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ENDOVASCULAR INTERVENTION IN MANAGEMENT OF LIFE THREATENING SUPERIOR VENA CAVA SYNDROME IN LUNG CARCINOMA STAGE 4

Cardiology

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KEYWORDS

INTRODUCTION

Superior vena cava (SVC) syndrome is caused by obstruction of the flow of venous blood from the upper body into the right atrium. In 95% of the cases, the obstruction is due to an underlying malignant disease, usually advanced- stage lung cancer. Obstruction of the SVC causes congestion and edema of the face and upper thorax.[1,2] Also Superior vena cava obstruction (SVCO) is a clinically important condition manifesting as progressive plethora and edema of the upper limbs, head and neck due to venous hypertension. The severity of these symptoms relies upon the degree of SVC compression and the location of the obstruction relative to the azygous vein or other potential routes of collateralization. Although 5% to 20% of SVC syndrome cases arise as a result of fibrosis after thrombosis or the presence of indwelling catheters, the majority of cases are caused by malignancy. Lung cancer accounts for 65% to 85% of malignant SVC syndrome, and the remaining cases are secondary to lymphoma, mediastinal masses, tumors of the breast, mesothelium, thyroid, thymus, esophagus, or other rare malignancies. It is estimated that 3% to 15% of patients with lung cancer and 5% to 20% of patients with intrathoracic malignancy develop SVC syndrome.[3] Management of the superior vena cava syndrome associated with malignant conditions involves both treatment of the cancer and relief of the symptoms of obstruction. Most data regarding management of the superior vena cava syndrome are from case series; randomized trials are scarce. The median life expectancy among patients with obstruction of the superior vena cava is approximately 6 months; but estimates vary widely according to the underlying malignant conditions.

Pathogenesis SVC Syndrome is SVC obstruction that caused extrinsic compression and intrinsic or luminal obstruction. Extrinsic compression are benign or malignant process involving lung, lymph node and mediastinal structures , then Intrinsic or luminal obstruction are neoplastic infiltration and thrombosis. After SVC obstruction, its will deploy to collateral development venous system include azygous, internal thoracic, lateral thoracic, paraspinous and esophageal venous systems. The indications for SVC stenting are symptomatic malignant SVCO, either at initial presentation or following failed chemotherapy or radiotherapy, and symptomatic benign SVCO. There is insufficient evidence to support primary SVC stenting in asymptomatic individuals. There are no absolute contraindications to SVC stenting. The relative contraindications are patients with underlying malignancies with a very good chance of early cure or remission, patients who cannot lie flat or semi-supine and patients with systemic sepsis or noncorrectable coagulopathy.[4]

CASE SUMMERY

A 55-year-old female with known lung Carcinoma stage IV presented with dyspnea at rest for few days. She had history of chemotherapy & radiotherapy for lung Carcinoma stage IV & SVC Syndrome. During progressing disease, she was increasing dyspnea day by day, since 4-5 months she have increasing upper extremity edema and facial swelling & headache. She have sometimes atypical chest pain. She didn't have diabetes mellitus, hypertension and dyslipidemia. Physical examination showed face and upper extremity swelling, blood pressure 110/70 mmHg and HR 90 bpm and others normal. Investigation reports show Hb 8.7 g/dl, platelet count 201000 thou/µL, creatinine 0.51 mg/dl , INR- 1.21 and ECG-Normal.

In these cases indication and the aim of endovascular stent implantation is palliative and to alleviate the patients' symptoms. It has been used in stenosis and obstruction of SVC for more than two decades.[5,6] Stent has become widely accepted in the management of malignant SVC obstruction and is now an accepted therapy as treatment of malignant SVC obstruction especially in advanced lung cancer and mediastinal tumors. Stenting in malignant SVC obstruction is increasingly been performed as it offers rapid relief of symptoms and gives the patients a better quality of life during their limited life expectancies due to the malignant disease itself.

IMAGING

Echocardiography showed LVEF 60%, mild MR and others normal. X Ray Thorax showed mass at right thorax. CT Thorax showed thrombus seen in subclavian vein Left & Right & extending into the brachiocephalic vein and SVC, also saw obstruction or subtotal occlusion SVC to Right atrium (RA). Angiography vein showed SVC to RA obstruction or total occlusion with thrombosis

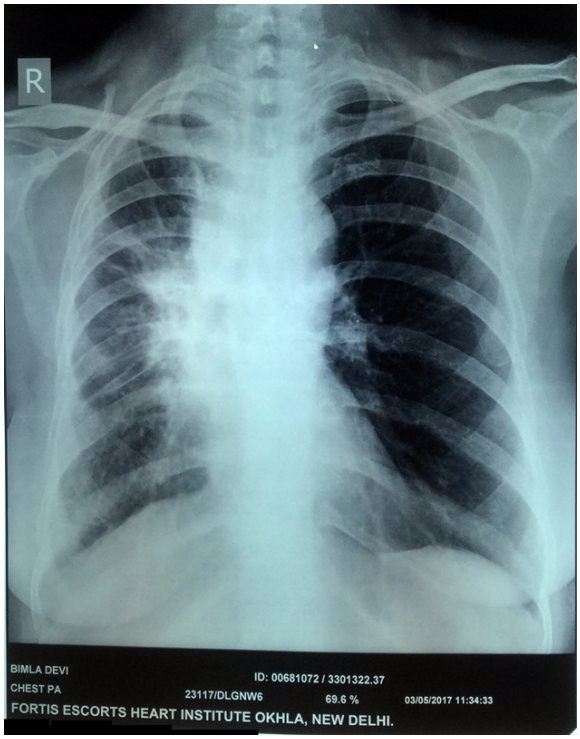

Figure 1: Mass at Right Thorax

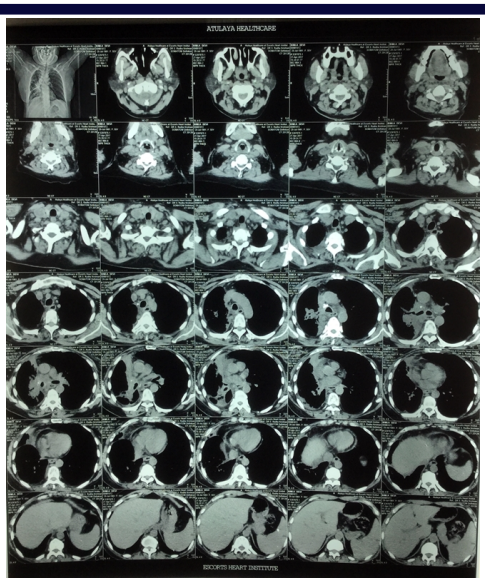

Figure 2: Thrombus seen in subclavian vein extending into the brachiocephalic vein to SVC

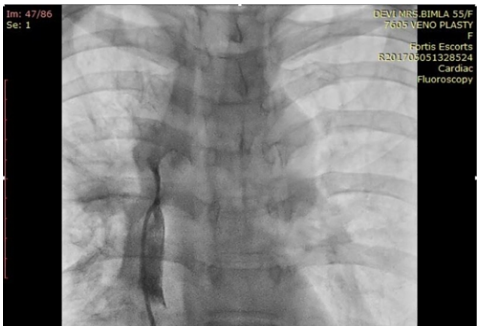

Figure 3: SVC to RA Obstruction 99% with thrombosis

INDICATION FOR INTERVENTION

We plan venoplasty or stenting SVC to RA, because she have symptomatic malignant SVCO (upper extremity edema, facial swelling, dyspnea, chronic cough and atypical chest pain) and so have objective fact obstruction SVC to RA by CT thorax. She have also processing chemotherapy or radiotherapy.

INTERVENTION

We prepare before procedure check 1) lab investigations include hematology routine, platelet, coagulation, renal function, blood sugar and electrolytes 2) Sheath 6 Fr ; GC JR 3.5 6 Fr ; GW Normal Terumo Hydrophilic 0.035 ; 260 cm, 3) PTA Balloon with diameter 5 X 20 mm, 4) Stent bare metal stent with diameter 12X 24 mm (Self Expanding) 5) We must standby & available *Covered Stent* for keeping bail out if occurred venous rupture 6) Standby Needle Brockenbrough if we will find lesion Fibrosis at SVC to RA 7) Prepare perform device emergency for pericardiocentesis in the case of pericardial tamponade due to rupture of central vein, and last 8) Prepare USG Guiding if Bailout for see cardiac area.

During procedure Heparin give 5000-7000 IU, IV and target ACT 250 second. Sheath inserted 6 Fr into the right femoral artery, use Guide Wire (GW) normal terumo hydrophilic 0.035 inch 260 cm and Guiding Catheter (GC) JR 3.5 6 Fr then GW must cross lesion obstruction SVC to RA. GW Terumo put at area left subclavian -brachialis. We pre-dilatation with PTA Balloon armada 35 5.0/40 mm with pressure 6 atm at SVC RA to left subclavian, continue PTA Balloon armada 35 8.0/60 mm with pressure 6 atm and last pre-dilatation PTA Balloon Atlas 12.0/40 mm with 6 pressure 6 atm. Cine injection contrast showed TIMI flow 3, less residual stenosis SVC to RA. So, we decide continue to put stent Eluminex Bard 12.0X60 mm (self-expanding), cine contrast showed good flow, no residual stenosis, no dissection and no venous rupture, also showed right subclavian artery give direct collateral to SVC to RA. We must carefully do intervention during post and pre dilatation.

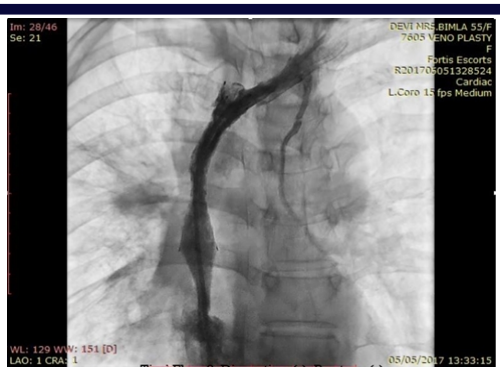

Figure 4: After stenting, Good result, No obstruction, No rupture, TIMI flow 3

LEARNING POINTS OF THE PROCEDURE

The deployment of endovascular stents emerged during the early 1990s as a promising new therapy.7-9 Although there do not appear to be doubts regarding the benefits that these endovascular prostheses offer patients in terms of symptom relief, debate continues as to whether the stent should be used as the initial treatment of choice, that is before implementing radiotherapy or chemotherapy. Also being debated is if a stent is an option only when obstruction recurs or if it can be used subsequent to the failure of RT and chemotherapy. There are two opposing views, each acquiring more adherents. Beginning earlier this decade, several authors of case series advocated stents as the initial treatment of SVC syndrome.—, Systematic reviews of the results of the different therapeutic options of SVC syndrome related to lung cancer have reported a higher effectiveness for stenting compared with chemotherapy, RT, or steroid treatment.–12 However, the classic views of other investigators persist. The recommendations are for initial insertion of stents for symptomatic SVC syndrome in NSCLC, but stent insertion is not recommended initially in symptomatic SVC syndrome caused by other malignancies such as SCLC and metastatic adenopathies of other tumors. More restrictively, stenting has been used only to alleviate urgent symptoms and in more anecdotal cases such as mesothelioma.–13

Deployment of a stent as the first step neither influenced the decision of the oncologist to continue with the scheduled coadjuvant therapies (chemotherapy, RT, or chemotherapy and RT) nor affected the survival rate. Other factors such as bilateral involvement of the innominate veins and the SVC, male sex, certain tumor types, and having undergone surgery, chemotherapy or RT before stenting do appear to negatively impact survival, whereas RT and chemotherapy treatment after stenting decreases the mortality hazard and is the only factor that had a significant positive effect on survival. However, these findings could be associated more with the advanced stage of the disease and, thus, the poorer prognosis than with the stent treatment.

The innovative approach of stenting denovo appeared for the first time in an article in 1997 by Nicholson et al.–14 Those investigators compared the results obtained in 76 SVC syndrome patients treated with stents (with or without associated RT) versus those in 25 retrospective cases treated only with RT. They concluded that stenting provided faster relief of symptoms and resulted in significantly greater improvement in the SVC obstruction score than RT ($p < 0.001$).

The option of conducting randomized prospective comparative studies is very limited. To our knowledge, only two small retrospective studies in which the use of endovascular stents was compared with RT have been reported.—, Unilateral placement is preferable in patients with SVC syndrome because it was as clinically effective as bilateral placement while offering lower cost, easier placement, and low rates of complications and recurrence.

Anticoagulation therapy is often prescribed for patients with SVC syndrome after stenting, although its effectiveness has never been clearly proven. The stent is highly thrombogenic in the first month until neoendothelium covers the endovascular surfaces. Many investigators use only oral antiplatelet therapy (aspirin, ticlopidine, or similar) for maintenance after complete heparinization for the first 3 or 4 days after stent placement. We have put the patient just on antiplatelets.

Technical success rates for SVC stenting are high, ranging from 95-100%. A systematic review of the literature published in 2009, showed

that stents were 87-100% effective in relieving SVCO at initial presentation. Reported re-obstruction rates following successful relief of obstructive symptoms range from 0-40%, however patency is restored in most patients with re-intervention. The only independent risk factor for endovascular therapeutic failure in a recent cohort analysis was thrombosis of the SVC. Complication risk is statistically greater in stents >16mm, with other factors such as the use of bare metal stents, cases of occlusion, and initial associated thrombosis strongly associated with reobstruction. Recent evidence on the use of covered stents versus bare metal stents has suggested superior patency rates with covered stents after 12 months in malignant SVCO. However, covered stents should be used with caution due to concerns of stent migration and covering important venous pathways or collaterals, particularly if placing a covered stent across the brachiocephalic confluence, although there is some evidence to suggest that custom-designed covered stents may not be prone to migration and coverage of a patent contralateral brachiocephalic vein is unlikely to be clinically evident. At present, there is insufficient evidence to recommend a specific type of stent for SVC stenting.

In conclusion, palliation of symptoms, together with more general improvement of quality of life, is the major goal in the overall management of lung cancer patients experiencing a highly stressful additional complication such as SVC syndrome. The syndrome requires effective fast-acting treatment, and percutaneous implantation of vascular endoprosthesis is fully justified in patients with a terminal illness irrespective of their life expectancy because of the rapid disappearance of clinical symptoms. The stent endo-prosthesis can be rapidly and safely introduced and, above all, does not interfere in any way with subsequent scheduled neoadjuvant oncology treatment. We believe that stenting should be considered the first treatment option for SVC syndromes.

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