

## Doctor, I was found to have renal cysts



**Dr. HO Chung Ping, MH, JP**  
*M.B.B.S.(H.K.), MRCP (UK),  
 FRCP (Edin), FRCP (Glasg),  
 FHKAM (Medicine), FHKCP,  
 Specialist in Nephrology*



**Ms. AU Yim Fong,**  
*Enrolled Nurse*



**Ms. WONG Kwong Kam,**  
*Registered Nurse*

Renal cyst was used to be a surgical or post-mortem findings before the advent of diagnostic ultrasound. In the past, intravenous urogram (IVU) was the main imaging tool for the nephrologist. The IVU has a low pick up rate for renal cyst unless it is very large. (Figure 1) After the World War II, research workers explored the use of 'left over' military ultrasound equipment for clinical use. During the experiment, the patients had to be immersed in a big tank of water because the equipment was designed to be used to detect underwater submarines. The kidney image turned out to be unexpectedly well. Clinical ultrasound machines were later developed and widely used in North America. However, when the author was working in a regional hospital in the 1980, there was no ultrasound machine in the whole hospital and the renal transplant patients had to be sent to other hospitals for transplant graft evaluation.



Fig. 1 A big renal cyst on IVU (arrowed)

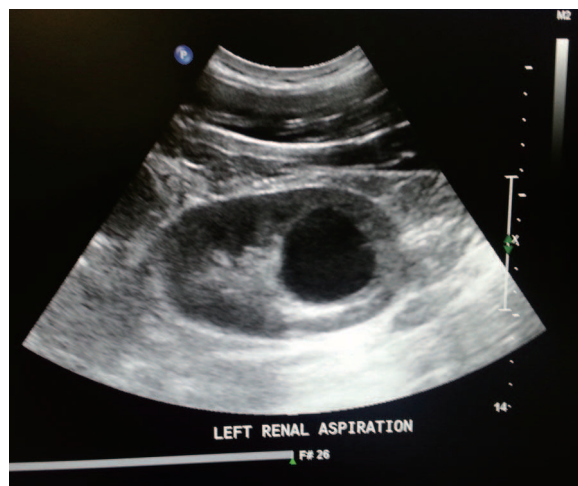


Fig. 2 A simple renal cyst

Today ultrasound machines are now widely available in medical facilities in Hong Kong. Diagnostic ultrasonography is non-invasive and it is now cheap. It is increasing incorporated in 'health check packages'. One invariable consequence is that many patients, who do not show any symptoms and signs of renal diseases, were found to have renal cysts. Such 'incidental cysts' pose problems for the family physicians because though they are asymptomatic, there are chances that they may be malignant or evolved to be malignant.

In the early days, the practice was that if the cyst was greater than a certain size (say 6 cm in diameter); the chance of malignancy was deemed to be considerable. Cyst puncture was advised and the cyst fluid sent for cytology for malignant cells to exclude malignancy. There was high chance of recurrence of the cyst and sometimes concentrated alcohol was injected into the cavity after fluid aspiration. The alcohol made the cyst wall more rigid and the chance of recurrence was reduced. The author's experience showed that in the

vast majority of the cases, no malignance was detected.

There are three types of renal cysts – hereditary, non-hereditary and acquired. The hereditary renal cyst includes the well-known polycystic kidneys disease. The acquired variety is more common. It was found that 50% of patients over the age of 50 at autopsy have acquired renal cysts. Most of them are asymptomatic and were detected on routine ultrasound examination or other imaging studies as an incidental finding. Most of them are benign but a small minority of them are malignant or potentially malignant. It is the duty of the physicians to identify that subset of patients whose renal cysts might turn malignant.

In 1986, Bosniak summarized those radiological features which might indicate the chance of malignancy, such as the presence of calcification or solid mass inside the cyst, multiple septa and the presence of vascular enhancement in the cyst wall etc. <sup>(1)</sup> He proposed to classify renal cysts according to those features <sup>(2)</sup>. A benign simple cyst is one with a hairline-thin wall that does not contain septa, calcifications, or solid components. (Figure 2: a simple cyst on ultrasound). In follow up studies, most simple cysts increase in size during the first two years after detection and seemed to stabilize afterwards. <sup>(3)</sup> It measures water density in computerized tomography CT, and does not enhance with contrast material. It is classified as Class 1 cyst in the Bosniak classification. The chance of malignancy in Class 1 and 2 cysts is negligible and

no follow up was recommended. However, there some cases in which it was not so clear cut and the refined classification added a subclass (class 2F) for which follow up was advised. The presence of vascular enhancement is a very important feature in the classification and a contrast CT is needed for the classification. This classification was practical and was widely utilized, especially now that CT scan services are widely available in the public hospitals and is within the reach of most people in private hospitals. We think that the Bosniak classification is very useful for the physicians but in some cases, clinical consideration is also important. The cases below may serve as illustrations.

### Case 1

A 65-year-old female patient was discovered to have renal cysts on ultrasound. (Figure 3). She has a strong family history of renal history as her mother and brothers all had renal cysts. The renal ultrasound showed the presence of multiple renal cysts on both kidneys. They were of varying sizes and there was no echogenicity inside the cysts.

From the family history and the appearance on the ultrasound, she has polycystic kidneys diseases. This is hereditary and no specific treatment is available at the moment. It was suggested that vasopressin 2 antagonist such as tolvaptan might stop the progression of the cyst progression. However, it has to be given on a long term basis and it is expensive at the moment. There were also side effects such as polyuria. The cornerstone in the management at present is to control the blood pressure, preferable with ACEI or ARB.

The complications of the cysts include bleeding and infection. The patient might present as sudden loin pain due to bleeding into the cyst. It can be confirmed by renal ultrasound or by direct cyst puncture. (Figure 4 and 5; cyst puncture and the bleeding into the cyst). Treatment is mainly conservative including analgesics.

### Case 2

A 60-year-old male complained of pain on the left loin. There was no gross haematuria. US showed that he had 2 renal cysts in the left kidney and a big renal cyst on the right kidney. The right renal cyst showed the presence of a septum dividing the cyst into two. The left renal cysts showed some echogenicity inside the cysts which might be due to recent bleeding. (Figure 6 and 7). The left loin pain may be due to bleeding into the cyst.

Since this is not a simple cyst, a contrast CT scan was ordered. It confirmed the presence of a septum inside the right renal cyst but there was no space occupying lesion or other attenuation inside the cyst. There was no vascular enhancement. The left renal cysts showed no septa but there was attenuation consistent with some recent haemorrhage into the cyst. There was no vascular enhancement. (Figure 8).

In view of the findings, the right renal cysts was classified as Bosniak type 2 cysts. Since there were some calcifications detected on renal ultrasound, the cyst was treated as a Class 2F cyst and he was advised to attend follow up for repeated ultrasound assessment later.

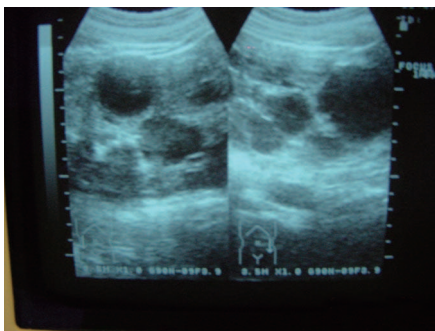


Fig. 3 Polycystic kidneys disease

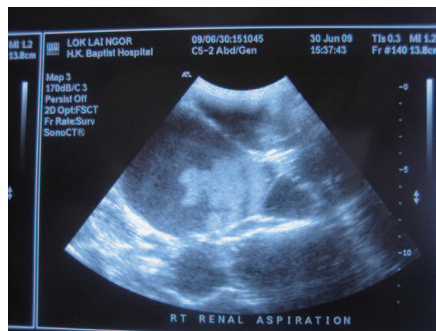


Fig. 4 Bleeding into the cyst



Fig. 5 Cyst puncture showed blood stained fluid

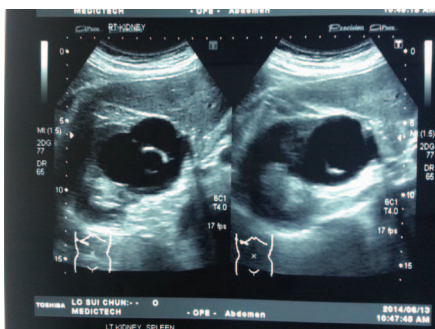


Fig. 6 The right renal cyst

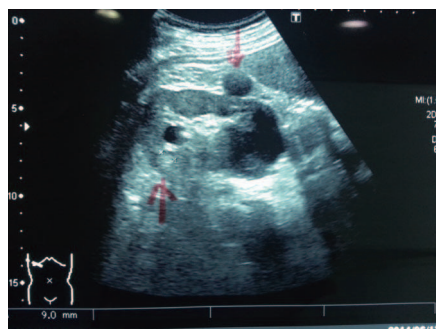


Fig. 7 The left renal cyst

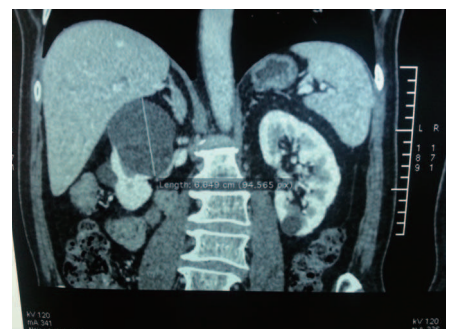


Fig. 8 The right renal cyst on FT, note the presence of septum but absence of contrast enhancement



### Case 3

A 30-year-old patient was found to have a right renal cyst on renal ultrasound. On reviewing the films, the cyst was noted to be of 8 cm in diameter which was situated near the renal pelvis. There was mild hydronephrosis of the right kidney. (Figure 9)

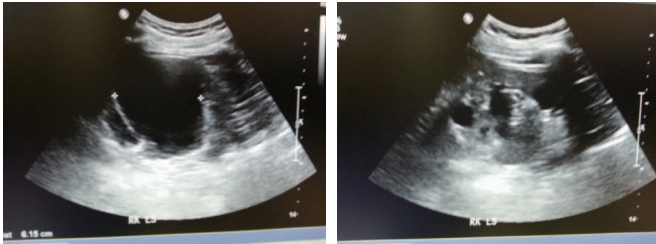


Fig. 9a cyst causing hydronephrosis

Fig. 9b cyst after aspiration

In view of the large size of the cyst, the para-pelvic position and the hydronephrosis, there was concerns over the compression effect of the cyst. A renal cyst puncture was done under ultrasound guide (Figure 10 and Figure 11) and the cyst fluid was aspirated. Repeated US showed the subsidence of the hydronephrosis. The fluid obtained was straw coloured and the cytology for malignant cells was negative. Since there was no anatomical obstruction, the distended pelvis was thought to be a normal anatomical variation.

### Conclusion

Renal cysts are generally benign but one need to identify those features which may suggest the presence of malignancy. The Bosniak classification is useful but it is based on CT scans. In the majority of cases, the cysts were discovered incidentally by ultrasound. If the cyst looked to be simple (thin walled, clear fluid, no septa mass inside the cyst), there is probably no need to go further. If there is any deviation from the simple cyst, (Figure 12), a contrast CT scan may be used for Bosniak classification. In suspected cases, the fluid can be aspirated under ultrasound and the fluid sent for malignant cells. There is high chance that the cyst will recur after aspiration but if malignancy is excluded, the patient can be assured. In special cases, alcohol injection after cyst aspiration may prevent the recurrence.



Fig. 10 Cyst puncture under ultrasound guide



Fig. 11 Aspiration of cyst



Fig. 12 A complicated cyst

The Bosniak classification is useful tool and we hope it should be included in all CT report of renal cyst to assist the physicians in the patient management.

**Table 1: Bosniak Renal Cyst classification<sup>(2)</sup>**

<b>Bosniak 1</b>
<ul style="list-style-type: none"> <li>• simple cyst, imperceptible wall, rounded</li> <li>• work up: nil</li> <li>• % malignant: ~ 0%</li> </ul>
<b>Bosniak 2</b>
<ul style="list-style-type: none"> <li>• minimally complex, a few thin (&lt; 1mm) septa, thin Ca<sup>++</sup>; non-enhancing high-attenuation (due to proteinaceous or haemorrhagic fluid) renal lesions of less than 3 cm are also included in this category; these lesions are generally well margined.</li> <li>• work up: nil</li> <li>• % malignant: ~ 0%</li> </ul>
<b>Bosniak 2F</b>
<ul style="list-style-type: none"> <li>• minimally complex but requiring follow up.</li> <li>• increased number of septa, minimally thickened or enhancing septa or wall</li> <li>• thick Ca<sup>++</sup>,</li> <li>• hyperdense cyst that is:                             <ul style="list-style-type: none"> <li>o &gt; 3 cm diameter, mostly intrarenal (less than 25% of wall visible); no enhancement</li> </ul> </li> <li>• work up: needs ultrasound/CT follow up</li> <li>• % malignant: ~ 25 %<sup>6</sup></li> </ul>
<b>Bosniak 3</b>
<ul style="list-style-type: none"> <li>• indeterminate, thick or multiple septations, mural nodule, hyperdense on CT (see 2F)</li> <li>• treatment/work up: partial nephrectomy or RF ablation in elderly/poor surgical risk</li> <li>• % malignant: ~ 54%<sup>6</sup></li> </ul>
<b>Bosniak 4</b>
<ul style="list-style-type: none"> <li>• clearly malignant, solid mass with large cystic or necrotic component</li> <li>• treatment: partial/total nephrectomy</li> <li>• % malignant: ~100%</li> </ul>

### Reference

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