Omentoplasty and omentopexy post-pelvic lymph node dissection in surgical management of gynecological tumors

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Abstract—Background: Lymphadenectomy is staging procedure used in studied cases with pelvic gynaecological cancer, however, pelvic lymphadenectomy was associated with morbidities like lymphedema &
lymphocysts, Omentoplasty-omentumopexy has been utilized for prevention of lymphocysts that develop following pelvic lymphadenectomy. Patients and methods: This study is randomized controlled trial. 41 consecutive patients who were candidates for pelvic lymphadenectomy during radical hysterectomy for cancer cervix or endometrium were enrolled in this research & were allocated to 2 groups. Intervention group (Omentoplasty-Omentopexy (A) group) included twenty-one patients who underwent omentoplasty-omentumopexy. Control group (B) group included twenty patients who did not underwent omentoplasty-omentumopexy. The two groups were compared regarding development of lymphocyst. The study was done at National Cancer Institute, Cairo University from January 2020 to June 2021. Results: Forty-one consecutive studied cases were enrolled in this research from January 2020 to June 2021. With an average age 58.9±12.4 years, no statistically significant variation between the Omentoplasty-Omentopexy (A) & control group (B) regarding tumor site and histopathologic tumor types and tumor grade. No significant difference was found regarding primary tumor location either endometrial or cervical and its effect on post operative complications. A significant higher proportion of cyst complication was detected among control group (B) (60%) compared to 14.3% in the Omentoplasty-Omentopexy group (A) (p- value= 0.002). Conclusions: Omentoplasty and omentopexy is a feasible surgical technique which helps in decreasing post operative surgical complications following pelvic lymphadenectomy in surgical management of gynecological tumors.

Keywords—lymphocyst, pelvic lymphadenectomy, omenoplasty-omentumopexy.

Introduction

Pelvic lymphadenectomy is common surgical method of treating uterine cervical & endometrial carcinoma (1, 2). Lymphadenectomy is staging process used in cases of pelvic gynaecological cancer that have been studied. Presence of nodal involvement is poor prognostic factor that requires specific adjuvant treatments. Despite advancements in magnetic resonance imaging & positron-emission tomography for sensing lymph node metastasis, surgical excision of nodal metastasis is considered debulking process, & histopathological test of lymphadenectomy specimens is reliable way of determining if either node is implicated (3, 4). Even so, pelvic lymphadenectomy has been linked to complications like lymphedema and lymphocysts. Lymphocysts can occasionally cause severe complications like bacterial infection, urinary tract stenosis, & Because of their size & location, they cause pressure symptoms. (5)

Lymphocysts are lymph collections that form thin-walled cysts with & without septations. This could be due to incomplete lymphostasis, which causes postoperative lymph leakage in amounts too big for peritoneum to completely absorb. Excess lymph collects within cyst-like structures formed by node
expulsion & almost always appears within first year of surgery (6), despite the fact that postponed cases have been noted (7). All over researches, incidence of asymptomatic & symptomatic lymphocysts ranged from 0 percent to 58.5 percent (8, 9). There are various methods aimed at preventing complications associated with pelvic lymphadenectomy, like leaving retroperitoneum & vaginal vault open (10,11), closed-suction drainage (12), the omental J-flap (13,14) & administration of anticoagulants (15) have been tested. Omentoplasty-omentopexy has been used to cure lymphocysts that form after pelvic lymphadenectomy & renal transplantation (5-16).

Numerous researches looked at infracolic omentum’s role in prevention of lymphatic problems (8, 17, and 18), since omental tissue can capture fluids & has fenestrated capillaries, its framework allows for transfer of fluids & large molecules (18). Logmans et al. characterised omentoplasty-omentopexy in pilot study of twenty two women with stage I/IIa cervical cancer (8). Omental flaps were then sutured into the psoas muscle after being inserted into retroperitoneal space. Peritoneum was then used to cover omental flap. Goal of this study is to see how simple method omentoplasty-omentopexy affects avoiding complications following pelvic lymphadenectomy.

**Patients and Methods**

Study is a randomized controlled trial. 41 consecutive studied cases who were candidates for radical hysterectomy for cancer cervix or endometrium were enrolled in this research & were allocated to two groups. Intervention group (Omentoplasty-Omentopexy (A) group) included twenty-one patients who underwent omentoplasty-omentopexy. Control group (B) group included twenty patients who did not undergo omentoplasty-omentopexy. The two groups were compared regarding development of lymphocyst. The study was done at National Cancer Institute, Cairo University from January 2020 to June 2021. Purpose of this randomised controlled trial was to determine efficacy of omentoplasty-omentopexy after pelvic lymphadenectomy throughout radical hysterectomy in preventing postoperative problems such as lymphocysts. It was done at National Cancer Institute, Cairo University from January 2020 to June 2021.

Forty-one patients presenting with of cervical or endometrial cancer have been scheduled to undergo radical hysterectomy with bilateral pelvic lymphadenectomy. After informed written consent was taken, full history taking, and examination were done. Pre-operative investigations in the form of CT, MRI or PET-CT were performed. All patients underwent dilatation and curettage (D&C). Patients were scheduled for radical hysterectomy. Nine of the cervical cancer patients were initially treated with Concurrent chemoradiotherapy. The prescribed radiotherapy dose was 45Gy over 25 fractions with weekly Cisplatin. Surgery was performed within 3 to 6 weeks from the end of the external beam radiotherapy due to the ineligibility for brachytherapy. Patients were allocated to two groups. Intervention group (Omentoplasty-Omentopexy (A) group) included twenty-one patients who underwent omentoplasty-omentopexy. Control group (B) group included twenty patients who did not underwent omentoplasty-omentopexy.
Those studied cases were given general anaesthesia & epidural anaesthesia, as well as central venous line. A broad-spectrum antibiotic was administered intravenously just before anaesthesia induction & was continued postoperatively for seven days. Deep venous thrombosis was prevented by wearing elastic stockings. Patients with suspected intraoperative omental metastasis, peritoneal spread of the disease or too short infra-colic omentum were excluded from the study. At 2, 4, 12 month after surgery, studied cases were evaluated for presence of lymphocysts, intestinal problems, lymphedema, & severe complications associated with lymphocele, like infections & urinary tract stenosis. Every visit included imaging to determine size of lymphocysts & to rule out hydronephrosis. Lymphocysts were defined as any cystic creation larger than one centimetre in the area of pelvic lymph nodes like shown in the MRI image figure (1). And CT image figure (2).

Figure 1. T2 MRI revealed two bilateral lymphocysts are seen along the external iliac vessels on both sides measuring about 5.6x2.6 cm on left side and about 4.7x1.9 cm on right side post-pelvic lymphadenectomy during radical hysterectomy.

Figure 2. CT image revealed left side lymphocele along left external iliac vessels 3.2 x 2.8 cm post-pelvic lymphadenectomy during radical hysterectomy
Surgical technique
Lymphadenectomy

Standard pelvic lymphadenectomy had been performed, dissection of all lymph node groups along internal & external iliac vessels till bifurcation of common iliac artery, bilateral iliac vessels and obturator nerve were skeletonized as shown in (Figure. 3).

![Figure 3. Standard pelvic lymphadenectomy](image)

Omentoplasty and omentopexy

Bilateral omental flaps pedicled on the right and left gastroepiploic arteries were performed as shown in figure (4).

![Figure 4. Bilateral omental flap rising](image)

The flaps were brought down to the pelvic lymphadenectomy bed, allocated into retroperitoneal space & edges of flaps were fixed to psoas muscle as illustrated in figure (5).
Finally, the omental flap was covered with parietal peritoneum as shown in figure 6.

**Statistical methods**

SPSS win statistical package version was used to analyse the data. Means & standard deviations & median & range were used to summarise numerical data. Student t-test was used to compare numerical variety among 2 categories. Frequencies & percentages were used to show qualitative data. Chi-square experiment or Fisher's exact examination was used to show relationship among qualitative data. P-values less than or equal 0.05 were considered significant. 41 consecutive studied cases were enrolled in this research from January 2020 to June 2021. With an average age 58.9±12.4 years, with no significant variations between both groups regarding age (p-value= 0.345). Tumors were classified histopathologically as stated by World Health Organization (WHO, 2020) diagnostic criteria for pathological classification of female reproductive system tumors.
Table 1
Sociodemographic and tumor characteristics among the participants

<table>
<thead>
<tr>
<th></th>
<th>Total (n=41)</th>
<th>Omentoplasty and Omentopexy category (A) (n= 21)</th>
<th>Control category (B) (n=20.0)</th>
<th>The P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Years old</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Mean ± SD*</td>
<td>58.9±12.4</td>
<td>57.1±12.1</td>
<td>60.8±12.6</td>
<td>0.345</td>
</tr>
<tr>
<td>Median (range)</td>
<td>62 (25-78)</td>
<td>58 (25-74)</td>
<td>64 (28-78)</td>
<td></td>
</tr>
<tr>
<td><strong>Tumor site</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cervix</td>
<td>9 (22.0%)</td>
<td>6 (28.6%)</td>
<td>3 (15.0%)</td>
<td>0.454</td>
</tr>
<tr>
<td>Endometrial</td>
<td>32 (78.0%)</td>
<td>15 (71.4%)</td>
<td>17 (85.0%)</td>
<td></td>
</tr>
<tr>
<td><strong>Histologic tumor type</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adenocarcinoma</td>
<td>27 (65.9%)</td>
<td>12 (57.1%)</td>
<td>15 (75.0%)</td>
<td>0.228</td>
</tr>
<tr>
<td>Others**</td>
<td>14 (34.1%)</td>
<td>9 (42.9%)</td>
<td>5 (25%)</td>
<td></td>
</tr>
<tr>
<td><strong>Grade</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1&amp;2</td>
<td>30 (73.2%)</td>
<td>19 (90.5%)</td>
<td>11 (55.0%)</td>
<td>0.010</td>
</tr>
<tr>
<td>3</td>
<td>11 (26.8%)</td>
<td>2 (9.5%)</td>
<td>9 (45.0%)</td>
<td></td>
</tr>
<tr>
<td><strong>Lymph node</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Negative</td>
<td>28 (68.3%)</td>
<td>15 (71.4%)</td>
<td>13 (65.0%)</td>
<td>0.685</td>
</tr>
<tr>
<td>Positive</td>
<td>13 (31.7%)</td>
<td>6 (28.6%)</td>
<td>7 (35.0%)</td>
<td></td>
</tr>
</tbody>
</table>

*SD= Standard deviation, ** other histologic tumor types included squamous cell carcinoma, leiomyosarcoma, Mullerian tumor, clear cell carcinoma, undifferentiated carcinoma and carcinosarcoma.

Endometrial cancer accounted for more than three fourth of the participants (78.0%). The most frequently encountered tumor type was adenocarcinoma (cervical adenocarcinoma and endometrioid adenocarcinoma) in 65.9% of patients. No statistically important variation between Omentoplasty-Omentopexy (A) & control group (B) regarding tumor site and tumor type (p-value 0.454, 0.228 respectively). Grade 1 & 2 occurs in 73.2 % of the patients. The Omentoplasty-omentopexy group has higher lower grades (grade 1&2) than control group (90.5% versus 55%, p-value 0.010). More than two third of the participants (68.3%) have negative lymph nodes with no significant differences between the Omentoplasty-omentopexy group (p-value 0.685) as presented in table 1.

Table 2
Treatment and complications among the participants

<table>
<thead>
<tr>
<th></th>
<th>Total (n=41)</th>
<th>Omentoplasty and Omentopexy category (A) (n= 21)</th>
<th>Control category (B) (n=20.0)</th>
<th>The P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neoadjuvant treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes (concurrent chemo-irradiation)</td>
<td>33 (80.5%)</td>
<td>17 (81.0%)</td>
<td>16 (80.0%)</td>
<td>0.623</td>
</tr>
<tr>
<td></td>
<td>8 (19.5%)</td>
<td>4 (19.0%)</td>
<td>4 (20.0%)</td>
<td></td>
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</tbody>
</table>
There was no important variation between post operative complication rate & neoadjuvant therapy in both groups, Neoadjuvant chemo irradiation was received in six of the nine cervical cancer patients, almost all patients (90.2%) were operated via conventional open surgery, while ten percent of patients were operated via minimally invasive laparoscopic approach presented in table 2. Significant higher proportion of cyst complications among control group (B) (60%) compared to 14.3% in the Omentoplasty-Omentopexy group (A) (p-value= 0.002) as shown in figure 7.

---no p-value due to small number

<table>
<thead>
<tr>
<th>Operation</th>
<th>Total (n=41)</th>
<th>No Cyst (n=26)</th>
<th>Cyst (n=15)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tumor site</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cervix</td>
<td>9</td>
<td>8 (88.9%)</td>
<td>1 (11.1%)</td>
<td>0.197</td>
</tr>
<tr>
<td>Endometrial</td>
<td>32</td>
<td>18 (56.3%)</td>
<td>14 (43.8%)</td>
<td></td>
</tr>
<tr>
<td>Histologic tumor type</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adenocarcinoma</td>
<td>27</td>
<td>16 (59.3%)</td>
<td>11 (40.7%)</td>
<td>0.443</td>
</tr>
<tr>
<td>Others**</td>
<td>14</td>
<td>10 (71.4%)</td>
<td>4 (28.6%)</td>
<td></td>
</tr>
<tr>
<td>Grade</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1&amp;2</td>
<td>30</td>
<td>19 (63.3%)</td>
<td>11 (36.7%)</td>
<td>1.000</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
<td>7 (63.6%)</td>
<td>4 (36.4%)</td>
<td></td>
</tr>
</tbody>
</table>

Figure 7. Cyst complication among Omentoplasty-Omentopexy group and control group

Table 3
Relation between sociodemographic, tumor characters, treatment, and cyst formation
No statistically significant differences were found regarding primary tumor location and its effect on post operative complications (p=0.197). On comparing tumor pathological types (p= 0.443), tumor grades (p=1.00) and lymph node statuses (p =0.498), we found no statistically significant differences regarding incidence of lymphocyst formation. Again on comparing patient received neoadjuvant treatment versus upfront surgery (p=0.687), there was no statistically important variation regarding incidence of lymphocyst formation. Finally, the correlation between cyst formation and type of surgery (open versus laparoscopic) cannot be assessed due to small number of patients operated on via laparoscopic approach (4 patients only). None of the patients who developed lymphocysts or lymphedema was complicated with 2ry infection. Three studied cases had postoperative paralytic ileus in both groups which who managed conservatively.

Discussion

Rate of postoperative pelvic lymphadenectomy problems like lymphocyst differs between 0.4 & 58 percent (9,19,20,21,22 ,23 ,24). This broad disclosed variation is most likely leading to differences in surgical techniques (open, laparoscopy, & robotic surgery) & recognition modalities (U/S, CT, & MRI) (25).and This is probably because of the different ways of pelvic lymph node dissection. In this research same standard lymphadenectomy procedure was performed in all 41 patients, Significant higher proportion of cyst complication among control group (B) (60%) which align with historical control group done by Tanaka et al, in 101 studied cases who studied incidences of lymphedema, Clinically palpable lymphocysts & major cases like thrombosis, infection, & urinary tract compression were found in 68percent, 27percent, & 22percent of patients, respectively (15) compared to 14.3% in Omentoplasty-Omentopexy group (A) with (p- value= 0.002), under rationale that omentum can absorb fluids.

omentum has fenestrated capillaries that allow fluids & large molecules to pass through (22). They have good functional potential & are essential in antibacterial defence. This could be due to lymphatics of omentum, which form sensitive, interconnected network that starts as blind endothelial sacculations (forty-
sixty pm) within milky spots. They join to form collecting channels with valves. They are found on lateral side of trabeculae & unoccupied into right subpyloric lymph nodes & left splenic nodes (23). The majority of patients (85.7%) there were no postoperative problems in women who had omentoplasty & omentopexy. Lymphocysts occurred in 3 patients (14.3%), who were asymptomatic and discovered radiologically during follow up. On the other hand, in group (B) 12 patients suffered from lymphocyst formation with variable symptoms like urinary bladder compression, mild to moderate hydronephrosis, loin and pelvic pain. (p-value= 0.002).

Regardless of the fact that lymphocysts are generally asymptomatic, they have negative impact on strategy & may cause anxiety in surgeons & studied cases. (19,28), Hydronephrosis related to cyst formation observed in group (B), mild to moderate Hydronephrosis was observed in 3 patients, resolved by time (6 months) in 2 patients and the last one need interventional radiological aspiration (6cm). This study found no infectious problems associated with lymphocysts & lymphedema. At both groups, 3 studied cases developed postoperative paralytic ileus & were treated conservatively. Relationship between this intestinal problem & omentoplasty & omentopexy was unclear, which could be because of omentum manipulation. Lymphadenectomy extent, gynaecological cancer type, number of positive lymph nodes, & surgery form have all been considered as risk factors for lymphocyst structure (open, laparoscopy, & robotic surgery) (19,22,24,28). Even so, data on these risk factors are contentious, & just few potential clinical trials have looked into them.

Kim et al. (22) indicated that studied cases with cervical cancer had highest rate of lymphocyst formation, whereas Zikan et al. (24). On the other hand, we found as no significant differences regarding cancer site endometrial or cervical (p=0.197). type nor the pathological grade with p value (= 0.443-=1.00). Lymphocyst varies from 0.4 to 58% (9,19,20,21,22,23,24). This widely reported variability is most likely because of the inclusion of various surgical techniques (open, laparoscopy, & robotic surgery). In our study, the correlation between lymphocyst formation and type of surgery technique (open versus laparoscopic) cannot be assessed due to small number patients operated on via laparoscopic approach (4 patients only). Petru et al. and (23) Zikan et al. (24) discovered link among positive lymph nodes & occurrence of lymphocysts Achouri et al. (28) there was no link found among positive lymph nodes & the creation of lymphocysts. We discovered no link between lymph node status & lymphocyst formation (p =0.498).

Data on relationship between neoadjuvant chemoradiotherapy & lymphocyst formation is debatable (19, 22, 24, and 28). Kim et al. (22) showed significantly greater occurrence of lymphocysts in RT studied cases, meanwhile Zikan et al. (24) & Achouri et al. (28) There was no link found among RT & a higher likelihood of lymphocysts. This is consistent with current research, as no substantial relationship was found between neoadjuvant cure & the advancement of lymphocysts. Patsner B. (13) & Logmans et al. (14) omental J-flap has been shown to be useful & Avoiding lymphocysts & lymphedema is safe method. Strategy deviates from J-flap. Rather than splitting omental flap from hepatic flexure of transverse colon following ligation of right gastroepiploic artery, we
split infracolicomentum in half & performed omentoplasty so that omental flap could achieve pelvic floor. Suction drainage, omental flaps, & non-closure of retroperitoneum, open-vaginal vault, & Standard surgical strategies include use of power sources for lymphadenectomy & postoperative octreotide administration (19, 28). Have been proposed to minimise or remove existence of pelvic lymphadenectomy-related problems. Our omentoplasty & omentopexy method appears to be simple & safe procedure for lowering risk of problems following pelvic lymphadenectomy in surgical treatment of gynaecological tumours.

Conclusion

Omentoplasty and omentopexy is a feasible surgical technique which helps in decreasing post operative surgical complications following pelvic lymphadenectomy in surgical management of gynecological tumors. Further prospective randomized controlled trials are warranted with large sample size to ascertain its role in decreasing the post operative complications and improving the quality of life.

References


