

MRI VISUALIZATION OF THE MAJOR BLOOD VESSELS DURING TENSION-FREE VAGINAL TAPE (TVT) PROCEDURE

Aims of study

To reduce the risk of major blood vessel injury at Tension-Free Vaginal Tape procedure by 1. Defining with MRI the major blood vessels in the proper plane of the Tension-Free Vaginal Tape procedure. 2. Measuring the distances between these vessels and the needle in that plane. 3. Identifying reference structures to locate the major blood vessels.

Methods

A retrospective review of 19 female pelvic MRI. Multiple sequences were performed but the measurements were carried out on T2 weighted 4 mm axial cuts. The plane chosen for analysis and measurements was at the superior aspect of the symphysis pubis, which included the vagina and upper urethra. This corresponds to the plane for needle insertion during TVT. The main outcome measures were: the definition of major blood vessels in the plane of the TVT and the following distances: the vertical distance between the mid-urethra and the symphysis pubis, the horizontal distance from the medial boundary of the ilio-femoral vessels on both sides, the horizontal distance from the sacral tuberosities on both sides to the midline, the angle between the mid-urethra and the ilio-femoral vessels. The data was analysed using the linear regression test to evaluate the relations between the patient's age and weight to the distances and angles measured and using correlation test to evaluate the relations between the various pelvic distances and the angles from the midline to the ilio-femoral blood vessels.

Results

Their mean age of the patients was 54.3 ± 16.0 years (Range 28-95 years) and their mean weight was 65.1 ± 13.5 kg (range 52-111 kg). The indications for pelvic MRI were early (stage 1 or 2) cervical carcinoma (10 patients) and endometrial carcinoma (6 patient), one patient had vulvar carcinoma and one a pelvic cyst. The only major blood vessels in the plane for TVT were the external iliac-femoral junction vessels. The mean distance of the left ilio-femoral vessels from the midline was 5.7 ± 0.4 cm (range 4.6-6.6 cm) and 5.7 ± 0.3 cm (range 5.7-6.3 cm) for the right vessels. The mean distance of the left sacral tuberosities from the midline was 5.5 ± 0.4 cm (range 4.7-6.2 cm) and 5.6 ± 0.3 cm (range 5.1-6.2 cm) for the right ilio-femoral vessels. The angle between the mid urethra and the left ilio-femoral vessels was 50.6 ± 4.4 degrees (range 42-59) and 49.6 ± 4.0 degrees (range 42-59) for the right ilio-femoral vessels. No correlation was found between the age and the pelvic distances. There was also no evidence of a relationship with weight except for the distance from midline to the right sacral tuberosity (table 1). The heaviest patient (111-Kg) produced this deviation and when she was excluded, this relationship was not significant.

No correlation was found between the distance from the mid-urethra to the pubic bone and the angles from the mid-urethra to either ilio-femoral vessel. A significant correlation was found between the right and left angles ($p < 0.003$), right and left sacral tuberosities ($p < 0.05$) and right and left ilio-femoral vessels ($p < 0.0004$). Correlation was also found between the distance of the right and left ilio-femoral vessels from the midline and the distance of the right and left sacral tuberosities from the midline (Table 2, $p < 0.01$, $p < 0.007$).

Conclusions

Palpation of the sacral tuberosities might indicate the location of the ilio-femoral blood vessels. Avoiding angulations of the needle more than 40 degrees or lateral insertion of no more than 3 cm from the midline during TVT procedure may prevent damage to these vessels.