Research Paper

Broad ligament leiomyoma in postoperative material – analysis of 17 cases

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ABSTRACT

Leiomyoma is the most common benign tumor of all uterine neoplasms. It is a non-epithelial mesenchymal benign monoclonal tumor formed by smooth muscle cells of the myoblasts or myometrium vascular wall, and the stroma built of fibrous connective tissue. Parauterine location of leiomyomas, that is, in the broad ligament is observed in <1% cases. They can develop in any area of the body where smooth muscles exist. The present study was conducted to analyze the cases of leiomyomas of the uterine broad ligament diagnosed postoperatively after gynecological operations. In the years 1998 to 2016, there were 17 cases of leiomyoma of the broad ligament detected after gynecological operations in the Department of Gynecology and Obstetrics at R Sz S in Radom. The analysis included the type of surgery performed, coexisting genital disorders including malignant tumors, age, body mass, BMI and parity. The collected clinical observations were compared with the material presented in case reports in the English-language literature. In the analyzed group, 29.4% women did not give birth. Concomitant malignancies of the genital organs were noted in 11.8% cases. Broad ligament leiomyomas are difficult to diagnose in the preoperative period. Surgical treatment limited only to myomectomy should be reserved for women who want to maintain fertility, do not consent to hysterectomy, or in cases when other circumstances prevent it.

Key words: Leiomyoma, diagnosis, myomectomy, gynecological operations.

INTRODUCTION

Leiomyoma is the most common benign tumor of all uterine neoplasms (Rajanna et al., 2013). It is a non-epithelial mesenchymal benign monoclonal tumor formed by smooth muscle cells of the myoblasts or myometrium vascular wall, and the stroma built of fibrous connective tissue (Auguściak-Duma and Sieroń, 2008). Parauterine location of leiomyomas, that is, in the broad ligament is observed in <1% cases (Mostafà and Abdelaziz, 2014; Bakari et al., 2015; Tsai, 2016). They can develop in any area of the body where smooth muscles exist (Kumar and Malhotra, 2008).

Broad ligament of the uterus is a transverse two-layered peritoneal fold that connects the sides of the uterus to the lateral walls and floor of the small pelvis. The space between the two layers of the broad ligament is filled with connective tissue composed of smooth muscle cells and conjugated fibers, nerves, uterine and vaginal venous plexus, lymph vessels, terminal section of the ureter, and round ligament of the uterus.

Epithelial tumors are the most common type localized in the broad ligament of the uterus (Preeti and Dinesh, 2014), and leiomyoma is the most frequent mesenchymal type (Bakari et al., 2015). Each leiomyoma, growing independently or in a group, originates from a single precursor cell in which primary mutation has occurred (Ligon and Morton, 2000). In addition, transforming growth factor beta (TGF-β) is thought to be involved in leiomyoma formation, via either inhibiting or stimulating tumor growth and its fibrosis. TGF-β also affects tumor microenvironment...
as an immunosuppressive or angiogenesis-stimulating agent (Luo et al., 2007; Laping et al., 2007). Also, BMP-1/mTLD subfamily proteins, that is, bone morphogenic protein and mammalian tolloid are important regulators of extracellular matrix (ECM) formation and production of prelecan which is a potent anti-angiogenic factor (Auguściak-Duma and Sieroń, 2008). Wołańska et al. (2012) report that extracellular matrix formation seems to be a stronger stimulant of fibroids than angiogenesis. The genetic basis is one of the identified risk factors for this disease (Stewart and Morton, 2006). In addition, a significant increase in the expression of vascular endothelial growth factor A (VEGF-A) has been observed in the patients with family history of leiomyoma (Chang et al., 2010). Cytogenetic abnormalities are found in approximately 40% of uterine leiomyomas. These include translocation, trisomy and deletion (Czapczak et al., 2011; Hodge et al., 2014).

Hoffman et al. (2004) suggest that deregulated apoptosis and proliferation due to genetic disorders are crucial for the formation of leiomyomas. The results of human in vitro tests indicate the involvement of mediating factors, such as cytokines and growth factors, which facilitate hormones affecting tumor growth. Estrogen and progesterone regulate the expression of cytokines and growth factors, and modify the activity of other transcription factors. Deregulated production of cytokines and growth factors is likely to increase the frequency of cell division, may enhance cell hypertrophy and extracellular matrix accumulation, or all these phenomena may occur simultaneously (Wołańska et al., 2012).

Symptoms and ailments caused by leiomyomas include abdominal discomfort due to pain and distension, menstrual disorders, dysmenorrhea, reproductive problems and postmenopausal uterine bleeding (Rajanna et al., 2013; Bakari et al., 2015; Preeti and Dinesh, 2014). The formation of leiomyomas in the broad ligament is often asymptomatic so they grow large. As a result, they can displace the uterus in the opposite direction and compress adjacent structures (‘mass effect’) so women experience specific ailments from the gastro-intestinal and/or urinary ways (Rajanna et al., 2013; Preeti and Dinesh, 2014; Khodry and Tamam, 2014). Compression of the urethra, bladder cervix or ureter can disturb urinary outflow and cause hydronephrosis (Rajanna et al., 2013; Khodry and Tamam, 2014).

As broad ligament leiomyomas occur rarely, diagnosis is particularly difficult (Jagtap et al., 2014). In the preoperative diagnosis and during the surgery itself, precise location of the ureteral run is important in the case of leiomyoma in the broad ligament. Pseudoleiomyoma connected with the lateral wall of the uterine body moves the ureter downwardly and sidewardly. In contrast, true leiomyoma can develop anywhere adjacent to the ureter which may pass over or under the leiomyoma or through its capsule (Parker, 2005). Preoperative tomography with contrast or urography can visualize the location of the ureter. Preoperative ureteral catheterization is also recommended (Chaudhari and Parulekar, 2015; Emerich, 2008). The present study included only true leiomyomas of the uterine broad ligament.

Objective

The purpose of study was to present cases of leiomyoma located in the uterine broad ligament detected in the postoperative material collected over a 19-year period.

MATERIALS AND METHODS

The review of medical records found 17 cases of broad ligament leiomyoma operated in the Department of Gynecology and Obstetrics R Sz S in Radom in 1998 - 2016. The patients were qualified for surgery on the basis of gynecological examination, ultrasonography (USG), computed tomography (CT), and histological examination of uterine scrapings. The final diagnosis was made at the Department of Pathomorphology of Radomski Specialist Hospital in Radom. The analyzed material included surgical reports, histopathological (diagnostic, ad hoc and final) results, history findings, hospital discharge documentation, laboratory results, and follow-up medical records from gynecological, obstetric, and oncological outpatient clinics.

The patients were divided into three groups depending on the extent of the surgery performed. Detailed information on individual cases is presented in Table 1. Table 2 shows information on the type and extent of surgeries performed. While Table 3 shows the age, body mass and BMI, parity, and the use of blood in the perioperative period.

The obtained results were compared with the data presented in recent English-language literature. Statistical calculations were carried out using Gretl program (shareware, free license). To determine statistical significance of the differences in the examined parameters in the groups of patients, ANOVA variance test was used. The dependencies between variables were further analyzed by Student’s t-tests for the equality of means to verify differences between the groups. Statistically significant differences were considered at p < 0.05.

RESULTS

Mean age of patients was 48.6 years, and in the examined groups it was respectively:

- MM (4 cases) - age range 34–43, mean age 39 years;
- MM + SAH (5 cases) – age range 43–49 years, mean age 46.4 years;
- MM + TAH and TVH (8 cases) – age range 45–68 years, mean age 54.8.

Since p values < 0.05 were noted only in the case of age,
<table>
<thead>
<tr>
<th>No</th>
<th>Year</th>
<th>Age</th>
<th>Side of tumor location</th>
<th>Preoperative Diagnosis. Body mass [kg] (BMI)</th>
<th>Surgery. Initial treatment</th>
<th>Histopathological diagnosis of the broad ligament leiomyoma. Dimension/diameter of myoma</th>
<th>Additional information. Histopathological diagnosis of concomitant diseases</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>2000</td>
<td>42</td>
<td>right</td>
<td>Myoma uteri 84 (31.23)</td>
<td>Laparotomy the transversal MM</td>
<td>Leiomyoma 50x40x40 mm</td>
<td>Cyst of ovary simple paraovarian; left. Haemorrhagic corpus luteum of the ovary; right.</td>
</tr>
<tr>
<td>2.</td>
<td>2003</td>
<td>53</td>
<td>right</td>
<td>Myomata uteri 75 (30.82)</td>
<td>Laparotomy median TAH+BSO. MM</td>
<td>Leiomyoma oedematosum hyalinisantia 200 mm.</td>
<td>Endometriosis superficialis et leiomyomatous partly hyalinisantia one leiomyoma with assault vessels in the body of the uterus. Superficial endometriosis.</td>
</tr>
<tr>
<td>3.</td>
<td>2003</td>
<td>48</td>
<td>left</td>
<td>Myomata uteri 67 (24.91)</td>
<td>Laparotomy the transversal SAH. MM</td>
<td>Leiomyoma oedematosum 60x50x50 mm.</td>
<td>Leiomyomatous intramural part cellular hyalinisantia adenomyosis of the uterus.</td>
</tr>
<tr>
<td>4.</td>
<td>2006</td>
<td>57</td>
<td>right</td>
<td>Adnexal tumor 80 (33.73)</td>
<td>Laparotomy median, TAH+BSO+OM. MM</td>
<td>Leiomyomatosis. Focus of leiomyomatosis</td>
<td>Thecoma ovarian torsion of the haemorrhagic necrosis (4x).</td>
</tr>
<tr>
<td>5.</td>
<td>2007</td>
<td>57</td>
<td>right</td>
<td>Malignant neoplasm uterus 74 (27.51)</td>
<td>Laparotomy median TAH+BSO+OM. MM</td>
<td>Leiomyoma hyalinisantia 50x50x45 mm</td>
<td>Adenocarcinoma endometrioides G 2. Metastases carcinomatoseae mucous cervical canal.</td>
</tr>
<tr>
<td>6.</td>
<td>2007</td>
<td>37</td>
<td>right</td>
<td>Myoma uteri 54 (24.00)</td>
<td>Laparotomy the transversal MM</td>
<td>Leiomyoma hyalinisantia 80x50x50 mm</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>2009</td>
<td>54</td>
<td>right</td>
<td>Myomata uteri 99 (39.66)</td>
<td>Laparotomy the transversal TAH+BSO. MM</td>
<td>Leiomyoma 120 mm</td>
<td>Leiomyomatous intramural and deep endometriosis.</td>
</tr>
<tr>
<td>8.</td>
<td>2009</td>
<td>43</td>
<td>left</td>
<td>Myoma uteri 61 (23.83)</td>
<td>Laparotomy the transversal MM</td>
<td>Leiomyoma oedematosum 110 mm</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>2010</td>
<td>43</td>
<td>left</td>
<td>Myomata uteri 70 (28.04)</td>
<td>Laparotomy the transversal SAH. MM</td>
<td>Leiomyoma 60 mm</td>
<td>Leiomyomatous intramural one cellular. Endometriosis.</td>
</tr>
<tr>
<td>10.</td>
<td>2010</td>
<td>55</td>
<td>left</td>
<td>Myomata uteri 68 (24.98)</td>
<td>Laparotomy median, lower TAH+BSO. MM</td>
<td>Leiomyoma 150x140x130 mm</td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>2011</td>
<td>44</td>
<td>left</td>
<td>Myoma uteri 78 (26.99)</td>
<td>Laparotomy the transversal SAH. MM</td>
<td>Leiomyoma 110 mm</td>
<td>Leiomyoma intramural.</td>
</tr>
</tbody>
</table>
Table 1: Cases of leiomyoma in the broad ligament (N = 17).

<table>
<thead>
<tr>
<th>Case</th>
<th>Year</th>
<th>Age</th>
<th>Side</th>
<th>Lesion Details</th>
<th>Surgery Details</th>
<th>Lesion Size</th>
<th>Lesion Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.</td>
<td>2012</td>
<td>48</td>
<td>left</td>
<td>Myoma uteri 95 (37.11)</td>
<td>Laparotomy the transversal SAH. MM</td>
<td>Leiomyoma</td>
<td>80x60x50 mm</td>
</tr>
<tr>
<td>14.</td>
<td>2013</td>
<td>34</td>
<td>right</td>
<td>Myoma uteri 58 (21.30)</td>
<td>Laparotomy the transversal MM</td>
<td>Leiomyoma</td>
<td>70x70x65 mm</td>
</tr>
<tr>
<td>15.</td>
<td>2013</td>
<td>68</td>
<td>right</td>
<td>Uterine prolapse total 65 (23.88)</td>
<td>TVH. MM (3)</td>
<td>Leiomyoma (3)</td>
<td>10, 15, 23 mm</td>
</tr>
<tr>
<td>16.</td>
<td>2014</td>
<td>49</td>
<td>left</td>
<td>Myoma uteri 63 (21.80)</td>
<td>Laparotomy the transversal SAH+BS. MM</td>
<td>Leiomyoma</td>
<td>15x10x10 mm</td>
</tr>
<tr>
<td>17.</td>
<td>2016</td>
<td>45</td>
<td>left</td>
<td>Myomata uteri 70 (28.04)</td>
<td>Laparotomy the transversal TAH+BS. MM</td>
<td>Leiomyoma</td>
<td>Intramural leiomyomata.</td>
</tr>
</tbody>
</table>

TAH - Total abdominal hysterectomy, TVH - Total vaginal hysterectomy, SAH - Subtotal abdominal hysterectomy, MM – Myomectomy (Enucleation / Excision) of broad ligament leiomyoma, BSO - Bilateral salpingo-oophorectomy, BS - Bilateral tubal excision, PLN - Pelvic lymphadenectomy, OM – Omentectomy.

Table 2: Surgeries performed in patients with broad ligament leiomyomas (N=17).

<table>
<thead>
<tr>
<th>Type of surgery</th>
<th>Laparotomy median</th>
<th>Laparotomy median inf.</th>
<th>Laparotomy transversa</th>
<th>TVH</th>
<th>BSO</th>
<th>BS</th>
<th>PLN</th>
<th>OM</th>
<th>MM</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MM+TAH / TVH</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>8</td>
<td>8 (29.4)</td>
</tr>
<tr>
<td>MM+SAH</td>
<td>5</td>
<td>4</td>
<td>1.5</td>
<td>5</td>
<td>5</td>
<td>5</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>5 (47.1)</td>
</tr>
<tr>
<td>MM</td>
<td>4</td>
<td></td>
<td></td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4 (23.5)</td>
</tr>
<tr>
<td>Total - 17</td>
<td>3</td>
<td>2</td>
<td>11</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>17</td>
<td>17 (100)</td>
</tr>
</tbody>
</table>

TAH - Total abdominal hysterectomy, TVH - Total vaginal hysterectomy, SAH - Subtotal abdominal hysterectomy, MM – Myomectomy broad ligament leiomyoma, BSO - Bilateral salpingo-oophorectomy, BS - Bilateral salpingotomy, PLN - Pelvic lymphadenectomy, OM – Omentectomy.

A statistically significant difference was observed between the groups. In the group of 12 women who gave birth, mean number of deliveries was 2.5; and in particular groups 1.7 - 2.6 (Table 3). The types of operations performed in three groups depending on the extent of the operation are shown in Table 2. Histopathological results of leiomyomas in the broad ligament and other genital organs removed during surgery are shown in Table 1.

Histopathologically, removed tumors were identified as leiomyoma (11 cases) and leiomyomatosis parametri (1 case). The remaining cases were: leiomyoma oedematous (2 cases), leiomyoma oedematous hyalinisans (1 case), and leiomyoma hyalinisans (2 cases).

Among 13 patients in whom SAH and TAH/TVH were performed, 4 cases of leiomyoma were found, including 1 case of malignancy in the uterine cervix, numerous uterine...
fibroids (7 cases) including 1 invading the vessels of the uterine body, and 1 leiomyoma cellular (LC). Besides, there was 1 case of leiomyomatosis partim cellularia with adenomyosis of the uterine body, and 1 case of intravenous leiomyomatosis, a very rare type of fibroid, detected in the uterine body.

Malignant tumor of the uterine cervix was found in one case. Other types included ovarian folliculoma and left peritubal cyst. The necessity of transfusion of packed red blood cells (PRBCs) occurred in three (17.6%) operated women in groups with hysterectomy and amputation of the uterine body.

**DISCUSSION**

Preoperative diagnosis of leiomyoma in the uterine broad ligament is difficult due to various reasons. The problem is rare. Various degenerations develop within tumors that grow very large. Leiomyomas often coexist with other tumors of the uterus and adnexa. Furthermore, in many cases, the extent of imaging diagnostics is incomplete.

Since broad ligament leiomyoma is in fact extremely rare, it is not always considered, and that poses additional diagnostic difficulty (Jagtap et al., 2014). It is not uncommon to initially diagnose tumors detected in this location as ovarian tumors (Yadav et al., 2017). The majority of published reports discuss cases of leiomyomas that were preoperatively diagnosed as adnexal tumors (Nayki et al., 2014). In the presented material, broad ligament leiomyoma was suspected only in one case.

Broad ligament leiomyomas often reach large size and weight of 3,000 - 13,000 g as their formation is asymptomatic (Nayki et al., 2014; Godbole et al., 2012). In the examined material, the largest tumor had a diameter of about 20 cm.

Disordered blood supply caused by vascular insufficiency is another cause of retrograde changes, e.g. various types of degeneration as well as foci of necrosis. The type and development of retrograde changes depends on the rate of leiomyoma ischemia (Yuel and Kaur, 2006). Cystic degeneration as a consequence of leiomyoma is a rare complication and makes up 4% of all degenerative cases. This is another reason why clinical diagnosis and imaging of broad ligament leiomyoma is difficult (Masood et al., 2014; Low and Chong, 2004; Bansal and Garg, 2014).

The review of our material showed two cases (11.8%) of edematous leiomyoma in the broad ligament, two cases (11.8%) of hyalinized leiomyoma, and one case (5.9%) of leiomyoma with edema and hyalinization. Also, other authors observed various retrograde changes, such as hyalinization and mucoid foci (Jagtap et al., 2014), areas of cysts and mucoid degenerations (Khodry and Tamam, 2014; Sharma et al., 2016), hyaline degeneration (Soliman et al., 2011), cystic degeneration (Khodry and Tamam, 2014; Nayki et al., 2014; Masood et al., 2014), mucoid degeneration (Godbole et al., 2012; Yuel and Kaur, 2006), foci of necrosis and calcium salt deposits (Rajanna et al., 2013).

Moreover, tumors affecting other genital organs, concomitant to leiomyomas of the broad ligament, especially uterine leiomyomas, can distort pelvic morphology, and additionally make preoperative diagnostics more difficult (Rajanna et al., 2013; Bakari et al., 2015; Preeti and Dinesh, 2014; Jagtap et al., 2014; Masood et al., 2014; Bansal and Garg, 2014).

Transformation of broad ligament leiomyoma into leiomyosarcoma is rare. In the literature, the risk of this type of transformation is assessed as 0.1 - 0.8% (Rajanna et al., 2013; Soliman et al., 2011). Our material did not reveal such cases.

Imaging techniques such as USG, CT and MRI are essential in the preoperative diagnosis of which MRI is the most useful (Fasih et al., 2008). Ultrasonography can detect the areas of different echogenicity depending on the degree of degeneration, fibrosis, and calcification. Transvaginal ultrasonography allows visualization of the uterus and ovaries independent of parauterine leiomyoma. MRI can visualize this condition even more precisely. On T1-dependent images, leiomyomas produce low-signal intensity similar to the uterine muscle (Jeong, 2014). Leiomyomas with degenerative areas and mucoid necrosis may be seen as areas of high-signal intensity on T2 dependent images.

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**Table 3: Patients’ characteristics.**

<table>
<thead>
<tr>
<th>Type of surgery</th>
<th>Parameter</th>
<th>Age (range)</th>
<th>Body weight (range)</th>
<th>BMI (range)</th>
<th>Patients who did not deliver (n)</th>
<th>Deliveries (mean)</th>
<th>Miscarriage (n)</th>
<th>Use of blood</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MM+TAH / TVH</td>
<td>Age</td>
<td>54.8 (45-68)</td>
<td>74.1 (62-99)</td>
<td>28.96 (39.66-23.05)</td>
<td>4</td>
<td>4 (2.5)</td>
<td>1</td>
<td>2 x 2 U</td>
<td>8 (47.1)</td>
</tr>
<tr>
<td>MM+SAH</td>
<td></td>
<td>46.4 (43-49)</td>
<td>74.6 (63-95)</td>
<td>27.77 (37.11-21.8)</td>
<td>0</td>
<td>5 (2.6)</td>
<td>0</td>
<td>1 x 2 U</td>
<td>5 (29.4)</td>
</tr>
<tr>
<td>MM</td>
<td></td>
<td>39.0 (34-43)</td>
<td>64.3 (54-84)</td>
<td>25.51 (21.3-31.23)</td>
<td>1</td>
<td>3 (1.7)</td>
<td>1</td>
<td></td>
<td>4 (23.5)</td>
</tr>
<tr>
<td>Total – 17</td>
<td></td>
<td>48.6 (34-68)</td>
<td>71.9 (54-99)</td>
<td>27.7 (21.3-31.23)</td>
<td>5 (29.4%)</td>
<td>12 (70.6%)</td>
<td>2</td>
<td>3 x 2 U</td>
<td>17 (100)</td>
</tr>
</tbody>
</table>

TAH - Total abdominal hysterectomy, TVH - Total vaginal hysterectomy, SAH - Subtotal abdominal hysterectomy, MM – Myomectomy broad ligament leiomyoma, BSO - Bilateral salpingo-oophorectomy, BS - Bilateral salpingotomy, PLN – Pelvic lymphadenectomy, OM – Omentectomy.
(Rajanna et al., 2013). Preoperative diagnosis of broad ligament leiomyoma is more likely if USG/CT - guided biopsy and histopathological examination have been performed prior to surgery (Moyle et al., 2010). Complete diagnostic imaging is not always possible due to financial constraints (Bakari et al., 2015). Unfortunately, this situation also occurred in the reviewed material. Before the patients reported for treatment, the symptoms often persisted for several months. The literature review shows that prior to surgical treatment, the symptoms manifested 2 to 18 months before surgery (Khodry and Tamam, 2014; Soliman et al., 2011).

In our study, mean age of patients undergoing surgery was 48.6 years (range 34 - 68 years). Statistically significant differences in age were recorded between the groups of patients depending on the extent of performed operation. According to the literature data, the age of patients with postoperative diagnosis of the broad ligament leiomyoma was 31 - 51 years (Bakari et al., 2015; Khodry and Tamam, 2014).

The Mean body weight of the patients undergoing surgery was 71.9 kg, mean BMI was 27.7. There were no statistically significant differences between the groups.

In addition to ethnicity, age and obesity, genetic factors are important contributors that account for the increased risk of leiomyoma formation. Among five (29.4%) operated patients who did not give birth, four were diagnosed with diseases within the uterine body, that is, fibroids – 2 cases, one case of myoma and endometriosis, and one case of endometroidal adenoma.

Dyląg and Kucharz (2001) found that blood and blood preparations were used in patients diagnosed with leiomyoma cellular of the uterus treated in the gynecological and obstetric ward of the clinical hospital and regional hospital, respectively in 6.6 and 8.2% of the patients treated. In the presented material, a higher percentage, that is, 17.6% of all 17 patients operated on for broad ligament leiomyoma, and 23.1% in the groups with total hysterectomy or amputation of the uterine body was probably related to greater operative difficulties and consequently greater intraoperative blood loss. The reviewed reports also showed that transfusion of blood and blood preparations (from 1 to 4 U) was necessary (Bakari et al., 2015; Chaudhari and Parulekar, 2015; Nayki et al., 2014; Goel and Ladlad, 2014).

All 17 operations were performed by laparotomy (Table 1). In the cases described in the literature, laparotomy was the most often performed by midline incision of the lower abdomen, often extending over the umbilicus (Bakari et al., 2015). Laparoscopy was rarely performed (Chmaj-Wierzchowska et al., 2012). The analysis of our material showed that the technique was used in three cases.

In the group of 13 patients with broad ligament leiomyomas who underwent hysterectomy, 4 (30.8%) patients (with uterine malignancies, LC, and leiomyomatous partim cellularia) required further oncological treatment or follow up.

The women underwent the following types of surgery: myomectomy (fertility-sparing treatment) or myomectomy with subtotal or total hysterectomy. Tables 1 and 2 show types of operations in three studied groups. The review of literature showed that in the case of young women, fertility-sparing myomectomies were undertaken (Bakari et al., 2015; Chaudhari and Parulekar, 2015; Chmaj-J Wierzchowska et al., 2012) including laparoscopic myomectomy of broad ligament leiomyoma (Bakari et al., 2015). The following operations were most often performed:

- Excision of broad ligament leiomyoma with total hysterectomy (Rajanna et al., 2013; Goel and Ladlad, 2014),
- Excision of broad ligament leiomyoma with subtotal hysterectomy (Masood et al., 2014).

Removing broad ligament leiomyoma can be difficult and dangerous in cases of large size and degenerative changes. Vascular hemorrhage following the excision of broad ligament leiomyoma is a serious complication and an indication to reoperation (Emerich, 2008). In such cases, there is also a risk of ureteral damage (Godbolt et al., 2012). Limited extent of elective operation is sometimes forced by anatomical conditions in the operating field. Subtotal hysterectomy was performed in the case of urinary bladder adhesions to the lower sections of the uterus (Masood et al., 2014). Surgical operations of large leiomyomas in the broad ligament sometimes required the involvement of a multidisciplinary surgical team (Soliman et al., 2011).

Conclusions

Broad ligament leiomyomas are difficult to diagnose in the preoperative period. Surgical treatment limited only to myomectomy should be reserved for women who wish to maintain fertility, do not consent to hysterectomy, or when other circumstances prevent it.

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