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ANATOMY OF THE OBTURATOR REGION: RELATIONS TO A TRANS-OBTURATOR SLING

Aims of Study

Recently a new anti-incontinence procedure has been introduced that approaches placement of a mid-urethral polypropylene tape via the obturator foramen. The anticipated advantages of this new approach are lessened bowel, vascular, and bladder injury relative to either the "top-down" or traditional "bottom-up" tape placement techniques that both pass through the space of Retzius. As has been demonstrated with the Tension Free Vaginal Tape (TVT), understanding of the relevant anatomy is paramount to avoidance of operative injury; knowledge of the anatomy of the obturator region likewise should be understood. Given the paucity of information on the anatomy of the obturator region, particularly approached from the perineum, we sought to better define this anatomy with particular emphasis on describing the course of any device passed through the obturator foramen to treat urinary incontinence.

Methods

Five fresh frozen cadavers were dissected bilaterally in the dorsal supine lithotomy position. Dissection was performed from both an abdominal approach and a perineal approach exposing the space of Retzius abdominally and the thigh musculature. Careful identification of all relevant vascular and nerve structures was done with measurements made from these structures and established soft tissue and bony landmarks. A curved needle was passed from the inner thigh through the obturator foramen to the lateral vagina at the level of the mid-urethra. Measurements were done between the needle and important nerve and vascular structures. Summary statistics were done. Photographs and drawings demonstrated important relationships.

Results

Approached from the perineum the obturator foramen is oriented superiorly and laterally. Although not palpable, the obturator canal is on average 4.4 cm (SD $\pm$ 0.2, range 4.2 – 4.5) from midpoint of the lateral edge of the ischiopubic rami. The adductor longus tendon can be reliably palpated at its origin along the pubic crest. Just dorsal to the adductor longus muscle is the broad origin of the gracilis muscle. Finally the adductor magnus muscle can be palpated before leaving the obturator region. Viewed from the perineum the obturator externus muscle is completely covered by the overlying adductor longus, adductor brevis and gracilis muscles.

Peeling back the adductor longus muscle from its origin exposes the origin of the adductor brevis as well as the edge of the pectineus muscle. Beneath these muscles the obturator externus muscle is visualized. Piercing the obturator externus muscle the anterior and posterior divisions of the obturator nerve pass out the obturator canal. The obturator artery divides into medial and lateral branches with passage through the canal. Medial branches pass through or above the obturator externus muscle nearly perpendicular to the obturator membrane branching further to feed the medial portions of the adductor brevis and longus muscles.

A curved device directed from lateral to the clitoris and labia majora through the obturator foramen into the anterior vagina at the midurethra passes in order through the following structures: Gracilis, adductor brevis, obturator externus, obturator membrane, beneath or through the obturator internus muscle, periurethral endopelvic connective tissue and finally vaginal wall. Along this path the device passes on average 2.4 cm (SD $\pm$ 0.3, range 2 – 2.7 cm) inferior-medial to the obturator canal. The posterior division of the obturator nerve is on average 4.5 cm (SD $\pm$ 0.9, range 4 – 5.5 cm) from the midpoint of the lateral edge of the ischiopubic ramus and on average 2.8 cm (SD $\pm$ 0.7, range 2.1 – 3.5 cm) from a passed trans-obturator device. The anterior division of the obturator nerve is on average 5.4 cm (SD $\pm$ 0.9, range 4.5 – 6.5 cm) from the midpoint of the lateral edge of the ischiopubic ramus and on average 3.4 cm (SD $\pm$ 0.8, range 2.7 – 4.5 cm) from a passed trans-obturator device. The obturator artery and vein predictably has both medial and lateral branches after passing

through the obturator canal. The medial division and its subsequent branches pass inferior-laterally with the most medial branch passing 2.6 cm (SD ± 0.3, range 2.3 - 3 cm) from the midpoint of the lateral edge of the ischiopubic ramus. A trans-obturator device would pass on average 1.1 cm (SD ± 0.4, range 0.5 – 1.4 cm) from this most medial branch of the medial division of the obturator vessels. The lateral division of the obturator vessels passes superio-laterally after tranversing the obturator canal. The most medial branch of these vessels was 4.4 cm (SD± 0.3; range4 – 4.6 cm) from the midpoint of the lateral edge of the ischiopubic ramus.

Conclusions

Vascular and nerve structures are within 1 to 3 cm of the path of any device passed through the obturator foramen. Devices passed around the upper one half of the ishiopubic ramus risk injury to these structures, although the small caliber of the vessels and the confined space in which it would bleed make the consequences of injury uncertain.