Diagnostic assessment of painless microhematuria: prospective study comparing image quality, assessibility and diagnostic certainty of multidetector-row CT and intravenous pyelography within a single examination

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PURPOSE: The purpose of this study is to prospectively compare intravenous pyelography (IVP) and combined unenhanced and excretory phase multidetector-row CT (MDCT) with respect to image quality, diagnostic certainty and diagnostic concordance with the final clinical diagnosis in patients with painless microhematuria. MATERIALS AND METHODS: Unenhanced MDCT, IVP and excretory phase MDCT were performed in 59 consecutive patients (21 women, 38 men, mean age 56 +/- 19 years, range 23 - 83 years) with painless microhematuria of unknown origin during a single examination with a single contrast media application (100 ml, non-ionic iodinated contrast media). Images were assessed by two experienced urogenital radiologists in consensus for image quality, diagnostic certainty of stone detection, obstruction, parenchymal lesions and morphological distinctive features. Imaging diagnoses of MDCT and IVP were compared with the final clinical diagnoses. In case of failure to detect an relevant pathology, the final clinical diagnosis was established after a mean follow-up period of 18 +/- 6 months (10 months to 2 years). Costs and radiation exposure of IVP and MDCT were compared.

RESULTS: MDCT scan performed better than IVP in terms of image quality for all regarded variables. Image quality of MDCT was rated in all parameters as very good or good; the image quality of IVP differed in a wide range. MDCT and IVP reached a sensitivity of 100 % and 50 % for stone detection (n = 14, p = 0.008), respectively. Two bladder stones were not detected by IVU but correctly seen with MDCT. MDCT and IVP were unsatisfactory for detecting transitional cell carcinomas (n = 4, 2 of 4 detected with MDCT, 0 of 4 detected with IVU). One false positive transitional cell carcinoma was detected with IVP, none with MDCT. Additional relevant pathological changes (one teratoma, one abdominal aortic aneurysma and one abscess) were detected using MDCT but missed with IVP. In 38 of 59 patients (64 %) imaging and clinical follow-up over up to 24 months did not reveal any pathology to explain the microhematuria. The costs of the IVP (283 Euro) were lower compared with non-enhanced MDCT (380 Euro) or combined non-enhanced and contrast-enhanced MDCT (560 Euro). The radiation exposure was 23 - 27 mSv for MDCT.
and 2.3 mSv for IVP. CONCLUSION: MDCT performed better regarding image
quality, subjective diagnostic certainty and diagnostic results with respect to
stone detection. Since urolithiasis is a frequent cause of painless
microhematuria MDCT is recommended as the initial imaging modality rather
than IVU.

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