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Case Report

Tumour thrombosis of the left axillary vein due to infiltrative ductal carcinoma causing superior vena cava obstruction [☆]

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ABSTRACT

Invasive ductal carcinoma is the most common type of breast cancer and can affect any age group, predominantly females older than 55 years of age. We present a case of a female in her mid-30s complaining of a fungating mass in the upper outer quadrant of the left anterior chest wall. On workup of the patient, it was histopathologically found that the patient was affected by infiltrating ductal carcinoma of the left breast, which was causing tumoral thrombosis of the left axillary vein. Also, thrombosis of the right axillary vein, bilateral brachiocephalic veins, and superior vena cava with a focal hepatic hotspot sign were appreciated on contrast-enhanced computed tomography scan. No such case of tumoral thrombosis of the axillary vein causing superior vena cava obstruction has been reported in recent literature.

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Case report

A female patient in her mid-30s came to the general surgery department at a camp organized by our hospital in a rural area of central India, complaining of a large foul smelling, blood and pus-discharging ulcerated lesion in the upper outer quadrant of the left breast as shown in [Fig. 1](#). Six months ago,

the lesion was a small, pea-sized pus-discharging nodule in the upper outer quadrant of the left breast, which gradually increased in size, and then it burst, and a small ulcer was formed. With time, the ulcer increased and has grown to its current size.

The patient presented with a current weight of 61 kgs with a body mass index of 22.7 and complained of weight loss of more than 18 kilograms in the past 6 months without any

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Fig. 1 – A fungating mass lesion in the left half of the left breast.

significant exercise, leading to a suspicion of a malignant lesion.

The patient is a housewife and a mother of 2 children aged 9 and 6 years, both by normal vaginal delivery. She has a regular 30-day menstrual cycle with no history of oral contraceptive pills intake or any other hormone replacement therapy. She is a nonalcoholic and vegetarian by diet.

She did not visit any medical facility previously due to the lack of a hospital in the nearby area.

The patient complains of pain in the left shoulder and upper back, with a gradual increase in the circumference of the

left arm compared to the right arm. Initially, the pain was associated with the movement and usage of the left arm, but in a few months, the pain was constant even without work and would limit her daily activities. There were no aggravating factors, and it would be relieved to some extent with the use of painkillers.

She complains of breathlessness while doing daily chores, leading to a suspicion of involvement of the respiratory system. The patient gives no history of any known systemic illness. No member of the family or a relative is known to be affected by any breast pathology.

Swelling was large, malodorous and fungating measuring approximately 6 × 4 cm with associated pus and blood discharge in the left anterolateral chest wall. The lesion was tender on touch. A swelling was noted in the left arm with a significant difference in the circumference of approximately 3.2 cm compared to the right arm, suspecting lymphedema.

A defect in the skin surface and subcutaneous tissues reaching up to the pectoralis muscle was noted in the outer half of the left breast along with heterogeneously enhancing soft tissue density spiculated mass lesions in the upper half of the left breast and the nipple areolar complex suggesting a neoplastic etiology as shown in Fig. 2.

Similar lesions were noted in the upper and lower half of the right breast suggesting metastatic spread of the tumor as shown in Fig. 3.

Post contrast administration, heterogenous enhancement with a filling defect was noted in the left axillary vein suggesting tumor thrombosis as shown in Fig. 4.

In the early arterial phase of contrast administration, multiple enhancing vascular collaterals were visualized in the subcutaneous and intermuscular planes of the right neck and thorax region with a dense blush of contrast in the inferior vena cava (IVC) and the portal vein. A dense blush of contrast is seen in segment IV of the liver demonstrating the focal hepatic hotpot sign suggesting superior vena cava obstruction (SVCO) as shown in Fig. 5.

Also, filling defects were observed in the bilateral brachiocephalic veins, the right axillary vein and the SVC in all the phases of imaging post contrast administration.

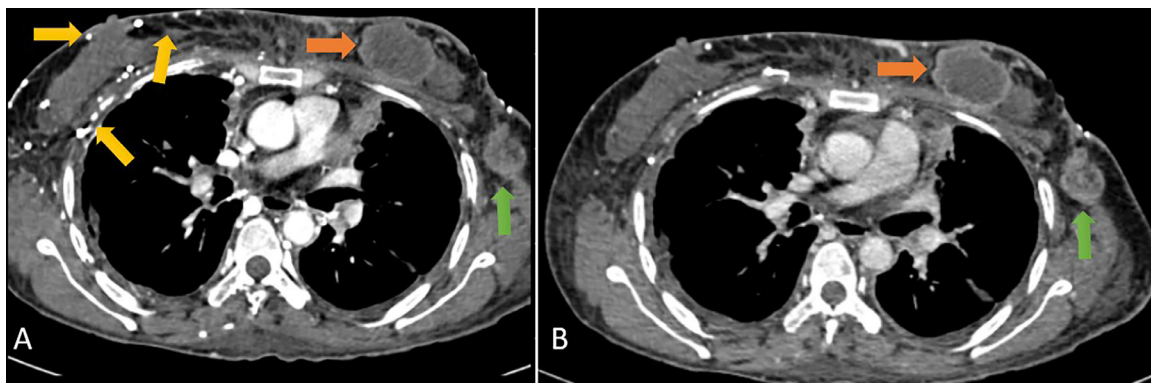


Fig. 2 – Contrast enhanced computed tomography axial section early arterial phase (A), and venous phase (B) showing heterogeneously enhancing soft tissue density mass lesion with spiculated margins in the upper half of the left breast (orange arrow) with enlarged heterogeneously enhancing lymph node in the left axillary region (green arrow); and multiple venous channels showing enhancement in the early arterial phase (yellow arrows) noted.

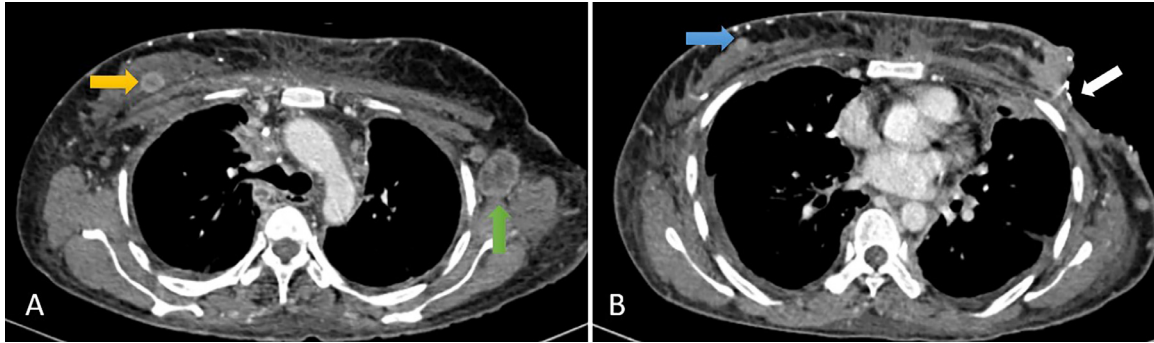


Fig. 3 - Contrast enhanced computed tomography axial section early arterial phase (A), and (B) showing heterogeneously enhancing soft tissue density mass with spiculated margins in the upper half (yellow arrow), and lower half (blue arrow) of the right breast; heterogeneously enhancing enlarged lymph node in the left axilla (green arrow); and a defect in the skin surface and subcutaneous tissue reaching up to the pectoralis muscle (white arrow).

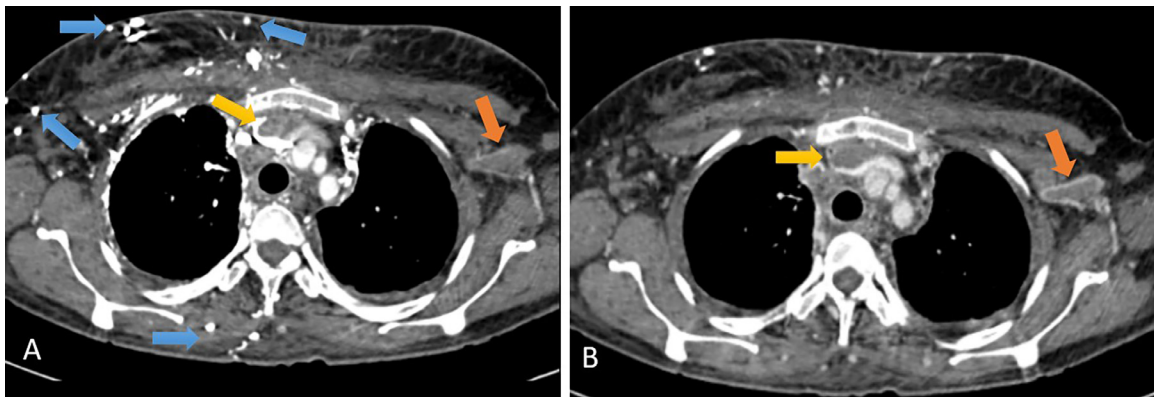


Fig. 4 - Contrast enhanced computed tomography axial section early arterial phase (A), and venous phase (B) showing heterogenous enhancement of the left axillary vein post contrast administration with filling defect in all phases of imaging suggesting tumoral thrombosis (orange arrow); a filling defect in left brachiocephalic vein suggesting thrombosis (yellow arrow); and multiple venous channels showing enhancement in the early arterial phase (blue arrows) noted.

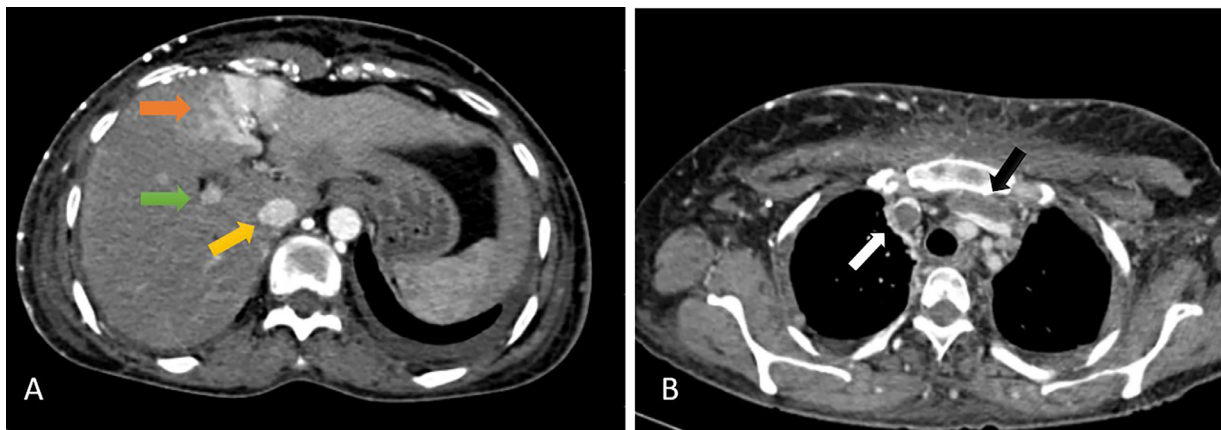


Fig. 5 - Contrast enhanced computed tomography axial section early arterial phase demonstrating superior vena cava obstruction - (A) showing dense blush of contrast in the segment IV (orange arrow); dense opacification of inferior vena cava (yellow arrow) and portal vein (green arrow) suggesting focal hepatic hot spot sign; and (B) showing a filling defect in the superior vena cava (gray arrow) and the left brachiocephalic vein (black arrow) suggesting thrombosis.

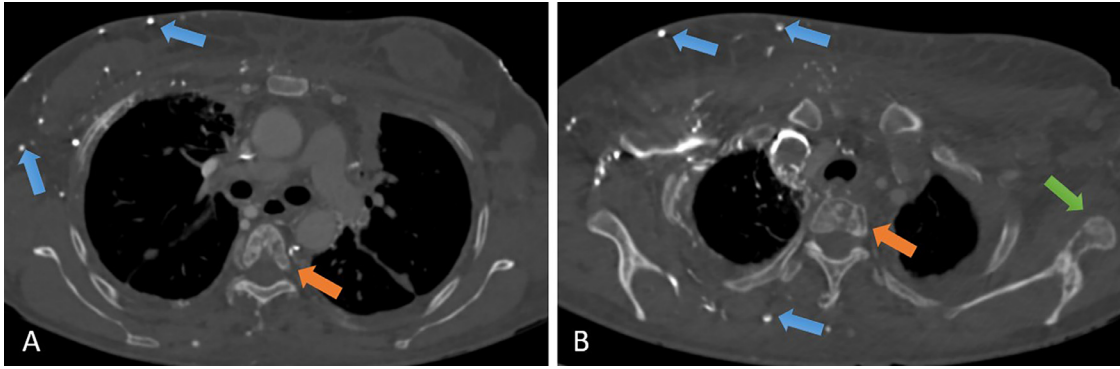


Fig. 6 – Contrast enhanced computed tomography axial section early arterial phase (A), and (B) showing osteolytic lesions in the thoracic vertebrae (orange arrows); and the left scapula (green arrow); and multiple venous channels showing enhancement in the early arterial phase (blue arrows) noted.

The lung parenchyma showed a few soft tissue density nodules. Osteolytic lesions were visualized in the thoracic vertebrae and the scapula as shown in Fig. 6.

A diagnosis of neoplastic etiology causing tumoral thrombosis of the left axillary vein with SVCO and lung and skeletal metastasis was compiled. A frozen section trucut biopsy of the mass lesion in the upper half of the left breast was carried out by general surgery and the tissue sample was sent to the pathology where a histopathological diagnosis of the invasive ductal carcinoma was achieved as shown in Figures 7-9.

The patient was transferred to the medical oncology department to evaluate the role of chemotherapy or radiotherapy in managing the disease. The patient was advised of emergency radiotherapy for superior vena cava obstruction, and the patient refused it due to financial constraints.

Discussion

Invasive ductal carcinoma is the most prevalent type of breast carcinoma and is reported to involve 70%-80% of the patients

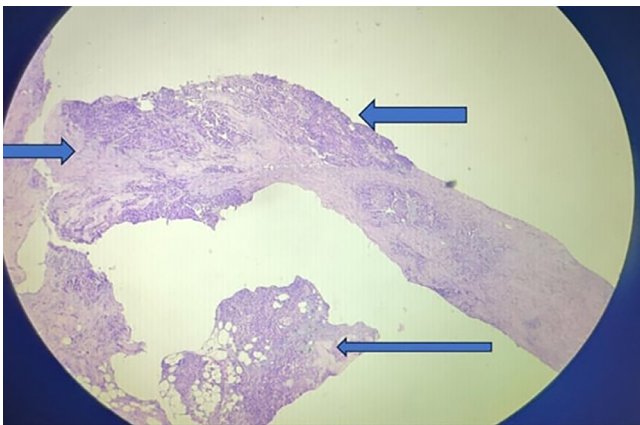


Fig. 7 – Core needle biopsy of breast using hematoxylin and eosin stain and magnification of 4x showing tumor cell nests invading surrounding parenchyma (blue arrows).

affected by breast carcinoma [1]. The cancer can metastasize through blood or lymphatic channels to various body parts [2]. The development of tumoral thrombosis in cases of invasive ductal carcinoma is extremely rare and is demonstrated in this case. On injecting the contrast intravenously; the contrast flows into the venous collaterals, which drain the portal vein and ultimately into the segment IV of liver. Internal thoracic, superior, and inferior epigastric veins form the collateral pathways, which drain into the left lobe of the liver after draining into the para-umbilical veins. The inferior and superior veins of Sappey are the chief paraumbilical veins having drainage into the liver parenchyma and portal vein branches giving the hepatic hotpot sign [3,4].

Breast carcinoma is the most prevalent carcinoma in females and also the leading cause of death [5]. The aetiology of breast cancer is very complex and multifactorial, but the role of hormones, diet, genetics, reproductive factors and environment is considered important [1]. There is an increased risk of development of breast carcinoma in patients who have first-

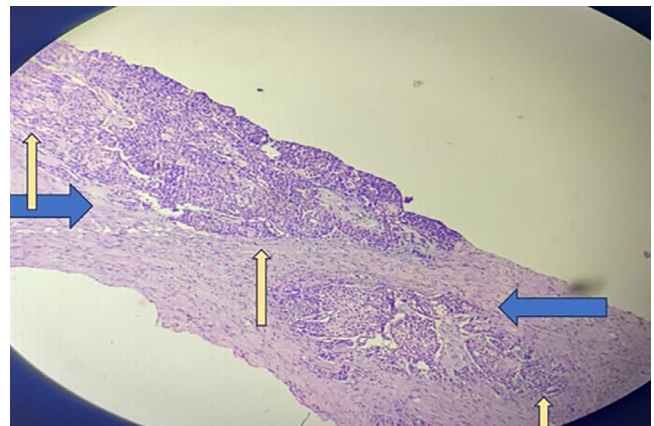


Fig. 8 – Core needle biopsy of breast using hematoxylin and eosin stain and magnification of 10x showing tumor cell nests forming solid sheets and focal cribriform pattern (blue arrow); and invasion of the tumor cells into the adjacent breast parenchyma (yellow arrow).

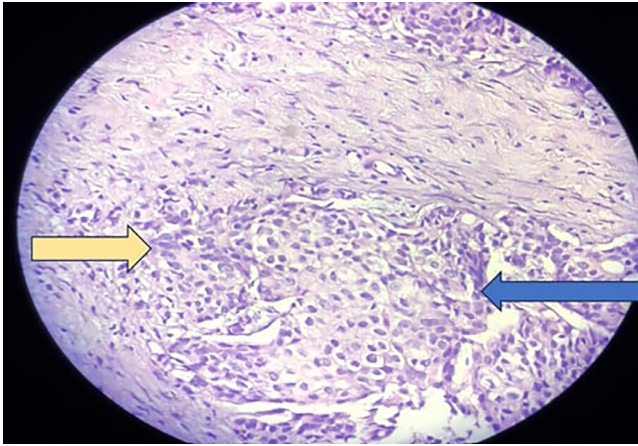


Fig. 9 – Core needle biopsy of breast using hematoxylin and eosin stain and magnification of 40x showing tumor nests composed of large irregular cells having abundant foamy to clear cytoplasm, nuclei with coarse chromatin and prominent nucleoli (blue arrow); and infiltrative borders of tumor with surrounding desmoplastic stroma (yellow arrow).

degree relatives with breast carcinoma, which was absent in our case. Other risk factors include mutations in the BRCA1 and BRCA2 gene [1].

Tumor thrombosis is characterized by the invasion of tumor cells into a vessel, mostly a vein. It is important to identify tumor thrombosis because its presence can affect the staging, prognosis, and management of the disease. It is most often seen in renal cell carcinoma, Wilms tumor, hepatocellular carcinoma and adrenal cortical carcinoma and mostly affects the inferior vena cava. The infiltration of the tumor cells into the axillary vein has yet to be reported in the recent literature. It is important to differentiate bland thrombus from tumor thrombus, the latter showing the vessel's expansion with enhancement postcontrast administration. The most specific sign suggesting tumor thrombosis is vessel enhancement. Vessel expansion is another sign suggesting tumor thrombosis. On magnetic resonance imaging, the tumor thrombosis shows diffusion restriction [6]. In our case, the tumor was invading the left axillary vein, causing tumoral thrombosis. This further leads to disruption in the normal blood flow through the veins, encouraging venous stasis and later leading to thrombus formation in the other vessels.

The focal hepatic hotspot sign, also known as the hot quadrangle sign is a pseudo lesion characterized by increased accumulation of iodinated contrast in the segment IV (medial segment of the hepatic lobe) due to superior vena cava obstruction (SVCO). In cases of SVCO, when the contrast is administered into an upper limb, it is diverted into the collateral pathways, including thoracic and epigastric veins, which communicate with the paraumbilical veins (superior and inferior veins of Sappey) carrying the blood to the left lobe of liver with direct perfusion of the liver parenchyma and also drainage of blood into the branches of the portal vein [3,4].

In the presented case, the cause of breathlessness was suspected to be due to the lesion's respiratory involvement, which

was ruled out by imaging. The main cause of breathlessness in our patient was the presence of SVCO. It is believed that the SVCO causes a reduction in the blood volume of the heart due to an impairment of the venous return. As a result, the flow of the deoxygenated blood is impaired, causing a rise in the carbon dioxide levels in the affected veins [7]. Also, the cause of pain in the left shoulder and upper back was mainly due to the osteolytic lesions in the scapula and the upper thoracic vertebra.

Invasive ductal carcinoma of the breast is the most common type of breast carcinoma. The diagnosis is always made on histopathological evidence [1]. The treatment is dependent on the staging. The treatment guidelines include total mastectomy or lumpectomy with axillary staging ± dissection and breast reconstruction with radiation to the whole breast and the involved lymph nodes in cases where the metastasis to the adjacent bones and organs has not taken place. In cases of metastasis, surgical intervention is avoided, and selective radiation is provided to the metastatic lesions [8].

Tumor thrombus may lead to the development of bilateral axillary, brachiocephalic vein, and superior vena cava thrombosis, obstructing the superior vena cava, which shows an indirect sign known as focal hepatic hot spot sign in the early arterial contrast phase. CT plays an important role in diagnosing tumoral thrombosis and appears as increased vascular diameter, showing enhancement postcontrast administration. Infiltrative ductal carcinoma causing axillary vein thrombosis has not been reported in the recent literature and is a new learning point for readers. However, histopathology is always the main modality for diagnosing the lesion.

Patient consent

Verbal and written informed consent were obtained from the patient to use the images for publication.

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