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Clinical and Therapeutic Aspects of Inguinal Hernia in Children in the General Surgery Department of Reference Health Center in Commune I of Bamako Mali

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Abstract

Inguinal hernia in children is a congenital pathology in children linked to the persistence of the peritoneo-vaginal canal in children and the NÜCK canal in girls; persisting into adulthood. This work aimed to study inguinal hernia in children in the general surgery department of the Reference Health Center of Commune I of the Bamako District; to determine the frequency of inguinal hernia; describe the epidemiological, clinical and therapeutic aspects of inguinal hernias and in order to evaluate the cost of treatment. This was a prospective study from April 2017 to March 2018 during which 60 children with an inguinal hernia were collected. Inguinal hernias in children represented 9.23% of patients operated on in the department. The average age was 59.23 months with extremes of one month and 180 months and a standard deviation of 49.23 years. The male sex was dominant with a sex ratio equal to 9:1. The notion of prematurity was found in 11.7% and was associated with a testicle not in place in 1.7% of cases. 41.7% of our patients were referred by a doctor and 66.7% of patients presented with painless, intermittent inguino-scrotal swelling (83.3% of cases). The hernia was discovered before one week of life in 50% of cases. Inguinal swelling was absent in 11.7% but observed intraoperatively. The inguinal hernia was unilateral in 91.7% of cases and 70% of hernias were discovered by the parents during pushing efforts. The inguinal hernia was located on the right in 61.7% of cases. The hernia swelling was soft,

painless, impulsive and reducible in 78.3% of cases. The swelling was inguino-scrotal in 58.3% of cases. The hernia was simple in 95% of patients and hernial strangulation was observed in 3 cases or 5% of cases. 98.3% of patients were ASA I. The treatment was carried out openly in all our patients including closure of the vaginal peritoneal canal in 95% of cases under general anesthesia in 98.3% of cases. The morbidity rate was 8.4% (surgical site infection: 6.7% of cases and hematoma: 1.7%). The immediate consequences were simple in 96.6% of cases. No cases of recurrence occurred during the 6 months after the intervention. The average cost of care was estimated at 69,743 FCFA.

Keywords

Inguinal Hernia, Child, Surgery, Cs Ref C I, Bamako Mali

1. Introduction

An inguinal hernia is a pathological protrusion of a portion of peritoneum possibly containing abdominal viscera through the abdominal wall. Inguinal hernia in children is a congenital pathology in children linked to the persistence of; peritoneo-vaginal in children and the NÜCK canal in girls; persisting into adulthood [1].

In the United States, the incidence of inguinal hernias was between 1% and 5% [2].

In France, the prevalence: 0.8% to 4.4% (6 to 8 boys for one girl), predominance on the right (60%) and the left (30%) and bilateral in 10%; 30% of premature babies [3].

In England, the treatment of inguinal hernia: 10 cases per 100,000 inhabitants with more than 80,000 interventions carried out per year [4].

Iran: 10% of pathologies in infants [5].

Ivory Coast: a frequency of 18% among children aged 0 to 15 [6].

In Senegal: 538 children aged between 15 days and 15 years were operated on for an inguinal hernia, *i.e.* 86.08% of the 625 patients operated on for groin hernias [7] [8].

In Mali: 15.8% of consultations; 21.6% of surgical interventions with a hospital frequency of 5.29% (n = 3379) [9].

Inguinal hernia in children, an often benign pathology, presents a risk of strangulation in 10% to 15% of cases, compromising the vitality of the intestine and gonads [3] [4] [8]. The diagnosis of inguinal hernia is clinical when there is inguinal or inguino-scrotal swelling, during crying or pushing efforts [3]. Its treatment is surgical and consists of resection of the peritoneovaginal canal or the Nück canal [1] [9].

We are a second-reference peripheral general surgery service. Faced with the high number of inguinal hernias in children during our consultations in the department; given the lack of pediatric surgery service and study on this health

problem in the Reference Health Center of Commune I of Bamako, we decided to carry out this work.

2. Method and Patients

This work was carried out in the general surgery department of the Reference Health Center of Commune I of the Bamako District. This was a prospective cross-sectional study from April 2017 to March 2018. We included 60 children aged 0 to 15 years for inguinal hernia during our study.

- Inclusion criteria: All children aged 0 to 15 years old whose diagnosis of inguinal hernia was obvious and/or strangulated without risk of necrosis were included in this study.
- Non-inclusion criteria: Any child treated for other pathologies of the peritoneovaginal canal or operated elsewhere.

The variables studied included sociodemographic factors (age, sex, profession, residence); physical examinations (general, functional, physical signs); additional examinations (ultrasound); biological assessments (blood count, Rhesus group, prothrombin level, cephalin kaolin level, blood glucose); and surgical treatment techniques and short- and medium-term operative outcomes.

The supports used were the medical files of the patients and the interviews of the parents recorded, the registers of outpatient consultations, hospitalization, recording the reports of the patients, the individual investigation sheet and the anesthesia protocol.

Data entry and analysis were carried out using Epi-info and Zotéro software. Word processing was carried out on Excel 2016 and Microsoft Word 2016 software. The comparison tests used are Chi^2 and p with a significance threshold of $p < 0.05$.

3. Results

During the study period, 2123 consultations were carried out in the general surgery department of the reference health center of commune I of the Bamako District in Mali including 650 surgical interventions including 60 cases of inguinal hernias and 125 cases of hospitalization. Inguinal and or inguino-scrotal hernia in children represented 9.23% of surgical interventions and 2.83% of consultations in the general surgery department of the Cs ref of commune I Bamako.

During this study we observed infants in 36.70% of cases. The average age of the patients was 59.23 months with a standard deviation of 49.23 and extremes of 1 month and 180 months. The sex ratio was 9 in favor of the male sex. The patients (85% of cases) resided in commune I of Bamako. Patients with a merchant father (58.3%); housewife mothers (85%) were the most represented (Table 1).

The method of recruitment was during the ordinary consultation, *i.e.* 97% of cases and 41.7% of patients were referred to us by doctors (Table 2). The parents had no particular history apart from hypertension (3.3% of cases), inguinal hernia (5% of cases), sickle cell anemia (5% of cases) and diabetes (3.3% of cases).

Table 1. Sociodemographic data of patients.

Patient sociodemographic data		Effective	Percentage
Age	Newborn: 0-28 days	7	11.70
	Infant: 29 days-24 months	22	36.70
	Small child: 25 months-5 years	13	21.60
	Big child: 6-15 years old	18	30
Sex	Male	54	90
	Feminine	6	10
Origin	Municipality I	51	85
	Municipality V	1	2
	Municipality VI	2	3
	C/Kati	5	8
	Guinea	1	2
Total		60	100
Father's main activity	Trader	35	58.30
	Peasant	9	15
	Teacher	1	1.70
	Pupil/Student	3	5
	Expatriate	1	1.70
	Black-smith	1	1.70
	Maneuver	3	5
	Marabout	2	3.30
	Worker	3	5
	Fisherman	1	1.70
	Dry cleaner	1	1.70
Main activity of the mother	Shopkeeper	4	6.70
	An accountant	1	1.70
	Pupil/Student	3	5
	Nurse	1	1.70
	Housewife	51	85

90% of mothers were followed during their pregnancy, 76.7% of mothers were multiparous and the children were born full-term in 88.3% of cases; premature (11.7% of cases).

The hernia was discovered before one week of life in 50% of cases and the circumstances of discovery by the parents were made during pushing efforts (70% of cases); spontaneous in 30% of cases. 66.7% of our patients presented

with painless inguino-scrotal swelling. The inguinal hernia was located on the right in 61.7% of cases; 95% of hernias were simple and the hernia was inguino-scrotal in 70% of cases. The inguinal hernia was painless in 83.3% of cases. The inguinal swelling was soft, painless, impulsive and reducible in 78.3% of cases; 5% of hernias were associated with an empty scrotum. Prematurity of patients was 11.7% of cases, 5% of patients had associated testicular ectopy and approximately 2% had a testicular tumor (Table 3).

The ASA I class was the most represented, at 98.3%. Closure of the vaginal peritoneal canal was the most commonly performed surgical technique, accounting for 95% of cases. General anesthesia was the type of anesthesia used in 98.3% of cases; a single patient under locoregional anesthesia, *i.e.* 1.7% of cases. The contents of the hernia sac were peritoneal fluid in 88.4% of cases; the ovary (3.3%) and the small intestine (3.3%) of cases. The operating time was at most 30 minutes in 65% of cases and 70% of our patients received an antibiotic and an anti-inflammatory (Table 4).

The method of postoperative follow-up was the appointment (25% of cases), seen at home (16.7% of cases) and the contact person (33.3% of cases). We observed 25% of our patients lost to follow-up, specific in our context when the operative consequences are simple (25% of cases).

The immediate consequences were simple in 92% of cases and in 96.6% of

Table 2. Distribution of patients according to recruitment method and qualification of the referent.

Method of recruitment/Qualification of the referent		Effective	Percentage
Method of recruitment	Emergency	2	3
	Ordinary consultation	58	97
Qualification of the referent	Doctor	25	41.70
	Student in thesis year	20	33.30
	Male nurse	10	16.70
	Caregivers	5	8.30
Total		60	60

Table 3. Distribution of patients according to personal history.

Personal history		Effective	Percentage
Age of gestation	Born at term	53	88.30
	Prematurities	7	11.70
Nutritional habits	Exclusive breastfeeding	12	20
	Artificial milk	1	1.70
	Mixed	47	78.30
Total		60	60

Table 4. Clinical data.

Clinical data		Effective	Frequency
Circumstances of discovery and Functional signs	Pushing effort	42	70
	Spontaneous	18	30
	Painless swelling	50	83.30
	Painful swelling	3	5
	None	7	11.70
ASA Classification	ASA I	59	98.30
	ASA II	1	1.70
Inspection	No swelling	7	11.70
	Inguinal swelling	18	30
	Inguino-scrotal swelling	35	58.30
Affected side	Right hernia	37	61.70
	Left hernia	18	30
	Bilateral hernia	5	8.30
Characteristics of hernia	Soft, painless, impulsive and reducible	47	78.30
	Hard, tense, painful and irreducible	3	5
	Tense, painless and irreducible	10	16.70
Scrotal palpation	Testicle in place	51	85
	Testicle absent	9	15
Type of hernia	Simple hernia	57	95
	Strangulated hernia	3	5
Total		60	60

cases after 3 months (Table 5). The average cost of care was 69,743 FCFA (Table 6).

4. Discussion

This prospective, descriptive study running from April 2018 to March 2018 allowed us to collect and monitor patients through the consultation register, operative report, monitoring and investigation form. We are a general surgery department; peripheral with a limited technical platform for a judicious choice of patients.

Inguinal hernia in children constitutes the most frequent reason for consultation in the pediatric surgery department of the Gabriel Touré University Hospital, *i.e.* 5.8% of cases and 21.6% of surgical interventions [10]. The study by Mallé S., in Mali in 2016 found 19.57% [11]. In our series, it represented 9.23% of surgical interventions. This difference can only be explained by the reduction in the attendance rate in the reference health center of commune I.

Table 5. Treatment.

Treatment		Effective	Percentage
Type of anesthesia	General anaesthesia	59	98.30
	Locoregional anesthesia	1	1.70
Operating time	0 - 14 minutes	21	35
	15 - 30 minutes	39	65
Operating technique	Simple cure	57	95
	Wall repair	2	3.30
	Orchiectomy	1	1.70
Contents of the bag	Peritoneal fluid	53	88.40
	Testicle	3	5
	Ovary	2	3.30
	Small intestine	2	3.30
Immediate post-operative consequences	Simple	55	92
	Wall infection (SSI)	4	6
	Hematoma	1	2
Post-operative follow-up at 3 months	Simple	58	96.60
	Testicular retraction	1	1.70
	Testicular atrophy	1	1.70
Total		60	100

Table 6. Average cost of care.

Type of hernia	Simple	Complicated
Average cost		89,600

Inguinal hernia in infants has always been the most represented age group [5]. There is a significant difference between the average age of 59.23 months of our children and that found in the American, Italian and Senegalese series [8]. The sex ratio is in favor of boys according to the authors [12] [13] [14] [15]. Certain variations in pelvi-abdominal morphology seem (absence of a bulky cord in the female inguinal path) to explain the lower frequency of inguinal hernias in girls [12]. In our series the sex ratio was 9 in favor of boys as described in the literature.

In the literature, the overall frequency of inguinal hernia varies between 0.8% and 4.4% in full-term children; it reaches almost 30% in premature babies [3] [4]. In our study premature babies represented 11.7%. This rate is not statistically different from those found by Kalantari [6] in Iran. There is a significant difference between our prematurity rate and that of Kouamé [7] with $p < 0.05$ in Ivory Coast and Lipskar [16] in the United States with $p < 0.05$ through recruitment.

The circumstances vary, most often caused by the parents in the form of in-

guinal or inguino-scrotal swelling occurring during cries or pushing efforts and or even outside of pushing efforts in wide neck hernias [17]. In our study, the discovery was made in 70% of cases during pushing efforts compared to 30% of cases spontaneously. This differs from that of the Ivorian series [7] (66.78% of cases of spontaneous discovery).

Clinical signs of inguinal hernia may be absent at the time of the clinical examination requiring an ultrasound of the groin [3] [11] [12]. In our series, 11.7% (7 patients) did not have inguinal swelling on physical examination but had persistence of the perineovaginal canal intraoperatively. There is a significant difference between this rate and that found by Harouna in Niger. The right side is predominant in the literature [3] [7] [8] [12] [18] [19]. In the distribution, the right side was the most dominant, *i.e.* 61.7% of cases. This rate is statistically comparable to that observed by Kouamé [7] in Ivory Coast, *i.e.* $p = 0.7211$. Other authors find that the high frequency of hernia on the right is linked to the delay in closure of the peritoneo-vaginal canal and the small bowel mass on the right than on the left [3].

Inguinal hernia can be accompanied by malformations as described in the literature [7] [8] [20]. We observed testicular ectopy (5%) and testicular tumor (1.7%) in our series. This is not comparable to those of other authors [7] [8]. The frequency of strangulation varies according to the authors [21] [18]. This was the main complication. There is no significant difference between our rate (5%) and those reported by Lee [22], $p = 0.195$ in the USA and Timmers [23], $p = 0.098$ in the Netherlands; unlike the Canadian series where $p < 0.05$. In children, the treatment of inguinal hernia consists of resection and ligation of the sac [4] [7] [24]. Lipskar [16] in 2009 in the USA and Chan [13] in Taiwan region in 2010 performed the treatment under laparoscopy which mainly allows the diagnosis of a contralateral hernia and good aesthetic results [25] [26].

The surgical outcomes vary according to the authors [17] [27] with few post-operative complications. We found a postoperative morbidity rate of 8.4% (5 cases). This rate differs statistically from that found in the Pakistani [17] and Nigerian [27] series ($p < 0.05$) which could be explained by the fact that these authors carried out the inguinal hernia repair laparoscopically. The cost of treating inguinal hernia in children is well above the Malian minimum wage of 28,460 CFA francs. The cost is increased by the occurrence of complications.

5. Conclusions

Childhood hernia is a congenital condition; the most frequent and covered by the general surgery unit of the reference health center of commune I of the district of Bamako in Mali.

The diagnosis is clinical, generally evoked by the presence of unilateral or bilateral inguinal or inguino-scrotal swelling. In our countries, late diagnosis of inguinal hernia can lead to a serious complication (strangulation) which is often fatal. Hernia repair is a non-trivial procedure even if it is carried out on an out-

patient basis.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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