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Case Report

The Role of the Sentinel Lymph Node in Vulvar Cancer: A Case Report and Literature Review

M. Goudira*[1], M. Chaoui [1], A. El Boukhrissi [1], E. Kpekpeou [1], M. Otmane [1], N. Ismaili Alaoui[1]

1. *Department of Nuclear Medicine – Hassan II University Hospital, Fez.*

***Correspondence to**: M. Goudira, Department of Nuclear Medicine – Hassan II University Hospital, Fez.

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Abstract

Vulvar cancer is a rare disease representing approximately 3–5% of gynecological cancers. The inguinal lymph node status is the main prognostic factor. Sentinel lymph node (SLN) biopsy makes it possible to identify the first lymphatic relay draining the tumor and to assess lymph node involvement while avoiding a complete inguinal lymphadenectomy, which is often associated with significant morbidity.

We report the case of a 23-year-old patient presenting with a left vulvar swelling whose biopsy revealed a well-differentiated micro-invasive squamous cell carcinoma. Pelvic MRI showed a 4-cm vulvar tumor classified as FIGO stage II without suspicious lymphadenopathy. The patient underwent a total vulvectomy associated with bilateral sentinel lymph node biopsy after lymphatic mapping using technetium-99m lymphoscintigraphy and combined intraoperative radioisotopic and colorimetric detection. Ten lymph nodes were removed, and histopathological analysis was negative for metastasis.

The sentinel lymph node technique currently represents a reliable approach for nodal staging in early vulvar cancers. It significantly reduces the morbidity associated with inguino-femoral lymph node dissection while maintaining satisfactory oncological safety.

Keywords: *vulvar cancer, sentinel lymph node, lymphoscintigraphy, postoperative morbidity, recurrence risk.*

Introduction

Vulvar cancer is a rare disease, accounting for approximately 3–5% of gynecological cancers (1). In about 90% of cases, it corresponds to a squamous cell carcinoma arising from the vulvar epithelial lining. Vulvar melanomas represent around 5% of cases (4).

This disease mainly affects elderly women, but it may also occur in younger women, particularly in the presence of persistent infection with high-risk oncogenic human papillomaviruses (HPV).

The diagnosis is based on histological confirmation by biopsy, and treatment combines surgery, radiotherapy, and sometimes chemotherapy, depending on the FIGO stage and the locoregional extent of the tumor.

The sentinel lymph node (SLN) is defined as the first lymph node receiving lymphatic drainage from the tumor. Its identification allows early detection of lymph node involvement. Histological examination of the

SLN guides the therapeutic strategy and makes it possible to avoid complete lymph node dissection, which is frequently associated with significant morbidity such as lymphedema, infections, lymphocele formation, and wound dehiscence (5).

Materials and Methods

Detection of the sentinel lymph node (SLN) in vulvar cancer is based on a combined radioisotopic and colorimetric technique.

First, on the day before surgery, a perilesional injection of human albumin nanocolloids labeled with technetium-99m (Nanocoll®) is performed. The injection is administered using four syringes containing 20 MBq each.

Approximately one hour after the injection, lymphoscintigraphy is performed using a gamma camera, with anterior and posterior acquisitions. This examination may be complemented by SPECT/CT imaging in order to achieve precise anatomical localization of the sentinel lymph nodes.

During surgery, patent blue dye or methylene blue is injected around the tumor (colorimetric method). The surgeon then identifies the sentinel lymph nodes using a hand-held gamma detection probe.

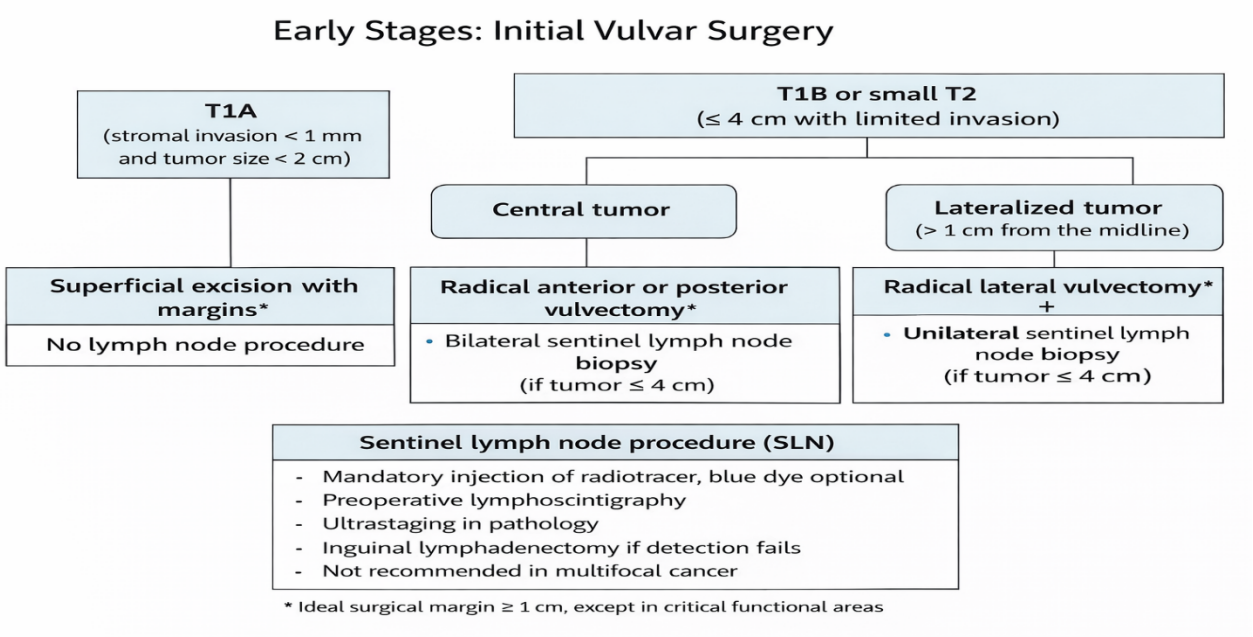
Lymph nodes showing radioactive activity and/or blue staining are surgically removed and subsequently sent for histopathological analysis.

Observation

A 23-year-old patient was admitted for a progressively enlarging left vulvar swelling. Histological examination of the biopsy revealed a well-differentiated keratinizing micro-invasive squamous cell carcinoma.

Pelvic MRI demonstrated a 4-cm left vulvar tumor (FIGO stage II) involving the clitoris and the lower third of the vagina, without extension to the anal canal or perineal muscles. Small inguinal lymph nodes were present but showed no suspicious features.

After multidisciplinary team discussion, the decision was made to perform a total vulvectomy with bilateral sentinel lymph node excision.



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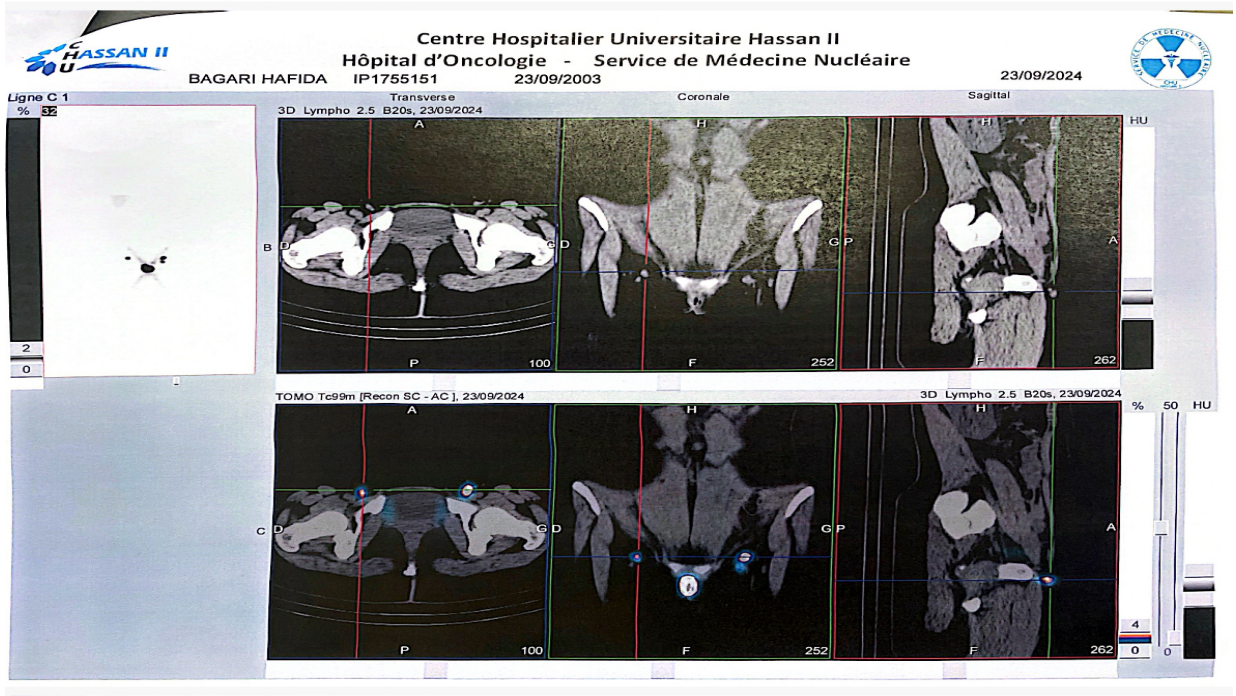
Results

Isotopic detection allowed the identification of three contiguous lymph nodes with intense signal on the left side (consistent with the tumor location, which was slightly lateralized to the left) and two less intense lymph nodes on the right side.

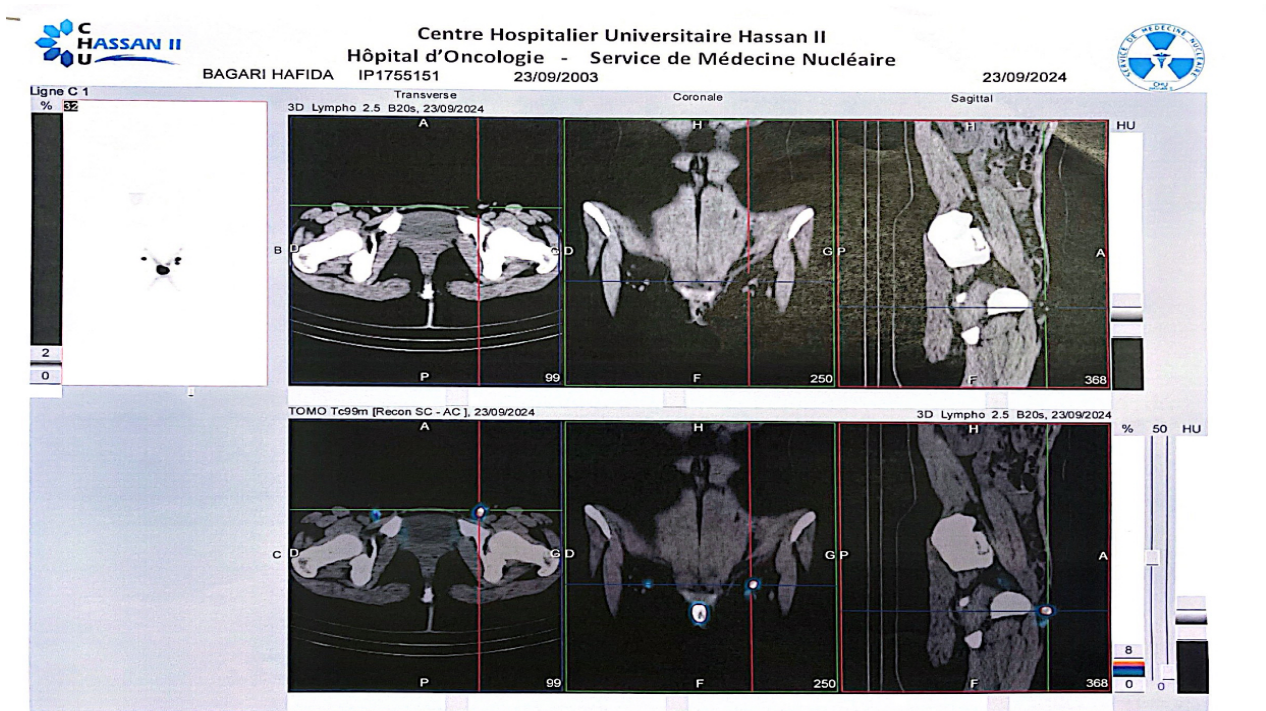
During surgery, using the combined detection technique, two blocks were removed on the right side containing four lymph nodes, and three blocks were removed on the left side containing six lymph nodes.

The surgical specimen (the vulvectomy specimen plus the 10 excised lymph nodes) was sent to the pathology laboratory. Histopathological analysis confirmed a well-differentiated, mature, infiltrating squamous cell carcinoma without vascular emboli, with clear surgical margins. Sentinel lymph node analysis showed 4N−/4N on the right side and 6N−/6N on the left side, indicating no lymph node metastasis.

Subsequently, adjuvant radiotherapy was indicated, but given the young age of the patient and the risk-benefit ratio in terms of fertility, close monitoring was opted for.



Lymph nodes detected on the right side



Lymph nodes detected on the left side

Discussion

The sentinel lymph node technique represents a major advance in the management of vulvar cancer. However, it is contraindicated in cases of large tumors (>4 cm), in the presence of clinical or radiological suspicion of lymph node involvement, or in patients with previous vulvar surgery that may alter lymphatic drainage.
The main indications include:

- Unifocal tumor < 4 cm
- Absence of palpable inguinal lymphadenopathy
- Tumor located more than 1 cm from the midline (otherwise bilateral exploration is required)

The multicenter GROINSS-V I study (Groningen International Study on Sentinel Nodes in Vulvar Cancer) validated the sentinel lymph node technique as an alternative to inguinofemoral lymphadenectomy. The study demonstrated that in patients with a negative sentinel lymph node, omission of complete lymph node dissection is safe, with an inguinal recurrence rate <3% and significantly reduced morbidity (6).
The extension of this study led to GROINSS-V II, a phase II, multicenter, non-randomized trial evaluating whether inguinofemoral radiotherapy could safely replace inguinofemoral lymphadenectomy (IFL) in patients with early vulvar squamous cell carcinoma and metastatic sentinel lymph nodes.
Initial results were unsatisfactory, leading to an amendment of the study protocol:

- Micrometastases (≤2 mm): continuation of radiotherapy alone (50 Gy)
- Macrometastases (>2 mm): return to the standard treatment, inguinofemoral lymphadenectomy, with or without adjuvant radiotherapy

The results concluded that in patients with micrometastases (≤2 mm) in the sentinel lymph node, inguinofemoral radiotherapy (50 Gy) is a safe alternative to inguinofemoral lymphadenectomy, with a very low groin recurrence rate and reduced morbidity (8). However, for patients with macrometastases (>2 mm), inguinofemoral lymphadenectomy remains the standard of care, since radiotherapy alone (50 Gy) is associated with an unacceptably high risk of inguinal recurrence.
Postoperative morbidity after complete lymph node dissection is substantial, with up to 40% lymphedema and 30% wound infections, whereas it is reduced to less than 5% after sentinel lymph node excision alone (7).
These findings have refined lymph node management in early vulvar cancer and directly led to the development of GROINSS-V III, which has shown promising preliminary results. This ongoing study

investigates higher-dose chemoradiotherapy for macrometastases in order to reduce the need for lymphadenectomy while maintaining control of recurrence risk (9).

In association with the European GROINSS-V study, the GOG-173 trial provided strong evidence that in carefully selected patients with clinically and radiologically negative lymph nodes and limited vulvar tumors, sentinel lymph node biopsy is a safe option with a low rate of inguinal recurrence and significantly lower morbidity compared with complete lymphadenectomy.

The study reported a sentinel lymph node detection rate of approximately 92% (2). The sensitivity for detecting lymph node involvement was around 91–92%, with a negative predictive value of approximately 96%. For tumors smaller than 4 cm, sensitivity reached about 94%, and the probability of a false-negative lymph node dissection was low at around 2%. These trials have led to the recognition of sentinel lymph node biopsy as a standard technique for the management of early vulvar cancer in many centers worldwide (3).

Conclusion

Sentinel lymph node analysis has become a diagnostic and therapeutic reference in early-stage vulvar cancer. It provides reliable lymph node staging, significantly reduces postoperative morbidity, and improves patients' quality of life, while preserving the chances of cure. The overall 5-year survival rate for vulvar cancer is approximately 70%, depending mainly on tumor size and lymph node status. Therefore, lymphatic mapping using lymphoscintigraphy represents an essential tool in the modern and conservative therapeutic approach to vulvar cancer.

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