increase the diagnostic yield so as to justify its use(Solomon, Solliday, and Gracey, 1974). In Iraq three studies have discussed the value of cytopathology in relation to rigid bronchoscopy (Elhassani, 1987; FA, 1987).Actually there are some limitations in our study like; there was no use of biopsy at all in our cases which may affect the accuracy of the diagnosis. Also longer duration of follow up is recommended as one year duration to some extent considered short and the type of therapy received by the patient is not proved well as the patient may take treatment outside the country. In conclusion from data derived from this study we concluded that SVCO is not uncommon within cases of CA bronchus, also in our study its prevalence was 11.5%.Also the right upper site of pathology is more frequent with SVCO and squamous cell CA is more prevalent in cases of SVCO.

REFERENCES

Armstrong, B. A., Perez, C. A., Simpson, J. R., and Hederman, M. A. 1987. Role of irradiation in the management of superior vena cava syndrome. *Int J Radiat Oncol Biol Phys* 13:9-531.

Bell, D. R., Woods, R. L., and Levi, J. A. 1986. Superior vena caval obstruction: a 10-year experience. *Med J Aust* 145: 8-566.

Dombernowsky, P., and Hansen, H. H. 1978. Combination chemotherapy in the management of superior vena caval obstruction in small-cell anaplastic carcinoma of the lung. *Acta Med Scand* 204: 6 - 513.

Elhassani, N. 1987. Bronchial carcinoma in Iraq. *J.Fac.Med.baghdad*29:37- 46.

FA, A.-A. 1987. lung cancer in Iraq:Analysis of 576 cases. *J.Fac.Med.baghdad* 29, 87-93.

Garcia Monaco, R., Bertoni, H., Pallota, G., Lastiri, R., Varela, M., Beveraggi, E. M., and Vassallo, B. C. 2003. Use of self-expanding vascular endoprostheses in superior vena cava syndrome. *Eur J Cardiothorac Surg* 24: 11 - 208.

Johnston, W. W., and Bossen, E. H. 1981. Ten years of respiratory cytopathology at Duke University Medical Center. I. The cytopathologic diagnosis of lung cancer during the years 1970 to 1974, noting the significance of specimen number and type. *Acta Cytol* 25: 7-103.

Lewis, M. A., Hendrickson, A. W., and Moynihan, T. J. 2011. Oncologic emergencies: Pathophysiology, presentation, diagnosis, and treatment. *CA Cancer J Clin* 61: 287-314.

Markman, M. (1999). Diagnosis and management of superior vena cava syndrome. *Cleve Clin J Med* 66: 59-61.

Marsh, B. R., Frost, J. K., Erozan, Y. S., Carter, D., and Proctor, D. F. (1973). Flexible fiberoptic bronchoscopy. Its place in the search for lung cancer. *Ann Otol Rhinol Laryngol* 82: 64 - 757.

Parish, J. M., Marschke, R. F., Jr., Dines, D. E., and Lee, R. E. 1981. Etiologic considerations in superior vena cava syndrome. *Mayo Clin Proc* 56: 13 - 407.

Rice, T. W., Rodriguez, R. M., and Light, R. W. 2006. The superior vena cava syndrome: clinical characteristics and evolving etiology. *Medicine (Baltimore)* 85: 37-42.

Rosa, U. W., Prolla, J. C., and Gastal Eda, S. 1973. Cytology in diagnosis of cancer affecting the lung. Results in 1,000 consecutive patients. *Chest* 63:7 - 203.

Rowell, N. P., and Gleeson, F. V. 2002. Steroids, radiotherapy, chemotherapy and stents for superior vena caval obstruction in carcinoma of the bronchus: a systematic review. *Clin Oncol (R Coll Radiol)* 14:51-338.

Salsali, M., and Cliffton, E. E. 1969. Superior vena caval obstruction in carcinoma of lung. *N Y State J Med* 69: 80-2875.

Schechter, M. M. 1954. The superior vena cava syndrome. *Am J Med Sci* 227: 46-56.

Schraufnagel, D. E., Hill, R., Leech, J. A., and Pare, J. A. 1981. Superior vena caval obstruction. Is it a medical emergency? *Am J Med* 70: 74-1169.

Sculier, J. P., Evans, W. K., Feld, R., DeBoer, G., Payne, D. G., Shepherd, F. A., Pringle, J. F., Yeoh, J. L., Quirt, I. C., Curtis, J. E., and et al. 1986. Superior vena caval obstruction syndrome in small cell lung cancer. *Cancer* 57: 51 - 847-51.

Solomon, D. A., Solliday, N. H., and Gracey, D. R. 1974. Cytology in fiberoptic bronchoscopy. Comparison of bronchial brushing, washing and post-bronchoscopy sputum. *Chest* 65: 9- 616.

Spiro, S. G. 1984. Diagnosis and staging. *Recent Results Cancer Res*92: 16-29.

Spiro, S. G., Shah, S., Harper, P. G., Tobias, J. S., Geddes, D. M., and Souhami, R. L. 1983. Treatment of obstruction of the superior vena cava by combination chemotherapy with and without irradiation in small-cell carcinoma of the bronchus. *Thorax* 38: 5-501.

Urban, T., Lebeau, B., Chastang, C., Leclerc, P., Botto, M. J., and Sauvaget, J. 1993. Superior vena cava syndrome in small-cell lung cancer. *Arch Intern Med* 153: 7-384-7.

Wurschmidt, F., Bunemann, H., and Heilmann, H. P. 1995. Small cell lung cancer with and without superior vena cava syndrome: a multivariate analysis of prognostic factors in 408 cases. *Int J Radiat Oncol Biol Phys* 33: 77-82.

Yellin, A., Rosen, A., Reichert, N., and Lieberman, Y. 1990. Superior vena cava syndrome. The myth--the facts. *Am Rev Respir Dis* 141: 8-1114.

****