

## Original Article

# Lipid-rich carcinoma of male breast in Chinese: a case report and literature review

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**Abstract:** Lipid-rich carcinoma of the breast is a rare variant of breast cancer, especially in males. Herein we report a case occurring in a 54-year-old male patient, who presented with a noticed painless, pea-sized lump in his left breast. Clinical examination and mammography suggested malignancy. Subsequent modified radical mastectomy revealed the diagnosis of lipid-rich carcinoma. To our knowledge, this subtype of mammary carcinoma is unprecedented in Chinese males in literature.

**Keywords:** Breast cancer, male, lipid-rich carcinoma

## Introduction

Lipid-rich carcinoma of the breast is a rare variant, histologic phenotype of breast cancer, with a proportion of <1~1.6% among all breast malignant tumors according to the World Health Organization (WHO) classification of tumors of the breast [1]. There are only a few reports describing the cytological features of these tumors. In China, the first Lipid-rich Carcinoma of the breast was reported in 1984 [2]. One case arising in the white male breast has been reported in 1995 [3]. Herein, we report a case of lipid-rich carcinoma occurring in a 54-year-old male patient, and the literature is reviewed. To the best of our knowledge, this subtype of mammary carcinoma is unprecedented in Chinese males. The morphological features, differential diagnosis and treatment along with a brief review of the literature are discussed here.

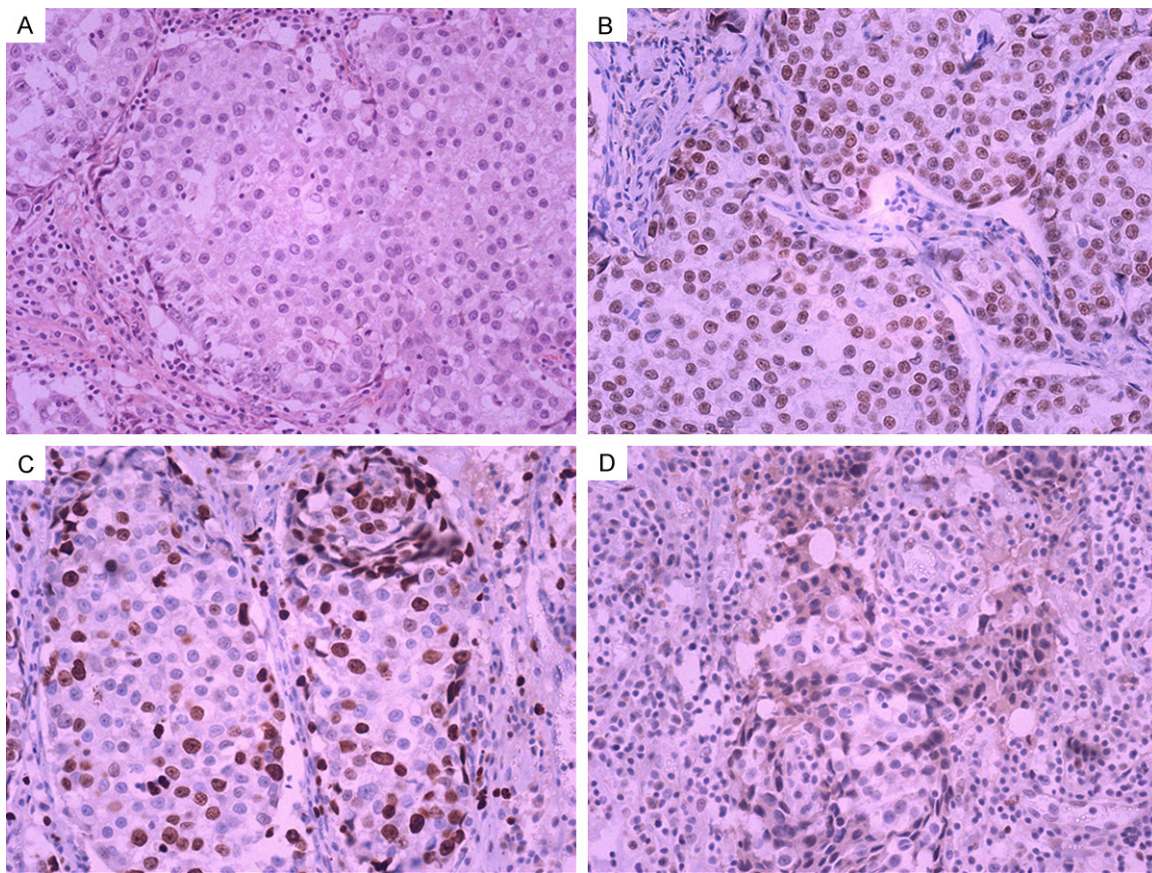
## Case report

A Chinese man in his fifth decade visited our hospital for noticed a painless, pea-sized lump in his left breast, which was detected by self-examination 2 months ago. There were no other signs or symptoms. Physical examination

revealed a hard, immobile mass with obscure boundary in the upper outer quadrant of his left breast, but no palpable node in the left axilla. Sonography revealed a 1.8 cm in diameter, irregular mass. Results of chest radiographs, bone scans and ultrasounds of the liver were normal (cT1N0M0). The patient underwent modified radical mastectomy with axillary lymph node dissection (Auchincloss's operation). The excised tumor measured 1.6 × 1.0 × 1.2 cm in diameter, and its cut surface was grayish-white. The excised tissue specimens were routinely processed for histological, histochemical, and immunohistochemical examinations.

Briefly, formalin-fixed, paraffin-embedded tissues were stained with hematoxylin and eosin (HE). The tumor was diagnosed as a lipid-rich carcinoma accompanied by no special type of the breast carcinoma.

Cancer cell invasion was seen in the mammary fat pad. Adjacent non-cancerous mammary gland showed diffuse and extensive secretory activity. Microscopic examination revealed that the tumor cells were arranged in nests, cords, and solid sheets. The cells were relatively large and polygonal with abundant univacuolated or multi-vacuolated foamy clear cytoplasm. The



**Figure 1.** The nuclei were irregular, hyperchromatic, pleomorphic, and with one or more prominent nucleoli of varying size (A). Immunohistochemical analysis revealed that the tumour cells were consistently positive for estrogen receptor (B) and epidermal growth factor receptor 2, and negative for P53 (C). The positive rate for Ki67 was 20% (D).

nuclei were irregular, hyperchromatic, pleomorphic, and with one or more prominent nucleoli of varying size (**Figure 1A**). Immunohistochemical analysis revealed that the tumour cells were consistently positive for estrogen receptor (ER) (**Figure 1B**) and epidermal growth factor receptor 2 (HER2), and negative for P53 (**Figure 1C**). The positive rate for Ki67 was 20% (**Figure 1D**). The positive rate for Oestrogen receptor (ER), and epidermal growth factor receptor 2 (HER2) were as flows 80%, +++.

None of a total of 16 lymph nodes was found histologically to contain metastatic tumor. The postoperative treatment consisted of four times of TC (docetaxel 75 mg/m<sup>2</sup> day 1, Cyclophosphamide 600 mg/m<sup>2</sup> day 1) chemotherapy and Tamoxifen 20 mg per day for five years. The patient has remained cancer-free for 41 months without any evidence of local recurrence or distant metastases.

## Discussion

Lipid-rich carcinoma (L-RC) of the breast is a rare histologic phenotype of breast cancer, according to the World Health Organization (WHO) classification of tumors of the breast. If morphological features and histochemical confirmation are used to identify lipid-rich carcinoma, the incidence of Lipid-rich carcinoma of the breast is accounted for <1-1.6% of all breast malignant tumors [1]. This entity was first described by Aboumrar and coworkers in 1963 [4], and named as lipid-secreting carcinoma. Although they did not tell us the ultrastructural data, two histological features supported the classification of this tumor as a lipid-secreting and not degenerative entity: the presence of lipid-containing tumor cells in metastatic foci and the presence of mitotic figures in lipid-containing tumor cells. However, in 1974, on the basis of the ultrastructural characteristics and the aggressive clinical behavior, Ramos and

Taylor declared that lipid-rich carcinoma should be regarded as a specific type of mammary carcinoma and renamed it as a lipid-rich breast carcinoma [5]. In 2003, WHO's new classification had established it as an independent type of breast cancer. According to WHO classification 2012, lipid-rich carcinoma of the breast is an invasive breast carcinoma in which no fewer than 90% of the cells contain abundant cytoplasmic neutral lipids [1].

The majority of them are female patients, L-RC can occur in male, and one case arising in the white male breast has been reported in 1995 [3]. To the best of our knowledge this subtype of mammary carcinoma is unprecedented in male of Chinese in literature.

The patients ranged from 10 to 81 years of age at the time of diagnosis [6]. Breast lump is the predominant symptom in most cases. The diameter of the tumours ranged from 1.2 to 15 cm [7, 8]. Other symptoms include mass in axillary and bloody nipple discharge [9]. An association with neuroleptic drugs has been reported [10]. One case presented as Paget disease [4]. A metastatic lipid-rich carcinoma producing pancreatic-type isoamylase has been reported [10].

Ultrastructural features of lipid-rich carcinoma of the breast have been portrayed in two cases [5, 11]. These papers reach a consensus on the presence of a prominent rough endoplasmic reticulum, regarded as an indication of an active secretory cell. Furthermore, Ramos and Taylor portrayed a well-developed Golgi complex as a further sign of the existence of secretory cell type [5]. Cytologically, the tumor is making up of clusters of malignant foamy cells with clear and abundant bubbly cytoplasm containing various sized vacuoles. The nuclei are pleomorphic, hyperchromatic, and have evident nucleoli [8]. Some of the nuclei are eccentric and shifted by the cytoplasmic vacuoles. Mitosis is rare. These tumor cells are positive for neutral lipid stain (Oil Red O stain), confirming the impression of L-RC. Histologically, the tumors are arranged in nests, cords, and solid sheet patterns. The cells are large and exhibit abundant foamy multi-vacuolated clear cytoplasm. The nuclei are irregular, hyperchromatic, pleomorphic, and contain one or more prominent nuclei [2-5, 8, 9, 12, 13]. As a rule, the tumor cells are stained positively for neutral

lipid [2-5, 8, 9, 12, 13]. Ultrastructurally, the appearance of abundant cytoplasmic lipid droplets is the symbol of L-RC [5, 8, 13]. Well-developed Golgi apparatus and various sized lipid droplets are identified in the cytoplasm [4], as well as intramitochondrial needle-like crystals [4, 13]. The lipid is a secretory outcome because the cytoplasm is abundant in rough endoplasmic reticulum with prominent Golgi apparatus [5, 13].

The intrinsic subtypes of breast cancer can be divided into as follows: luminal A, luminal B, Erb-B2 over-expression, and Basal-like. The luminal B subtype can be further divided into Luminal B-(HER2 negative (ER and/or PgR positive, HER2 negative, Ki-67 high), HER2 positive (ER positive HER2 over-expressed or amplified, Any Ki-67 Any PgR) [14]. According to this system, the present case is the unclassified subtype, 'Luminal B-like (HER2 positive)'. Due to the rarity of lipid-rich carcinomas, the association between intrinsic subtypes and aggressiveness has not been extensively studied. HER2 oncogene amplification appears to be one important step in the pathogenesis of breast cancer. 2 HER2 protein, encoded by the HER2 gene, is a transmembrane protein, displaying homology with the epidermal growth factor family. 3 HER2 protein over-expression and gene amplification occur in 20-30% of invasive breast cancers and have been associated with poor clinical outcome and inadequate response to hormonal therapy. Moreover, drug resistance and efficacy of targeted therapies can be predicted by positive or negative HER2 status.

Due to its rarity, the treatment of lipid-rich carcinoma is still a debatable issue at present, and radical surgery, whenever feasible, and systemic treatments are frequently used, but the benefit of these therapeutic regimen was not clear yet. P. Shi<sup>1</sup> deemed that only the minority of lipid-rich carcinomas developed local recurrence, so theoretically breast conserving surgery can provide the effect of local control if the excision margin is negative. Taking the high rate of axillary lymph node metastasis into account, the sentinel node procedure should be carried out with caution [6]. In accordance with the guidelines for the treatment of breast cancer overall, radiotherapy was given to patients who had positive axillary lymph nodes. L-RC can develop metastases very soon



after surgery, and the most common metastatic sites include lung, liver and bone, so systematic therapy played an critical role in its treatment [15]. Systemic treatments, including chemotherapy and endocrine therapy, should be emphasized because lipid-rich carcinomas tend to metastasize. Chemotherapy is most important for its treatment, and a taxol- or platinum-based regimen is recommended [15].

In conclusion, L-RC is a rather unusual and aggressive histological type of breast carcinoma. More and more extensively investigation on its biological behavior and longer follow-up will be required to reveal the factual biologic individuality, which will be helpful for us in selecting effective treatments.

## Disclosure of conflict of interest

None.

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