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### RESEARCH ARTICLE

#### THE FEEDING VESSEL SIGN REVEALING A SEPTIC PULMONARY EMBOLISM: A CASE REPORT AND REVIEW OF LITERATURE

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#### Abstract

Septic Pulmonary Embolism(SPE) is a rare septicemia caused by primary infection located at another site. We reported an elderly patient followed on oncology department, for low rectal cancer who presented respiratory failure with fever. In order to diagnosis covid-19 who was suspected in first intention, a chest CT scan confirmed a SPE by the presence of the Feeding Vessel Sign associated with bilateral nodules with and without cavitations localized predominantly in low lobes and bilateral pleural effusion. This report allowed us to describe the imaging's features due to SPE, to emphasize the importance of the Feeding Vessel Sign and to precise the differential diagnose in which we noticed that sign. We conclude that CT scan play main role to show the Feeding Vessel Sign and all the others signs in the recognition of SPE. In adults with tumor history, the differential diagnoses to recognize are mainly metastasis and covid -19 infection.

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#### Introduction:-

Septic Pulmonary Embolism (SPE) is an uncommon disease and may present with an insidious onset of fever, cough, hemoptysis, without any specific presentation (1). The CT appearance of septic emboli includes nodules and wedge-shaped subpleural opacities with or without cavitation and the Feeding Vessel Sign (2). Most patients with SPE are diagnosed on the basis of CT findings and the presence of a primary source of infection (3). In adult patients, the septic emboli are frequent complications of right-sided bacterial endocarditis, septic thrombophlebitis, or occasionally osteomyelitis (4). The objective of this work is to describe the imaging's features due to septic pulmonary embolism, to emphasize the importance of the feeding vessel sign and precise the differential diagnoses in which we find this sign.

#### Patient and Observation:-

A 70-year-old man with history of having a surgery for lower rectum tumor 5 years ago, under radiotherapy and chemotherapy, hospitalized for management of post-radiation colic occlusion. Upon admission, physical exam noticed that his general condition was altered by the disease and age. The clinicians placed yet a central catheter via installing port-a-cath (PAC) for medication. By the way, the patient had a pseudocontinent perineal colostomy attached to anal canal installed after abdominopelvic amputation for cancer of the low rectum. Then, the patient was treated by anal dilation with Hegar candle followed by corticotherapy and they removed the PAC who was infected, took pus and catheter for bacteriological analysis. During hospitalization, systemic examination showed that he developed bedsores at the back on buttock.

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After 11 days of his hospitalization, he presented cough, respiratory distress(dyspnea) in a febrile context.He is referred on radiology department for chest CT scan in order to rule out COVID-19 infection as we were in pandemic period of COVID-19 infection and a sample for blood count (hemogram) was requested. We did a chest scan without injection to avoid possible contamination in that context of suspicion.CT scan showed low bilateral pleural effusion(Fig.1), bilateral peripheral nodules with excavation ,some without cavitations of different sizes between 4-28mm (Fig.3et 4),the Feeding Vessel Sign clearly visible on coronaland sagittal reconstruction(Fig.2),intra-lobular septal thickening and right scissural thickening (Fig.5) .The CT scan did not show the frosted glass or the halo sign or paving crazy characteristic of covid-19 infection despite the bilaterality and the location of lesions .

Laboratory report available after admission noticed thaton his hemogram Hemoglobinwas 9g/dl, total leucocyt were14000/mm<sup>3</sup>(leukocytosis) with 80% of Neutrophils.Analysis of pus onGram stain and culture isolated StaphylococcusAureus. The sample taken for covid-19 was negative.Considering the clinicalsigns, the infected catheter (PAC), the presence of bedsores, laboratory reports and CT scan result, we concluded to Septic Pulmonary Embolism. The patient was treated with IV antibiotic for 4 weeks and improvedwellclinicallyfrom2 weekson treatment.

### **Discussion:-**

Septic Pulmonary Embolism (SPE) is caused by fragments of thrombi containing pathogens, mobilized from an infectious site and transported in the pulmonary arterial circulation where they get implanted, leading to infarctions and micro abscesses (5).

SPE is very rare without any common risk factors .Those are such as tricuspid valve bacterial endocarditis, intravenous (IV) drug use, thrombophlebitis, indwelling catheters or devices, osteomyelitis, odontogenic or soft tissue infection have more chance to develop SPE (1).Septic pulmonary emboli are usually associated with primary deep tissue infections, such as septic arthritis, cellulitis, and, rarely, pyomyositis(6).Pathologies responsible for an immunodeficiency increased the risk of this septicemia and were listed as diabetes ,cancer ,anticancer drugs,HIV,malnutrition or long term corticosteroid therapy(7).

A computer search for a discharge diagnosis of pulmonaryembolism, lung cyst, lung abscess, necrotizing pneumonitis, soft tissue infections (such as cellulitis, deep sited abscesses), or bone or joint infections (4). Clinical findings are aspecific and include fever, dyspnea, chestpain, hemoptysis and cough and the complications of SPE are listed to be lung abscesses, broncho-pleural fistulas, pleural empyema, pneumothorax, septic shock and multiple organ failure (1,5).

In our case, a central infected catheter and the presence of infected buttock bedsores with deficient immunity by the cancer and corticotherapywerepointed to be the causes of the diagnosis. Thisbacteriemia will be spread by septicemia to the lung via pulmonaryvessel.

Then, the clinician needed to have prompt diagnosis in order toprevent those complications and treat the patient for improving him very quickly.

Chest X- ray and chest CT scan play a major role in diagnosis (1,3,8). Nowadays, CT scan is recommended as the first -choice imaging modality to diagnose SPE (3,7). CT is superior to chest radiography in showing the presence and extent of septic embolism [2]. According to Deng-Wei Chou et al., the most common computed tomographic findings included a feeding vessel sign (90%), peripheral nodules without cavities (80%) or with cavities (65%), and peripheral wedge-shaped opacities (75%) (3).Then, there is lower lobe predominance and peripheral nodular densitieswerebetween 5-35 mm and wedge-shaped lesions were between 10-20 mm (1).

Especially in children cases, radiographic features of SPE typically include patchy air space lesions simulating nonspecific bronchopneumonia; multiple ill-defined round or wedge shaped densities of varying sizes from 0.5 to 3.5 cm located peripherally; lesions abutting the pleura and located at the end of vessels (feeding vessel sign) seen on chest CT scans(4) .Although, chest radiographs reveal peripheral bilateral poorly marginated lung nodules that have a tendency to cavitate with thick irregular walls, but tend to be non-specific(9).Chest X-ray can be negative or non-specific, showing bilateral, peripheral, poorly marginated lung nodules, whichmay present cavitation (1-3 cm)(5).

The CT scan lesions involving all the lung lobes and they have a vascular, peripheral distribution, since the septic emboli have a small size and get implanted in peripheral pulmonary vessels(9,10).The CT appearance of septic emboli includes nodules and wedge-shaped subpleural opacities with or without cavitation and the feeding vessel sign(2).Chest CT scan revealed multiple bilateral pulmonary nodules mainly in subpleural areas(8), lower lobe nodules that show various stages of cavitation(9).Pneumothorax, empyema or pleural effusions were noted by some authors (4). Pericardial effusion and bilateral pleural effusion were reported by literature (2). After contrast administration, the lesions may not show contrast enhancement (pulmonary infarcts) or may present as strong peripheral rim-enhancement and a necrotic center (5,10).

Other findings include the feeding vessel sign observed in 60-70% of patients, subpleural wedge-shaped opacities, air bronchograms within nodules and extension into the pleural space and pleural effusion(9).The visualization of a feeding vessel sign was further examined with use of multiplanar reconstruction in the coronal, sagittal, and oblique planes(2).The feeding vessel sign consists of a distinct vessel leading directly into the center of a nodule or a mass. This sign has been considered highly suggestive of septic embolism, the prevalence varying from 67–100% in various series(2).Recent studies have shown that most frequently the “feeding vessel sign” is due to a venous branch or represents a pulmonary vein, which can be traced to the left atrium(5,10).Sometimes on multiplanar reconstructions, the apparent feeding vessel is shown to pass around the opacity or nodules instead of entering it. This sign indicates either that the lesion has a hematogenous origin or that the disease process occurs near small pulmonary vessels(10). In addition, echocardiography was performed to diagnose endocarditis which is often associated with SPE if the primary cause was an IV venous catheter infection (9).

In Our case, we found multiple bilateral nodules of different sizes, some with cavitation (microabscess) and others without cavitation, involving low lobes predominance, feeding vessel sign and bilateral pleural effusions. We report that our case is the first work in which we rule out covid-19 because some similar signs such as bilaterality, peripheral and low lobes location of lesions.

A number of hematogenous non-neoplastic disorders of the lung can show this sign, for example pulmonary vasculitis, pulmonary infarction, septic embolism, angioinvasive pulmonary aspergillosis(11). The feeding vessel sign also occurs in pulmonary metastasis, hemorrhagic nodules, or consolidation seen in vasculitis(2,10).Pulmonary sequestration is an uncommon congenital anomaly in which the arterial supply derives most frequently from the thoracic or abdominal aorta and other origins of blood supply are rarely described(12).Investigating the infectious focus and isolating the microorganism is also very important in commencing the correct treatment consisting in systemic antibiotic therapy initialization (1,9).

### **Conclusion:-**

Multiple and bilateral subpleural nodular pulmonary parenchymal lesions were common on plain chest radiographs and CT scan .However, chest CT scans showed very well the additional findings of a “vessel sign” and central cavitations ,with low lobe predominance confirming the existence of septic pulmonary embolism which must be managed fast in order to prevent complications and mortality.However, in adults, metastasis and covid-19 infection were the main differential diagnosis of SPE further the presence of vessel sign on one hand and multiple similarities of clinical signs and location of radiological signs on the other hand.

### **Conflicts of Interest:**

We declare that we have no conflicts of interest.

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### **Authors Contributions**

1. **Wilson BIZIMANA:** writing of manuscript and figure organization
2. **Raïssa KAUKONE:** Proofreading and Manuscript Organization
3. **Hounayda JERGUIGUE:** Manuscript Reviewing
4. **Youssef OMOR:** Manuscript Reviewing and approving
5. **Rachida LATIB:** Conceptual input

Figures:-



Figure 1:- Chest CT scan, axial plane, showing medium abundance bilateral pleural effusion.

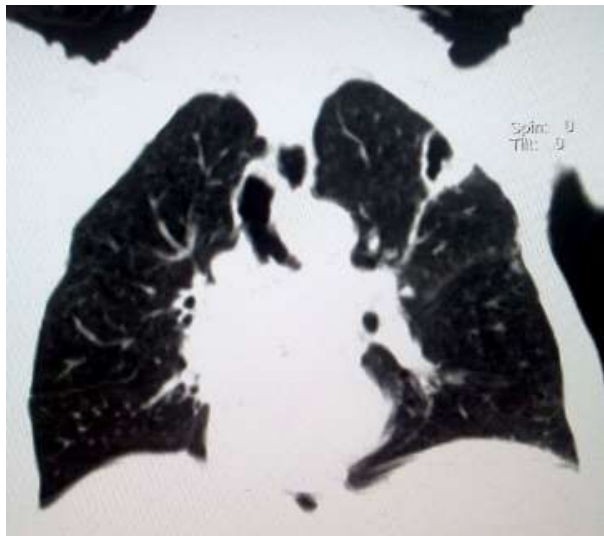
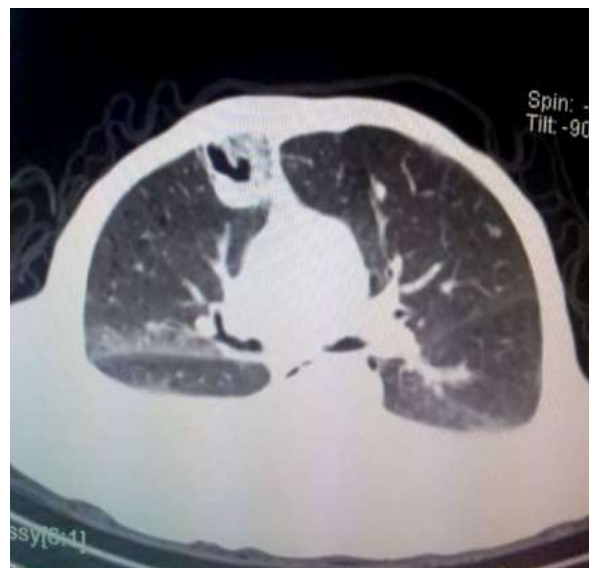


Figure 2:- Chest CT scan, coronal plane, showing Feeding vessel sign, connected to nodule with cavitation.





**Figure 3 and 4:-** Chest CT scan, axial and coronal planes showing peripheral and subpleural nodules with cavitation on bilateral on left and right lobes some on upper lobes, the others in low lobes.



**Figure 5:** Intra&interlobular septal thickening and right scissural thickening associated to subpleural nodule excavated of right lung.

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