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Management and Outcome of Ureteropelvic Junction Obstruction in Senegalese Children

Ibrahima Bocar Wellé[1*], Ndeye Aby Ndoye[1], Papa Alassane Mbaye[1], Doudou Gueye[1], Ndeye Fatou Seck[1], Faty Balla Lo[1], Lissoune Cissé[1], Anderson Safari Kibanja[1], Florent Tshibwid A. Zeng[1], Youssouph Diedhiou[1], Aloïse Sagna[1], Oumar Ndour[2], Gabriel Ngom[1]

[1]Department of Pediatric Surgery, Albert Royer National Children's Hospital Centre, Université Cheikh Anta Diop, Dakar, Senegal
[2]Department of Pediatric Surgery, Aristide Le Dantec University Teaching Hospital, Université Cheikh Anta Diop, Dakar, Senegal
Email: *welzizou10@gamil.com

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Abstract

Introduction: The ureteropelvic junction obstruction is a rare congenital malformation of the upper urinary tract. We report its management and outcome at Senegal's main pediatric surgical department. **Patients and Methods:** We conducted a descriptive review of all patients managed in our pediatric surgical department at Albert Royer National Children's Hospital Centre from January 1st, 2013 to December 31st, 2017. **Results:** Thirty patients were included in our study. The mean age was three years. Males were more affected (sex ratio of 2.75). The prenatal diagnosis was made in 23% of cases using prenatal ultrasonography. An abdominal mass was the circumstance of discovery in 36% of cases, and lumbar contact and renal sloshing were found in 66% of cases. There was no renal function impairment in 93% of cases. Urinary tract infection occurred in 50% of cases. Ultrasonography (100%) and urinary computed tomography (56%) were used to diagnose. A temporary nephrostomy was performed in 23% of cases, and as definitive treatment, an open Anderson-Hynes procedure was performed in 96% as a nephrectomy was made in a patient. Early postoperative complications were encountered in 56% of cases: urinary tract infection (36%), surgical site infection and anastomotic stenosis (6% both), and urinoma and textiloma (both in 3%). A patient died from sepsis. After a mean follow-up of 12 months, no additional complication was reported. **Conclusion:** Ureteropelvic junction obstruction was frequently diagnosed late, and its management carried unneglectable morbidity in our environment. A laparoscopic approach would be a solution to improve its outcome.

Keywords

Ureteropelvic Junction Obstruction, Management, Outcome, Children, Senegal

1. Introduction

The ureteropelvic junction obstruction (UPJO) is the most frequent congenital malformation of the upper urinary tract (UUT) [1]. Its incidence during normal pregnancy ranges from 4.5% to 7% in Europe [2]. In Africa, antenatal diagnosis is rare, so no prenatal incidence is reported, and population-based studies lack, so its in-hospital frequency was estimated to be 6.3 cases per year [3]. Its diagnosis is increasingly made in the prenatal period thanks to prenatal ultrasonography (US) [4]. In the postnatal period, the circumstances of discovery are variable, but usually present as an abdominal mass. Ultrasonography (the first-line investigation), urinary tract computed tomography (CT) and renal scintigraphy are currently the investigations of choice [5]. The gold standard of UPJO treatment depends on degree of obstruction and function of the affected renal parenchyma, and includes conservative management, pyeloplasty or nephrectomy. Pyeloplasty is performed according to the principle proposed by Anderson Hynes and Kuss, which allows the removal of the affected portion of the ureteropelvic junction, and better urinary drainage from the pelvis to the proximal ureter [6] [7].

This work aimed to evaluate the management of UPJO in our pediatric surgery department.

2. Patients and Methods

We conducted a descriptive study review in our pediatric surgery department, at Albert Royer National Children's Hospital Centre, the main of Senegal, serving all 14 regions of Senegal and its neighboring countries such as Gambia, Guinea, and Mauritania. Diagnosis of UPJO was considered based on ultrasonography with pelvic anteroposterior diameter superior to 10 mm. From 2015, urinary CT was also introduced in the diagnosis protocol since it became available and affordable for patients. It was used to confirm findings of renal US. We included all patients managed for UPJO in our department over five years (from January 1^{st,} 2013 to December 31st, 2017). The data was collected on a pre-established survey form. The parameters were studied: patient's age and sex, the existence of prenatal ultrasound, clinical aspects, biology, imaging (kind of imaging and its results), treatment (temporary and definitive), and outcomes. The data were encoded on an Excel spreadsheet (Microsoft Office 2010^{TM}) and analyzed with EpiInfo 7.2^{TM}. The quantitative data were presented as frequencies. Our study received authorization from our Institutional Ethics Committee.

3. Results

During the study period, 30 cases of UPJO were collected, *i.e.*, six cases per year. The mean age was three years, with extremes of 12 days and 13 years. Our series had 22 (73.3%) males and eight (26.7%) females, *i.e.*, a sex ratio of 2.75.

The prenatal diagnosis was made in seven cases (23.3%) thanks to the prenatal US. An abdominal mass dominated the circumstances of discovery in 12 cases

(40%). The physical examination revealed a lumbar mass in five cases (16.7%), flank tenderness in five cases (16.7%), lumbar contact, and renal sloshing in 20 cases (66.7%). Renal function was normal in 28 cases (93.3%) and impaired in two cases (6.7%). Fifteen patients had a urinary tract infection (UTI), and the most commonly identified pathogens were *Escherichia coli* (four cases, 13.3%) and *Klebsiella pneumoniae* in (three cases, 10%). Ultrasonography of the urinary tract was performed in all our patients and allowed to evoke the diagnosis in all cases. In some patients, additional investigations (Table 1) included urinary CT, retrograde urethrocystography, intravenous urography, and renal scintigraphy, which noted a nonfunctional left kidney in a single patient.

All of our patients underwent surgical treatment. A temporary nephrostomy was performed in seven cases (23.3%). An open approach via homolateral anterolateral muscle splitting incision was performed in 26 cases (86.7%) and a homolateral anterior transperitoneal incision in four cases (13.3%). Anderson-Hynes procedure was performed in 29 cases (96.7%) and nephrectomy in a patient due to a nonfunctional left kidney, confirmed by renal scintigraphy. Trans-anastomotic tube was left in place in all our patients, including 14 (46.7%) by a double J probe, 14 (46.7%) by a transparenchymal probe and in one (3.3%) by a blue stent. All patients underwent drainage of the renal compartment.

The postoperative course was unremarkable in 13 patients (43.3%), and complications occurred in 17 patients (56.6%), as detailed in Table 2. The mean LOS was 9.1 days. One case of death was registered due to sepsis complicating

Table 1. Complementary investigations.

Investigation	Number	Percentage
Urinary CT	17	56.7
Retrograde urethrocystography	10	33.3
Intravenous urography	4	13.3
Renal scintigraphy	2	6.7

Table 2. Postoperative curse of patients.

Postoperative curse	Number	Percentage
Unremarkable	13	43.3
Complications	17	56.6
Urinary tract infection	11	36.7
Surgical site infection	2	6.7
Anastomotic stenosis	2	6.7
Urinoma	1	3.3
Textiloma	1	3.3
Mortality	1	3.3

postoperative urinary tract infection (UTI). After a mean follow-up of 12 months (from 23 days to three years), no recurrence nor additional complication were noted.

4. Discussion

Ureteropelvic junction obstruction is the most frequent congenital malformation of the upper urinary tract. Its incidence is variable in the literature. We recorded 6 cases per year, similar to data of other African authors in Ivory Coast and Tunisia, ranging from 5.88 to 6.3 cases per year [3] [8]. However, this is lower than the results of a French study, finding 9.6 cases per year [9]. This difference can be explained by the fact that, in our context, some children are managed in adult urology departments.

The mean age of our patients was three years, which is comparable to most of the data in the literature, the majority of which make the diagnosis before the age of 6 years [3] [9] [10]. As in our series, most authors reported a male predominance [3] [8] [9] [11].

The diagnosis of UPJO is increasingly made in the prenatal period thanks to prenatal ultrasonography. We reported 23.3% of prenatal diagnoses, which is comparable to some African studies [3] but much lower than most European studies [9] [12] [13]. This low percentage could be explained, on the one hand, by the lack of radiologists specializing in pediatric urological pathology. On the other hand, unmonitored pregnancies, most prenatal ultrasounds are performed by midwives.

Postnatally, the revealing symptomatology is variable in the literature. The main symptom, according to most authors, is abdominal pain and UTI [11] [12] [14] [15]. This was not the case in our series and that of another African author where the main revealing symptom was an abdominal mass in 28.6% of cases [3]. The clinical examination of a child presenting with UPJO gives widely varied results, which depend on the degree of the obstruction and the child's age. All our patients benefited from the creatinine dosage, and two of them had impaired renal function, *i.e.*, in 6.6% of cases. This result is comparable to the data of some series [10] [16], but lower compared to the series of another African study which recorded 22.9% of patients with impaired renal function [3].

In our series, UTIs were encountered in 50% of cases, similar to results of other authors who reported UTIs in 60% of cases [17], but other authors reported a much lower frequency of UTI, found in 6% of patients [16].

In our series, urinary tract US was performed in all patients and urinary CT in 17 patients. Urinary US and CT were the key investigations in our series, whereas, in a resource-constrained setting, urinary US and IVU were more used [18]. This difference can be explained by the fact that IVU is being abandoned in our practice. Scintigraphy was performed in only two cases (6.6%) in our series, which is low compared to the majority of series in the literature [9] [11]. Retrograde uretrocystography (RUC) is strongly recommended in the literature [12].

It makes it possible to highlight associated vesicoureteric reflux (VUR) and to consider antibiotic prophylaxis [19]. It was realized in 33.33% of our study cases and was normal in all cases.

Treatment for PSU ranges from expectant monitoring to surgery**.** Monitoring is indicated for prenatal diagnosis UPJO because spontaneous improvement is possible in infants by tissue maturation [8]. Nevertheless, some authors have shown that 20% of monitored patients benefit from surgery [12]. On the other hand, several authors suggest surgical treatment as soon as possible if UPJO is diagnosed postnatally [8]. The decision to operate immediately or secondarily after monitoring depends on the authors and the intercurrent complications or the lack of improvement during monitoring. For some authors, surgery was performed straight away, leading to a marked dilation regression and a systematic improvement in the emptying curve [9].

Laparoscopic and robot-assisted pyeloplasty and other minimally invasive techniques such as endopyelotomy are increasingly used, especially in high-income countries (HICs) [20]. All our patients had benefited from an open Anderson-Hynes procedure because of the lack of minimally invasive equipment, as shown by reports of other authors in resource-constrained settings [17] [18]. However, the open Anderson-Hynes procedure gives results comparable to the laparoscopic approach [3].

All of our patients had benefited from trans-anastomotic drainage, which was not used by some authors supporting that the trans-anastomotic drainage is useless when the ureteric anastomosis is made without any difficulty, which does not present tension, watertight at the end of the intervention [14].

Several postoperative complications can be encountered. We noted 56.6% of complications, which is higher than other reports, registering complications from 3.55% to 8.6% [3] [10]. The mean LOS was 9.1 days in our study. This result is similar to that of African authors**,** who found an average of 7 +/− 1.86 days [3], while those in HICs reported LOS to be three days [21]. This difference can be explained by the fact that all our patients underwent open surgery, whereas, in HICs, the laparoscopic approach was used. Mortality of UPJO is low. We noted mortality of 3.3%, comparable to the series of authors in the same context as us, who found 2.8% of deaths.

5. Limitation of the Study

We conducted a single-center study, which resulted in a small sample size of 30 patients. However, taking the rarity of diagnosis of this condition in our environment, we retrieved important information for all patients, so that all were included. Still, this study is one of the rare reporting UPJO in Sub-Saharan Africa.

6. Conclusion

The anomaly of the ureteropelvic junction is rare in our daily practice. The rate of prenatal diagnosis is low in our context. The most used morphological ex-

aminations were urinary ultrasonography and computed tomography. Open Anderson-Hynes procedure was the technique most used in our context and gave results comparable to the laparoscopic approach, but it lengthened the length of stay and exposed to a greater risk of postoperative complications.

Conflicts of Interest

The authors declare that they have no competing interests.

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