

Peritoneovaginal Duct and Nüeck's Duct Persistence in Children at Campus Teaching Hospital in Lomé (Togo)

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How to cite this paper: Boume, M.A., Bikor, K.E.E., Wandote, O.E.A., Sanni, Y.S., Teko, D.V., Kante, T.B., Ngassam, Y.A. and Akakpo-Numado, G.K. (2022) Peritoneovaginal Duct and Nüeck's Duct Persistence in Children at Campus Teaching Hospital in Lomé (Togo). *Open Journal of Pediatrics*, 12, 137-147.

<https://doi.org/10.4236/ojped.2022.121015>

Received: November 24, 2021

Accepted: February 27, 2022

Published: March 2, 2022

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Abstract

Introduction: Peritoneovaginal duct (PVD) and Nüeck duct (ND) include several abnormalities with many clinical entities that are at the cause of a variety of symptoms. These are frequent in pediatric surgeon practice and could lead to serious complications. The aim of our work was to describe the epidemiological, diagnostic and therapeutic aspects of pathologies of PVD or ND in our conditions after the first five years of surgical activities of our pediatric department. **Material and Methods:** This was a retrospective and descriptive study, carried out on the files of children, aged zero to 15 years, presenting PVD or ND pathology, operated in the service, over a period of 4 years (2016 to 2019). Results were classified good, medium or bad. **Results:** During the study period, among the 865 children operated in pediatric surgery, 164 children were found for PVD and ND pathologies (18.95%). The average age was 5.3 years old. There were 152 boys (92.68%) and 12 girls (7.32%). The reason for consultation was inguinal or inguino-scrotal swelling in 99.3% of the children. The right side was affected in 58.5% of cases. In boys, there were inguinal hernias (27.5%), inguinoscrotal hernias (30.3%), hydroceles (36.9%) and cysts (5.3%). In girls, there were inguinal hernias (91.7%) and 1 ovarian hernia (8.3%). The umbilical hernia was associated with these pathologies in 39 cases. Treatment was conventional closure of the PVD or ND. With an average follow-up of 2.5 years (range 3 months and 3.5 years), the results were good in all cases. **Conclusion:** Pathologies of PVD or ND took an important place in the activities of the pediatric surgery department. Management by conventional surgery has given good results in all cases. Early treatment of these pathologies helps prevent complications.

Keywords

Peritoneovaginal Duct, Nüeck Duct, Hernia, Hydrocele, Cord Cyst, Pediatric Surgery

1. Introduction

Peritoneovaginal duct (PVD) and Nüeck's duct (ND) abnormalities include pathologies due to the persistence of PVD in boys and ND in girls [1]. These are very common pathologies in pediatric surgery. In fact, 80% of newborns have a permeable PVD or ND [2]. According to Potts *et al.* [3] the persistence of the vaginal process is a common phenomenon occurring in 2% - 5% of term newborns and 30% of premature newborns. Thus, PVD and ND abnormalities take an important place in pediatric surgical activities [4]. Abnormalities of the PVD include the following anatomic-clinical entities: the hernia, the hydrocele and the cyst of the spermatic cord. ND abnormalities include inguinal hernia, ovarian hernia and ND cyst [5]. The clinical diagnosis of an inguinal hernia is made before the appearance of inguinal swelling during crying or pushing efforts. When the swelling is inguino-scrotal, it is an inguino-scrotal hernia. In a non-communicating hydrocele or spermatic cord cyst, the swelling is permanent, painless and transilluminable. In the communicating hydrocele, the swelling is reducible, painless and transilluminable [5]. Some of the abnormalities associated with these persistent congenital ducts, such as hernias, could lead to serious life-threatening and gonadic" complications [5]. The treatment of these pathologies is nowadays marked by the argument on the advisability of the laparoscopic approach [3] [6]. The important place of these pathologies in pediatric surgical activities, in the Campus teaching hospital pediatric surgery department is evident; but we don't have equipment for laparoscopic approach. In this context, after five years of activity, we initiated this work in order to check in the management of pathologies of the PVD and ND at the Campus teaching hospital.

2. Material et Methods

This was a retrospective and descriptive study, which concerned the medical files of children (from birth to 15 years included) of both sexes, who had been operated in the pediatric surgery department of the Campus teaching hospital, for an abnormality of the PVD or ND. It covered a period of 4 years from January 1st, 2016 to December 31, 2019. We included in our study any male child with any of the pathologies of PVD (Inguinal hernia, inguinoscrotal hernia, spermatic cord cyst, vaginal hydrocele) or female with ND pathology (Inguinal hernia, ovarian hernia, ND cyst) operated during the study period. We did not select for our study the files of children who had consulted for an abnormality of the PVD or ND and who were not treated. Epidemiological (frequency, age, sex), diagnostic (clinical signs, ultrasound signs, anatomopathological forms, diagnosis, sides con-

cerned), therapeutic (indications, methods,) and evolutionary parameters (disappearance of swelling, recurrence, testicular atrophy and scar) were studied and **Table 1** shows the criteria for assessing the results. These parameters were recorded on the survey sheet, which was filled in from the consultation register, the medical records and the operative report register. The data entry was done by the Epi data software version 3.1. The data analysis was done by SPSS software version 2.6.

3. Results

3.1. Socio-Demographic Data

During the study period, 2944 children consulted in the department and 285 of them for PVD or ND pathologies, with a hospital consultation frequency of 9.68%. In the same period, 865 children were treated in the department, including 164 for PVD and ND pathologies. The hospital surgical treatment frequency was 18.95%. The average age was 5.12 ± 3.81 years with extremes of 1 and 180 months. These were 56 infants, 58 small children, and 50 big children. There were 152 boys (92.68%) and 12 girls (7.32%) with a sex ratio of 12.66. In the 164 children, 181 cases of PVD and ND pathologies were treated.

3.2. Diagnostics Aspects

In boys ($n = 152$), the reason for consultation was dominated by scrotal swelling in 61 cases (40.1%) and inguinal swelling in 57 cases (37.5%). Inguinoscrotal swelling was found in 33 cases (21.7%) and bilateral scrotal pain in 1 case (0.7%). Four children (2.6%) were received for emergency counselling. The others had come for scheduled consultations.

The diagnosis was clinical in all children except two children in whom ultrasound

Table 1. Criteria for assessing the therapeutic results of treatment of peritoneal vaginal duct or Nück's duct persistence.

	Criteria
Good	Total disappearance of swelling Absence of recurrence unremarkable scar
Average	Regression of swelling Residual collection in the bursa (postoperative hematoma) Scar \pm unsightly
Bad	Recurrence Testicle not in place Ascended testicle Unsightly scarring Testicular atrophy

was performed. **Table 2** shows the distribution of boys according to the diagnosis.

Abnormalities sat on the right in 93 cases (61.18%), on the left in 45 cases (29.60%) and were bilateral in 14 cases (9.22%). **Figure 1** shows an uncomplicated left inguinoscrotal hernia in a 19 months old boy.

In 44% children, the PVD abnormalities were associated to other diseases. **Table 3** shows distribution of boys by associated abnormalities.

Table 2. Distribution of boys by diagnosis.

	n	%
Uncomplicated inguinal hernia	49	27
Hydrocele	61	37
Uncomplicated inguinoscrotal hernia	44	28.2
Spermatic cord cyst	8	5.3
Strangulated inguinal hernia	1	1.9
Strangulated inguinoscrotal hernia	2	1.2
Engorged inguinoscrotal hernia	1	0.6
Total	166	100

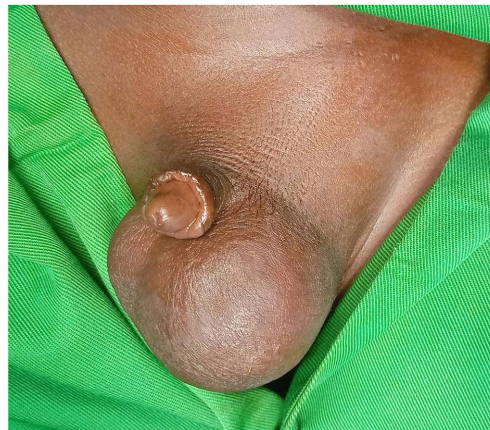


Figure 1. Left inguinoscrotal hernia in a 19 months old boy.

Table 3. Distribution of boys by associated abnormalities.

	n	%
Umbilical hernia	37	24.4
Testicular ectopy	4	2.7
Epididymal cyst	2	1.3
Strolling testicle	1	0.6
Absence of associated abnormalities	108	71
Total	152	100

In the girls ($n = 12$), the reason for consultation was inguinal swelling. Unilateral left inguinal hernia was the most common diagnosis in 5 cases (41.7%). The unilateral right side was affected in 3 cases (25%). The abnormality was also bilateral in 3 cases (25%). One case of herniation of the right ovary (8.3%) was also found. **Figure 2** shows a bilateral inguinal hernia in a 6 years old girl.

Malformations were associated with ND pathology in 3 cases. These were two cases of umbilical hernia and one case of white line hernia.

3.3. Therapeutic Aspects

Surgical treatment was performed in all patients. The procedure performed was the closure of the PVD in the boy or the ND in the girl. It was performed through the classical inguinal approach.

In the three cases of strangulated hernias and the one case of engorged hernia, the viability of the loops allowed their reintegration without resection.

For the 56 cases of hydrocele, the surgical treatment was identical with, in addition, evacuation of the fluid collection.

For the 8 cases of spermatic cord cysts, evacuation of the cyst contents was done in addition to closure of the PVD. In the same operation time, the anomalies associated with the pathology of the PVD or the ND were managed: 39 umbilical hernia cure, 1 white line hernia cure, 5 undescended testicular management and 2 epididymis cyst excisions.

Exploration on the contralateral side was done in 29 cases (17.68%). They were 26 boys and 3 girls. The average age of these children was 63.66 ± 50.77 months. The extremes were 7 months and 9 years.

Figure 3 shows the pre and post operative aspects of the ombilical and inguinal regions in a boy managed for bilateral inguinoscrotal hernia associated to umbilical huge hernia.

3.4. Evolutionary Aspects

The immediate postoperative course was simple in all our patients. The average hospital stay was 2.08 days with extremes of 1 and 8 days. The postoperative morbidity was marked by one case of bursal hematoma which evolved favorably with treatment. The evolution after 6 months was simple in all cases with unremarkable scars. We did not note any testicular retraction, testicular atrophy or

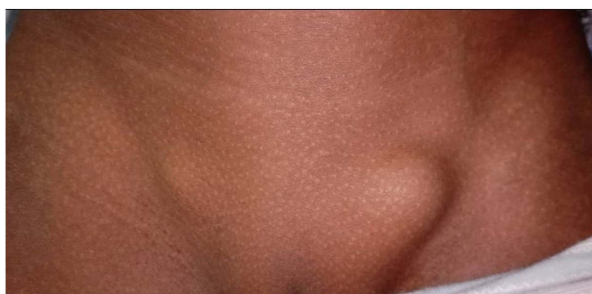


Figure 2. Bilateral inguinal hernia in a 6 years old girl.

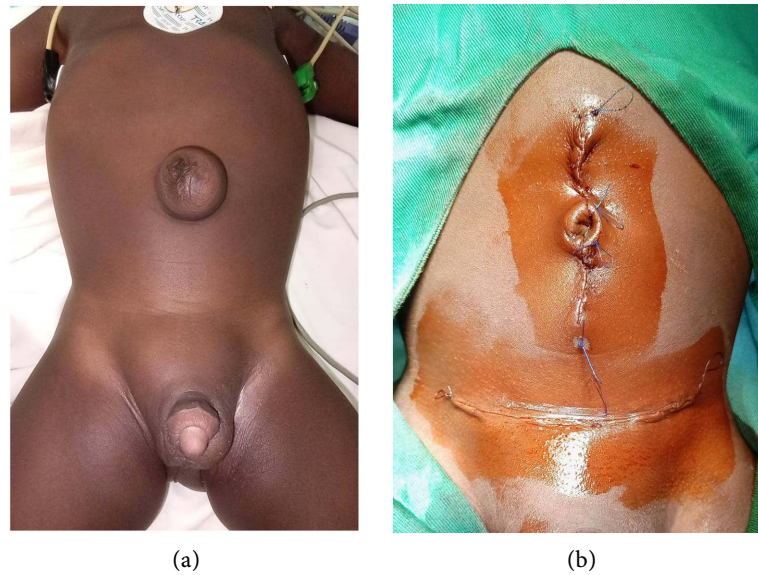


Figure 3. Bilateral inguinoscrotal hernia associated with a huge umbilical hernia in a boy (a) and appearance of the umbilical and inguinoscrotal regions after cure of the 3 hernias (b).

parietal suppuration. The postoperative mortality was zero. With an average follow-up of 2.5 years (range 3 months and 3.5 years), the results were good in all cases.

4. Discussion

4.1. Epidemiologic Aspects

Inguinal hernias represent the most frequent reason for consultation in pediatric surgery [7] [8]. During the study period, 2944 children consulted the pediatric surgery department and 285 of them for PVD or ND pathologies, with a hospital consultation frequency of 9.68%. This frequency is underestimated because some cases are managed in other medical centers, which may skew data. In the same city, there is a second pediatric department which is the first in the country. That department could even take care of more of more cases. Apart from this department, other surgeons also take care of these pathologies in private medical centers of the city. Sewa *et al.* [4] in Togo had collected 111 cases in four years when they practiced in Dapaong in the north of the country like general surgeon. Sarr *et al.* [9] in Dakar (Senegal), reported 163 cases in five years of urological practice. PVD and ND abnormalities are ubiquitous and very frequent. In our conditions the few number of pediatric surgeons allow othre surgeons to take care of them.

Small children were the most represented in our study, with 58 cases (35.4%). Kalantari *et al.* [10] in Iran recorded mostly infants. Bastiani *et al.* [11] stated that it is the most common pathology in infants. The The children in our series were older than those of Ngom *et al.* [1] and Kouamé *et al.* [12] who reported respectively 58.4% of infants and 57% of children less than one month old. The

mean age in our series was 5.12 ± 3.81 years with extremes of 1 and 180 months. Kalantari *et al.* [10] in Iran found a mean age of 2 years. Sarr *et al.* [9] found a mean age of 7.5 ± 7 years. The age of diagnosis is highly dependent on the age of medical consultation. These are congenital anomalies that occur very soon after birth. When people have a family doctor who regularly consults the children, the diagnosis is often made earlier and the child is referred to a pediatric surgeon. In cases where the conditions do not allow quick access to a medical consultation or people are afraid of surgery in a child as is the case in our environment, the diagnosis is delayed. The fear of surgery associated with the lack of financial means also leads parents to hope instead for a correction for sometimes several years before being forced to surgical treatment.

Our series was composed of 152 males and 12 females, which gives a sex ratio of 12.66. This male predominance was found by Ngom *et al.* [1] with a sex ratio of 40.6. It is known that these pathologies of the vaginal process are more common in boys. For some authors, it is at least six times [13] [14] [15]. The reasons for this male predominance are not formally known.

4.2. Diagnostic Aspects

The common character of PVD or ND pathologies is swelling. This swelling can be inguinal or inguino-scrotal depending on the case [16]. It was the reason for consultation in 163 (99.3%) of the children in our series. Mieret *et al.* [17] and Sarr *et al.* [9] found this swelling in all the children in their series. Ngom *et al.* [1] found this swelling in 98.4% of children in their studies. The pathologies of the PVD or ND are generally benign and do not usually present an urgent character [16]. In our series, 163 (99.4%) children were seen in a scheduled consultation. Sarr *et al.* [9] had received all the children in their study in a scheduled consultation. Strangulation or engorgement of a hernia constitutes a diagnostic and therapeutic emergency [16]. In our series, 1 (0.6%) child was seen in emergency. Keita *et al.* [18] had received 17.09% of the children in their study in emergency. Inguinal, scrotal or inguinoscrotal swellings are the most constant and revealing physical signs [16]. We noted them in all the children in our series. Harouna *et al.* [19] found these swellings in 96%. The diagnosis of PVD and ND pathologies is clinical [20]. A careful clinical examination allows differentiation of the anatomical forms [20]. However, in case of doubt, some authors recommend performing an ultrasound [1]. In our study, ultrasound was performed in 2 (1.3%). We believe that a careful questioning of the parents and the examination of the photos they took at the time of the appearance of the swelling can lead to the diagnosis and postpone the request for an ultrasound.

In our series, hernia was the most frequent anatomoclinic type in 87 cases (57.23%) followed by hydrocele in 56 cases (36.84%). This predominance of hernia was also found in the series by Ngom *et al.* [1], with 76.8%. Sarr *et al.* [9] noted 72% of hydrocele. In practice, hernias are more common than hydroceles. The width of the duct as well as the early efforts of the child such as during

coughing, screams and laughter that lead to abdominal contraction can explain this situation.

We recorded 96 cases of right-sided involvement, *i.e.* 58.5%. This right-sided predominance was also described by Amadou *et al.* [16]. Other authors reported that the incidence of right-sided hernias is more than three times that of left-sided hernias. Some authors believe that the high frequency of hernia on the right side is related to the delay in closure of the peritoneovaginal canal on the right than on the left [7]. The hernia was strangulated in 3 cases (3.6%) in our series. Akcakaya *et al.* [21] found hernial strangulation in 10%. Hernial strangulation is a serious complication that can be prevented by early diagnosis and management of hernias in children. The risk of strangulation is higher the younger the child and/or the more premature the child [22]. A strangulated hernia develops when the blood supply to the intestines is compromised. This is a surgical emergency as it causes intestinal obstruction, ischaemia, subsequent necrosis and perforation and is therefore associated with erythema, oedema and pain. In boys, irreducible hernias can cause testicular damage; testicular atrophy has been found in 15% of irreducible hernias and is thought to be secondary to a local pressure effect [23]. Similarly, ovarian damage may occur in girls [24].

Failure of the ND to close is the cause of two anatomoclinical entities: inguinal or ovarian hernia, and ND cyst. In our series, inguinal hernia was the most frequent with 11 cases (91.7%). It can depend on the age of the girls of our series. In female infants, the ovaries are the most commonly herniated content; however, after one year of age, bowel becomes more common, and a herniated ovary in an adolescent would be extremely unlikely [24].

PVD and ND pathologies may be accompanied by other abnormalities. Umbilical hernia was the most frequent association; 39 cases (88.63%). This predominance was also reported by Nandiolo *et al.* [25]. Umbilical hernia is a frequent pathology in children; it would be more frequent in black children, and its frequency can reach 50% of children in some African regions [26].

4.3. Therapeutic Aspects

The classic surgical treatment is closure of the PVD or ND. This closure was performed in all cases in our study. That classical treatment by direct inguinal access is efficient with fewer complications [19] [27] especially injury to the spermatic vessels or deferential duct, recurrences and iatrogenic cryptorchidies [19] [27]. But, some children may require a second time for PVD on the contralateral side to the previous [19] [28]. This has also been noticed by Harouna *et al.* [19]. In this context, the surgical treatment can be done by laparoscopic approach which advantages are evident [29] [30]. Apart from the extended and clear view of the hernia orifice (direct or indirect hernia), it's also possible to avoid injuring the elements of spermatic cord and having recurrences. In the series of Montupet and Esposito, [29] the contralateral inguinal orifice exploration was positive in 15.92% of cases. In the series of Akakpo-Numado *et al.* [3], 4 out of 21 boys (19.92%) had no clinically contralateral PVD; which were repaired at

the same sitting, thereby obviating extra costs.

4.4. Evolutionary Aspects

At 1 month, a bursal hematoma had been found in our study with a favorable evolution. Manipulation of the spermatic cord and testicle during surgery exposes to the risk of testicular retraction or testicular atrophy in the medium or long term [5]. Recurrence is most often related to incomplete ligation of the duct. These complications were not found in our study.

5. Limitation of the Study

This is a retrospective study covering the period from January 1, 2016 to December 31, 2019. The absence of perinatal information (term of pregnancy, systematic review at birth) in medical records prevented the study of these records.

6. Conclusion

PVD and ND pathologies are very frequent in pediatric surgical practice. They include several entities dominated by hernias which are very frequent in children with a risk of serious complications, hence the importance of their early management. Hernia strangulation should be the haunting concern of the medical staff. Morbidity is low and mortality is zero. Early management helps to avoid complications.

Formatting of Funding Sources

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sector.

Ethical Committee Approval

The authors declare having Ethical committee approval for the study.

Conflicts of Interest

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

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