Sentinel Lymph Node Identification in Endometrial Cancer

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OBJECTIVE To evaluate the feasibility of intra-operative detection of sentinel lymph nodes (SLN) in the patient with endometrial cancer (EC).

METHODS Thirty-one patients with Stage I and II endometrial cancer, who underwent a hysterectomy and a lymphadenectomy, were enrolled in the study. At laparotomy, methylene blue dye tracer was injected into the subserosal myometrium of corpus uteri at multiple sites, and dye uptake into the lymphatic channels was observed. The blue nodes which were identified as SLNs were traced and excised. The other nodes were then removed. All of the excised nodes were submitted for pathological hematoxylin and eosin (H&E) staining examination.

RESULTS Failure of dye uptake occurred in 4 of the 31 cases (12.9%) because of spillage, and no lymphatic coloration was observed there. Lymphatic staining was clearly observable as blue dye diffused to the lymphatic channels of the uterine surface and the infundibulopelvic ligaments in 27 (87.1%) cases. Concurrent coloration in the pelvic lymphatic vessels was also observed in 22 of the 27 patients. The SLNs were identified in 23 of the 27 (85.2%) cases with a lymphatic staining, with a total number of 90 SLNs, and a mean of 3.9 in each case (range, 1-10). Besides one SLN (1.1%) in the para-aortic area, the other 89 (98.9%) were in the nodes of the pelvis. The most dense locations of SLNs included obturator in 38 (42.2%) and interiliac in 19 (21.1%) cases. In our group, pelvic lymphadenectomy was conducted in 27 (87.1%) patients and pelvic nodal sampling in 4 (12.9%). Of the 31 cases, a concurrent abdominal para-aortic lymph node sampling was conducted in 7. A total of 926 nodes were harvested, with an average of 39.8 in each case (range, 14-55). Nodal metastases occurred in 3 patients (9.7%), 2 of them with SLN involvement and the other without SLN involvement. Adverse reactions or injury related to the study was not found.

CONCLUSION Application of methylene blue dye is feasible in an intra-operative SLN identification of endometrial cancer. The technology is convenient, safe, and worth further investigation.

KEY WORDS: endometrial tumor, lymphatic metastasis, sentinel lymph node biopsy, lymphadenectomy.

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Introduction

Retroperitoneal lymph node metastases are key factors in treatment and prognosis of endometrial cancer, however, the lymph node metastatic rate only reaches the 10% level in Stage I and II EC patients who account for a vast majority of the total EC patients with diverse
metastatic sites. A timely intra-operative discovery of a lymphatic metastasis is very important for determining the necessity of lymphadenectomy, and an introduction of the sentinel lymph node (SLN) identification technology provides a new approach in the study. In our study, the technology of methylene blue dye staining was used for a preliminary study on the SLN identification of EC.

Materials and Methods

Source of data
A total 31 EC patients who underwent surgery in our hospital, during a period from September 2004 to February 2007, were enrolled. The median age of the patients was 53 (range, 33-65). The histological types of the disease were in the following: endometrioid adenocarcinoma in 28 cases (90.3%), adenosquamous carcinoma in 2 (6.5%) and clear-cell carcinoma in 1 (3.2%). The differentiation grades included G1 in 13 cases (41.9%), G2 in 12 (38.7%), and G3 in 6 (19.4%). Preoperative segmented curettage for diagnosis and clinical staging were conducted in all patients based on the 1971 International Federation of Gynecology and Obstetrics (FIGO) standards, and the number of cases in Stage I amounted to 19 of the total cases (61.3%) and the cases in Stage II were 12 (38.7%) (Table 1). Postoperative surgical pathological staging was based on the standards of FIGO 1988, the number of cases in different stages showed in the following: 5 in Stage IA (16.1%), 8 in Stage IB (25.8%), 4 in Stage IC (12.9%), 5 in Stage IIA (16.1%), 4 in Stage IIB (12.9%), 2 in Stage IIIA (6.5%), and 3 in Stage IIIC (9.7%) (Table 2).

All cases underwent pelvic and abdominal CT or MRI examinations before surgery, but no enlarged lymph nodes were found.

Mode of surgery
Of the 31 patients, a total hysterectomy and bilateral salpingo-oophorectomy, was performed in 7 (22.6%), subradical hysterectomy in 18 (58.1%), and radical hysterectomy in 6 (19.4%). A concurrent pelvic lymphadenectomy was performed in 27 patients (87.1%) and a pelvic node sampling in 4 (12.9%). In 7 of the 31 patients (22.6%), a para-aortic lymph node sampling was performed.

SLN identification
At the time of explorative laparotomy, the uterus was exposed and the fallopian tubes were occluded with hemoclips and 1% methylene blue dye (MB) was injected into the subserosal myometrium of corpus uteri (Fig.1). As the 19 patients in Stage I having limited lesion confined to the uterus, the injection sites were at the most superior portion, the anterior midline and the posterior midline of the fundus. Four milliliters methylene blue dye was entirely injected into the 3 sites mentioned above. For the 12 patients in Stage II with cervical involvement, 2 ml of dye was injected into the bilateral uterus isthmus. Local compression and electronic coagulation were used to prevent dye spillage. The retroperitoneal spaces were opened right after dye injection to expose the lymph drainage region. Blue lymphatic channels were dissected to identify the dye-contained lymph nodes (SLN), these nodes were removed and sent to the pathology as individual specimens. The number and position of the SLN were recorded carefully. After this procedure, the formerly planned surgery was performed.

Pathological examination
Routine H&E staining examination for the SLN and other nodal samples was conducted separately, and the results were compared.

Results
No dye-contained lymphatics were found in the first 4 patients (12.9%) for the spillage of methylene blue. Thereafter, slow bolus injection, locally pressing and electronic coagulation were used to help preventing dye spillage. In the other 27 patients (87.1%), the blue “flash” initially occurred on the uterus surface (Fig.1), and then the blue dye diffused to the infundibulopelvic ligaments. The lymphatic vessels in the infundibulopelvic ligaments were stained In 22 of the 27 cases mentioned above, there were blue-stained lymphatic vessels in the parametrial tissues (Fig.2). The blue-stained vessels were also seen on the surface of the round ligament in 17 of the total patients.

SLN was not found in 4 of the 27 patients with dye uptake in lymphatic vessel (14.8%), and para-aortic nodal sampling was not performed in these 4 patients. SLNs were identified in the other 23 patients (85.2%). Except for 1 patient whose SLN was located at the right inferior para-aortic area (between the inferior mesenteric artery and the aortic bifurcation), all SLNs of the other 22 patients were distributed to the pelvic cavity, and