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## Clinical images

## Laparoscopic sentinel node detection with indocyanine green in endometrial cancer

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## Introduction

The sentinel node hypothesis states that the sentinel lymph node is the first station that drains a defined anatomic region, and that histologic evaluation of the sentinel lymph node is representative for all other lymph nodes draining this region.

The sentinel node concept was pioneered by Cabanas in the 1970s.<sup>1</sup> It has been successfully used and has shown encouraging results in cancers of the vulva, penis, breast, and cervix.<sup>1</sup>

Sentinel node biopsy for endometrial cancer is still investigational.<sup>2</sup> A meta-analysis of 26 studies including 1101 sentinel node procedures found a sensitivity of 93% for detection of lymph node metastases in women with endometrial cancer.<sup>3</sup>

Indocyanine green dye (ICG) is a negatively charged, amphiphilic yet water soluble but relatively hydrophobic tricarboyanine. It is a fluorescent dye that is used in human medicine in a number of procedures, the majority of which are to display blood and lymph vessels. Advantages are that it binds exclusively to plasma proteins thereby remaining confined to the vascular compartment, it is quickly and completely excreted in bile, and has very low toxicity to humans.

In gynecological cancers, ICG may be injected into the cervix and taken up by the pelvic and later para-aortic lymph nodes. The sentinel nodes of these regions take up the dye which then become fluorescently visible in the near-infrared spectrum.

## Case Report

A 67-year-old woman G4P2A2 presented with postmenopausal bleeding for 1 year. She underwent menopause 11 years ago.

She had a history of hypertension and diabetes diagnosed 5 years previously and had been undergoing treatment for these. She had presented with these symptoms at another center and was treated for an infection but due to persistence of symptoms she came to Chang Gung Memorial Hospital (Taoyuan, Taiwan), where a biopsy was performed that revealed endometrial cancer.

Ultrasonography showed a solitary uterine nodule with a dilated endometrial cavity. Endometrial thickness of 1.24 cm was noted along with an endometrial mass of 1.49 cm. Magnetic resonance imaging of the pelvis showed a nonmeasurable tumor size, with unassessable tumor invasion and no local or distant nodal metastases. Under the impression of endometrial malignancy, she was admitted for laparoscopic staging surgery.

Before the introduction of the trocars, ICG (Diagnogreen injection; Daiichi Sankyo, Bangkok, Thailand) is injected in the cervix at four quadrants with 1 mL of dye in each quadrant at a depth of 2 mm in two quadrants and a depth of 4 mm in the other two quadrants. The dye comes prepackaged and has to be mixed before use. A vial containing 25 mg ICG powder is mixed with 5 mL of sterile water using a 1-mL tuberculin syringe. Our technique involves two superficial injections at the 10 o'clock and 2 o'clock positions and two deep injections at the 4 o'clock and 8 o'clock positions into the cervical stroma.

The primary trocar of 12 mm was placed through Lee–Huang point with four ancillary trocars of 5 mm each. No evidence of ascites, adhesions, or peritoneal seedlings were seen on inspection. The uterus was atrophic in appearance with grossly normal bilateral adnexae. The procedure was initiated with peritoneal washings for cytology followed by total laparoscopic hysterectomy with

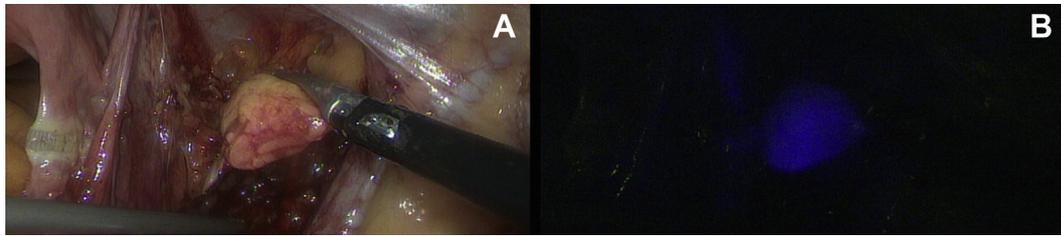
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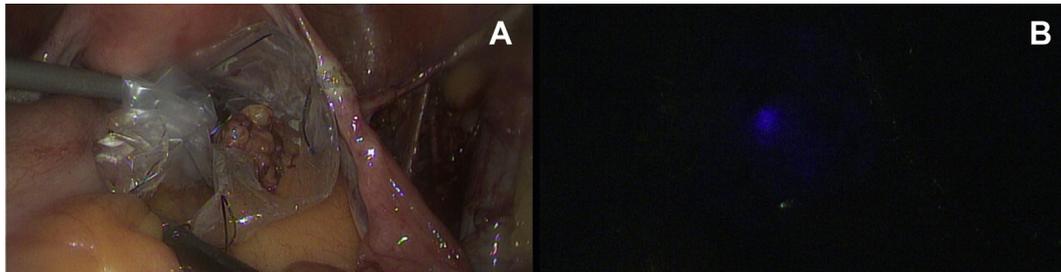
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**Figure 1.** (A) Sentinel node represented by right sided interiliac pelvic lymph nodes. (B) In near-infrared light, the sentinel node is visible in blue along with its lymphatics.



**Figure 2.** (A) Excised sentinel node placed in a specimen retrieval bag. (B) Confirmation of the sentinel node before retrieval by switching to near-infrared light and confirming its presence in the specimen retrieval bag.

bilateral salpingo-oophorectomy. Once the uterus has been removed through the vagina, sentinel nodes are identified by switching to the near-infrared setting and are retrieved to be studied separately. Sentinel lymph nodes were detected at the right and left obturator lymph nodes (Figures 1 and 2). A complete bilateral pelvic lymphadenectomy was also performed.

The patient tolerated the surgery well and was discharged the next day.

The respective margins of the corpus, bilateral adnexae, and lymph nodes were negative.

Final pathology revealed the uterine cervix to be negative for malignancy. The uterine endometrium showed endometrioid carcinoma Grade III pT1aN0 and the uterine myometrium showed endometrioid carcinoma by invasion. Bilateral adnexae were negative for malignancy and the lymph nodes were also negative.

Microdissection showed a 1.4 cm × 1 cm × 0.3-cm poorly differentiated endometrioid carcinoma with a myometrial invasion of 0.3 cm corresponding to 15% of myometrial wall thickness. No lymphovascular permeation was seen and all nodes were negative.

## Discussion

The concept of sentinel nodes is not new, but in the past, it was not a very feasible procedure due to requirements of radiographic services with technetium dye or extravasation and poor visualization with patent blue and methylene blue dyes. With the advent of ICG, its ease of administration, low toxicity, and easy visibility, the morbidity and radicality associated with treating gynecological malignancy will be greatly reduced.

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