

INVESTIGATIVE UROLOGY

Digital Three-Dimensional Modeling of the Male Pelvis and Bicycle Seats: Impact of Rider Position and Seat Design on Potential Penile Hypoxia and Erectile Dysfunction

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Objective: To digitally model (three-dimensional, 3D) the course of the pudendal arteries relative to the bony pelvis in the adult male, and to identify sites of compression with different bicycle riding positions as a potential cause of penile hypoxia and erectile dysfunction.

Subjects and Methods: 3D models were made from computed tomography scans of one adult male pelvis (a healthy volunteer) and three bicycle seats. Models were correlated with lateral radiographs of a seated rider to determine potential vascular compression between the bony pelvis and seats at different angles of rider positioning.

Results: Pelvis/seat models suggest that the most likely site of compression of the internal pudendal artery is immediately below the pubic symphysis, especially with the rider leaning forward. For an upright rider, the internal pudendal arteries do not appear to be compressed between the seat and the bony pelvis. Leaning partly forward with arms extended, the seat/symphysis areas were reduced to 73 mm² with standard seat and 259 mm² with a grooved seat. Leaning fully forward, the seat/symphysis areas decreased (no space with standard seat; 51 mm² with a grooved seat) and both the ischial tuberosities and the pubic symphysis might be in contact with the seat.

Conclusion: A grooved seat allows better preservation of the seat/symphysis space than a standard seat, but the rider's position is more important for preserving the seat-symphysis space (and reducing compression) than is seat design alone. Any factors which influence the seat-symphysis space (including an individual's anatomy, seat design and rider position) can increase the potential for penile hypoxia and erectile dysfunction/perineal numbness.

Editorial Comment

The first published article associating bicycling with erectile dysfunction appeared 20 years ago and referred to a man riding a stationary bicycle that experienced transient tight sensations around the glans penis during the exercise and progressive impairment of sexual potency over a period of more than one year. After lowering the bicycle seat the attacks of impaired penile sensation disappeared, and one month after the patient discontinued the bicycle exercises, sexual potency returned (1). The authors proposed a vascular compression for explain the abnormal penile sensation and a neural compression for impotence (1). Ten years later, a study included 260 participants in a Norwegian annual bicycle touring race of 540 km. Thirty-five of 160 responding males (22%) reported symptoms from the innervation area of the pudendal or cavernous nerves. Thirty-three had penile numbness or hypoesthesia after the tour. In 10, the numbness lasted for more than one week. Impotence was reported by 21 (13%) of the males. It lasted for more than one week in 11, and for more than one month in three. The symptoms afflict both experienced cyclists and novices. In some, the complaints may last up to eight months. The authors concluded that changing the hand and body position on the bike, restricting the training intensity, and taking ample pauses might also be necessary in prolonged and vigorous bicycle riding to prevent damage to peripheral nerves (2). Since then, many studies showed the association of bicycling with erectile dysfunction and genital numbness as well as associated the symptoms with the body position and bicycle characteristics (3,4).

The present study by Gemery et al. created digital 3-dimensional models of pelvis, pudendal arteries and bicycle seats to evaluate potential sites of compression of the vessels. The authors hypothesized that the

type of seat in conjunction with the rider's position differentially affects the orientation and compression of the pudendal arteries. This precise morphological study supports the hypothesis that the compression occurs between the top of the forward portion of the bicycle seats and the undersurface of the pubic symphysis, and is associated with the rider's position. Based on their results, the authors suggested that the rider's position has a greater role than seat design in potential compression.

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Comparative Study of Degree of Renal Trauma between Amplatz Sequential Fascial Dilation and Balloon Dilation during Percutaneous Renal Surgery in an Animal Model

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Objectives: To compare two commonly used methods of dilation, the Amplatz sequential fascial (ASF) and the balloon dilator, in a porcine model.

Methods: Fourteen kidneys from 9 female pigs were used for this experiment. One kidney of each pig underwent ASF dilation and the other underwent balloon dilation using the Nephromax balloon. This was achieved after percutaneous renal puncture with an 18-gauge needle under fluoroscopic guidance. The effects of both methods of dilation were assessed immediately in 1 pig, after 24 hours in 3 pigs, at 4 weeks in 4 pigs, and at 6 weeks in 1. The animals were killed, and the kidneys were removed for gross and histologic examination.

Results: Grossly, the ASF dilated tracts appeared rounded and the balloon dilated tracts appeared V-shaped with lateral fragmentation within 24 hours. No obvious gross differences were noted at 4 to 6 weeks between the two methods of dilation, with both appearing as fine scars. Histologically, minor differences were seen at 4 to 6 weeks, with slightly more abscesses and larger scar formation in the kidneys that underwent ASF dilation than in the balloon dilation group.

Conclusions: In this porcine animal model, the degree of renal trauma induced by the ASF dilators and the balloon dilators during percutaneous renal surgery seems to be comparable. The acute and chronic renal parenchyma effects of both methods of tract dilation were almost similar. The choice of nephrostomy tract dilation should be by physician preference.

Editorial Comment

This is an interesting animal model study comparing the two most common methods of nephrostomy tract dilation in USA; Amplatz sequential fascial (ASF) dilators and balloon dilators. The study aimed to determine whether any significant differences in renal trauma were present between the two techniques both acutely (immediate to 24 hours) and chronically (at 4 to 6 weeks) in pigs. The authors chosen the best animal model for this kind of analysis, since the renal collecting system, the intrarenal arteries and the kidney morphometric parameters are very similar between pigs and humans (1,2).

The analysis was macroscopic and microscopic. The histologic examination at 24 hours showed no apparent differences, except for the degree of hemorrhage, which was slightly more in the ASF dilated tracts. However, in the specimen removed at 4 to 6 weeks after ASF dilation, slightly more inflammation with abscess formation was present in the ASF dilated tracts than in the balloon-dilated tracts.

The slight differences were not significant and the authors demonstrated that the use of either method of dilation had no difference in terms of the degree of renal parenchymal trauma. Therefore, they concluded that the method of dilation is a matter of physician preference and experience.

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RECONSTRUCTIVE UROLOGY

New Technique of Total Phalloplasty with Reinnervated Latissimus Dorsi Myocutaneous Free Flap in Female-to-Male Transsexuals

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From December 2001 to September 2005, the technique of total penile reconstruction with a reinnervated free latissimus dorsi myocutaneous flap was used in 22 patients (24-38 years old) with gender dysphoria. These patients were followed up for at least 11 months (range, 11-44 months). All flaps survived. Complications include hematoma (7 cases), vascular thrombosis (2 cases), partial necrosis (1 case), excessive swelling of the