A R T I C L E   I N F O

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A B S T R A C T

Aim: Only 4.8% of general surgeons in our country prefer Shouldice herniorrhaphy in primary inguinal hernia repair. In the evaluation of postoperative complications, this technique, which has the closest results to Lichtenstein herniorrhaphy, could be the preferred method in selected cases of primary inguinal hernia repair. It does not only provide an alternative to the surgeon, but it can also be the first choice in cases where mesh repair cannot be applied. In this study, we aimed to evaluate the efficacy of Shouldice herniorrhaphy in patients who got the primary inguinal hernia diagnosis, comparing Lichtenstein herniorrhaphy.

Patients and method: Our study was done two-centred. We followed 48 patients who were operated with Lichtenstein technique for a diagnosis of primary inguinal hernia at the General Surgery Clinic of Erzincan Mengücek Gazi Training and Research Hospital between February 2011 and February 2014 and 42 patients who were applied Shouldice technique at Bulancak State Hospital General Surgery Department between January 2010 and February 2013. The patients were evaluated in respect of age, gender, hernia area, hernia type and early or late complications.

Findings: In respect of early complications, urine retention developed in only 2 (4.7%) patients of the Shouldice group. In the Lichtenstein group, complications developed in a total of 3 (6.3%) patients, as superficial infection was observed in 1 patient, seroma in 1 and urinary retention in 1. When we searched late-stage complications of the patients, paraesthesia developed in the inguinal area of 1 (2.3%) patient in the Shouldice group, and neuralgia developed in 2 (4.1%) patients of the Lichtenstein group. No recurrence was determined in any of the patients.

Conclusion: In the repair of inguinal hernia, surgeons should not be tied to just one method. Shouldice herniorrhaphy is a good technique that could be the first choice when the use of mesh is not possible and could be an alternative to Lichtenstein herniorrhaphy when done appropriately. In surgical training, it should be considered after the Lichtenstein method in primary inguinal hernia repair.

1. Introduction

Excluding emergency surgery, hernia repairs are the second most common operations performed by general surgeons [1]. In the last 2–3 decades, great advances have been recorded in inguinal hernia repair; repairs that were tense and made using patient’s own tissues have been replaced with the use of mesh and tension-free repairs [2,3].

According to a survey among Turkish general surgeons, the preferred technique for primary hernia repair is Lichtenstein herniorrhaphy at 68.4%, and Shouldice herniorrhaphy is in 4th place at 4.8% [1]. Shouldice herniorrhaphy is included in the operation group labelled open and tension. As this form of repair has been found to be less tense than the other techniques in the group, low rates of postoperative pain, movement restriction and recurrence have been reported [4,5].

When postoperative complications are evaluated, this technique, which has the closest results to Lichtenstein herniorrhaphy, could be the preferred method in selected cases of primary inguinal hernia repair. It not only offers an alternative to the surgeon but could also be the first choice in cases where mesh repair cannot be applied.

2. Patients and method

Our study was done two-centred. We followed 48 patients who were operated with Lichtenstein technique for a diagnosis of primary inguinal hernia at the General Surgery Clinic of Erzincan Mengücek Gazi Training and Research Hospital between February 2011 and...
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As anaesthesia technique, spinal anaesthesia was used in all patients. Preoperatively, 1 gr Na IV was administered. In the operation, inguinal area was reached with a parallel incision; the inguinal canal was reached from the anterior. After ligation of the hernia sac, in the patients undergoing Lichtenstein herniorrhaphy, the 6 × 11 cm polypropylene mesh was fixed continually to lower fibres of the internal ring and to the tendon junction on the upper side with separate 2/0 prolene sutures between the inguinal canal and the tendon junction. From a cut opened in the patch, the spermatic cord was taken within the patch. The two patch legs formed by opening the junction. From a cut opened in the patch, the spermatic cord was taken within the patch. The two patch legs formed by opening the cut were fixed with separate sutures to each other and to an underlying muscle layer. In those to whom Shouldice herniorrhaphy was applied, following hernia sac ligation, the fascia transversalis was opened as far as the pubis. The two leaves were double stitched with continuous double layer no. 1 prolene sutures. No drains were placed in any patient. Annually, number of operation done by the operators is approximately 100. The work has been reported in line with the STROBE criteria.

### 3. Results

The patients comprised 67 males and 23 females with a mean age of 38 years (range, 17–76 years). The average age is 46.1 in Lichtenstein herniorrhaphy and 29 in Shouldice herniorrhaphy. The gender distribution of the patients according to the groups is shown in Table 1, hernia distribution in Table 2 and exploration findings in Table 3.

The mean follow-up time was 21 months (range, 11–35 months) in all patients.

In respect of early complications, urinary retention developed in only 2 (4.78%) patients of the Shouldice group. In the Lichtenstein group, complications developed in a total of 3 (6.3%) patients as superficial infection was observed in 1 patient, seroma in 1 and urinary retention in 1 (Table 4). Complications graded according to the Clavien Dindo Scale as shown in Table 4. Haematoma was not seen in any patient. The urine retention has developed as a complication of the spinal anaesthesia, and a Foley catheter was applied to those patients. The catheter was removed on postoperative first day. For the patients in whom seroma developed, after aspiration no additional intervention was felt to be necessary. Superficial wound infections were treated with drainage and antibiotherapy.

When late-stage complications were evaluated, paraesthesia was seen to have developed in the inguinal area of 1 (2.3%) patient in the Shouldice group and neuralgia developed in 2 (4.1%) patients of the Lichtenstein group. No recurrence was determined in any patient.

### 4. Discussion

As Shouldice herniorrhaphy was reported in the past to be the best method for adult males in respect of recurrence, it has been recommended that this method is compared with mesh repair and laparoscopic techniques [6]. Nowadays, mesh repair is accepted as the first choice in inguinal hernia treatment. Lichtenstein herniorrhaphy is a standard technique which is easy to learn, safe to apply and reduces hospital stay, costs and patient discomfort to a minimum. It has the advantages of requiring minimal dissection, early return to activities, low recurrence rates and that it can be applied in a short time under local anaesthesia [7,8].

In literature, Shouldice herniorrhaphy has reported recurrence rates of less than 1% in primary inguinal hernias and 2–4% in recurrent inguinal hernias [9]. Shouldice herniorrhaphy was reported to have the lowest recurrence rates in mesh repairs in a comparative analysis with other open herniorrhaphy techniques and lower recurrence compared with other techniques not using mesh. No difference was found in respect of chronic pain, complications and length of hospital stay. When recurrence is taken into consideration, it has been concluded that of the techniques not using mesh, the Shouldice method is the best method [10].

In a study by McGillicudy [11] comparing the Shouldice and Lichtenstein techniques, they were found to be similar in terms of operating time, complication rates and postoperative discomfort. However, at mean 21 months postoperatively, the recurrence rate of the Lichtenstein repairs was 0.5% and in the Shouldice herniorrhaphy 2%, and this difference was found to be statistically significant. The Lichtenstein method was found to be superior to the Shouldice method.

In the current study, the number of patients is low and the follow-up period is short in both methods. During the follow-up period, no recurrence was observed in either group. The complication rates

### Table 1
Gender distribution of patients.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Shouldice herniorrhaphy n</th>
<th>%</th>
<th>Lichtenstein herniorrhaphy n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>32</td>
<td>76.1</td>
<td>35</td>
<td>72.9</td>
</tr>
<tr>
<td>Female</td>
<td>10</td>
<td>23.8</td>
<td>13</td>
<td>27</td>
</tr>
</tbody>
</table>

### Table 2
Hernia distribution.

<table>
<thead>
<tr>
<th>Localization</th>
<th>Shouldice herniorrhaphy n</th>
<th>%</th>
<th>Lichtenstein herniorrhaphy n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right</td>
<td>31</td>
<td>73.8</td>
<td>30</td>
<td>62.5</td>
</tr>
<tr>
<td>Left</td>
<td>11</td>
<td>26.1</td>
<td>17</td>
<td>35.4</td>
</tr>
<tr>
<td>Bilateral</td>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>

### Table 3
Exploration findings.

<table>
<thead>
<tr>
<th>Type of hernia</th>
<th>Shouldice herniorrhaphy n</th>
<th>%</th>
<th>Lichtenstein herniorrhaphy n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct</td>
<td>6</td>
<td>14.2</td>
<td>19</td>
<td>39.6</td>
</tr>
<tr>
<td>Indirect</td>
<td>36</td>
<td>85.7</td>
<td>28</td>
<td>60.4</td>
</tr>
<tr>
<td>Pantaloons</td>
<td></td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

### Table 4
Early complications.

<table>
<thead>
<tr>
<th>Early complications</th>
<th>Shouldice herniorrhaphy n</th>
<th>Lichtenstein herniorrhaphy n</th>
<th>Total n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urinary retention</td>
<td>2</td>
<td>4.7</td>
<td>1</td>
</tr>
<tr>
<td>Wound infection</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Seroma (grade 3a)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>4.7</td>
<td>3</td>
</tr>
</tbody>
</table>

of both groups were similar. There are studies in literature with a sufficient number of cases and adequate follow-up which demonstrate the superiority of mesh repair [11]. Within the tension methods, the Shouldice method provides the closest results to the Lichtenstein method. The results of the current study support this view.

In this study, the preferred application technique in primary inguinal hernias was the Lichtenstein method. However, the aim of this study was to emphasise that surgeons should not restrict themselves to a single method, but that it is necessary to have alternative techniques in the repertoire [12–14]. We recommend the primary preference of the Shouldice method in cases where the use of mesh is not possible and taking it into consideration in surgical training subsequent to the Lichtenstein method in hernia repair.

References


