Invasive treatment trends in urinary calculi in a third level hospital


Servicio de Urología, Hospital Universitario Carlos Haya, Málaga, Spain

Received 1 February 2014; accepted 1 March 2014
Available online 11 December 2014

Abstract

Objective: In the following study, we observe the progress of various invasive calculi treatments that have taken place in our hospital in the last 15 years.

Materials and methods: We extracted data from our hospital database on patients who underwent extracorporeal shock wave lithotripsy (ESWL), endoscopic surgery and open surgery. We analyzed how the incidence of these treatments has evolved over the last 15 years. We also studied the number of publications in PubMed that reference invasive calculi treatments.

Results: From January 1998 to December 2012, a total of 10,947 patients were treated instrumentally for lithiasis, 9695 of whom (90.4%) underwent ESWL and 1034 of whom underwent endoscopic or open surgery (9.6%). The incidence of lithotripsy treatments reached its maximum in 2006, with a progressive reduction thereafter. The incidence of endoscopic surgery increased progressively until 2009 and then leveled off. We can see how in recent years there has been a clear increase in the number of studies that have covered endoscopic surgery, with a decreasing number covering ESWL.

Conclusions: In our community, ESWL remains the most widely used invasive treatment for calculi. In recent years, there has been a reduction in the number of ESWL treatments and an increase in the number of endoscopic treatments, with open surgery showing a clearly decreasing trend.

© 2014 AEU. Published by Elsevier España, S.L.U. All rights reserved.
Introduction

Urinary lithiasis is a common disease. The estimated incidence in Europe and in developed countries is 0.5–1%, with a prevalence of 5–10%. In the study by Sánchez-Martín it was estimated that the current prevalence of renal lithiasis in Spain is 5.06%, which would account for 2,233,214 cases, with a mean national incidence of 0.73% (325,079 new cases/year), data closer to those highlighted by other authors who have conducted field studies with annual incidences from 0.3 to 0.8 in the USA and in European countries. Most stones only require medical or expulsive treatment, with a small percentage requiring invasive or surgical treatment. The current invasive treatments are, in order of usage, extracorporeal shock wave lithotripsy (ESWL), endoscopic surgery (ureterorenoscopy [URS], retrograde intrarenal surgery [RIRS]), percutaneous surgery (PCNL) and open surgery (OS), laparoscopic and robotic surgery being included within this group. Out of these treatment modalities, ESWL is most commonly used due to stone size and location, its rapidity, lower morbidity, the possibility of performing it under sedation and on an outpatient basis, thereby resulting in increased acceptance by patients of this form of treatment. However, in the last few years, improved endoscopic surgical material and greater experience on the part of surgeons have led to an increase in endoscopic surgery rates. The present work analyzed the evolution of the different treatments for lithiasis that has taken place at our hospital over the last 15 years.

Materials and methods

Those patients treated with ESWL, pyelotomy, nephro- tomy, ureterolithotomy, cystolithotomy, percutaneous nephrolithotomy, URS and vesical litholapaxy from January 1998 to December 2012 were extracted from the database at our center. We calculated the incidence of the different treatments, grouping them into ESWL, OS (pyelotomy, nephrotomy, ureterolithotomy, cystolithotomy) and endoscopic surgery (URS, PCNL, vesical litholapaxy). Descriptive statistics of the different treatment modalities was performed. In order to check the incidence of treatments, we took into account the population census published by the National Institute of Statistics from 1998 to 2012 in our reference area, which changed as other hospitals were equipped with extracorporeal lithotripsy and endoscopic surgery equipments.

We likewise analyzed the number of publications in the PubMed database with the key words uroolithiasis, extracorporeal schokwaves, percutaneous nephrolithotomy, ureteroscopy, urologic surgical procedures, ureteroscopy, open surgery, laparoscopic surgery, robotic surgery, in order to check the evolution of those publications referring to the different treatments for urinary lithiasis and to find out whether it is correlated with the evolution of the treatments performed.

Results

From January 1998 to December 2012, a total of 10,947 patients were treated instrumentally for lithiasis, 9695 patients (90.4%) with ESWL and 1034 patients (9.6%) with surgery, either endoscopic or open.

Over the past 15 years, the number of patients undergoing ESWL has been slightly reduced, whereas the number of patients undergoing endoscopic surgery has increased.
Table 1 shows the number of lithotripsy and the mean of sessions used in lithotripsy treatment over the last 15 years. The incidence of treatments with lithotripsy peaked in 2006, with a subsequent progressive decrease. The incidence of ESWL/100,000 inhabitants had an average of 34.11 in the last 15 years. The incidence of endoscopic surgery gradually increased until 2009, it remaining stabilized afterwards. We can see how our reference population has been reduced over the years, especially in 2004 and 2011, when 2 hospitals in our area were provided with equipment for ESWL performance (Table 2).

Fig. 1 shows how the number of ESWL and open and endoscopic surgeries has evolved over the last 15 years. Considering our reference population for each year, the total number of treatments for lithiasis gradually increased until 2007, with a slight decline having been observed in the last 5 years.
Table 2  Distribution of the surgeries. Overall results of the number of patients treated by ESWL, open surgery, and endoscopic surgery from 1998 to 2012. We refer to the annual incidence of the treatments performed considering the reference population of our health area for ESWL and surgery.

<table>
<thead>
<tr>
<th></th>
<th>Total no. of ESWL patients</th>
<th>Overall open surgery</th>
<th>Overall endoscopic surgery</th>
<th>Total patients</th>
<th>ESWL incidence/100,000 inhab.</th>
<th>OS incidence/100,000 inhab.</th>
<th>Endoscopy incidence/100,000 inhab.</th>
<th>Reference population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998</td>
<td>720</td>
<td>91.8</td>
<td>28</td>
<td>36</td>
<td>784</td>
<td>31.67</td>
<td>1.23</td>
<td>2,273,133</td>
</tr>
<tr>
<td>1999</td>
<td>681</td>
<td>92.4</td>
<td>20</td>
<td>2.7</td>
<td>737</td>
<td>29.76</td>
<td>0.87</td>
<td>2,288,629</td>
</tr>
<tr>
<td>2000</td>
<td>651</td>
<td>91.7</td>
<td>19</td>
<td>2.7</td>
<td>710</td>
<td>28.18</td>
<td>0.82</td>
<td>2,309,784</td>
</tr>
<tr>
<td>2001</td>
<td>806</td>
<td>92.6</td>
<td>23</td>
<td>2.6</td>
<td>870</td>
<td>34.68</td>
<td>0.99</td>
<td>2,324,197</td>
</tr>
<tr>
<td>2002</td>
<td>814</td>
<td>96.2</td>
<td>0</td>
<td>0.0</td>
<td>846</td>
<td>34.93</td>
<td>0.00</td>
<td>2,330,229</td>
</tr>
<tr>
<td>2003</td>
<td>793</td>
<td>91.8</td>
<td>22</td>
<td>2.5</td>
<td>864</td>
<td>33.72</td>
<td>0.94</td>
<td>2,352,066</td>
</tr>
<tr>
<td>2004</td>
<td>713</td>
<td>89.0</td>
<td>15</td>
<td>1.9</td>
<td>801</td>
<td>30.17</td>
<td>0.63</td>
<td>2,363,644</td>
</tr>
<tr>
<td>2005</td>
<td>648</td>
<td>87.9</td>
<td>15</td>
<td>2.0</td>
<td>737</td>
<td>40.12</td>
<td>0.93</td>
<td>1,615,218</td>
</tr>
<tr>
<td>2006</td>
<td>686</td>
<td>88.6</td>
<td>13</td>
<td>1.7</td>
<td>774</td>
<td>41.98</td>
<td>0.80</td>
<td>1,633,970</td>
</tr>
<tr>
<td>2007</td>
<td>663</td>
<td>87.2</td>
<td>18</td>
<td>2.4</td>
<td>760</td>
<td>40.24</td>
<td>1.09</td>
<td>1,647,595</td>
</tr>
<tr>
<td>2008</td>
<td>612</td>
<td>89.9</td>
<td>9</td>
<td>1.3</td>
<td>681</td>
<td>36.74</td>
<td>0.54</td>
<td>1,665,616</td>
</tr>
<tr>
<td>2009</td>
<td>561</td>
<td>86.4</td>
<td>9</td>
<td>1.4</td>
<td>649</td>
<td>33.37</td>
<td>0.54</td>
<td>1,681,092</td>
</tr>
<tr>
<td>2010</td>
<td>551</td>
<td>90.6</td>
<td>11</td>
<td>1.8</td>
<td>608</td>
<td>32.54</td>
<td>0.65</td>
<td>1,693,499</td>
</tr>
<tr>
<td>2011</td>
<td>514</td>
<td>90.0</td>
<td>5</td>
<td>0.9</td>
<td>571</td>
<td>30.16</td>
<td>0.29</td>
<td>1,704,153</td>
</tr>
<tr>
<td>2012</td>
<td>500</td>
<td>83.7</td>
<td>12</td>
<td>3.6</td>
<td>555</td>
<td>33.41</td>
<td>0.80</td>
<td>1,496,585</td>
</tr>
<tr>
<td>Total</td>
<td>9695</td>
<td>90.4</td>
<td>219</td>
<td>2.0</td>
<td>10,947</td>
<td>Mean: 34.11</td>
<td>Mean: 0.74</td>
<td>Mean: 2.94</td>
</tr>
</tbody>
</table>
Fig. 2 Percentage of patients undergoing surgery, either endoscopic or open, compared to patients undergoing ESWL.

Fig. 2 shows in detail the development of surgery, both endoscopic and open, in relation to the patients treated with ESWL, thus illustrating how the number of treatments performed with surgery has increased, especially in the case of endoscopic surgery, which has experienced a significant increase.

Finally, Fig. 3 depicts the number of scientific articles published in PubMed from 1998 to 2012 regarding ESWL, endoscopic surgery (URS and PCNL), OS and laparoscopic surgery. We can see how in recent years there has been a clear increase in the number of studies on endoscopic surgery, with a decline of those on ESWL. Besides, there has been a slight increase in the number of studies on laparoscopic and robotic surgery, which is taking up the space left by OS.

**Discussion**

Urinary lithiasis is one of the most prevalent diseases in urological departments. Its prevalence is around 5%, with an incidence of 0.7–1% in western countries, with significant direct and indirect economic costs. To be specific, in Spain the estimated prevalence and incidence are around 5.06 and 0.73% respectively. Out of the stones treated, approximately 75% of them only needed medical-expulsive treatment, with 25% of them requiring instrumental treatment, either ESWL or surgery. Of the invasive treatments for lithiasis, ESWL is without question the most commonly used due to stone characteristics and location, as well as its ease and comfort for the patient. In the last few years, the prevalence of surgery treatments has increased in the case of endoscopic surgery (URS, RIRS and percutaneous nephrolithotomy) and decreased in the case of OS.

In our series, over 90% of the treatments were performed with ESWL. There was a peak in the years 2001–2004, with a gradual decrease in the number of treatments with ESWL having been observed since then due to the global trend, as well as due to the introduction of lithotripsy equipment at nearby hospitals, so our reference population has gone from 2,320,240 to 1,642,216 inhabitants. Regarding the trend of endoscopic surgery, there has been a gradual increase, with a probability of 4.7% from 1998 to 2003, 9% from 2004–2007 and of 9.1% from 2008 to 2012. With regard to the prevalence of OS, it has gradually decreased and was 2.3% from 1998 to 2002, 2.1% from 2003 to 2007 and 1.5% from 2008 to 2012. This same trend is reflected in other works, where a decrease in OS, especially in developed countries, and an increase in endoscopic surgery can be observed. This trend can be explained by a number of reasons, mainly due to further development of both endoscopic surgery and endoscopic materials, better and thinner ureterorenoscopes, better guidelines and greater training on the part of surgical teams. Likewise, over the last years, there has been greater diffusion of faster and cheaper electromagnetic lithotripsy equipment. All this has meant that those stones which in the 1990s were treated with ESWL are now treated with endoscopic surgery. This has also been reflected on the number of publications on this subject, with a decrease in the number of studies on ESWL, an increase in publications on endoscopic treatment and a stabilization in the number of publications on OS over the last 15 years.

Finally, this development in the invasive treatment of lithiasis has been reflected on the recommendations of clinical guidelines, with a migration of indications, which explains the fact that those stones previously treated with ESWL are now treated with endoscopic surgery.

**Conclusions**

ESWL remains the most commonly used invasive treatment for lithiasis in our field. In the last few years, there has been a decrease in ESWL treatments and an increase in endoscopic treatments, with OS showing a clear downward trend.
Conflict of interest

The authors declare that they have no conflict of interest.

References