Renal Stone Detection Using Unenhanced Multidetector Row Computerized Tomography

Computerized tomography (CT) has replaced excretory urography as the imaging modality of choice for renal and ureteral calculi, and advances in CT have further increased its ability to detect all types of pathological conditions including kidney stones. Jin et al (page 2767) from Loma Linda, California determined the effect of reconstructed section width on sensitivity and specificity for detecting renal calculi using multidetector row CT. Three to 5 renal stones (2 to 4 mm in size) were randomly placed into 14 human cadaveric kidneys and scanned by 16-row detector CT at 1.25 mm collimation and identical scanning parameters. After acquisition the images were reconstructed with a section width of 1.25, 2.5, 3.75 and 5.0 mm, and reviewed independently by 2 blinded radiologists. Specificity was not significantly affected by section width and ranged from 94.6% to 97.7%. In contrast, sensitivity increased as stone size increased and as section width decreased. Sensitivity to detect all stones was 80.7%, 80.7%, 87.7% and 92.1% for 5.0, 3.75, 2.5 and 1.25 mm section widths, respectively. Although the 2.0 mm stone detection rate improved with thinner section widths, stones larger than 2.0 mm were similarly detected at different slice selections (p = 0.056 to 0.572). The authors concluded that reconstruction section width, independent of other scanning parameters, influences the ability to detect small renal calculi and must be considered when creating CT protocols.

Spontaneous Electrical Waveforms in Aging Guinea Pig Prostates

Prostatic smooth muscle tone is believed to contribute to the outflow obstruction often found in men with benign prostatic enlargement. Despite this theory little is known about the electrical and mechanical properties of prostatic smooth muscle. Dey et al (page 2797) from Victoria, Australia characterized the spontaneous electrical activity in the aging guinea pig prostate. Membrane potential recordings were made using conventional single microelectrode recording techniques. Three types of spontaneous waveforms were recorded, including spikes, slow waves and spontaneous transient depolarizations. Spikes were classified as hyperactive or active. Active cells showed a mean ± SEM frequency of 5.06 ± 0.63 minutes⁻¹, significantly different from that in hyperactive cells (362.05 ± 151.82 minutes⁻¹, p <0.05). Slow wave activity occurred at a frequency of 5.2 ± 0.5 minutes⁻¹. Spikes and slow wave activity were abolished by nifedipine but the depolarizing transient remained unaltered from control values. Spontaneous transient depolarizations were recorded in the presence of slow waves, spikes and in quiescent cells. Spontaneous transient depolarization frequency was highest in otherwise quiescent cells compared to that in the presence of slow waves or spikes. Pacemaker potentials were not recorded in the aging prostate. The authors concluded that with increased age there is an increase in spike activity, which could conceivably explain the increased prostatic tone that accompanies aging.

Losartan Preserves Erectile Function After Nerve Injury

Angiotensin II is a known mediator of smooth muscle vasoconstriction and fibrosis. It up-regulates thrombospondin-1 (TSP-1), a major activator of latent transforming growth factor-β (TGFβ). TGFβ induces vascular fibrosis via intracellular SMAD signaling pathways. Canguven et al (page 2816) from Baltimore, Maryland evaluated the effect of treatment with the angiotensin II type 1 receptor antagonist losartan on erectile function in the rat following bilateral cavernous nerve injury (BCNI). Adult male rats were divided equally into 6 groups and subjected to various treatments. At 7 days after surgery erectile function was measured by electrically stimulating the cavernous nerves and monitoring intracavernous pressure. Penile tissue was collected for Western blot analysis of fibronectin, TGFβ-1, TSP-1, α-actin, and phosphorylated and total SMAD2 and SMAD3 expression. Erectile function was significantly decreased after BCNI compared with that after sham surgery. Low and high dose losartan preserved erectile function after BCNI compared to vehicle controls. Fibronectin, pSMAD2, pSMAD3, TGFβ-1, TSP-1 and α-actin expression was up-regulated, and total SMAD2 and SMAD3 expression was down-regulated in the penis after BCNI. After BCNI both doses of losartan signifi-
cantly attenuated the up-regulated expression of fibronectin, pSMAD2 and TSP-1, and up-regulated total SMAD2. These data suggest that fibrotic activators in the penis may cause decreased erectile function after BCNI. Angiotensin II type 1 receptor antagonism may counteract this effect and promote erectile function preservation in conditions associated with penile fibrosis. Treatment with losartan may be clinically useful to facilitate improved erectile recovery following radical prostatectomy. However, recommendations for clinical use must await further support from clinical investigations.

α1-Adrenoceptor and Arachidonate Pathways in Bladder Tissue

Several recent studies have suggested that the urothelium of the bladder has a crucial role in the regulation of detrusor contractility. Tarcan et al (page 2780) from Istanbul, Turkey investigated the role of α1-adrenoceptors, and the cyclooxygenase (COX) and lipoxygenase (LO) pathways in the increased contractile reactivity of demucosalized bladder tissues from 20 male Sprague-Dawley rats. Isometric tension studies were conducted at baseline tone, and contractile responses to 120 mM potassium, electrical field stimulation (EFS) and muscarinic receptor stimulation (carbachol) were assessed. Relaxation responses to EFS, isoproterenol, papaverine and sodium nitroprusside were recorded in carbachol precontracted strips. The effects of doxazosin, indomethacin (a COX inhibitor) and REV5901 (a LO inhibitor) on these responses were investigated.

Carbachol and EFS induced significantly greater contractions in demucosalized strips than in strips with intact mucosa. All contractile responses were significantly decreased in the presence of doxazosin, indomethacin and REV 5901 in intact and demucosalized tissues. Indomethacin augmented the effect of doxazosin on contractions of demucosalized tissues compared to the results obtained with doxazosin alone. In carbachol precontracted tissues relaxation responses to isoproterenol and EFS were significantly lower in demucosalized tissues. These responses were significantly decreased with doxazosin or indomethacin independent of mucosa. The authors concluded that bladder mucosa is a determinant of rat bladder tissue contractility, and their findings may have important clinical implications regarding the single and combined use of doxazosin with COX inhibitors.

Bone Morphogenetic Protein-10 and Prostate Cancer Growth

Bone morphogenetic proteins (BMPs), bone inductive factors enriched in the bone matrix, have been implicated in the development of prostate cancer, particularly in disease specific bone metastasis. Ye et al (page 2749) from Heath Park, United Kingdom investigated the role of BMP-10 in prostate cancer and prostate cancer cells, examining the expression of BMP-10 in human prostate tissue and prostate cancer cell lines. They also experimentally over expressed BMP-10 in human prostate cancer cells and then investigated the influence of BMP-10 on the biological behavior of prostate cancer cells in a series of in vitro studies. BMP-10 expression was decreased or absent in prostate tumors, particularly in higher grade foci. Forced BMP-10 over expression in prostate cancer cells reduced in vitro growth, cell matrix adhesion, invasion and migration. Furthermore, BMP-10 induced apoptosis in prostate cancer cells through a Smad independent pathway in which the 2 downstream candidates of BMP receptors XIAP (ILP) and ERK1/2 were activated. The authors concluded that BMP-10 inhibits the growth of prostate cancer cells largely due to induced apoptosis via Smad independent signaling in which XIAP and ERK1/2 are involved. BMP-10 can also prevent prostate cancer cell migration and invasiveness, suggesting that BMP-10 may function as a tumor suppressor and apoptosis regulator in prostate cancer.

Karl-Erik Andersson
Section Editor