Role of CT virtual cystoscopy in diagnosis of urinary bladder neoplasia

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Summary & Conclusion108Summary & ConclusionSeveral imaging techniques are available for use in the detection ofbladder pathology. U/S, CT, MRI and conventional cystoscopy could beused in diagnosis the bladder disease. Conventional cystoscopy isaccepted as a gold standard in diagnosis of urinary bladder diseases.Recently, three-dimensional computer – rendering techniques withrapid image acquisition have led to the development of virtual realityimaging. With commercially available software, virtual reality imagingallows interactive intramural navigation through any hollow viscus,simulating conventional endoscopy Recently CT-virtual endoscopy hasbeen introduced to the imaging armamentarium for use in the evaluationof urinary bladder. The Urinary bladder is a good candidate for virtualendoscopy because of its simple luminal morphology, relatively smallvolume and absence of involuntary peristalsis.CTVC technique is of a great value in detection of bladder tumorslarger than 5 mm with high sensitivity, specificity and accuracy rates.But recently high sensitivity rates for detection of bladder lesionsless than 5 mm by VC have been reported by many authors suchas(O'Connor et al., 2008).CTVC may be performed in several ways, including instilling gasand/or iodinated contrast material into the bladder prior to CT scanning,however, compared with virtual cystoscopy of the air-filled bladder,virtual cystoscopy of intravenous contrast material filled bladder hassome advantages as it is safer and more comfortable for the patientbecause bladder catheterization is not necessary. On the other handfilling the bladder with intravenous contrast material has been easilyachieved; radiation dose can be halved as CT data are obtained onlySummary & Conclusion109once whereas virtual cystoscopy of an air filled bladder reacquires twosets of CT data obtained with patient in supine and prone position. Inaddition, virtual cystoscopy can be performed as part of routine contrastenhanced CT and thus a satisfactory evaluation of the entire urinarytract can be obtained with only one examination.Generally speaking CTVC has several advantages overconventional cystoscopy: It is much less invasive, much less timeconsuming, requiring less equipments with fewer patient preparationsteps, can be performed without radiographic contrast (when CO2 orair is used in the bladder), allowing intraluminal viewing of the bladderfrom any angle permitting complete visualization of the bladder neck,trabeculation and diverticula. Diagnostic benefits of CTVC comparedwith conventional cystoscopy include its ability to accurately recordtumor maximum dimensions and volume without magnification

ordistortion.Patients with a severe urethral stricture or marked prostatichypertrophy, who may be poor candidates for conventional cystoscopy,can safely undergo CTVC.Of special interest is the technique of color mapping, which mayoptically facilitate distinction between normal and pathologicconditions.Virtual Cystoscopy with color mapping contributes morecomprehensive informations, because it is not restricted to the surfaceand takes changes of the entire wall thickness into account.Tumors, benign wall thickening and normal wall thickness arecorrectly identified by using axial source images and virtual cystoscopywith color mapping. The 3D models with color mapping are excellent atSummary & Conclusion110indicating how far tumors had infiltrated. However, the color mapping issensitive to artifacts.On the other hand several disadvantages were reported regardingCTVC, although areas of wall thickening are seen on virtual images, theyare more conspicuous on the transverse views. The calcificationsassociated are seen only on the transverse images and not on the virtualimages. False-positive finding of lesion may be reported due to airbubble in bladder.Many artifacts were also reported in technique of CTVC of thecontrast material- filled bladder when urine and contrast could not bemixed properly.Data acquisition should be performed in a helical mode with asingle breath hold to eliminate breathing motion artifact.So, transverse and virtual views are complementary in lesion detectionand characterization; therefore, sets of both these images should beused for accurate lesion detection.There are several important limitations of virtual cystoscopy. Amajor limitation is that it is unable to depict flat lesions. In addition,mucosal thickening secondary to fibrosis can not be distinguished from aneoplasm. Another disadvantage of virtual cystoscopy is that it lacks theability to provide tissue for histological evaluation, an ability that ispossible with conventional cystoscopy and biopsy.Limitations of virtual cystoscopy of the contrast material filledbladder include contraindication of the modality for the patient who cannot tolerate contrast material injection.Summary & Conclusion111Additionally, in patients that can not easily change position, theimage quality of virtual cystoscopy is inevitably suboptimal because ofinadequate mixing of the contrast material and urine.Summary & Conclusion112Conclusion:Early results using virtual cystoscopy are promising and correlatewell with traditional imaging modalities.Virtual cystoscopy is worthy of being a part of comprehensive CTexamination of the urinary bladder.CT virtual cystoscopy is not a competitive technique toconventional endoscopy of the urinary bladder; on the contrary, it hasbeen proved a useful complementary tool in the study of areas ofdifficult evaluation by conventional cystoscopy or as a complementaryexamination performed between conventional cystoscopic examinationsin a patient with bladder cancer who undergoing treatment.