

## Age-Related Occurrence of Simple Renal Cysts Studied by Ultrasonography

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**Summary.** Three hundred forty-eight outpatients without evidence of renal disease were examined by ultrasound. Their ages ranged from 18 to 83 years. Unexpected renal cysts of more than 1 cm were found in 47 patients (13.5%). No cysts were demonstrated in patients less than 23 years old; thereafter the number of patients with cysts increased significantly with age. The cyst diameter also tended to increase with age, but the correlation with age was not significant. There was no statistical difference of cyst occurrence between the right and left kidney, or between males and females. The upper portion of the kidney was most often affected in the equally divided three portions along the long axis. These results confirm that the development of simple renal cysts is age-related.

**Key words:** Aging – Kidney – Simple cyst – Ultrasonography

In the diagnosis of cystic disease of the kidney, recently computed tomography (CT) has been introduced and the accuracy of intravenous pyelography improved. The diagnostic frequency of renal cystic disease, therefore, appears to be increasing further.

On autopsy, Kissane [6] has reported that in subjects more than 50 years of age the incidence of simple cysts of the kidney is more than 50%. However, the reported incidence of simple cysts varies extremely among investigators: Laucks and McLachlan [8] have reported 24% by CT in patients without renal disease, while Brunn et al. [4] have reported 4.8% by ultrasonography in nonselected patients.

*Abbreviations:* CT=computed tomography; RCE=renal central echoes

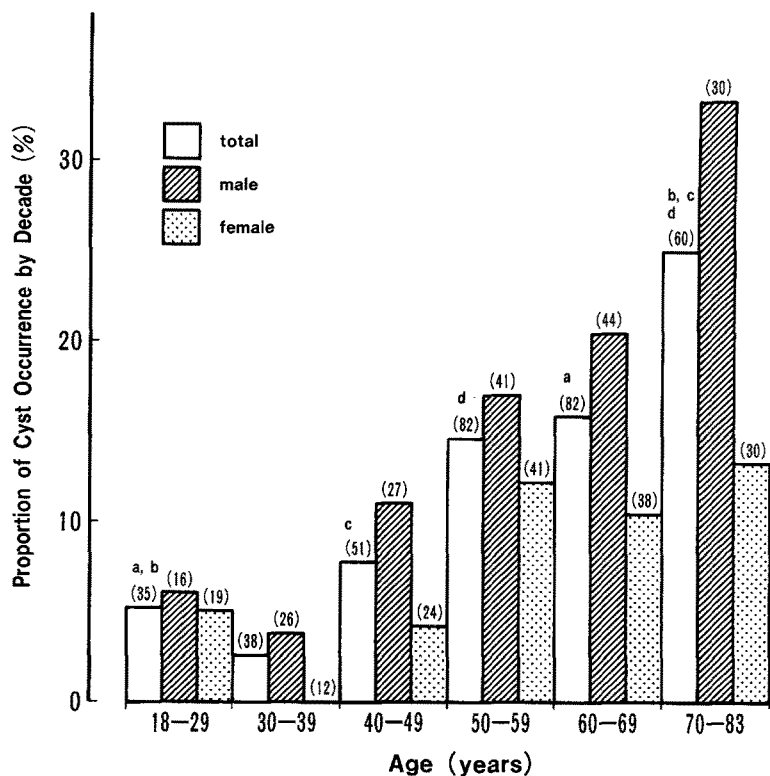
We examined the frequency with which unexpected simple cysts are demonstrated on ultrasonography of the abdomen (performed for reasons other than investigation of renal disease) and attempted to elucidate the age-related development of simple renal cysts which has previously been suggested [2, 8].

### Subjects and Methods

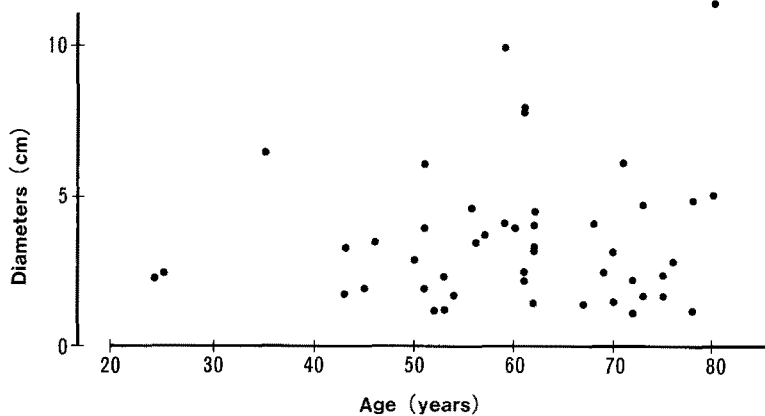
Three hundred forty-eight outpatients (18 to 83 years of age) of Keishinkai Hospital (Nagano 380, Japan) were examined for reasons unrelated to the upper urinary tract, usually for suspected or known intraabdominal malignancy or disease of the pancreas or biliary system. Apart from the existence of simple cysts, kidneys were normal on ultrasonography, urinalysis, and blood chemistry; 204 were males aged 18 to 78 years (mean, 44 years), while 144 were females aged 18 to 83 years (mean, 57 years).

Simple cysts were defined as follows: On B-mode the lesion is echo-free, has smooth walls, and has high-level echoes forming its distal wall [10]. However, it has been reported by Amis et al. [1] that several kinds of renal diseases show an- or hypo-echoic areas in the renal central echoes (RCE), and we can not always discriminate among these diseases by ultrasound alone. Therefore, patients with cystic lesions of more than 1 cm in the RCE underwent further examination such as excretory urogram, CT, or ultrasonically guided puncture [7]. Thus, in the present report, cysts with more than 1 cm in both the RCE and peripheral low echoic areas were considered in the statistical analyses.

This study was performed on a electron scan-type apparatus (EUB-400, Hitachi Medico) with



**Fig. 1.** Proportion of subjects with simple renal cysts by age decade. The number of subjects in each column is indicated in parentheses. Statistical analysis was performed between white columns (total of males and females): a versus a ( $P < 0.05$ ), b versus b ( $P < 0.01$ ), c versus c ( $P < 0.025$ ), and d versus d ( $P < 0.05$ )



**Fig. 2.** Diameters of simple cysts and ages of the subjects. Correlation analysis was insignificant ( $Y = 24.88 + 0.178X$ ;  $\gamma = 0.1041$ ;  $n = 47$ )

a 3.5 MHz convex-type probe (EZU-PC 3A, Hitachi Medico).

Statistical analyses were carried out by means of an  $\chi^2$ -test and Spearman's rank-correlation test. A  $P$  value of less than 0.05 was considered statistically significant. Some cysts were oval-shaped, in which case the longest diameter was considered. When the patient had multiple cysts, the largest one was included in the analyses.

**Results**

Simple cysts with diameters of more than 1 cm were observed in 47 of the 348 patients (13.5%). No cysts were observed in patients under 23 years old ( $n = 14$ ). Figure 1 shows the proportion of pa-

tients with cysts by age decade. Diagnostic frequency of simple renal cysts became more common with age. Male patients appeared to be more affected than females, but the difference was not statistically significant either for each decade or total comparison. Cyst occurrence was not significantly different between the right (55.3%) and left kidney (44.7%). The upper portion of the kidney was most often affected in the equally divided three portions along the long axis: the upper (57.8%) vs middle portion (15.6%) and the upper vs lower portion (26.6%) were significant at  $P < 0.005$ . Only four patients had multiple cysts (2 or 3 cysts).

Cyst diameter was 1 to 11.5 cm (mean 3.6 cm), increasing with age:  $3.13 \pm 1.62$  (cm, mean  $\pm$  SD) for 18 to 49 years ( $n = 7$ ),  $3.65 \pm 2.36$  for 50 to 59

years ( $n=13$ ),  $3.80 \pm 2.16$  for 60 to 69 years ( $n=12$ ) and  $3.50 \pm 2.76$  for 70 to 83 years ( $n=15$ ). However, correlation analysis between cyst diameters and patient ages was not significant, as shown in Fig. 2.

Precise examinations on excretory urogram, CT, or ultrasonically guided puncture revealed all the lesions in the RCE to be simple cysts.

Two patients had a large cyst (10 and 11.5 cm). They underwent puncture and 95% ethanol was injected into the cysts, since they were potentially hazardous in ureteral oppression.

## Discussion

A relationship between age and the development of cysts, though implied [3, 5, 6] is not established. In 1977, Baert and Steg [2] suggested in a microdissection study that the simple cyst of the kidney in the adult is mainly an acquired disorder. More recently, Laucks and McLachlan [8] have demonstrated on CT scans that the development of simple cysts of the kidney is related to aging. In this report, we confirmed the above findings using another method, ultrasonography.

Kissane [6] has argued from pathological evidence that cysts occur in more than 50% of persons over 50 years of age. The reported incidence of simple cysts, however, varies extremely among investigators. Laucks and McLachlan [8] have reported 24% by CT in patients without renal disease, while Brunn et al. [4] have reported 4.8% by ultrasonography in nonselected patients. In our experience, 13.5% of patients were affected with simple cysts of more than 1 cm. The difference as reported in the literature in the diagnostic frequency of cysts may be in part due to the diagnostic methods used [9]. In addition, race differences and underlying diseases may be responsible. In the latter, patients with hypertension or hyperlipidemia may readily develop simple cysts, since arteriosclerosis and resultant renal infarction can be precipitating factors [3]. Whether the above-mentioned factors are responsible or not, the different figures for the incidence of simple renal cysts seem due mainly to the selection of subjects.

When compared with ultrasonography, CT

seems to be an inappropriate tool for the screening of renal disease with regard to the expense and time required. Therefore, for the demonstration or exclusion of space-occupying renal changes, we recommend ultrasound should be the primary diagnostic tool.

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