THE USE OF LASER BEAM IN UROLOGY (7TH REPORT)

----- PERCUTANEOUS LASER LITHOTRIPSY FOR RENAL CALCULI -----

Yoshikatsu TANAHASHI, M.D., Isao NUMATA, M.D., Yutaka CHIBA, M.D.,
Naomasa IORITANI, M.D. and Seiichi ORIKASA, M.D.
Dept. of Urology, Tohoku University School of Med., Sendai, Japan 980.

A treatment of vesical stone using laser beam was established
in our laboratory and the method has been practically used routinely
without any problems.

On the other hand, the most recently developed treatment of the
upper urinary tract stone is to install a fistula through the skin,
and then the stones removed by way of the fistula endoscopically.
The authors have experienced the method for 2 years, and the method
was found to be effective and successful in 64 out of 66 cases in re-
moving the stones.

Extraction of the stone with a basket catheter or a specific
forceps is limited by the size of the stone, and a large stone must
be destructed in pieces before extraction out of the body. Laser
beam was thus applied for the purpose of destructing the stone, as
in the cases of vesical stone.

MATERIAL AND METHOD

Continuous wave YAG laser transmitted via a quartz fiber was
used. To prevent the elevation of temperature of the surface of
the stone, rigid nephroscope which has large capacity of sending the
cooling water was used.

Renal pelvic puncture under real time ultrasonic guidance was
performed. Supported by a guide wire, the punctuated hole was
enlarged by means of telescopic metal enlarger, finally up to 8 mm
in diameter. Then a 24F balloon catheter was indwelled. It
took about 20 to 30 minutes to complete these procedures.

Destruction of the stone is performed about 3 to 5 days after
the installation of the renal fistula. Rigid endoscope was intro-
duced into the renal pelvis or ureter via the way of nephrostomy
channel. And then optical fiber was inserted through catheter
passage, and laser beam was irradiated to the stone under direct
vision.

Type of destruction of the stone was different from the composi-
tion of the stone, some was produced crater-like holes, and some was
cracked. Once the stone was tend to be destructed, it was very
effective to add small out-force to the stone by means of forceps or
ultrasonic vibration. When the pieces of the stone became so small that they could pass through the nephrostomy channel, a forceps was used to take out the cracked stones.

RESULTS

The authors performed the percutaneous extraction of the upper urinary tract stones in 66 cases, and complete extraction of the stone could be accomplished in 64 cases. Laser beam was used successfully in 8 stones in 7 clinical cases out of 29 cases whose stones must be cracked to pass the nephrostomy channel before removal.

TABLE 1 CASES OF PERCUTANEOUS LASER LITHOTRIPSY

<table>
<thead>
<tr>
<th>CASE</th>
<th>age</th>
<th>sex</th>
<th>STONE</th>
<th>location</th>
<th>size</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Y.S.</td>
<td>27</td>
<td>M</td>
<td>kidney</td>
<td>9 x 5</td>
<td>success</td>
</tr>
<tr>
<td>2</td>
<td>K.A.</td>
<td>30</td>
<td>M</td>
<td>kidney</td>
<td>25 x 12</td>
<td>success</td>
</tr>
<tr>
<td>3</td>
<td>M.S.</td>
<td>44</td>
<td>M</td>
<td>ureter</td>
<td>22 x 17</td>
<td>success</td>
</tr>
<tr>
<td>4</td>
<td>R.U.</td>
<td>62</td>
<td>M</td>
<td>P-U junction</td>
<td>26 x 15</td>
<td>success</td>
</tr>
<tr>
<td>5</td>
<td>M.A.</td>
<td>28</td>
<td>M</td>
<td>kidney (stag-horn)</td>
<td>55 x 25</td>
<td>success</td>
</tr>
<tr>
<td>6</td>
<td>N.S.</td>
<td>45</td>
<td>M</td>
<td>kidney (stag-horn)</td>
<td>14 x 11</td>
<td>success</td>
</tr>
<tr>
<td>7</td>
<td>A.P.</td>
<td>40</td>
<td>M</td>
<td>kidney</td>
<td>20 x 15</td>
<td>success</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>kidney</td>
<td>48 x 34</td>
<td>success</td>
</tr>
</tbody>
</table>

FIG. 1 CASE 2 plain film

FIG. 2 CASE 4

plain film

before during after laser irradiation