

Case Report

DOUGHNUT SIGN in KIDNEY: A RARE CASE

Yu-Jang Su^{1,2*}; Che-Hung Liu¹

¹Department of Emergency Medicine, Mackay Memorial Hospital, No.92, Sec 2, Chung-Shan North Rd. Taipei 10449, Taiwan

²Mackay Medicine, Nursing and Management College, No.92, Shengjing Rd., Beitou District, Taipei 112, Taiwan

*Corresponding author: Yu-Jang Su, M.D. No.92, Sec 2, North Chung-Shan Rd. Taipei 10449. Department of Emergency Medicine, Mackay Memorial Hospital. Taipei, Taiwan.

TEL: 886-2-25433535*3126

E-mail: yjsu@msl.mmmh.org.tw

Keywords: Infected renal cyst, Doughnut sign, intussusception, Urinary tract infection *Escherichia coli*.

Introduction

The doughnut sign is abnormal in the medical images, especially in the abdomen that could be taken intussusceptions into considerations [1]. Here we presented another form of doughnut signs in the kidney indicating an infected renal cyst.

Case presentation

A 46 year-old lady suffered from right upper quadrant (RUQ) abdominal pain, fever, malaise, nausea, and chills for one day. She was tachycardiac (109 beats per minute) with a body temperature of 37.8 °C, and the blood pressure was taken as 164/55 mmHg. On physical examinations, there was no evidence of flank knocking pain. Blood tests showed elevated white blood cell (WBC) count: 10800/ μ L, band: 1%, Neutrophil: 87% and C-reactive protein: 13 mg/dL. Urine analysis revealed 40 WBC in high power field (HPF) with leukocyte 2+ in urine biochemistry. Bedside renal sonography showed a 1.5 cm-diameter hypoechoic round with thickened surrounded wall as doughnut sign of right side kidney (Figure-1). The computed tomography (CT) of abdomen (Figure-2) proved the infected renal cyst (IRC) of right kidney (Figure-3: local enlargement). Intravenous Fluoroquinolone (levofloxacin) 500 mg was administrated everyday, and she was recovered and discharged 4 days later. Two sets of blood cultures all grew *Escherichia Coli*.

Discussion

Space-occupying lesions in the kidneys are very commonly seen, and it is increased in the elderly as the age became older. Most of all (95% are benign cysts)

are asymptomatic, and they could be found by sonography or computed tomography (CT) when patients had flank pain, fever, or physical check-up [2]. The etiologies of infected solitary renal cyst are consisting of hematogenous bacterial seeding, medical procedure or surgery related. The typical symptoms of infected renal cyst (IRC) are flank pain, fever or shaking chills.

If the solitary renal cyst is not infected, the cystic wall is thin and the cystic content is low density in CT image. If the renal cyst is infected, the cystic wall thickened and revealing a doughnut sign (Figure-3). In the imaging diagnosis of IRC, it is important to differential with renal abscess. If the cystic content is turbid and uneven inner surface implies high possibilities of renal abscess. In our case, the inner layer is round and low density, homogenous content in the cyst indicating an IRC.

The predominant sonographic finding of IRC was an abnormal echogenic texture of the cyst contents with the frequency of wall thickening as a sign of infection [3]. The sonographic donut sign pointed out the renal cyst has been infected and parenteral antibiotics should be administrated.

Conclusion

Doughnut sign in the kidney implies us a condition of infected renal cyst and if it showed in the abdominal images, we should raise the concern about intussusception. In emergency medicine practices, we should keep alertness on the image doughnut signs. After all, in normal human's anatomies, there is no doughnut sign could be seen.



Figure-1: There is a 1.5 cm-diameter hypoechoic cyst with wall thickening (the white arrow keys) in right side kidney looking like a 'doughnut'.



Figure-2: Computed tomography (CT) of abdomen showed the right side thickening wall (the black arrow keys) infected renal cyst (IRC) looking like a 'doughnut'.



Figure-3: The doughnut sign in kidney (the black arrow keys) is obviously seen in local enlargement of right kidney CT image.

References

1. Tiao MM, Wan YL, Ng SH, et al. Sonographic features of small-bowel intussusception in pediatric patients. *Acad Emerg Med.* 2001; 8(4):368-73.
2. Feldberg MA, Mali WP. An infected renal cyst. *Urol Radiol.* 1980; 2(1):47-9.
3. Frishman E, Orron DE, Heiman Z, et al. Infected renal cysts: sonographic diagnosis and management. *J Ultrasound Med.* 1994; 13(1):7-10.