Videoscopic Inguinal-iliac-obturator Lymph-node Dissection: New Videoscopic Technique for Regional Lymphadenectomy in Patients with Melanoma

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Abstract. Aim: The feasibility of videoscopic inguinal-iliac-obturator lymphadenectomy (VIOL) was assessed in 20 patients with melanoma and compared with a retrospective sample of 24 patients undergoing standard ‘open’ technique (IIOL). Results: No postoperative death occurred; the mean operative time was lower in the IIOL series (190 min vs. 302 min) but the quality of life was greatly improved in the VIOL group thanks to earlier bladder catheter removal, no nasogastric suction, less pain, earlier mobilization, lower in-hospital stay, and earlier resumption of daily activities (27.6 vs. 83.2 days, p<0.001). Six out of 20 patients in the IIOL series had wound complications (30%) as compared to one in the VIOL series (4%) (p=0.035). Conclusion: Staging and therapeutic efficacy of VIOL were similar to the standard technique; the longer operative time of VIOL was greatly compensated by less pain, lower wound complication rate, and earlier discharge from hospital and recovery of daily activities.

An estimated 6,000 new case/year of melanoma are diagnosed in Italy, and the incidence of the disease is increasing (1). As with nearly all malignancies, the outcome of melanoma initially depends on the stage at presentation (2). It is estimated that 82-85% of patients with melanoma present with localized disease, 10-13% with regional disease, and 2-5% with distant metastatic disease.

Inguinal-iliac-obturator lymphadenectomy (IIOL) is the procedure of choice for patients with regional lymph-node metastases of melanoma in the lower extremities or lower part of the trunk (2). As recommended by the National Comprehensive Cancer Network 2016, IIOL is indicated for the treatment of clinically positive superficial nodes or three or more positive superficial nodes, if pelvic computed tomographic scan is positive, or if Cloquet’s node is positive (3). Patients with stage III disease after a positive sentinel lymph node biopsy should be offered a complete lymph node dissection of the involved nodal basin because studies have revealed additional metastases in non-sentinel node in 15-20% of them (4, 5). Excision of pelvic lymph-node metastases is reported to yield a 5-year survival rate of 0-35%. Recurrence within the pelvis occurs in 9-18% of patients after superficial lymph-node dissection, and in fewer than 5% after complete IIOL (2).

Currently, this surgery is performed using the traditional ‘open’ access, that is through a single long surgical wound or by means of two separate incisions: in the inguinal-femoral area to access the inguinal nodes, and in the iliac fossa for iliac-obturator nodes. The open technique involves the preparation of the skin flaps, often the sectioning of the inguinal ligament, muscular fascia and muscle of the lower abdominal wall in order to gain access to the lymph nodes. This technique is hampered by relatively high postoperative morbidity, ranging from 19% to 77% (6). As a matter of fact, lymphatic fistula occurs in 33% of patients, whereas seroma formation occurs up to 34% of patients; the mean in-hospital stay is approximately 15 (range=3-41) days. Relevant leg edema is observed in 13% of patients. The mortality rate is reported to be 1%; 30-day wound complications are reported in 77.4% of patients. Risk factors for complications include: body mass index ≥30 kg/m², advanced nodal disease, diabetes, and smoking (7, 8).

Based on these data, we assessed the feasibility of a new surgical approach, namely videoscopic IIOL (VIOL), and the clinical findings were compared with our historical experience with the open technique (IIOL).
Patients and Methods

The clinical data of 20 consecutive patients undergoing IIOL from July 2013 to September 2015 at the Surgical Oncology Unit of the Comprehensive Cancer Center San Martino Hospital - National Cancer Institute of Genoa, Italy, were compared with 24 consecutive patients with melanoma eligible for VIIOL. Patients were selected for surgery when a positive sentinel lymph node biopsy, clinical or radiological findings confirmed metastasis in inguinal lymph nodes. Absolute contraindications for VIIOL were similar to other laparoscopy contraindications. (9) Moreover, patients were excluded when co-morbidities contraindicated VIOL, such as severe respiratory failure or severe cardiac failure.

The following parameters were assessed: length of the operation, adequacy of lymph-node retrieval (lymph-node number, lymph-node ratio), incidence of postoperative complications, length of hospital stay, and time-interval to resumption of normal activities of daily life that was assessed at follow-up examinations.

Surgical technique. The VIIOL includes two surgical steps: firstly, the video-laparoscopic iliac-obturators lymph-node dissection is performed and videoscopic inguinal lymph node dissection is then accomplished. The technique described by Picciotto et al. for the approach to the iliac-obturators lymph nodes was adapted (10). The laparoscopic procedure was performed by means of three/four ports: one 10 mm port for the umbilical camera; a second 10 mm sovrapubic operative port; a third 5 mm operative port on the pararectal umbilical line, and a fourth optional contralateral pararectal umbilical 5 mm port. The anatomical boundaries of the limited template included the genito-femoral nerve laterally, the obliterated umbilical artery medially, the pubic bone distally, and the bifurcation of the common iliac artery proximally.

The procedure is performed under general anaesthesia. The patient is placed in the supine position with the pelvis slightly extended on a split-leg table. Prophylactic antibiotics are administered, and a Foley catheter is placed to empty the bladder; a transperitoneal 4 port technique is used.

The patient is tilted 30 degrees up on the pathological side in the 30-degree Trendelenburg head-down position. The lateral border of dissection is developed along the genito-femoral nerve by dividing the fibro-areolar tissue and exposing the ilio-psaous muscle. The lymphatic tissue packet is completely lifted en bloc off the surface of the ilio-psaous muscle and swept medially. Tissue anterior to the external iliac artery and vein is then individually split longitudinally, skeletonizing the two vessels circumferentially, using monopolar, bipolar, ultrasound devices (Figure 1). It should be noted that the external iliac vein typically appears flat at standard (15 mmHg) pneumo-peritoneum pressure; pneumo-peritoneum pressure can be reduced to 5 mmHg in order to allow re-distension of the vein to ease its identification.

The bifurcation of the common iliac arteries represents the proximal border. The hypogastric artery is carefully mobilized in order to avoid injury to the internal iliac vein. The released packet is rolled medially on the back side of the mobilized external iliac artery and vein, delivering it into the pelvis. The dissection along the medial aspect of the packet allows the identification of the obturator nerve (Figure 2). Distally, lymphatic vessels caudal to the Cloquet’s node are clipped and transected. Care is taken to avoid any spillage of cancer cells from enlarged lymph node(s) in order to prevent local seeding, so that the entire specimen is immediately placed in an Endo-Catch bag. The procedure is completed by peritoneal repair with a running suture and by placing a 15-G fluted drain through the lateral 5 mm port site.

The videoscopicinguinal-femoral dissection technique was adapted from the original technique described in patients with genito-urinary malignancies (6, 11).

The surgeon is positioned between the patient’s legs with the assistant standing outside the operative limb. A three-incision technique is used, with the first 10 mm port placed 3 cm distally to the apex of the femoral triangle. A scalpel is used to incise the skin and sharply dissect down through Camper and Scarpa’s fascias. A space similar to the one created in the open procedure is then developed by blunt-finger dissection, extending out 5 cm on each side from the incision. Initially, the space is insufflated up to 15 mmHg and, under direct visualization with a 30-degree scope, 10 mm and 5 mm short bladeless trocars are positioned 3 cm outside of the medial and lateral boundaries of the previously delineated femoral triangle.

Ultrasound shears are then used to complete the definition of the anterior working space between the fibro-adipose node-containing packet and the superficial tissue. At this time, the pressure is reduced to 8 mmHg to prevent end-tidal CO₂ elevation. The saphenous vein is readily identified within the apex of the femoral triangle, closed with clips and divided with an ultrasonic device.

Anatomical boundaries include: the sartorius muscle, laterally; the abductor muscle, medially; the external oblique fascia and inguinal ligament, proximally, and the apex of femoral triangle, distally (Figure 3). Careful dissection within the femoral triangle enables the identification of the femoral artery pulse as well as the medial femoral vein. An endoscopic linear cutting stapler with a vascular load, or vascular clips, is then used to transect the vein at the sapheno-femoral junction (Figure 4). The nodal packet is withdrawn in a laparoscopic specimen bag through the apical port by enlarging the skin incision to extract the specimen when necessary.

At the end of inguinal lymphadenectomy, by means of the 30-degree camera introduced under the inguinal ligament, the previously skeletonized femoral-iliac vessels are checked in order to verify the accuracy of the laparoscopic lymphadenectomy, by removing residual pathological lymph nodes: when residual pathological lymph nodes are found, once the internal circumflex vessels, internal pudendal vessels and, if necessary, inferior deep epigastric vessels are isolated and transected, those nodes are easily removed avoiding the transection of the inguinal ligament.

The procedure is completed by placing a 18-G fluted drain through the medial port site. A nasogastric tube is never inserted; postoperative pain is always managed with non-steroidal anti-inflammatory drugs. Patients are given a regular diet and encouraged to walk on the first day after the surgery.

Statistical analysis included the mean, standard deviation, and mean standard error for numerical variables; continuous variables were analyzed with a two-tailed Fisher’s exact test, and a value of \( p < 0.05 \) was considered statistically significant.

Results

Overall, 20 patients underwent open IIOL and 24 patients VIIOL. Seventeen (85%) primary cutaneous melanomas were located in the lower extremities, and three (15%) in the trunk. In the VIIOL series, 14 patients (58%) were male and 10 (42%) female; the mean age was 60 years (range=32-86
years). Nineteen (79%) primary melanomas were located in the lower extremities, and five (20%) in the trunk. The clinical and histological features of patients are reported in Table I. The median length of follow-up was 42.5 months (range=4-171 months) after IIOL, and 16 months (range=3-29 months) for VIIOL.

The surgical procedure was well tolerated in both series, with no intraoperative or 30-day operative death. The mean length of the operation was 190 min vs. 302 min with IIOL and VIIOL, respectively; no conversion from videoscopic to open surgery was required.

In the VIIOL group, the quality of life was greatly improved thanks to the earlier postoperative removal of the bladder catheter, and by avoiding use of a nasogastric tube. Moreover, pain was moderate and always managed with minor analgesic (1,500 paracetamol mg/day) because no abdominal muscle or fascia transection was performed (excluding the 1-cm port incision). Patients were usually able to walk on the first postoperative day, and bowel movements occurred within 2 days of surgery.

The mean in-hospital stay was 6 (range=4-8) and 2 (range=1-3) days in the IIOL and VIIOL series, respectively. There were six wound complications (6/20; 30%) in the IIOL series, with four wound infections and two of wound dehiscence, as compared to one wound infection in the VIIOL series (1/24; 4%) \((p=0.035;\) two-tailed Fisher’s exact test). Lymphatic fistula occurred in 13% and 8% in the IIOL and VIIOL series, whereas inguinal seroma resulted in 20% and 12.5%, respectively. No port-site recurrence occurred. Patients resumed normal daily and working activities on average after 83.2 days in those who underwent IIOL and after 27.6 days \((p<0.001)\) in patients treated with VIIOL.
Regarding pathological staging, an average removal of 15 lymph nodes was reported in the IIOL series, while in the VIOL series, an average of 24 lymph nodes (range=8-38) were removed: 14 (range=8-23) pelvic lymph nodes, and 10 (range=4-25) inguinal lymph nodes.

Discussion

Even with proper perioperative and precise wound care management, almost one out of three patients undergoing radical groin-iliac-obturator lymphadenectomy has postoperative complications requiring medical or interventional treatment (6). Furthermore, literature data report an average in-hospital stay of approximately 15 days (range=3-41) and a median postoperative morbidity of 4 months (range=1.5-2.4 months) (7).

In our experience, patients in the VIOL series had a significant reduction of postoperative wound complication rate (4% vs. 30%; p=0.035); they were able to walk within 24 hours of the operation; their postoperative pain was moderate and easily managed with non-steroidal anti-inflammatory drugs; a nasogastric tube was never required, nor a central venous catheter, while the bladder catheter was removed soon after surgery. Finally, patients were usually discharged on the second postoperative day, although with a suction drain closed circuit, and they experienced a faster return to normal daily and working activities (27.6 days vs. 83.2 days in the VIOL and IIOL series, respectively). Hence, VIOL achieved an important reduction of the overall hospital costs, including the management in the Outpatient Clinic notwithstanding the longer duration of the operation (approximately 302 min vs. 190 min in the VIOL and IIOL series, respectively).

With regard to pathological staging, at least 10 to 15 lymph nodes are usually removed in the IIOL procedure. (12-18). Our historical control group had an average removal of 15 lymph nodes; in the current VIOL series, an average of 24 lymph nodes (range=8-38) were removed: 14 (range=8-23) pelvic lymph nodes, and 10 (range=4-25) inguinal lymph nodes. In other clinical series, traditional open ilio-inguinal radical dissection had a mean lymph-node retrieval of 21.5 lymph nodes (range=17-25), whereas inguinal dissection had an average of 11 (range=10-14) (19-22).

With regard to seroma formation and lymphatic fistula, a small but consistent advantage was appreciated in the VIOL series. No lymphedema occurred by the time of writing, likely due to the short follow-up interval. Therefore although VIOL has only a moderate advantage regarding lymphatic drainage and rate of lymphocele, it greatly reduces postoperative morbidity and complication rate with fewer postoperative wound complications, less postoperative pain, early discharge from the hospital and early recovery of daily and working activities.

Conclusion

The staging and therapeutic efficacy of transperitoneal VIOL was similar to the standard IIOL technique. The
operative time was quite acceptable although slightly longer, with no need for conversion to an open procedure, and no intraoperative complication. Moreover, VIIOL greatly reduced postoperative morbidity and the morbidity rate with fewer wound complications and postoperative pain, earlier discharge from the hospital and recovery of daily and working activities. From the technical standpoint, this technique is certainly convincing, is easy to learn by a surgeon with sufficient laparoscopic experience, and safe and reliable for the pathological staging of the disease.

Financial Disclosure

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