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Endoscopic inguinal sentinel node biopsy using indocyanine green in early-stage vulvar cancer: an innovative technique

Marco Petrillo^{1,2,#}, Giulio Sozzi^{3,*}, Giuseppe Paci³, Margherita Dessole⁴,
Giovanni Scambia⁵, Vito Chiantera³

¹ Department of Clinical and Experimental Medicine, Gynecologic and Obstetric Clinic, University of Sassari, Sassari, Italy.

² PhD School in Biomedical Sciences, University of Sassari, Sassari, Italy.

³ Department of Gynecologic Oncology, University of Palermo, Palermo, Italy.

⁴ Community Gynecologic Service, Azienda Socio-Sanitaria di Sassari, Sassari, Italy.

⁵ Department of Woman and Child Health and Public Healthcare, Fondazione Policlinico Universitario A. Gemelli IRCCS, Rome, Italy.

The first two authors have equally contributed to the article.

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*Corresponding author: Giulio Sozzi, M.D.
Department of Gynecologic Oncology, University of Palermo, Piazza Nicola Leotta 4, 90127 Palermo, Italy.
Email: giuliosozzi@hotmail.it.
ORCID: 0000-0001-5847-8822.

ABSTRACT

Background. Minimally invasive lymphadenectomy is progressively emerging as an appealing strategy in patients with vulvar cancer, and at the same time, sentinel node biopsy is currently recognized as standard of care in patients with early-stage disease.

Case presentation. The integration of minimally-invasive approaches and sentinel node biopsy appears as an intriguing horizon, and we present here the first endoscopic sentinel node biopsy using indocyanine green performed in a patient with early-stage vulvar cancer.

Twenty-five mg of indocyanine green powder was diluted in 20 ml of injectable solution, and two ml of the solution were injected next to the vulvar lesion. After 10 minutes, the sentinel node was detected using a camera with Karl Storz near infrared system and removed using two ancillary 3 mm trocars. The sentinel node biopsy procedure duration was 25 minutes. Ipsilateral complete endoscopic inguino-femoral lymphadenectomy was then performed. The patient was discharged on post-operative day 1. At frozen section, and final histology one sentinel node was detected, and resulted negative for metastasis. No lymph-nodal metastases were detected in non-sentinel nodes. No surgical complications were observed, and 15 months after surgery the patient was free from disease.

Conclusions. We present the first successful endoscopic inguinal sentinel node biopsy using Indocyanine green. Further studies are needed to clarify the feasibility and safeness of the procedure.

INTRODUCTION

Vulvar cancer is a rare condition affecting older women and accounts for 3-5% of all gynecological cancers, and primary treatment is radical vulvectomy with inguinal nodal staging [1, 2]. However, rad-

ical lymphadenectomy is associated with significant morbidities, and in the last decade, a growing attention has been dedicated to the development of sentinel node biopsy (SNB) in women with gynaecological cancer [3-8]. In this context, indocyanine green (ICG) has progressively emerged as the most effective

tive tracer in both endometrial, and cervical cancer given its quick lymphatic diffusion, and favourable economic profile compared to standard radiotracers such as technetium-99 [4-10]. On the other hand, the procedure of SNB has been recently introduced in the clinical practice also in women with early-stage vulvar cancer [11]. At the same time, several reports have demonstrated the feasibility of minimally invasive inguinal lymphadenectomy with significant benefits in term of post-operative complications [12-14]. For these reasons, the combination of inguinal SNB and endoscopic approach appears a promising strategy, giving the opportunity to perform a scarless procedure with a clear clinical advantage for the patients. However, a surgical description of this challenging surgical technique has never been provided.

CASE PRESENTATION

The presented paper provides a step-by-step description of an endoscopic inguinal SNB using indocyanine green in early-stage vulvar cancer. The procedure has been performed at the Department of Gynecologic Oncology of the University of Palermo. Formal ethical approval was not required for this technical demonstration. Written informed consent to be enrolled, and for personal data to be published in the present article was obtained. The patient was an eighty-two years old woman with 3 cm vulvar squamous cell carcinoma (**Figure 1**). Computed Tomography scan and physical exam revealed absence of inguinal lymphadenopathies.



Figure 1. Vulvar lesion.

We briefly describe here the surgical steps required to complete the procedure.

First step

As first step, we drew on the patient's leg the femoral triangle, also identifying the femoral artery (**Figure 2**).

Second step

A 10-mm trocar for endoscope was placed around 10 cm below the inguinal ligament, furthermore two additional 3-mm trocars were placed externally to the femoral triangle in order to have a direct access to the groin (**Figure 3**).

Third step

The definition of the surgical field is the further step of the procedure consisting of a careful dissection

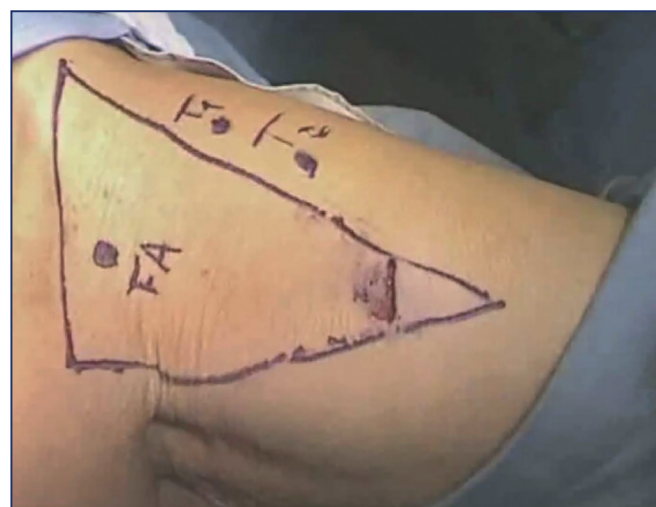


Figure 2. Transcutaneous identification of the femoral triangle and of the femoral artery.

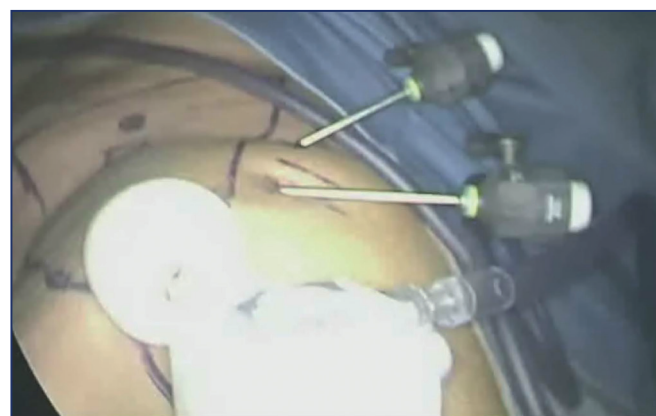


Figure 3. Trocar placement.

of subcutaneous fatty tissue avoiding as much as possible sealing and cutting thus preserving lymphatic vessels (**Figure 4**). At the end of this part of the surgery, we were able to identify the two major surgical landmarks: the inguinal ligament ventrally, and the great saphenous vein in the dorsal part of the field (**Figure 5**).

Fourth step

Then, 25 mg of ICG powder was diluted in 20 ml of water, and 2 ml of the solution were injected next to the vulvar lesion (**Figure 6**).

Fifth step

After 10 minutes the camera was introduced through the 10-mm trocar, and the sentinel node was detected in the area of superficial inguinal lymph nodes using the endoscopic Karl Storz near infrared system (**Figure 7**).

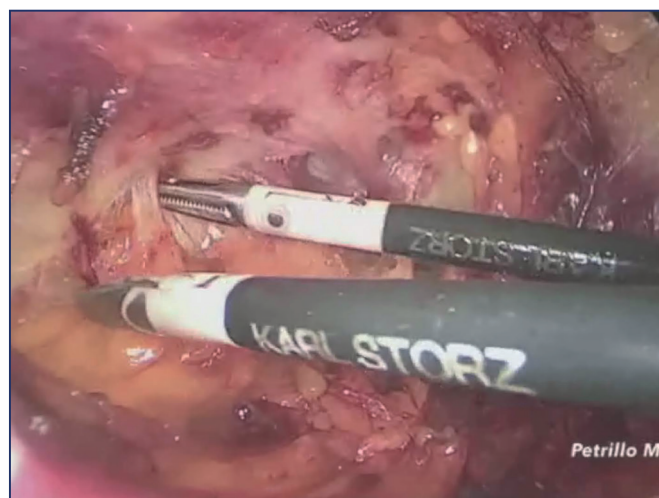


Figure 4. Definition of the surgical field.

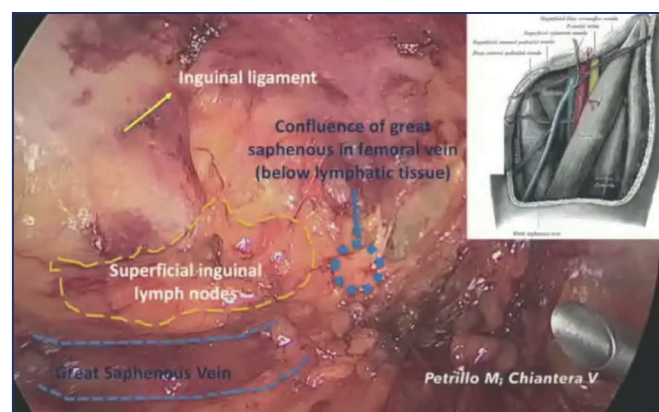


Figure 5. Identification of the principal anatomical landmarks.

Sixth step

Then a careful dissection of the great saphenous vein was performed, which confirmed the ICG uptake only in the detected sentinel node.

Seventh step

Finally, the sentinel node was removed in endobag and submitted to histological examination (**Figure 8**).

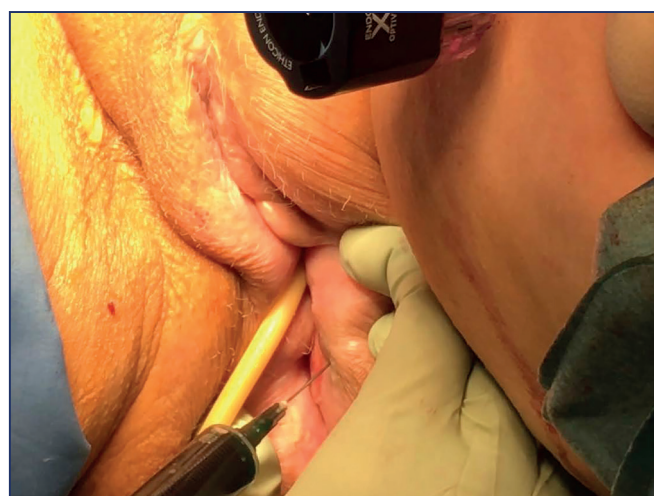


Figure 6. ICG peri-lesional injection.

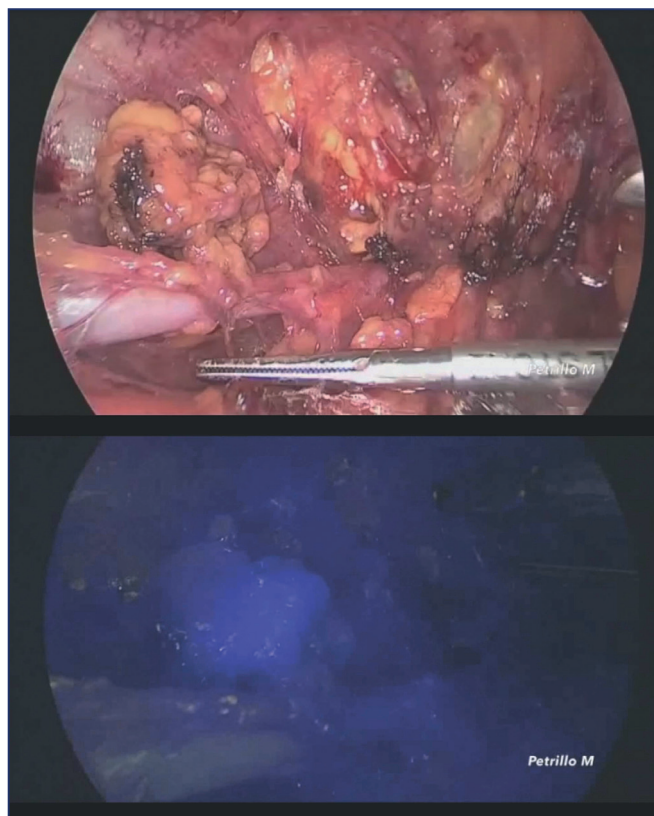


Figure 7. Detection of the sentinel node.



Figure 8. Removal of the sentinel node.

Because of the innovativeness of the procedure, that needs to be validated yet, completion ipsilateral inguino-femoral radical lymphadenectomy was performed as previously described [12–15]. Finally, left radical hemi vulvectomy was performed to complete the surgical procedure.

RESULTS

The SNB procedure duration was 25 minutes, and no significant haematic blood loss were recorded. The patient discharged on post-operative day 1. At frozen section analysis, and at final histology one sentinel node was detected, and resulted negative for metastasis. No lymph-nodal metastases were detected in non-sentinel nodes. No early or late surgical complications were observed and a scarless result was obtained (**Figure 9**). Fifteen months after surgery the patient was free from disease.

CONCLUSIONS

We present the first case of successful endoscopic inguinal SNB using ICG, a very innovating surgical technique, that could represent a further alternative option for the management of early-stage vulvar cancer. However, our successful demonstration does not support the routine application of the described technique, and further studies are needed to confirm our promising results. The validation of our technique could give the opportunity to perform this minimally invasive technique avoiding a radical lymphadenectomy as suggested by the principal guidelines [8].

COMPLIANCE WITH ETHICAL STANDARDS

Authors contribution

M.P.: conceptualization, data curation, methodology, writing – original draft, writing – review &

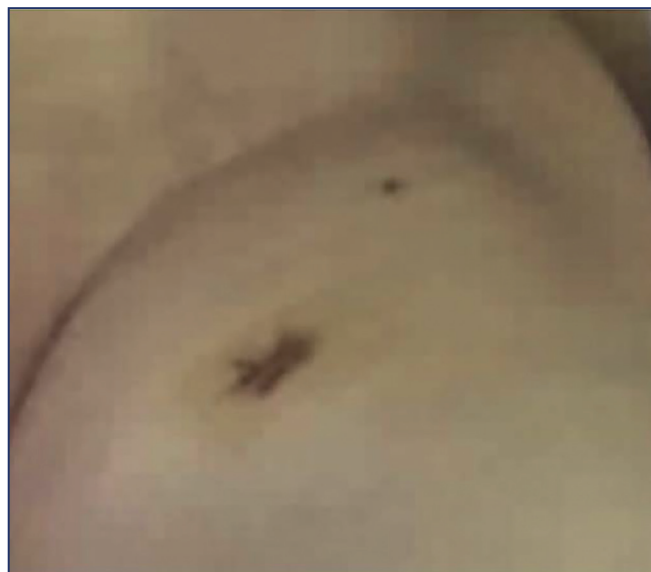


Figure 9. Aesthetic result at two weeks after surgery.

editing. G.So.: conceptualization, data curation, methodology, writing – original draft, writing – review & editing. G.P.: methodology and data curation. M.D.: methodology and data curation. G.Sc.: conceptualization, supervision, validation, writing – original draft, writing – review & editing. V.C.: conceptualization, supervision, validation, writing – original draft, writing – review & editing.

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Disclosure of interests

The authors declare that they have no conflict of interests.

Ethical approval

Formal ethical approval was not required for this technical demonstration.

Informed consent

Written informed consent to be enrolled, and for personal data to be published in the present article was obtained.

Data sharing

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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