Hypothesis / aims of study
The aim of this study is to compare the urodynamic parameters in ischemic and hemorrhagic stroke patients with bladder dysfunction.

Study design, materials and methods
We retrospectively reviewed medical records such as computed tomography (CT) or magnetic resonance imaging (MRI) and urodynamic study and identified 84 cases among 150 stroke patients underwent urodynamic test due to lower urinary tract symptoms (LUTS) from June 2003 to May 2008. Exclusion criteria are diabetes mellitus (DM) cystopathy, previous pelvic surgery, spinal cord injury, benign prostate hyperplasia (BPH), and other neurologic etiology.

Results
Among analyzed variables of urodynamic study, total bladder capacity, postvoid residual urine volume and bladder compliance have a significant value between ischemic and hemorrhagic stroke group ($P = 0.004$, $P = 0.017$, $P = 0.007$). Ischemic group have detrusor overactivity (DO) (70.7%), detrusor underactivity (DU) (29.3%), and hemorrhagic group have DO (34.6%), DU (65.4%). ($P = 0.003$).

Interpretation of results
Ischemic group have DO more than DU, and hemorrhagic group have DU more than DO. We have three clues to solve this phenomenon.
1. Hemorrhagic stroke remains cytotoxic edema after stroke.
2. Although hemorrhagic stroke tend to develop in the identical location, arteriole rupture effect surrounding lacunae.
3. Cortical deficits are relatively more common in ischemic stroke rather than subcortical lesions.

Concluding message
Evaluation of the stroke type may be helpful in the determination of the type of urinary dysfunction and in deciding the appropriate bladder management. The urodynamic study, however, is essential to manage LUTS in stroke patients.

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Ischemic Stroke (n=58)</th>
<th>Hemorrhagic Stroke (n=26)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>No of Pt with DO</td>
<td>41</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>No of Pt with DU</td>
<td>17</td>
<td>17</td>
<td>0.003</td>
</tr>
</tbody>
</table>

Specify source of funding or grant none
Is this a clinical trial? No
What were the subjects in the study? HUMAN
Was this study approved by an ethics committee? No
This study did not require ethics committee approval because This study consisted of retrospective pure urodynamic study results without another tools or medications. So, this study did not require approval.
Was the Declaration of Helsinki followed? Yes
Was informed consent obtained from the patients? Yes