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Alarming Mortality Of Biliary Atresia In Two Senegalese Tertiary Hospitals: A Plea For Early Diagnosis

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Abstract

Background: The management of biliary atresia is challenging in low-income countries, with delayed diagnosis and its consequences. We aimed to report its epidemiological, diagnostic, therapeutic aspects and outcomes in Dakar, Senegal.

Methods: We conducted a 5-year retrospective review, which included 16 patients, admitted in the pediatric surgery services of Aristide Le Dantec University Teaching Hospital and Diamniadio Children's Hospital.

Results: The mean age at admission was 105.6 (1 - 420 days), with 10 girls. Cholestatic jaundice was found in all cases, discolored stools in 43.7%, dark urine and hepatomegaly in 31.2%. All patients had biological cholestasis and cytolysis syndromes. The ultrasound was performed in all patients with a sensitivity of 56.2%. The mean age at the time of surgery was 145 days (22 – 540 days). The surgical exploration was conducted in 10 cases and found type IV Biliary Atresia in 50%. The Kasai procedure was performed in 4 cases and liver biopsy in 9 cases. Mortality occurred in 75% (50% post-operatively and 25% pre-operatively). In two cases, the postoperative course was unremarkable with the success of the Kasai Procedure after a 42-months follow-up. Two patients were lost to follow-up.

Conclusion: Biliary atresia still has high mortality in our context. This is mainly due to delayed diagnosis, which is common in our environment. Multidisciplinary assessment of persistent neonatal jaundice is crucial to reduce biliary atresia-related mortality

Keywords: Biliary Atresia, Delayed Diagnosis, Mortality

Introduction

Biliary atresia (BA) is a congenital malformation of unknown etiology. It is more common in the Pacific islands, its incidence ranges from 1/8000 to 1/17000 live births **(Lofberg et al., 2020).** In African countries, population-based studies are not available, however, some authors report a yearly in-hospital frequency of approximately 5 cases per year **(Kerkeni et al., 2015)**. It is the leading surgical cause of neonatal jaundice and constitutes a surgical emergency **(Lillegard et al., 2017)**. Its prognosis, which highly depends on early management, has changed with the development of biliodigestive shunts and with liver transplantation in high-income countries, while mortality is still high in low-income countries **(Cazares et al., 2020; Okoro et al., 2013).**

Many factors impact outcome of BA surgery, of which age at surgery is of capital importance **(Cazares et al., 2020)**. However, in the African setting,

delayed diagnosis is common, which in turns delay the surgical management and leads to high mortality **(Okoro et al, 2013)**.
In the Sub-Sahara Africa, management of BA is challenging and the literature is scarce on this subject. we aimed to report the epidemiological, diagnostic, therapeutic aspects and their outcomes in Dakar, Senegal.

Patients and Methods

We conducted a retrospective review over 5 years, from 2011 to December 2016, including all newborns and infants with documented biliary atresia or confirmed intraoperatively. The study was held in pediatric surgery services of Aristide Le Dantec University Teaching Hospital (ALD UTH) and Diamniadio Children's Hospital (DCH), both in Dakar, Senegal. A total of 16 patients were included in our study, with 6 (37.5%) coming from ALD UTH and 10 (62.5%) from DCH.

The following parameters were studied for each patient: age, sex, clinical findings and results of complementary investigations, age at surgery, type of biliary atresia (using the French Classification as shown in **table 1**), type of surgical treatment, and outcomes.

Results

Clinical data

The mean age on admission was 105.6 days (1 – 420 days). Girls were more represented in our series with 10 cases (62.5%). Clinically, the general condition was good (absence of asthenia, fasting, and anorexia) in 8 patients (50%) whereas it was poor for the remaining 8. Cholestatic jaundice was found in all cases with acholic stools in 7 cases (43.8%), dark urine, and hepatomegaly in 5 cases (31.2%). The absence of reported acholic in the 9 remaining cases was not explained.

Investigations

Liver function tests showed cholestasis in all our patients. The mean total bilirubin was 201mg/l and which of direct bilirubin was 132.68 mg/l. The biological cytolysis syndrome was present in all cases with transaminase levels ranging from 1 to 17 times normal. The abdominal ultrasound was performed in all patients diagnosed BA in 56.2%. It revealed the absence of intrahepatic bile ducts dilatation in all cases. The gall bladder was not visualized in 7 cases (43.7%). The main bile duct was not visualized in 5 cases (31.2%) and hepatomegaly was found in 5 cases (31.2%).

Surgical management

The mean age at the time of surgery was 145 days (22-540 days). The mean time from diagnosis to surgery was 44.5 days. The surgical exploration was

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realized in 10 patients (62.5%) and found macroscopically cholestatic liver in 4 patients (25%), a macroscopically cirrhotic liver in 5 patients (31.2%), and the presence of ascites in 2 patients (12.5%). Type IV was found in 5 patients (31.2%), type II in 3 patients (18.7%), and type III in 2 patients (12.5%). A surgical procedure was performed in 4 patients (25%) including cysto-enterostomy (anastomosis between the cyst at the porta hepatis and the Roux limb from proximal jejunum) in 2 patients with type II BA, hepato-porto-cholecystostomy (anastomosis between the porta hepatis and the patent gallbladder) and hepato-porto-enterostomy, the Kasai procedure, (anastomosis between the porta hepatis and the Roux limb prepared from the proximal jejunum) in a single patient each, with type III and IV respectively. Liver biopsy was performed in 9 cases, as the remaining patient was an open and close case.

Outcomes

Of the 16 patients, 12 deaths (75%) were registered, of which 4 (25%) occurred preoperatively and 8 (50%) postoperatively. The postoperative course was unremarkable, with the success of the surgical procedure in 2 cases (12.5%) after a 42-months follow-up. Two non-operated patients (12.5%) were lost to follow-up.

A delay of awakening after anesthesia, associated with hematemesis, due to ruptured esophageal varices, was noted in a patient, leading to their death. A sepsis occurred in a patient as well as a post-operative abdominal eventration (fascial dehiscence) in one case.

Discussion

The incidence of biliary atresia ranges from a country to another, ranging from 1/8000 to 1/170000, but no population-based studies are available in Africa **(De Vries, 2012; Lofberg et al., 2020).**

In comparison to high-income countries, the diagnosis is delayed in our context as outlined in previous studies **(Benjamain et al., 2006; Chardot, 2013)**, with a mean age ranging from 56 to 59 days. In our context, the delayed diagnosis can be explained by the lack of knowledge, by medical practitioners of primary care facilities, of the alert value of discolored or white stools during the first days of life. There is an underestimation of the emergency to establish the diagnosis of biliary atresia when patients present with jaundice. This leads to a delayed referral of these patients in tertiary centers. Our study outlined a female predominance, which is in line with most of the literature data **(Bjørnland et al., 2018).**

In the post-natal period, BA is suspected based on any neonatal cholestatic jaundice persisting beyond 2-3 weeks of life. Discolored stools and dark urine may settle progressively or later. Hemorrhagic signs, sometimes in the form

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of intracranial hemorrhage (ICH), may be indicative **(Akiyama et al., 2006).** Jaundice was the most consistent sign in our series as well as in all the series consulted, as shown in other series **(Campion, 2001)**.

The laboratory findings confirm the presence of cholestasis, hepatic cytolysis, and hepatocellular failure in delayed cases. According to the literature, there is no correlation between the extent of cholestasis and hyperbilirubinemia. Biliary atresia may be accompanied by a moderate and fluctuating increase in bilirubinemia. Its decrease between two successive examinations cannot lend support to rule out the diagnosis **(Cazares et al., 2020).** In Campion's series**,** the conjugated bilirubin assay was decisive in 4 cases where no clinical evidence of referral to cholestasis was noted by the physician in charge. In our series, predominantly conjugated hyperbilirubinemia and elevated transaminases were found in all our patients, by the data found in the literature **(Campion, 2001).**

Abdominal ultrasound after a fasting period of 6 to 8 hours, although not sufficient to establish the diagnosis with certainty, provides some strong arguments in favor of the condition. Its sensitivity and specificity can exceed 90% in specialized centers **(Li-ping, 2013).**

In our series, the ultrasound was performed on all our patients. It allowed the diagnosis of BA to be set in 56.2% of patients, with a similar sensitivity to the data in the literature **(Li-ping, 2013; Yang et al., 2009)**.

In cases where the gallbladder appears normal on ultrasound, cholangiography is necessary to check the patency of the bile ducts **(Shanmugam et al., 2009),** unlike nuclear magnetic resonance, **(Chardot et al., 2009).** This technique was not performed in our study.

Percutaneous liver biopsy is the most accurate diagnostic test for confirming BA, with an accuracy of 90-95% when the sample taken is large enough and when it is examined by qualified pathologists **(Moyer et al., 2004).** Currently, liver biopsy done under ultrasound guidance is the most widely used and accurate diagnostic method **(Lillegard et al., 2017).** A percutaneous liver biopsy was not performed in our study. This can be explained by the lack of suitable facilities to perform this procedure.

The current treatment of BA is sequential. In the neonatal period, the Kasai procedure is performed to restore bile flow to the intestine. The liver graft is performed in case of failure to restore the flow and/or complications of biliary cirrhosis **(Chardot et al., 2009).** The success of the surgical procedure depends on the earliness of the procedure. Thus, 80% of patients who underwent surgery before 45 days are alive with a native liver three years after surgery **(Kasai et al., 1968).** In our study, we noted a significant delay in treatment when comparing our data with other series **(Nio et al., 2010)** in Japan and **(Chardot, 2013)** in France. This is explained by two facts: the great delay in diagnosis and a long time from diagnosis to treatment. In the latter

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situation, no clear reason was found on patients' medical records. We believe that the main reason may be the cost of the surgical procedure, as parents needed to pay from their pocket. In our series, surgical exploration allowed us to find BA type IV in the majority of cases, according to the French classification, which is consistent with the data reported in the literature **(Chardot et al., 2009).** In our series, only 4 patients (25%) benefited from the biliary derivation procedure. This low number of patients who benefited from the Kasai procedure compared to the literature can be explained by the delayed diagnosis and management, which meant that complications were already established in the majority of cases at the time of surgical exploration.

In our series, the post-operative evolution was outlined by the success of Kasai in half of the cases. Our data are close to those in the literature. Stools that remain putty-white for more than two weeks are evidence of the probable failure of the operation. If they remain discolored after the sixth month and jaundice persists or increases, failure is certain **(Nio et al., 2010).**

In our series, we noted a lack of resumption of biliary flow after the biliary derivation procedure, in 2 patients who underwent surgery before 2 months. After hepato-porto-enterostomy early complications such as angiocholitis or late complications such as portal hypertension may occur. None of these major complications were noted in our series. The mortality rate is highly variable in the literature. It is very high in our series when comparing our results with those in the European literature, as shown by Bjørnland's study **(Bjørnland et al., 2018)** in Norway. This difference can be explained by time taken to diagnose and in the speed of treatment of BA, which was longer in our study, as well as by differences in the level of technical facilities, mainly with anesthetists, who were not fully trained in pediatric anesthesia, especially in children with biliary atresia. This high mortality may also be related to the absence of liver transplantation in our context since many children reach our services at the stage of liver cirrhosis, which would have a better prognosis if liver transplantation would be available.

Conclusion

Diagnostic delay is the main challenge in the management of BA in our context, with very high mortality rate. Training pediatrician and general practitioners to its early diagnosis and referral would result in early surgery and better outcome in our setting.

References:

1. Lofberg K, Sekabira J, Krishnaswami S. Biliary Atresia. In: Ameh EA, Bickler SW, Lakhoo K, Nwomeh BC, Poenaru D, editors. Pediatric Surgery- A Compehensive Textbook for Africa, 2nd edition. Springer Switzerland. 2020: 845-855.

2. Kerkeni Y, Ksiaa A, Belghith M, et al. Biliary atresia: experience of a Nord Africain Center. Tunis Med. 2015;93:683–6.
3. Lillegard JB, Miller AC, Fleck AW. Biliary Atresia. In: Mattei P, editor. Fundamentals of Pediatric Surgery, 2nd edition. Springer International Publishing. 2017:629-636
4. Cazares J, Ure B, Yamataka A. Biliari atresia. In: Holcomb III GW, Murphy JP, St. Peter SD, eds. Holcomb and Ashcraft's Pediatric Surgery, 7th edition. Elsevier. 2020, 679-694.
5. Okoro PE, Igwe P, Opara PI. Pattern and survival of biliary atresia patients; experience in Southern Nigeria. Niger J Surg. 2013;19:4–6.
6. Dimmick J, Bove K, Mc Adams A. Extrahepatic biliary atresia and the polysplenia syndrome. J Peddiatr 1975; 86(4): 644-45p.
7. Cowles RA, The Jaundiced Infant: Biliary Atresia. In: Coran AG ed. Pediatric Surgery, 7th edition. Elsevier Saunders, Philadelphia. 2012, 1321-1330.
8. Davenport M. Biliary Atresia. In: Davenport M, Heaton N, Superina R, eds. Surgery of the liver, bile ducts and pancreas in children, 3rd edition. CRC Press, Taylor & Francis Group, Boca Raton. 2017, 71-86.
9. De Vries W. Biliary atresia in the Netherlands: outcome of patients diagnosed between 1987 and 2008. J Pediatr 2012; 638-44.
10. Vic P., Gestas P, Mallet EC, Arnaud JP. Atrésie des voies biliaires en Polynésie Française. Etude rétrospective de 10 ans. Arch Pediatr 1994; 1(7): 646-51.
11. Benjamain L Shneider. A multicenter study of the outcome of biliary atresia in the United States, 1997 to 2000. J Pediatr 2006; 148(4): 467-474.
12. Chardot C. Improving outcomes of biliary atresia: French national series 1986–2009. J Hepatol 2013; 58: 1209-1217.
13. Bjørnland K, Hinna M, Aksnes G, Stensrud KJ, Ertresvåg K, Bjørnstad-Østensen A, et al. Outcome for biliary atresia patients treated at a low-volume centre. Scand J Gastroenterol 2018; 1-4.
14. Akiyama H, Y O, Nagashima T, A Y, Muraji T, Y U. Intracranial hemorrhage and vitamin K deficiency associated with biliary atresia: summary of 15 cases and review of the literature. Pediatr Neurosurg 2006; 42: 362-7.
15. Campion A. Analyse du retard au diagnostic de l'atrésie des voies biliaires. Arch pédiatr 2001;8: 493-8.
16. Bernard O. Diagnostic précoce des ictères cholestatique chez le nouveau-né. Arch Pédiatr 1998; 5: 1031-5.

 ISSN: 1857-7881 (Print) e - ISSN 1857-7431

17. Li-Ping Jiang. The diagnostic value of high-frequency ultrasonography in biliary atresia. Hepatobiliary Pancreat Dis Int. 2013; 12: 415-22.
18. Yang J, D M, Peng Y, L S, Chun-Lin L. Comparison of different diagnostic methods for differentiating biliary atresia from idiopathic neonatal hepatitis. Clinical Imaging 2009; 33: 439–446.
19. Shanmugam N, Harrison PM, J D, Peddu P, AS K, Davenport M. Selective use of endoscopic retrograde cholangiopancreatography in diagnosis of biliary atresia in infants younger than 100 days. J Pediatr Gastroenterol Nutr. 2009; 49(4): 435-41.
20. Chardot C, Darwish AA, Jacquemin E. Atrésie des voies biliaires. Trait Chir Encycl Med Chiropr 2009; 40–980.
21. Moyer V, DK F, Whitington PF. Guideline for the evaluation of cholestatic jaundice in infants : recommendations of the North American Society for Pediatric Gastroenterology, Hepatology and Nutrition. J Pediatr Gastroenterol Nutr 2004; 39: 115-28.
22. Kasai M, S K, Asakura Y, Y S, Ohashi E. Surgical treatment of biliary atresia. J Pediatr Surg 1968; 3: 665-75.
23. Nio M, Sasaki H, Wada M. Impact of age at kasai operation on short and longterm outcomes of type III biliary atresia at a single institution. J Ped Surg 2010;10. 1016.