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Review article

# Management of simple renal cyst in children: French multicenter experience of 36 cases and review of the literature

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## Summary

### Objective
The widespread use of renal ultrasonography has resulted in simple renal cysts (SRC) being discovered with increasing frequency in routine pediatric urological practice. Management of SRC, however, remains controversial. Most SRC are asymptomatic, are diagnosed incidentally, and have no clinical consequence. Our goal was to focus on management strategies for SRC in children with the support of our experience and a review of the literature.

### Materials and methods
A literature review was made of SRC in children since 1950, analyzing epidemiologic data, diagnosis, and management. In addition, a retrospective multicenter study was conducted from 1998 to 2009. Patients included presented with a unique SRC. Data recorded were patient characteristics (age, gender), symptoms, imaging features of the cyst (size, side, pole, and location), type of management, and long-term outcomes. To focus on management, two groups of patients were defined: primary surgical management and primary conservative management consisting of clinical and US follow-up. Our results were compared with the literature.

### Results
Thirty-six cases were included. Fifteen patients were symptomatic. Comparing the two groups, long-term outcomes were similar. The only significant factors were preoperative (age of the patient, diameter and location of the cyst): the bigger the cyst, the more likely it was to be exorenal, and the greater the likelihood that surgery would be performed ($p = 0.006$). Symptoms were not a significant indicator for surgery.

### Conclusion
According to the literature and our experience, and considering the benign natural history of SRC and the similar outcomes whatever the treatment, primary conservative management is recommended for all cases. Surgery should be restricted to symptomatic large compressive cysts, increase in cyst size on follow-up, and uncertain diagnosis. Percutaneous cyst aspiration with sclerotherapy has not yet been used enough to ascertain its safety, and requires prospective evaluation.

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## Introduction

A simple renal cyst (SRC) is defined as a solitary or essential renal cyst. It is quite common in adults, but uncommon in children, and is being discovered with increasing frequency with the widespread use of ultrasonography (US), particularly prenatal US [1]. Most SRC in children are asymptomatic and discovered incidentally. Wilm's tumor is the main differential diagnosis [2]. In adults, Bosniak's CT scan classification is the reference for diagnosis of SRC [3]. Bosniak stage I defines a solitary cyst, that is a simple renal cyst.

Management of SRC has been well defined in adults [4]: surgical treatment is recommended if symptoms occur or if the diagnosis is uncertain. The gold standard treatment, when possible, is cyst aspiration under ultrasound guidance associated with injection of a sclerosing agent. If the cyst recurs, marsupialization is performed.

Few studies have compared sclerotherapy with marsupialization in children and even fewer have studied specifically punction with sclerotherapy. To our knowledge, conservative treatment with US follow-up has never been evaluated. Although many diagnostic studies have been done, there are no clear guidelines for the management of SRC in children.

The present study is a multicenter, retrospective study, associated with a literature review in order to evaluate the actual management of SRC in children.

## Epidemiology

SRC is common in adults with prevalence of about 10%, and its incidence increases with age. In children, the prevalence of SRC is underestimated. It has been reported that the incidence of SRC increases with age from 0.22% to 0.55% in children, to more than 5% in the fourth decade, and up to 36% in the eighth decade of life [5,6]. The widespread use of prenatal renal US means that SRC is being detected with increasing frequency in routine pediatric urological practice [1]. The first case report of prenatal SRC was published in 1985 by Steinhardt [7]. Since then, many case reports have been published. The most recent series about management was published in 2001, with eight cases of SRC [8]. The sex ratio of SRC was 1.6 in our series [9], which is similar to reports in the literature [10]. Our series was similar to those reported in the literature, especially for their location [5,11] in the superior pole [7].

## Pathogenesis

The pathogenic mechanisms of SRC are still unknown although several theories have been proposed, including obstruction of renal tubules [12] or caliceal diverticula, which can block communication within the collecting system [13,14]. With regard to the natural history of SRC, we suggest that prenatal cysts, which resolve spontaneously, are caused by a reversible process like focal ischemia, whereas postnatal cysts may be caused by other permanent mechanisms, which have not yet been elucidated.

## Diagnosis

The diagnostic criteria for congenital SRC, using urographic features, were first described by DeWeerd in 1956 [15], but are as topical as ever in children. The criteria are: (1) single, round, unilocular, (2) anechoic lesion with no elements within the cyst, (3) no communication between the cavity of the cyst and the renal pelvis, and (4) patent renal pelvis and ureter. Nowadays, Bosniak's tomodensitometric classification is the diagnostic classification of SRC used in adults [3]. SRC in children correspond to Bosniak stage I, that is a thin, smooth-walled renal cyst. This benign cyst shows homogeneity, water content with no septation, and a sharp interface with adjacent renal parenchyma, with no wall-thickening, calcification, or enhancement in contrast studies. However, in children, compared with CT scan, US remains the best screening and diagnostic method because it is efficient, non-irradiating, harmless, and inexpensive [16]. Hence, our "how to proceed" is in line with the use of US. In the case of SRC, US shows a simple homogeneous anechoic cyst with no septa.

## Material and methods

### Review of the literature

Based on a study conducted in 2009 on 36 cases of SRC in children, a review of international literature was undertaken using Pubmed and Medline looking for reports in which SRC in children appear as keywords. Only one filter was used: papers from years 1950. Publications included patients over 18 years old or other locations for the cyst were excluded.

### The author's experience

A retrospective descriptive multicenter study was conducted in eastern France (Reims, Nancy, Strasbourg, Colmar, Besancon, and Dijon) and reviewed 36 patients between January 1998 and May 2009. Children were excluded if they had had cystic dysplastic kidneys, family history of polycystic kidney disease, or a renal insufficiency.

All SRC was defined using US preferentially. To analyze these SRC, a precise SRC radio-anatomical classification was used based on their double localization: either exorenal, that is outside the capsule, or intrarenal, that is parenchymal; either polar, that is in the upper or lower pole of the kidney, or mediorenal.

To focus on management, two groups of patients were compared based on the type of primary management: group 1 for primary surgical management, and group 2 for conservative management.

Parametric data were expressed as means $\pm$ standard deviations or medians for age, and analyzed using the unpaired, two-tailed Student's *t* test, assuming variance to be equal.

Categorical variables for the groups were compared using $\chi 2$ or Fisher's Exact test. Statistical analysis was performed using SPSS software (SPSS, Inc, Chicago, IL,