

## VIRTUAL REALITY OF THE FEMALE PELVIS DIMENSIONS OF WOMEN WITH PELVIC ORGAN PROLAPSE

### Hypothesis / aims of study

The female pelvis is perfect architecture, it not only protects all of the pelvic organs but also amortizes intra-abdominal pressure to protect the pelvic supporting structures including the levator ani muscle ,connective tissue , nerves and blood vessels. Of the total, the levator ani muscle and connective tissue are the most important supporting structures to prevent pelvic organ prolapse(POP) through attaching the pelvis. We think it is reasonable hypothesis that the female pelvis dimensions is one of the potential risk factors. So we designed this study to investigate anatomic features in the pelvic bones between women with and without pelvic organ prolapse using virtual reality system and identify relationship between the pelvis and the female pelvic organ prolapse.

### Study design, materials and methods

We designed a case-control study of women with and without POP, 41 healthy volunteers and 30 patients with POP aged from 42 to 71 years were enrolled. After the diagnosis of POP was reached by history taking, a gynecologic examination, and application of the pelvic organ prolapse quantification (POP-Q) system, they underwent 64 row spiral computed tomography (CT) of the pelvis at our institution between July 2007 and May 2008. The CT imaging data was imported into virtual reality system, and we made the pelvis three-dimensional reconstruction and measured the area, angle and length of the pelvis by cutting, rotating and other methods with tools in the virtual reality system. Relevant measures included transverse diameter of the inlet, angle of the pubic arch, intertuberous diameter, interspinous diameter, anteroposterior diameter of the midpelvis and area of the midpelvis. The statistical package SPSS, version 13.0 (SPSS, Chicago, IL, USA) was used to analyze the data. Differences in the measurements were compared using the independent sample t test. P-value is set to <0.05

### Results

Women with pelvic organ prolapse had a wider transverse diameter of the inlet ( $131.55 \pm 5.09$ mm VS  $119.04 \pm 5.40$ mm) and a wider anteroposterior diameter of the midpelvis ( $129.63 \pm 5.20$ mm VS  $114.63 \pm 7.01$ mm) than women without pelvic organ prolapse, P <0.05. We found that a wider transverse diameter of the inlet and a wider anteroposterior diameter of the midpelvis were significantly associated with pelvic organ prolapse.

### Interpretation of results

The results of the present study showed that the dimensions of the pelvis was significantly wider in women with POP, a little part of intra-abdominal pressure reached the pelvic floor after amortization of abdominal wall and ala of ilium, a wider transverse diameter of the inlet indicates more intra-abdominal pressure would reach the pelvic floor. and the levator ani muscle like a "hammock" supporting the pelvic organs attaching the pelvis. A wider anteroposterior diameter of the midpelvis purports a longer anteroposterior diameter of the pubovisceral muscle and levator hiatus. according to mechanics principle, the pelvic floor need to bear major intra-abdominal pressure, so it is more easy to be injured.

### Concluding message

We speculated that these features of bony pelvic architecture may predispose the patient to neuromuscular and connective tissue injury, leading to the development of pelvic organ prolapse, which is one of the risk factors in female pelvic organ prolapse.

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<b><i>Is this a clinical trial?</i></b>	<b>Yes</b>
<b><i>Is this study registered in a public clinical trials registry?</i></b>	<b>No</b>
<b><i>What were the subjects in the study?</i></b>	<b>HUMAN</b>
<b><i>Was this study approved by an ethics committee?</i></b>	<b>Yes</b>
<b><i>Specify Name of Ethics Committee</i></b>	<b>The review board of the Health Sciences Center of Fujian Medical University</b>
<b><i>Was the Declaration of Helsinki followed?</i></b>	<b>Yes</b>
<b><i>Was informed consent obtained from the patients?</i></b>	<b>Yes</b>