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## ABNORMAL URINALYSIS IN ACUTE APPENDICITIS

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In a retrospective review of 32 consecutive patients (20 adults and 12 children) with acute appendicitis, we correlated abnormal urinalysis with the operative findings. Abnormal results on urinalysis were noted in 10 adults and 5 children. All urine specimens were collected by the clean-catch method. Abnormal findings were found more frequently in female patients. The majority of the patients with abnormal urinalysis had a ruptured or inflamed appendix in proximity to the urinary tract.

**Key words:** Urinalysis, Appendicitis, Operative findings

Microscopic hematuria is a well recognized, incidental finding in many patients presenting with acute appendicitis. Although it is known that microscopic hematuria or pyuria can be associated with acute appendicitis, little has been reported on the predictive value of an abnormal urinalysis in relation to the pathological status of the appendix. We herein attempt to investigate the correlation of abnormal urinalysis with operative findings of appendectomy performed in our surgical section.

### MATERIAL AND METHODS

Of 32 consecutive patients with histologically confirmed acute appendicitis 20 were adults, between 16 and 85 years old (average 40 years), and 12 were children, between 7 and 16 years old (average 11.4 years).

Urinalysis was done on a clean-catch specimen on admission of each patient. A centrifuged urine specimen with 4 or more white cells or red cells per high power field was considered abnormal. The patients were evaluated according to age, sex, history of urinary tract disease and operative findings. Surgical findings

concerning the location of the appendix and whether it was ruptured were obtained from the operative report.

### RESULTS

Abnormal urinalysis: Of the 32 patients, 15 (46.9%) had a positive urinary sediment. Microscopic hematuria without pyuria was found in 5 adults and 1 child. One patient had a history of pyelonephritis before appendicitis.

Sex: Sixteen patients were females and 16 were males. Abnormal urinalysis were found in 4 of 7 boys (57.1%), 1 of 5 girls (20%), 3 of 9 men (33.3%) and 7 of 11 women (63.6%). Fifty per cent of the females and 43.8% of the males had a positive sediment. Eight of the 15 patients (53.3%) with abnormal urinalysis were considered to have a ruptured or abnormally positioned appendix. This includes retrocecal, retroileal and pelvic appendices. Four of these 8 patients had significant microscopic hematuria. In other words, 50% of the patients with an abnormally positioned appendix had a positive urine sediment, whereas 40% of the patients with an appendix in a normal position had a positive sediment.

Three of the 10 patients (30 %) with abscesses and 1 of 5 patients (20 %) with perforated appendices had pyuria. Nine of 20 patients (45 %) without abscess or perforation had a positive sediment.

#### DISCUSSION

Abnormal urinalysis is not uncommon in patients with acute appendicitis. There was a higher incidence of positive urine specimens in female patients, possibly because of contamination of a voided urine specimen. The high incidence of abnormal urinalysis in patients with either a ruptured or inflamed appendix in the retrocecal or pelvic position suggests that the pathological status of the appendix and its proximity to the urinary system may be factors. An inflamed retrocecal, retroileal appendix or abscess, in close relationship with the right ureter may produce a localized inflammatory response in the ureteral mucosa with a secondary leukocytic infiltration.

One patient was found to have more than 20 red cells or 50 white cells in a urinary sediment. She was revealed to have a previous history of pyelonephritis. Therefore, the discovery of great numbers of white cells or red cells in the urinary sediment should lead the observer to a more serious consideration of a diagnosis of urinary tract pathology such as pyelonephritis or ureteral calculus.

Graham found only 6 cases of pyuria

and 1 of hematuria in 62 patients with appendicitis<sup>1)</sup>. He considered these urine findings unrelated to the appendicitis. In contrast, Flannigan reported a case of gross hematuria associated with appendicitis<sup>2)</sup>. He suggested that pelvic inflammatory diseases such as regional enteritis and diverticulitis or appendicitis can be a recognized cause of hematuria.

In conclusion, an abnormal urinalysis in a patient with appendicitis is not uncommon and was found in 46.9 % of the patients who underwent appendectomy for acute appendicitis. In our series there was a higher incidence of positive urine specimens in female patients. Patients with an abnormally positioned appendix may be more likely to develop microscopic pyuria or hematuria in the presence of acute appendicitis because of the close relationship to the right ureter. Serious consideration should be given to a diagnosis of urinary tract pathology in patients with equivocal signs of acute appendicitis if unusually large numbers of cells are found on urinalysis.

#### REFERENCES

- 1) Graham JA: Urinary cell counts in appendicitis. *Scot Med J* **10**: 126, 1965
- 2) Flannigan GM and Towler JM: Appendicitis presenting with painless hematuria. *J Urol* **129**: 1248, 1983

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## 和文抄録

## 急性虫垂炎における異常尿所見について

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急性虫垂炎に罹患した32人の患者（成人20人子供12人）を対象に、異常尿所見と手術所見との関連性について検討を加えた。

これらのうち尿所見が異常を呈した例は、成人10例、子供5例であった。すべての尿は清潔に採取され

た。

異常尿所見は女性により多く認められた。尿所見が異常を呈した患者の大部分において、尿路系の近傍で破裂したあるいは炎症をともなった虫垂を認めた。