

SPIRAL COMPUTED TOMOGRAPHY SCAN EVALUATION OF THE ADJUSTABLE CONTINENCE THERAPY (ACT™) IMPLANT IN FEMALE PATIENTS WITH STRESS URINARY INCONTINENCE

Hypothesis / aims of study

The use of the Adjustable Continence Therapy (ACT™) was introduced in 1999 for the treatment of urodynamic stress incontinence in women. Nowadays main indication for ACT™ implant is represented by severe Intrinsic Sphincter Deficiency (ISD) in women. The ACT™ System is made up of two balloons implanted close to the urethra through a perineal approach. The volume of the balloons can be adjusted after implantation through a subcutaneous port in the labia majora (1). The aim of this study was to evaluate the location of ACT™ devices and the dynamic changes occurring during strain, with the aid of the Spiral Multi Detector CT scan (MDTC).

Study design, materials and methods

A total of 50 female patients, affected by stress urinary incontinence (SUI), were implanted with the ACT™ device over a six year period (May 2000 - March 2006). A total of ten consecutive patients, were evaluated (follow-up: 1-32 months) postoperatively using pelvic spiral MDCT scan. Thin pelvic collimated scans (1.25 mm) with bone algorithm, completed by multiplanar reformatting (MPR) and volume rendering technique (VRT) were obtained. A 10 Ch Nelaton catheter was used to better evaluate the urethra and to fill the bladder with non-ionic contrast medium (40ml, 400 mgI/ml). The patients were supine and the procedure was performed at rest and under maximum strain. All the patients complained of various degree of ISD, in two cases combined with urethral hypermobility. At clinical follow-up (range 1-32 months) all the patients evaluated were dry or showed a significant clinical improvement.

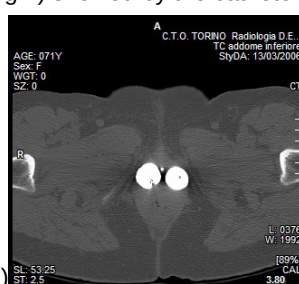
Results

The MDCT scan showed the location of ACT™ devices compared to the urethra, the bladder neck, pubis and pelvis and the dynamic changes occurring during strain.

Axial MPR: ACT™ devices are located back the pubis or caudal the lower border of the symphysis. At least one of the devices is tightly closed the urethra wall (fig.1) showed by the catheter print on it (fig.2).



(fig.1) ACT™ devices can placed

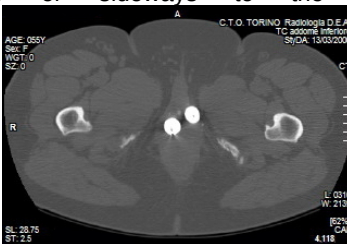
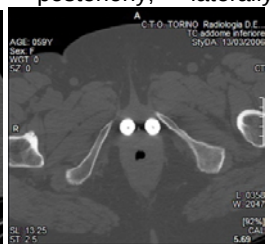


(fig.2) posteriorly, laterally or sideways to the

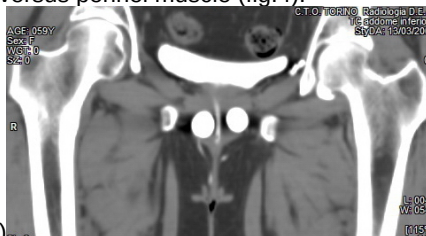
urethra axis (fig.3).



(fig.3)

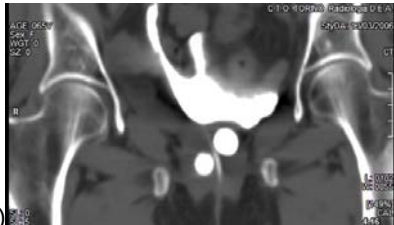


Coronal MPR: in the majority of cases the devices are located distally to the bladder neck and above the deep transversus perinei muscle (fig.4).



(fig.4)

In same cases the devices are placed above the levator ani muscle plane. In such a location the devices stabilize the cervical region during strain (fig.5). Devices are not always symmetrically placed causing sometimes a clear kinking of the urethra (fig.6).

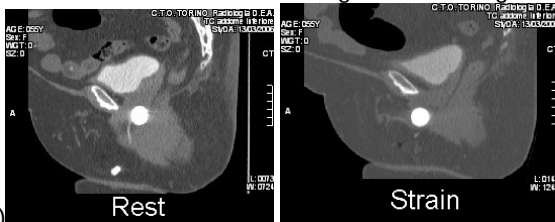


(fig.5)



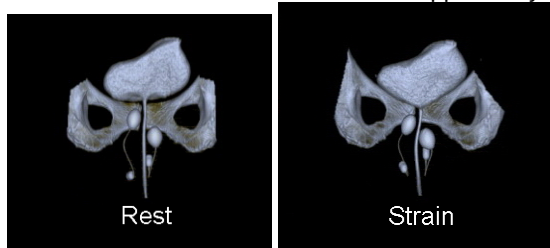
(fig.6)

Sagittal MPR: it is possible to appreciate dynamic features of ACT™. In patients with fixed urethra there is no downward sliding of the devices during strain. On the contrary it is evident in cases of urethral hypermobility sometimes combined with various degree of lowering of the bladder neck (fig.7).



(fig.7)

Dynamic features of the devices can also be appraised by the 3D reconstruction (VRT) (fig.8).



(fig.8)

Interpretation of results

Stress incontinence treatment with ACT™ devices can be easily evaluated by means of spiral Multi Detector CT scan. In order to assure the bulking effect, the devices have to be placed close the urethral wall (middle-urethra). Efficacy seem not be affected by their location on the sagittal or coronal plane. However an extremely cranial position must be avoided because the risk of the endopelvic fascia perforation and bladder irritation. Bladder catheter does not allow to deem urethral mobility possible only by ultrasound tomography or MRI.

Concluding message

The location of the ACT™ devices at 1-32 months follow-up usually appeared to be lower (i.e. around the middle urethra) than at the time of the implant (i.e. under the bladder neck). The dynamic evaluation during the CT studies was able to demonstrate the principle on which is based the restoring of continence. We are of the opinion that the main mechanism of action is represented by the bulking effect of the devices, easily achieved as much as they are located close the urethra wall. It seems less important the role played by the devices in the stabilization of the cervico-urethral region that keeps its mobility if they are not located too much cranially.

(1) European Urology Supplements 4 (2005) No. 3, pp.25

FUNDING: NONE

DISCLOSURES: NONE

HUMAN SUBJECTS: This study did not need ethical approval because standard radiologic technique but followed the Declaration of Helsinki Informed consent was obtained from the patients.