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RARE PRESENTATION: SYNCHRONOUS PRIMARY BREAST AND THYROID CANCER IN AN ELDERLY MALE

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ABSTRACT Synchronous primary breast and thyroid carcinomas are exceptionally rare, especially in males. This case report presents the first documented instance of synchronous primary breast and thyroid carcinoma in an 89-year-old male. The patient had a right breast mass, cervical lymph nodes and a heterogeneously enhancing lesion in right lobe of thyroid. The histopathological examination confirmed infiltrating ductal carcinoma and metastasis of papillary carcinoma thyroid in cervical lymph node. While hormonal imbalances and genetic mutations have been implicated in synchronous breast and thyroid carcinomas in females, this case underscores the complexity of cancer development and the need for additional research into the factors influencing these rare synchronous malignancies in males.

KEYWORDS

Synchronous primary tumors, breast cancer, thyroid cancer, male patient, hormonal factors, genetic predisposition, rare occurrence.

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Introduction:

Synchronous breast and thyroid carcinomas represent a rare and intriguing clinical entity where patients are diagnosed with both breast cancer (BC) and thyroid cancer (TC) concurrently or within a short timeframe. The association between BC and TC was first reported in 1966.1 However, with advancements in cancer detection methodologies, increased patient awareness, heightened surveillance, genetic predisposition, and improved survival rates, the identification of multiple primary cancers has become more frequent. The criteria for diagnosing synchronous primary malignancies include the following: 1) The primary tumors should unequivocally exhibit characteristics of primary malignancy. 2) The likelihood of metastasis from one tumor to the other should be ruled out. 3) Each tumor must be distinct. Several retrospective studies and case reports have explored synchronous BC and TC, revealing that the incidence of such cases is higher than would be expected by chance.2,3

The potential mechanisms underpinning synchronous BC and TC are complex. Various theories have been proposed, including the notion that the breast and thyroid are hormone-responsive organs subject to regulation by the hypothalamus-pituitary-glandular axis.4 Consequently, any hormonal imbalances or variations may contribute to the development of these cancers. Additionally, it is suggested that individuals with a family history of breast or thyroid cancer may have a heightened genetic predisposition to develop these malignancies. Known mutations in specific genes, such as BRCA1, BRCA2, and PTEN, are associated with an increased risk of both breast and thyroid cancers. Some genetic mutations and alterations are common to both breast and thyroid cancers. For example, changes in the PIK3CA gene and the MAP kinase pathway have been observed in both cancer types, implying shared genetic pathways. Moreover, certain signaling pathways and molecular mechanisms altered in breast cancer, such as the PI3K-AKT-mTOR pathway and the RAS-RAF-MEK-ERK pathway, are also implicated in thyroid cancer. These shared pathways may contribute to synchronous malignancies.5,6

While synchronous BC and TC are frequently reported in females, they are exceptionally rare in males. To the best of our knowledge, this case represents the first reported instance of synchronous primary breast and thyroid carcinoma in a male patient. The primary objective of this case report is to document and emphasize the exceptional rarity of synchronous primary breast and thyroid carcinomas in males, particularly in an 89-year-old male patient. By presenting this unique case, we aim to underscore the significance of recognizing and investigating such infrequent occurrences. This case prompts a deeper exploration of the underlying mechanisms, genetic predisposition, and hormonal factors contributing to synchronous malignancies in males. Understanding these factors may facilitate early detection, risk assessment, and the development of personalized treatment strategies for individuals, ultimately contributing to advancements in the field of oncology and improving patient care.

Clinical Presentation: An 89-year-old male patient presented to the outpatient department with a 1.5-year history of a right breast mass. The mass was hard, indurated, with ulceration of the overlying skin. Upon examination, palpable bilateral cervical lymph nodes were noted. The patient underwent radiological assessments and fine-needle aspiration cytology (FNAC) of the breast lump and cervical lymph node. CT chest examination revealed a large, heterogeneously enhancing, lobulated lesion in the right breast measuring 4.6 x 10 x 9 cm. This lesion exhibited an ulcerated superficial margin, loss of fat planes, and possible infiltration of the underlying pectoralis muscle, with a provisional diagnosis of malignant breast lesion. A neck CT revealed a heterogeneously enhancing lesion measuring 2 x 2 x 2.4 cm in the right lobe of the thyroid, primarily exhibiting cystic/necrotic areas. Additionally, a right level IIb lymph node measuring 26 x 18 mm was identified, containing an intensely enhancing eccentric soft tissue component, with metastatic lymph node involvement.

FNAC was performed on the breast mass, cervical lymph node, and thyroid mass (Figure 1). The breast mass FNAC (Figure 2) showed features consistent with ductal cell carcinoma. FNAC from the thyroid mass and cervical lymph node revealed features indicative of papillary carcinoma of the thyroid.

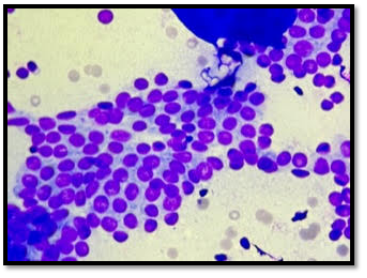

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Figure 1: FNAC from thyroid mass are cellular and show pseudoinclusions suggestive of Papillary Thyroid Carcinoma

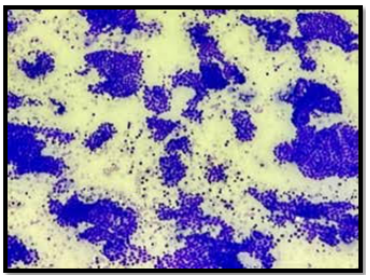

Figure 2: FNAC from breast mass are highly cellular and show sheets and clusters of malignant ductal cells suggestive of Intraductal carcinoma.

Subsequently, the patient underwent a right mastectomy with cervical lymph node dissection. Histopathological examination (Figure 3) confirmed infiltrating ductal carcinoma in the breast mass. Cervical lymph node (Figure 4) showed tumor infiltration with histological features of papillary carcinoma of the thyroid. The tumor cells were showing papillary architecture with typical nuclear features of papillary carcinoma thyroid.

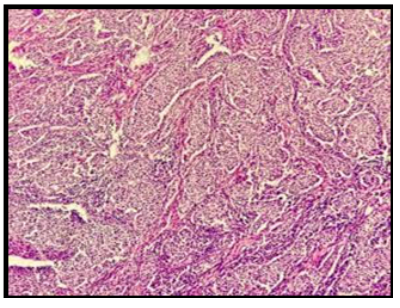

Figure 3: Histopathology of breast mass shows tumor cells in tubules and cords and show features of Invasive breast carcinoma.

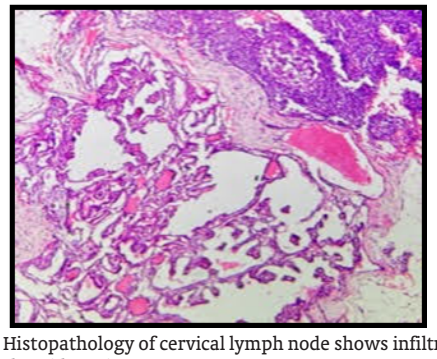

Figure 4: Histopathology of cervical lymph node shows infiltration by Papillary Thyroid Carcinoma.

A second surgery involving total thyroidectomy was planned for the patient; however, the patient did not follow through with the procedure.

Discussion:

Synchronous primary tumors of the breast and thyroid are rare but have been the subject of ongoing epidemiological studies. Research has shown an increased risk of breast cancer in females with a history of thyroid carcinoma, particularly premenopausal females.7 However, breast cancer does not appear to increase the risk of thyroid cancer. Numerous theories have been proposed to explain this higher association between breast cancer and thyroid cancer. Some studies have highlighted genetic, hormonal, environmental, and therapeutic factors as potential etiologies.8

Both breast and thyroid tissues are influenced by hormones, and imbalances in hormonal levels may contribute to the development of synchronous primary tumors. Cowden syndrome, characterized by mutations in the PTEN gene, is the only known tumor syndrome associated with an increased risk of developing both breast and thyroid carcinomas in the same individual. Germline mutations in PARP4 have been identified in patients treated for both carcinomas. Moreover, there is evidence suggesting an increased burden of single nucleotide polymorphisms (SNPs) in patients with thyroid cancer and breast cancer.9 Germline variants in BRCA1 have also been implicated in genetic susceptibility to thyroid carcinoma. Genome-wide linkage studies have indicated susceptibility loci for breast-thyroid carcinomas, with the first locus identified on chromosome 8q24 and the second on chromosome 2q35. It is noteworthy that all reported cases of synchronous primary breast and thyroid carcinoma are in females.10

According to our literature search, this is the first reported case of synchronous primary breast and thyroid carcinoma in a male patient. This rarity may be attributed to the infrequency of breast cancer in males. Breast carcinoma accounts for less than 1% of all breast carcinomas in men and less than 0.1% of male cancer-related deaths.11 Furthermore, differences in the hormonal milieu and breast tissue composition between males and females may contribute to the lower incidence of synchronous cancers in men. Further, gender-specific differences in environment, lifestyle choices and behaviors may contribute to variations in cancer incidence. One of the limitations of this case is that there are no histopathological findings of thyroid mass. However, the cervical lymph node had tumor metastasis with histopathological features of papillary carcinoma thyroid which confirms that the thyroid masses a primary malignancy.

Conclusion

This case of synchronous primary breast and thyroid carcinoma in an elderly male is exceptionally rare, emphasizing the limited occurrence of such cases in men. While synchronous breast and thyroid carcinomas are well-documented in females, their occurrence in males is scarce, warranting further investigation into the underlying mechanisms. Further research is needed to explore the genetic, hormonal, and environmental contributors to these rare synchronous malignancies. Additionally, the patient's decision to forgo total thyroidectomy raises questions about the management of synchronous malignancies in elderly individuals. Careful evaluation of treatment options, considering age and overall health, is essential in such cases. Understanding these factors may facilitate risk assessment, early detection, and the development of personalized treatment strategies for individuals.

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