SKILL AND TALENT

Outcomes of transurethral resection (TUR) of intravesical mesh after suburethral slings in the treatment of urinary stress incontinence

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Abstract

Objective: The objective of this study was to determine the efficacy as well as the complications associated with transurethral removal (TUR) of intravesical mesh, after suburethral sling, transobturator tape-TOT (Monarc™) or “minisling” (MiniArc®), in the treatment of female urinary stress incontinence (USI).

Materials and methods: A retrospective and consecutive study on 9 women with bladder perforation after midurethral slings (3 Monarc™ and 6 MiniArc®) placement for urinary stress incontinence. To remove the mesh, transurethral resection with an electrode loop (TUR-E) was used. The technique included location and total removal of mesh up to healthy tissue with bipolar resectoscope.

Results: The median age was 61 years (49–70 years). The median time between midurethral sling placement and onset of the symptoms was 13 months (1–79 months) and between sling placement and mesh removal it was 16 months (1–91 months). Five women (55.5%) developed bladder stones. Mean operating time was 29.4 ± 10.4 min and mean length of hospital stay was 2.6 ± 0.5 days. The median follow-up after mesh removal was 38 months (range, 14–109 months). No complications were found.

Conclusions: The use of transurethral resection of intravesical mesh after suburethral slings is easy and the results obtained by our surgical team are excellent.

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**PALABRAS CLAVE**
Complicaciones; Sling suburetral; Resección transuretral

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**Resultados de la resección transuretral (RTU) de malla intravesical tras tratamiento con cintillas suburetrales para la incontinencia urinaria de esfuerzo**

**Resumen**
El objetivo de este estudio fue determinar la eficacia y las complicaciones asociadas con la resección transuretral (RTU) de malla intravesical después de la cirugía con TOT (Monarc™) o «minisling» (MiniArc®) para tratar la incontinencia urinaria de esfuerzo femenina (IUE).

**Material y métodos:** Estudio retrospectivo de 9 mujeres consecutivas, todas ellas con perforación intravesical de cintilla suburetral: 3 en pacientes tratadas con Cabestrillo transobturator, Monarc™ y 6 en pacientes con «minisling», MiniArc®. Todas las pacientes fueron tratadas con RTU con asa con energía bipolar. La técnica incluye la identificación de la malla intravesical, la eliminación completa con el resector de energía bipolar hasta que no era visible más malla y se alcanzó el tejido sano perivesical.

**Resultados:** La edad media de nuestras pacientes fue de 61 años. El tiempo medio de aparición de síntomas tras la cirugía por IUE fue 13 meses (1-79) y el tiempo medio hasta la RTU de 16 meses (1-91). Cinco mujeres (55,5%), desarrollaron litiasis vesicales.

El tiempo de operación promedio fue de 29,4 ± 10,4 min y la estancia media hospitalaria fue de 2,6 ± 0,5 días. La mediana de seguimiento fue de 38 meses (rango: 14-109 meses) después de la eliminación de malla. No se encontraron complicaciones.

**Conclusión:** El uso de la resección transuretral para tratar las perforaciones vesicales tras cirugía vaginal con malla es fácil de realizar y en nuestro grupo tiene excelentes resultados. © 2014 AEU. Publicado por Elsevier España, S.L.U. Todos los derechos reservados.

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**Introduction**

The suburethral bands without tension, both retropubic and transobturator, represent the surgical treatment for stress urinary incontinence and have gained popularity because of its ease of use, minimal invasiveness, and high success rate. However, these techniques can have complications. Identifying and properly treating complications remain critical for our daily work. Diagnosing the onset of the mesh into the bladder or urethra after placing a suburethral band occurs for between 1% and 6% of the patients, and it can result from inadvertent intraoperative needle penetration or late erosion of the mesh. Even though the transobturator device (TOT) has less risk of injury to the lower urinary tract, surgeons must insert the needles carefully to avoid this complication. The advantages of “minisling” over anterior meshes are the anchoring, position, and shortest insertion path in order to reduce complications such as bladder perforation, vascular lesions, and perineal fasciitis, but this technique is not free from complications.

The bladder lesions identified during placement of the sling are usually not related to long-term sequelae. However, when the injury goes unnoticed or late mesh erosion occurs in the bladder or urethra, patients may experience dysuria, recurrent urinary tract infections, irritative or obstructive symptoms, bladder stones, and hematuria.

The guidelines of the European Association of Urology (EAU) on iatrogenic trauma recommend cystoscopy after surgery with suburethral band retropubically. However, routine cystoscopy after using the transobturator pathway or transvaginal approach is controversial, because bladder lesions are much less frequent; it is considered recommended but not obligatory. For the treatment of intraoperative perforations or late erosion, resection by open or endoscopic cystostomy is recommended. The choice depends on the level of experience of the surgeon and the location of the mesh. For other types of foreign bodies, extraction is performed using cystoscopy, and if not cystostomy.

The aim of this study is to determine the efficacy and complications associated with transurethral resection (TUR) of intravesical mesh after surgery with TOT (Monarc™) or “minisling” (MiniArc®) to treat female stress urinary incontinence (SUI).

**Materials and methods**

In this retrospective study, we observed the results and complications found in 9 women who were diagnosed with bladder erosion by mesh after undergoing surgery for correction of urinary incontinence by means of TOT (Monarc™) (American Medical Systems, Minnetonka, Minnesota, U.S.A.) or “minisling” (MiniArc®) (American Medical Systems, Minnetonka, Minnesota, U.S.A.) between July 2005 and April 2013. In this period, 502 women operated in our hospital for stress urinary incontinence were evaluated; in 293 women the Monarc™ device was placed, and in 209 we used the MiniArc®. The study was conducted in the Pelvic Floor Unit of Urogynecology of the University Hospital Rio Hortega of Valladolid, Spain.

Of the total 9 women identified with intravesical mesh erosion, in 3 we had previously placed a Monarc™ and in 6 a MiniArc®. All patients were treated with TUR with a loop with bipolar energy.
TUR of intravesical mesh after suburethral slings USE

The follow-up of our patients is performed at 3 months after surgery, at 6 months, and annually thereafter. In these follow-up visits, the visits protocol of the postoperative of correction of female stress urinary incontinence was performed: the presence of urinary symptoms of urgency or voiding difficulty, pain, or sexual dysfunction, and urinary leaks were observed with Valsalva maneuver during examination, as well as the presence of de novo erosions or prolapses; subjective evaluation was performed using the visual analog scale and it was also completed with urethrocystoscopy.

This study was approved by the Ethics Committee of the University Hospital Rio Hortega. All women who participated previously signed informed consent.

Results

At the time of surgery, the median age of our patients was 61 years (49–70). The median time between the operation in which suburethral band was placed and resection of intravesical mesh was placed was 16 months (1–91), and the median time between the placement of the band and the onset of symptoms was 13 months (1–79).

In 3 patients, the previous operation was a transobtur- to suburethral band (Monarc™) and in 6 women a mini-band (MiniArc®) was implanted to correct stress urinary incontinence. Five women (55.5%) developed bladder lithiasis on erosion (Table 1). All women had multiple urinary symptoms such as hematuria, recurrent infections of the lower urinary tract, dysuria, hypogastric pain, and urgency.

Systematic urinalyses showed pyuria and microhematuria, and urine cultures were positive to mixed flora in all patients. The 9 patients had abdominal ultrasound performed, revealing lithiasis, picture stones or foreign body imaging on the right bladder wall in 22.3% and on the left side wall in 77.7% of the patients. During cystoscopy, bladder erosions were identified and both urethral and ureteral orifices’ indemnities were checked.

Transurethral resection of the mesh was performed in all cases with a bipolar loop. The average surgical time was 29.4 ± 10.4 min (median 30, range 15–45 min) and the mean hospital stay was 2.6 ± 0.5 days (median 3, range of 2–3 days) (Table 2).

The mean follow-up so far after resection of the intravesical mesh is 38 months (range 14–109 months). During the cystoscopic examination performed in the follow-up, only one woman (1/9) had residual mesh after TUR and needed a second time to achieve complete resection; in this case we had placed Monarc™ previously. Postoperative control cystoscopies that were performed 3, 6, and 12 months after the follow-up showed in all cases healthy bladder mucosa. The symptoms disappeared in all patients. In this review, we found no case of postoperative vesicovaginal fistula or recurrence of stress urinary incontinence.

Discussion

The International Urogynecology Association (IUGA) and the International Continence Society (ICS) jointly published the terminology and classification of complications directly related to prosthesis insertion (meshes, bands) and grafts

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Figure 1  Anchoring of a MiniArc® with lithiasis inside the bladder.

All patients were placed in lithotomy position and an uretrocystoscopic examination was performed with 25 Fr resector and 30° lens under spinal anesthesia. Bladder lithiasis was identified in 5 patients (notice that the lithiasis is the mold of the anchoring system in this case of the MiniArc®), when detaching the lithiasis, the mesh inside the bladder can be seen, and in no case did we need techniques to break the lithiasis (Fig. 1).

The mesh is resected with a bipolar loop until it is not visible or perivesical healthy tissue is reached (Fig. 2). The resected mesh is removed by endoscopic foreign body forceps. In all patients, after confirming that no part of the mesh remains in the bladder, a 16-Fr intravesical Foley catheter is placed and held for 7 days.

During surgery, intraoperative complications were collected, during the month after early postoperative complications, and if they occur after that month, they are late postoperative complications.

Figure 2  Resection bed without visible mesh.
Table 1 Description of the type of previous surgery, location, presence of lithiasis, and the time to start with the symptoms and the time when intravesical mesh has been diagnosed and treated.

<table>
<thead>
<tr>
<th>N</th>
<th>Age (years)</th>
<th>SUI treatment</th>
<th>Location of erosion</th>
<th>Lithiasis</th>
<th>Time to clinic (months)</th>
<th>Time to TUR (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>61</td>
<td>Éonarc™ 2004</td>
<td>Interureteral</td>
<td>Yes</td>
<td>9</td>
<td>16</td>
</tr>
<tr>
<td>2</td>
<td>59</td>
<td>MiniArc® 2010</td>
<td>Left side</td>
<td>No</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>62</td>
<td>MiniArc® 2009</td>
<td>Left side</td>
<td>Yes</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td>4</td>
<td>54</td>
<td>MiniArc® 2010</td>
<td>Left side</td>
<td>No</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>5</td>
<td>58</td>
<td>MiniArc® 2010</td>
<td>Left side</td>
<td>Yes</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>69</td>
<td>Monarc™ 2004</td>
<td>Right side</td>
<td>Yes</td>
<td>79</td>
<td>91</td>
</tr>
<tr>
<td>7</td>
<td>49</td>
<td>Monarc™ 2011</td>
<td>Left side</td>
<td>Yes</td>
<td>6</td>
<td>19</td>
</tr>
<tr>
<td>8</td>
<td>70</td>
<td>MiniArc® 2013</td>
<td>Left side</td>
<td>No</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>66</td>
<td>MiniArc® 2013</td>
<td>Left side</td>
<td>No</td>
<td>2</td>
<td>5</td>
</tr>
</tbody>
</table>

In surgery of female pelvic floor,6 the definitions given are: "Exposure: status of displaying, disclosing, displaying, or making available" (e.g., vaginal mesh visualized through the separated vaginal epithelium); "Extrusion: gradual emergence in a body structure or tissue" (e.g., a loop of the band that comes out of the vaginal cavity); "Perforation: abnormal opening in a hollow organ or vescera". However, most of the revised publications have used the terms erosion and extrusion interchangeably. Several factors contribute to the rate of erosion/extrusion found in the literature: the surgical technique, the size of the mesh, and the specific properties of the material used such as the pore size and the micropore meshes, which have been associated with increased rates of extrusion. Local ischemia, elasticity, poor incorporation of mesh to the native tissue, subclinical infection, and basic tissue compatibility have also proved to increase extrusion.7

In a meta-analysis evaluating complications in 1854 patients after surgery with suburethral bands comparing the retropubic pathway to the transfascial one, perforation of the bladder was the most common, occurring in 3.5% of the retropubic bands and in 0.2% of procedures using the transobturator pathway.8

In our study, we found only 3 (1.02%) cases using the transfascial pathway and 6 (2.87%) using MiniArc® (with no significant differences).9 We could not determine in which cases perforations occurred during surgery, since no routine cystoscopy is performed after placement of the band, unless there is hematuria, so we must assume that in the 9 cases there are extrusions or unnoticed perforations.

In most cases reviewed, open surgery (retropubic or suprapubic) with complete or partial resection of intravesical mesh was the preferred treatment modality.10 Some patients may require a partial cystectomy if the amount of mesh which has eroded from the bladder wall is too large.

However, the recent success of endoscopic management of this complication has changed trends when considering a definitive treatment.

Reviewing the literature, we observed that a number of endoscopic techniques using different energy sources for the resection of the intravesical mesh are described: conventional TUR (with a bipolar energy loop)11,12; holmium laser (TUEH)13; cystoscopic resection with the help of endoloop sutures and endoscopic scissors.14

Transvesical laparoscopic resection of suburethral bands or lithiases15 and the latest laparoscopic approaches with one transvesical port have also provided solutions in these cases.

In our patients, we performed a radical TUR with a loop with bipolar energy; we completely resected the intravesical band, as well as the infiltrated muscle around the mesh. It is resected until the healthy tissue is seen, similar to radical transurethral surgery of bladder tumors. The possible complications of this therapeutic approach include:

Table 2 Description of the type of previous surgery, date of treatment of the resection of the intravesical mesh, surgical time (minutes), hospital stay (days), follow-up (months), if it has been demonstrated during the follow-up, residual mesh, and complications.

<table>
<thead>
<tr>
<th>N</th>
<th>SUI treatment</th>
<th>Bladder TUR</th>
<th>Time TUR (min)</th>
<th>Hospital stay (days)</th>
<th>Follow-up (months)</th>
<th>Residual mesh</th>
<th>Complications</th>
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<tr>
<td>1</td>
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<td>45</td>
<td>3</td>
<td>109</td>
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<td>No</td>
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<tr>
<td>2</td>
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<td>25/01/2011</td>
<td>15</td>
<td>2</td>
<td>43</td>
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<td>No</td>
</tr>
<tr>
<td>3</td>
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<td>03/11/2010</td>
<td>30</td>
<td>3</td>
<td>33</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>4</td>
<td>MiniArc®</td>
<td>12/01/2012</td>
<td>40</td>
<td>3</td>
<td>31</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>MiniArc®</td>
<td>10/06/2010</td>
<td>30</td>
<td>3</td>
<td>50</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>6</td>
<td>Monarc™</td>
<td>23/02/2020</td>
<td>20</td>
<td>2</td>
<td>30</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>Monarc™</td>
<td>08/11/2012</td>
<td>40</td>
<td>2</td>
<td>21</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>MiniArc®</td>
<td>18/04/2013</td>
<td>25</td>
<td>3</td>
<td>16</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>9</td>
<td>MiniArc®</td>
<td>13/06/2013</td>
<td>20</td>
<td>3</td>
<td>14</td>
<td>No</td>
<td>No</td>
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</table>
extraperitoneal bladder perforation (through the insertion point of the suburethral bands) and formation of vesicovaginal fistula. To avoid bladder or urethral perforation, transurethral resection should be performed with care by expert hands. Our group agrees with the recommendation of Oh and Ryu, who recommend performing the resection guided by a transvaginal finger for greater control of the anterior wall of the vagina and to prevent fistulas. This step has been included because it has proved very useful in our clinical practice.

We believe that the endoscopic management of this complication should be the first choice of treatment, and if this technique fails after multiple resections, then open or laparoscopic surgery should be considered. Transurethral surgery is associated with low morbidity, is a technique that is familiar for urologists, and it is inexpensive for the hospital, as it has similar equipment as for other diseases.

**Conclusion**

Transurethral surgery is associated with low morbidity, it is familiar for urologists, and we know its risks in other areas where we use the same surgical approach, and therefore, it is available in almost all our work environments.

Transurethral resection with bipolar loop of the intravesical mesh that appears after surgery with band has good functional results, assumable complications, high success, and low risk of recurrent stress incontinence.

**Conflict of interest**

The authors declare that they have no conflict of interest.

**References**