MANAGEMENT AND PROGNOSTIC FACTORS OF ESOPHAGEAL ATRESIA IN UNDER-EQUIPPED FACILITIES: ABOUT 93 CASES

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Abstract

Introduction: Mortality in esophageal atresia remains high in sub-Saharan Africa. Our purpose in this study is to describe our diagnostic and therapeutic management, and also identify the factors of morbidity and mortality in ill-equipped environment.

Patients And Methods: A retrospective descriptive and analytical study was carried out between April 2010 and March 2016 on newborn cases in the Department of Pediatric Surgery at the Albert Royer Children's Hospital in Dakar, for esophageal atresia. The parameters studied were as follows: delay in diagnosis, the associated pathologies, if any, Waterston’s system of prognostic classification, the surgical time, and the clinical and paraclinical evolution after treatment.

Outcomes: Ninety-three cases of esophageal atresia have been treated for the last six years. There were 59 boys and 34 girls. No cases of prenatal diagnosis were noted. Excessive salivation and respiratory distress were mainly the background circumstances. The mean age at admission was 5.16 days (ranging from 0 to 21 days). The mean therapeutic time was 8.41 days with extremes of 1 and 21 days. The related disorders were cardiac in 58.33% of cases, anorectal in 25% of cases, digestive and bony in 16% of cases. Applying the Waterston classification, 38 patients were in Group A, 45 in Group B, and 10 in Group C. Hospital-acquired infection (HAI) and anastomotic fistula constituted the bulk of postoperative morbidity. Sixty-one patients died after surgery, an overall mortality rate of 76.3%. Sixty-five percent of them had a nosocomial infection. Mortality was 73.49% after surgical operation with a survival rate of 26.51%.

Conclusion: Mortality in esophageal atresia is still high in developing countries and remains mainly related to delayed diagnosis, associated malformations and nosocomial infections.

Introduction

Esophageal atresia is the most common congenital defect of the esophagus [1-2]. Usually, the types associated with other malformations are poor prognosis. Though quite common, the advances that have been made in recent years in terms of diagnosis and surgical treatment of this disease, the mortality rate still varies greatly from one area to another. Indeed, morbidity and mortality related to esophageal atresia are low in developed countries. Survival associated with this congenital disorder varies in these areas (90 to 100%)[3-6]. On the contrary, in sub-Saharan Africa...
Africa, the poor results in the management of esophageal atresia are observable, as demonstrated by many studies [7-9]. The studies conducted on this part of the African continent reveal a mortality rate that concerns more than two-thirds of the newborns [7-9]. Despite this discrepancy, there has been no clear-cut difference in conventional surgical techniques between developed and developing countries. From this point of view, it seems useful to focus this work on the diagnostic and therapeutic management of esophageal atresia at the Albert Royer Children's Hospital in Dakar. The specific purpose of the present study is to identify the morbidity and mortality factors related to this pathology in order to improve the subsequent results.

**Patients & Method**

Our work is a retrospective, descriptive and analytical study. It collated data from 93 cases of esophageal atresia dealt with in the pediatric surgery department of Albert Royer national university children’s hospital (CHNEAR) in Dakar for 6 years (April 2010 to March 2016). Anteroposterior thoraco-abdominal radiography was performed in all patients, and heart ultrasound was used in 91.40% of the patients. There were 59 boys and 34 girls. Some patients died before surgery. Newborns who underwent surgical treatment were divided into 2 groups:

- Group 1: Patients who died after surgery,
- Group 2: Patients living after an average 22.3-month follow-up.

We studied the parameters likely to impact on morbidity and/or mortality in these 2 groups, namely diagnostic delay, whether or not with associated malformations and infections, Waterston classification, waiting period in hospital, clinical and paraclinical evolution after the treatment. Epi-info 6 together with the Fischer test were applied as statistical method. A significance threshold of 0.05 was adopted.

**Outcomes**

During the six-year study, ninety-three cases of esophageal atresia were recorded, i.e. 15.5 cases annually. The circumstances of discovery were generally increased saliva and respiratory distress. No cases of antenatal diagnosis were noted.

The average birth weight was 2,772g with extremes of 1,200g and 3,800g. The newborns were aged 5.16 days on average at the time of admission with extremes of 0-21 days. At the time of surgery, the age varied between 1 and 21 days with an average of 8.41 days.

Associated malformations were cardiac in over half of the cases (58.33%), then anorectal disorders in one third of the cases, digestive and spinal abnormalities were involved respectively in 16% of cases. Most of our patients had a lung infection on arrival. This helped give them an average prognosis even before a thorough malformation assessment was completed. Thus, 38 patients were allocated to Group A, 45 to Group B and 10 to Group C as per Waterston’s system of classification.

10 newborns died before surgery, or 10.7% of the patients. Among the latter, some patients were able to get an additional assessment, thus making it possible to evidence pathologies associated with esophageal atresia (Table 1).

All these newborns were assigned to Group C according to the Waterston classification.

| Table 1: Distribution of associated pathologies in patients who died before surgery |
|-----------------------------------|---|---|
| Related pathologies               | Number | Percentage |
| Infections (respiratory and other disorders) | 7 | 70 |
| Heart abnormalities               | 4 | 40 |
| Other malformations               | 2 | 20 |

Eighty-three patients received surgical treatment, including 95.18% on a single surgical procedure, and 4.82% on initial standby treatment, with the gastrostomy type associated or unrelated to esophagostomy. The post-operative morbidity rate in Group 2 was 45.77%. This was mainly due to nosocomial infections,
anastomotic fistula, and pleural effusion. After an average monitoring of 22.3 months (10 and 71 months), 6 cases of anastomotic stenosis were recorded with good improvement after endoscopic dilation sessions (Figure 1).

Figure 1: barium swallow test showing an anastomotic stenosis at M7 postoperative, a: before dilatations, b: after 2 sessions of dilatations

An overall mortality rate of 76.30% was recorded. Survival after treatment was 26.51%, i.e. 22 patients who represented Group 2. Mortality involved 61 patients, 73, 49% postoperatively, representing Group 1. Among the latter, 65.57% had hospital-acquired infection, compared to 13.63% in Group 2 (p = 0.027). The multi-resistant bacteria are usually the causative agents, such as klebsiella, yeasts and enteric bacteria. In addition to other biological signs of infection, thrombocytopenia was consistent in all patients and varied in severity. Group 1 showed the highest number of patients with pre-operative respiratory infection (p = 0.039). The mean age at surgery was 3 days in Group 2 and 9 days in Group 1 (p = 0.02). Furthermore, the patients who died postoperatively had more associated malformations (p = 0.003). Table 2 shows the different data studied in the two groups.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Group 1 (n = 61)</th>
<th>Group 2 (n = 22)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative respiratory infection</td>
<td>57.3%</td>
<td>31.82%</td>
<td>0.039</td>
</tr>
<tr>
<td>Related malformations</td>
<td>63.93%</td>
<td>27.27%</td>
<td>0.003</td>
</tr>
<tr>
<td>Nosocomial infections</td>
<td>65.57%</td>
<td>13.63%</td>
<td>0.027</td>
</tr>
<tr>
<td>≤ 48h</td>
<td>36</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Age at surgery</td>
<td>25</td>
<td>3</td>
<td>0.02</td>
</tr>
<tr>
<td>&gt; 48h</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Comment

Esophageal atresia is a congenital anomaly, the frequency of which varies widely according to the series[7, 10,11]. This frequency is all the lower in Africa given that the lack of screening in remote areas is still a fact of life. Nevertheless, we recorded 15.5 cases of esophageal atresia on an annual basis in our study.

In northern countries, the diagnosis of esophageal atresia is often made during the antenatal period, and management is started before the first 24 hours of life [12-14]. On the other hand, the average age at diagnosis is greater than 3 days in the studies carried out in a context of limited means [8-9]. Our work is no exception, since newborns were admitted when they were 5.16 days old and operated at the age of 8.41 days on average. This median age at surgery was much higher in the group of patients who died (p = 0.02). The Waterson’s system of classification is a good prognostic factor for us. This allows first to treat the lung infections which are very frequent if the diagnosis is made...
with delay. As part of our series, on the other hand, most patients who died before surgery, were classified as having poor prognosis according to criteria by Waterson. The number of newborns involved in this group is probably underestimated, as some of them could not take a comprehensive malformation assessment. This sometimes incomplete paraclinical assessment may explain the fact that the rate of related malformations is not significant enough between the 2 groups (p = 0.04). Indeed, antenatal diagnosis of esophageal atresia associated with fetal MRI would have allowed a comprehensive malformation assessment and so as to facilitate prognosis for newborns with more certainty [3, 15, 16].

Postoperative morbidity was mainly related to nosocomial infections, 21, 68%, pulmonary effusions, 18.07%, and anastomotic fistulas, 06.02%. Anastomotic stenosis was involved in 8 patients, or 36.36% of them. Its development was favorable following several dilatation sessions after an average follow-up of 22.3 months. These results are consistent with data from the literature [17-21]. The rate of nosocomial infections is significantly higher than in the other studies [11,22]. Indeed, the lack of a resuscitation unit exclusively reserved for neonatology, delayed diagnosis without any possible parenteral nutrition, slowness in the performance of paraclinical examination are all factors that favor the occurrence and aggravation of infections. The latter statistically impact on the risk of occurrence of death whether pre or post-operative (p = 0.027). This mortality rate related to esophageal atresia varies greatly depending on the series. In our study, the survival rate of 26.51% is higher than the findings in the other sub-Saharan Africa studies [7-8].

In addition, there was little statistically significant variation between the 2 groups regarding associated malformations. This is probably related to the fact that investigating related abnormalities is restricted to the use of thoraco-abdominal imaging and the heart ultrasound, and this was not performed in 08.6% of the newborns.

Conclusion
Morbidity, and especially mortality associated with esophageal atresia are still very high in ill-equipped facilities. In addition, they are mainly related to delayed management, associated malformations and nosocomial infections. Better results requires early diagnosis and management, together with an improved neonatal surgical environment.

References
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