Open Access Library Journal
2026, Volume 13, e15499
ISSN Online: 2333-9721
ISSN Print: 2333-9705

FAST-Forward Hypofractionated Radiotherapy in Mucinous Breast Carcinoma: A Case Report

Khouloud Ziani[1], Soukaina Morchid[1], Imane El Kachtouhi Aarim[1], Sanae Chaib[2], Jihane Kharmoum[2], Mariame Chraibi[2], Wafaa Merssetti[1], Nabila Sellal[1]

[1]Department of Radiation Oncology, Mohammed VI University Hospital Center of Tangier, Tangier, Morocco
[2]Department of Anatomical Pathology, Mohammed VI University Hospital Center of Tangier, Tangier, Morocco
Email: khouloudzn@gmail.com

How to cite this paper: Ziani, K., Morchid, S., El Kachtouhi Aarim, I., Chaib, S., Kharmoum, J., Chraibi, M., Merssetti, W. and Sellal, N. (2026) FAST-Forward Hypofractionated Radiotherapy in Mucinous Breast Carcinoma: A Case Report. *Open Access Library Journal*, **13**: e15499.
https://doi.org/10.4236/oalib.1115499

Received: May 18, 2026
Accepted: June 15, 2026
Published: June 18, 2026

Abstract

Mucinous breast carcinoma is a rare malignant tumor (1% - 4% of breast cancers), generally associated with a favorable prognosis. Its management is multidisciplinary; adjuvant radiation therapy aims to reduce the risk of locoregional recurrence. Short hypofractionated regimens, including the FAST-Forward protocol, are increasingly used in older patients due to their convenience and demonstrated efficacy in standard series of ductal carcinoma. We report the case of an 86-year-old female patient with mucinous carcinoma of the left breast classified as cT3N0M0; treated with surgery, hormone therapy, and adjuvant radiotherapy according to the FAST-Forward regimen (26 Gy in 5 fractions over one week), using a three-dimensional technique that allows for optimal coverage without exceeding the dose limits for at-risk organs. The treatment was well tolerated, and the patient did not experience any acute or late radiation-induced toxicity. After 15 months of follow-up, no locoregional recurrence was observed, and functional quality of life was preserved. This case demonstrates that the hypofractionated FAST-Forward regimen may be a safe and practical option for the adjuvant management of mucinous breast carcinoma in elderly patients. Larger series and long-term follow-up are needed to confirm the safety and efficacy specific to this histological subtype.

Subject Areas

Gynecology & Obstetrics, Oncology

Keywords

Mucinous Breast Carcinoma, Hypofractionated Radiation Therapy, FAST-Forward, Elderly Patient

1. Introduction

Breast cancer is one of the most common cancers in women, accounting for approximately 25% of all female cancers [1].

Histological type is an important prognostic factor, allowing for the identification of different subtypes and the development of a personalized treatment approach [2].

Mucinous breast carcinoma is a rare entity, accounting for 1% to 4% of malignant breast tumors. It is characterized by high mucin production and is generally associated with a favorable prognosis [3].

Its management relies on a multidisciplinary evaluation incorporating imaging, histological analysis, and lymph node status to optimize the therapeutic strategy. Surgery remains the mainstay of local treatment, supplemented, as indicated, by adjuvant radiation therapy aimed at reducing the risk of locoregional recurrence [3].

Specific data on the use of ultra-short hypofractionation regimens in this histological subgroup remain limited. The FAST-Forward protocol, now widely adopted in the management of early-stage breast cancer, has been rarely reported in patients with pure mucinous carcinoma, particularly in older patients.

We report on the case of an elderly patient treated with radiation therapy according to the FAST-Forward protocol for mucinous breast carcinoma. This case demonstrates the feasibility and tolerability of this therapeutic strategy in a clinical setting rarely described in the literature.

2. Case Presentation

This is an 86-year-old female patient with a history of well-controlled hypertension under treatment, who presented with a mass in her left breast that had been gradually growing over the past two years.

There was no family history of breast or ovarian cancer, and BRCA1/BRCA2 mutation status had not been evaluated. The patient was multiparous (four children), with a first pregnancy at age 24, and reported a history of breastfeeding. She had her first menstrual period at age 13 and entered menopause at age 48, with no history of hormone replacement therapy. She led a healthy lifestyle, with no history of smoking, alcohol consumption, or obesity.

On physical examination, her general condition was normal. Breast examination revealed, in the left breast, a large mass approximately 15 cm in diameter, firm in consistency, painless, occupying most of the breast, with no nipple discharge or associated signs of inflammation. The right breast was unremarkable. Examination of the axillary and supraclavicular lymph node regions revealed no lymphadenopathy.

Given this clinical presentation, breast imaging, including bilateral breast ultrasound and breast MRI, was indicated.

The bilateral breast ultrasound revealed, in the left breast, a large mass involving all quadrants, well-defined and heterogeneous, consisting of a solid hypoechoic

component that was vascularized on Doppler and a cystic component with thick, mobile echogenic content. The dimensions of the lesion were estimated at 80 × 140.5 × 140 mm. No suspicious axillary lymphadenopathy was identified. The right breast showed no significant abnormalities on ultrasound or mammography.

Breast MRI revealed, in the left breast, a large, well-defined oval mass with heterogeneous signal intensity, showing intense enhancement after contrast injection, associated with a mixed component and the presence of endocystic pseudopapillae with low signal intensity on T1- and T2-weighted images (Figure 1 and Figure 2).

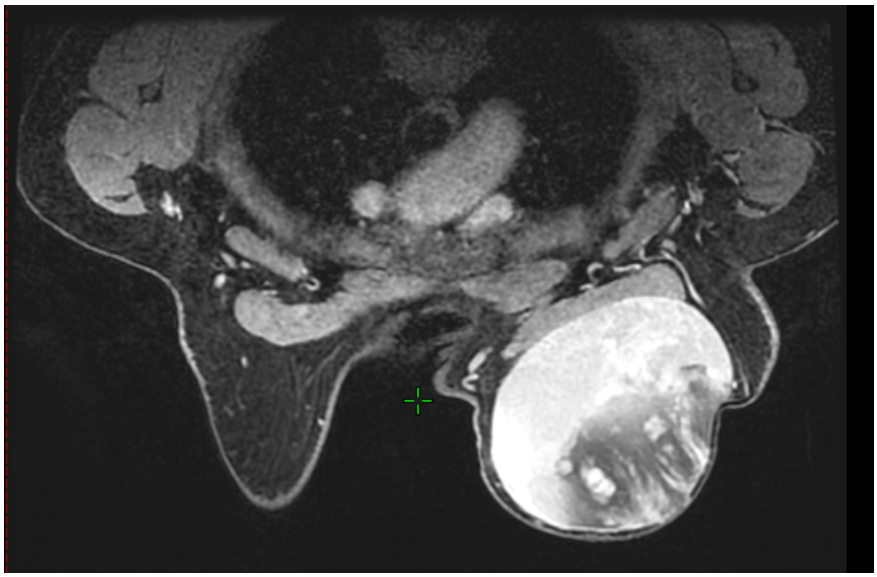

Figure 1. T1-weighted breast MRI with gadolinium contrast showing a large mass in the left breast with heterogeneous enhancement.

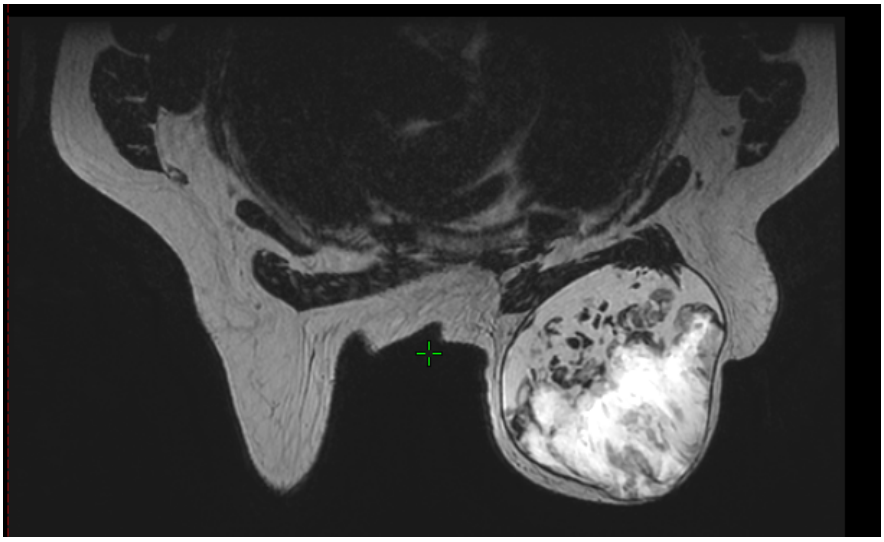

Figure 2. T2-weighted breast MRI showing a mass in the left breast with heterogeneous signal intensity, cystic components, and internal septa.

No suspicious lymphadenopathy was found. The tumor was classified as BI-RADS 5, indicating that a biopsy should be performed. The right breast was unremarkable.

A staging workup consisting of a thoraco-abdominal-pelvic CT scan did not reveal any distant metastases.

Based on these results, the diagnosis was mucinous carcinoma of the left breast, classified as cT3N0M0.

Histological examination of the needle biopsy revealed a myxoid, low-cell-density carcinomatous proliferation organized into clusters and tubules.

The tumor cells exhibited moderate cytonuclear atypia, with anisokaryosis, hyperchromatic nuclei, and eosinophilic cytoplasm. Mitotic activity was moderate, with 6 mitoses per 10 high-power fields, or 3.06 mitoses/mm^2. The tumor was classified as grade II (Scarff-Bloom-Richardson, modified by Elston and Ellis) (**Figure 3**).

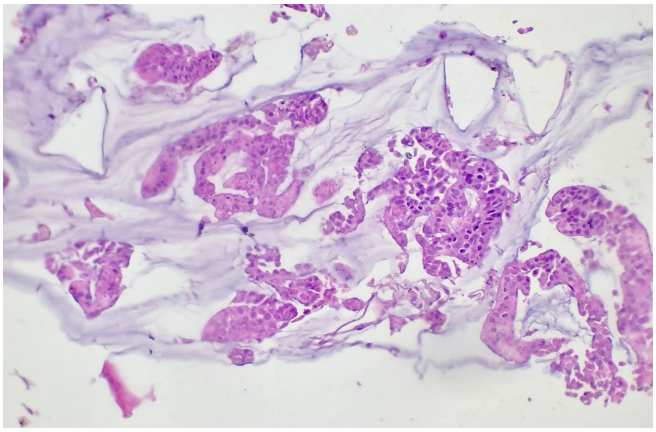

Figure 3. Histological image 20× magnification shows a carcinomatous proliferation composed of cellular clusters and occasional tubular structures, all set within an abundant, purely myxoid stroma.

On immunohistochemical analysis, the tumor was 100% positive for estrogen receptors (ER), negative for progesterone receptors (PR), and HER2-negative (score 0). The proliferation index was greater than 20%. These results are consistent with a luminal B-like HER2– molecular subtype according to the histomolecular classification of the 8th edition of the AJCC (American Joint Committee on Cancer).

The patient's case was discussed at a multidisciplinary team (MDT) meeting. Neoadjuvant chemotherapy was not recommended, and it was decided to proceed with surgery first. The patient therefore underwent a left mastectomy with ipsilateral axillary lymph node dissection.

Pathological examination of the surgical specimen confirmed a pure mucinous tumor, morphologically similar to that observed in the initial biopsy. It was an SBR grade 2 tumor, with no vascular emboli or perineural infiltration identified. The surgical margins were clear. The axillary lymph node study included 16

lymph nodes, all of which were free of metastases (0/16). Overall, the tumor was classified as pT3N0.

In light of the pathological findings, adjuvant chemotherapy was not indicated. However, adjuvant radiation therapy was indicated (stage pT3) and administered using an ultra-hypofractionated regimen (FAST-FORWARD), with a total dose of 26 Gy delivered in 5 daily fractions of 5.2 Gy each. The technique used was 3D conformal radiotherapy, and the clinical-anatomical target volume included the left chest wall.

The dosimetric analysis showed excellent coverage of the planned treatment volume (PTV), ranging from 95% to 107% (**Figure 4**).

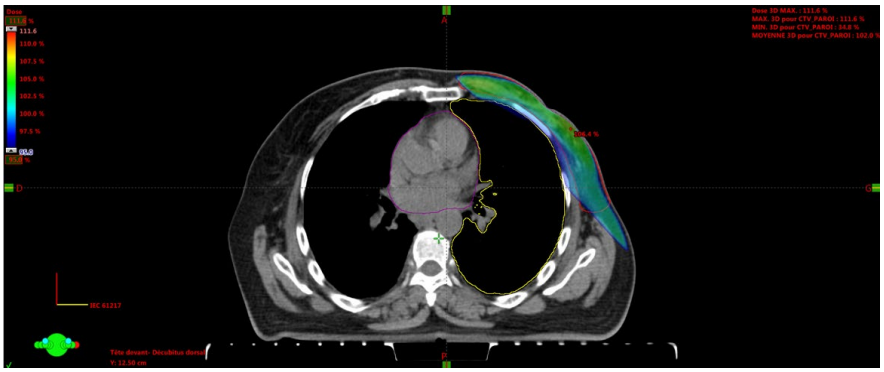

Figure 4. Axial cross-section from the planning CT scan illustrating the dose distribution.

The dose limits for at-risk organs were met, particularly for the heart (V7 = 5.4%), and were slightly exceeded for the ipsilateral lung (V8 = 17%) (**Figure 5**).

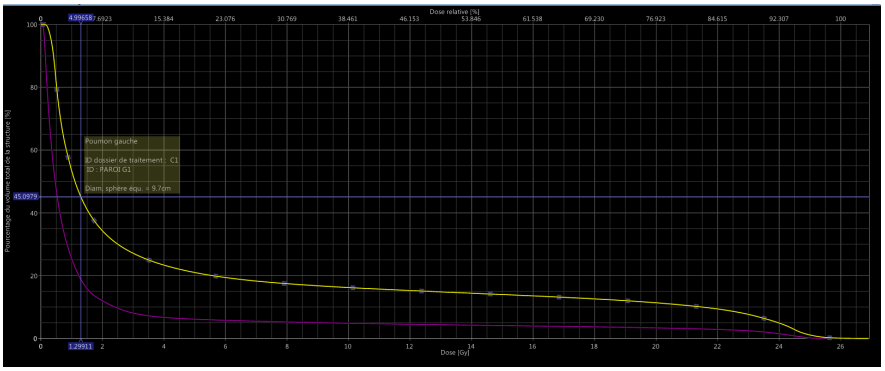

Figure 5. Dose-volume histogram (DVH) of at-risk organs.

The patient was started on aromatase inhibitor hormone therapy following radiation therapy. This treatment was continued for five years, with good clinical tolerance.

The clinical evaluation conducted one month and 3 months after treatment revealed no acute toxicity attributable to radiation therapy.

After a 15-month follow-up, no late toxicity was observed. In particular, according to the CTCAE (Common Terminology Criteria for Adverse Events) ver-

sion 5.0 classification, no grade ≥ 1 toxicity was found, notably no radiation dermatitis, radiation pneumonitis, esophagitis, or radiation-induced cardiac complications during the clinical and radiological follow-up examinations conducted after the completion of radiation therapy.

Follow-up was conducted systematically through clinical consultations and laboratory tests every three months. Radiological follow-up consisted of an annual breast ultrasound and an annual thoraco-abdominal-pelvic CT scan (TAP CT). Furthermore, no local-regional or distant recurrence was detected during this follow-up period.

3. Discussion

Mucinous breast carcinoma is a rare form of breast cancer that exhibits specific molecular and clinicopathological characteristics distinct from those of other types of breast cancer [4].

Although mucinous carcinoma shares several risk factors with the most common subtypes of breast cancer—such as advanced age, female sex, nulliparity, late menopause, and lack of breastfeeding—genetic predisposition, particularly that linked to BRCA1/2 mutations, is less frequently observed in this subtype [5].

Clinically, studies show that 44% of mucinous breast carcinomas were located in the upper-outer quadrant of the breast, while the remaining 56% were located in the upper-inner, lower-inner, lower-outer, and central quadrants, respectively [4]. In the present case, the mass occupied the entire upper quadrant, as mentioned earlier.

Radiologically, mucinous carcinoma can mimic a benign lesion on breast ultrasound, appearing as an oval or round, isoechoic or hypoechoic mass, as was the case with our patient. It can be difficult to differentiate mucinous carcinoma from benign lesions for various reasons. However, certain MRI features, such as a higher apparent diffusion coefficient (ADC) and enhanced internal septa, can facilitate this distinction [6].

Histologically, mucinous carcinomas are classified into two main variants: type A and type B. Type A is a low-cell-density variant characterized by abundant extracellular mucin and a predominantly mucinous stroma, whereas type B is more cellular and may exhibit neuroendocrine or micropapillary differentiation. The tumor is considered pure when the mucinous component accounts for more than 90% of the lesion [7] [8]. In this case, the tumor corresponded to the type A variant and was classified as a pure mucinous carcinoma.

In terms of treatment, pure mucinous carcinoma is managed similarly to other invasive breast cancers. When possible, lumpectomy or mastectomy combined with sentinel lymph node biopsy or ipsilateral axillary lymph node dissection, followed by adjuvant radiation therapy if indicated, is the standard approach for localized stages, just as it is for typical invasive ductal carcinoma [9].

Although axillary lymph node involvement is rare in cases of pure mucinous carcinoma (2% to 14%), it is considerably more common in the mixed mucinous

subtype (46% to 64%) [4]. Our patient underwent a left mastectomy due to the large size of the tumor, which occupied nearly the entire breast, along with ipsilateral axillary lymph node dissection. The decision to perform axillary lymph node dissection rather than the sentinel lymph node biopsy technique due to the latter's unavailability at the facility at that time.

In accordance with the inclusion criteria for the FAST Forward trial (patient ≥ 18 years old, T1 - T3 tumors, N0 - N1, M0, no prior radiation therapy) [10]; we selected the hypofractionated regimen of 26 Gy in 5 fractions over one week for our patient. This decision was motivated by compliance with the protocol, the favorable histological prognosis, and the benefit of limiting the duration and frequency of travel for an elderly patient.

Systemic treatment follows standard recommendations for breast cancer: mucinous carcinomas, which are often ER/PgR-positive, benefit from adjuvant hormone therapy to reduce the risk of recurrence, as in our case [11]. Chemotherapy is rarely used in pure mucinous carcinoma due to its indolent course; patients with favorable prognostic factors (N−, RE+) achieve satisfactory outcomes without chemotherapy.

Colloid breast carcinoma has a good prognosis, with a cancer-specific survival rate of 94% at 5 years and 81% at 20 years. Overall survival rates are comparable to those of the general population [4] [12] [13].

4. Conclusion

Pure mucinous carcinoma of the breast is a rare histological subtype with a favorable prognosis. This case demonstrates the feasibility and good tolerability of the FAST-Forward protocol in an elderly patient, suggesting that this strategy is a viable option in this specific clinical situation.

Conflicts of Interest

The authors declare no conflicts of interest.

References

[1] Tavassoli, F.A. and Devilee, P. (2003) Pathology and Genetics of Tumours of the Breast and Female Genital Organs. 2nd Edition, IARC Press.

[2] Ellis, I.O., Galea, M., Broughton, N., Locker, A., Blamey, R.W. and Elston, C.W. (1992) Pathological Prognostic Factors in Breast Cancer. II. Histological Type. Relationship with Survival in a Large Study with Long-Term Follow-Up. *Histopathology*, **20**, 479-489. https://doi.org/10.1111/j.1365-2559.1992.tb01032.x

[3] Khallaf, A., Oussafi, M., Ouazzani, H., Chaouche, I., Akammar, A., EL Bouardi, N., *et al.* (2025) Mucinous Carcinoma of the Breast: A Case Report and Comprehensive Literature Review. *Medical Reports*, **14**, Article ID: 100346. https://doi.org/10.1016/j.hmedic.2025.100346

[4] Di Saverio, S., Gutierrez, J. and Avisar, E. (2008) A Retrospective Review with Long Term Follow up of 11,400 Cases of Pure Mucinous Breast Carcinoma. *Breast Cancer Research and Treatment*, **111**, 541-547. https://doi.org/10.1007/s10549-007-9809-z

[5] Steiner, E., Klubert, D. and Knutson, D. (2008) Assessing Breast Cancer Risk in Women. *American Family Physician*, **78**, 1361-1366. https://pubmed.ncbi.nlm.nih.gov/19119554/

[6] Marrazzo, E., Frusone, F., Milana, F., Sagona, A., Gatzemeier, W., Barbieri, E., *et al.* (2020) Mucinous Breast Cancer: A Narrative Review of the Literature and a Retrospective Tertiary Single-Centre Analysis. *The Breast*, **49**, 87-92. https://doi.org/10.1016/j.breast.2019.11.002

[7] Chikkannaiah, P., Thangngeo, D., Guruprasad, C. and Venkataramanappa, S. (2020) Clinicopathological Study of Mucinous Carcinoma of Breast with Emphasis on Cytological Features: A Study at Tertiary Care Teaching Hospital of South India. *Journal of Laboratory Physicians*, **12**, 68-75. https://doi.org/10.1055/s-0040-1714935

[8] Ginter, P.S., Tang, X. and Shin, S.J. (2020) A Review of Mucinous Lesions of the Breast. *The Breast Journal*, **26**, 1168-1178. https://doi.org/10.1111/tbj.13878

[9] Memis, A., Ozdemir, N., Parildar, M., Ustun, E.E. and Erhan, Y. (2000) Mucinous (Colloid) Breast Cancer: Mammographic and US Features with Histologic Correlation. *European Journal of Radiology*, **35**, 39-43. https://doi.org/10.1016/s0720-048x(99)00124-2

[10] Murray Brunt, A., Haviland, J.S., Wheatley, D.A., Sydenham, M.A., Alhasso, A., Bloomfield, D.J., *et al.* (2020) Hypofractionated Breast Radiotherapy for 1 Week versus 3 Weeks (Fast-Forward): 5-Year Efficacy and Late Normal Tissue Effects Results from a Multicentre, Non-Inferiority, Randomised, Phase 3 Trial. *The Lancet*, **395**, 1613-1626. https://doi.org/10.1016/s0140-6736(20)30932-6

[11] Lian, W., Zheng, J. and Chen, D. (2020) Different Prognosis by Subtype in the Early Mucinous Breast Cancer: A SEER Population-Based Analysis. *Translational Cancer Research*, **9**, 5969-5978. https://doi.org/10.21037/tcr-20-1237

[12] Zhang, L., Jia, N., Han, L., Yang, L., Xu, W. and Chen, W. (2015) Comparative Analysis of Imaging and Pathology Features of Mucinous Carcinoma of the Breast. *Clinical Breast Cancer*, **15**, e147-e154. https://doi.org/10.1016/j.clbc.2014.11.005

[13] Shet, T. (2014) Time to Change the Way We Diagnose Mucinous Carcinomas of the Breast. *Human Pathology*, **45**, 434-435. https://doi.org/10.1016/j.humpath.2013.09.018