Original Article

Risk Factors and Short Outcome of Bowel Atresia in Neonates at Tertiary Hospital

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Abstract

Background: Bowel atresia is a rare congenital anomaly that could affect any part of the bowel. It is categorized based on the type and location of the affected bowel with jejunoileal being the most common type worldwide. Risk factors for developing intestinal atresia are not well established, but we know that genetics, poor prenatal care, and low birth weight are considered risk factors. **Patients and Methods:** This is a case–control study conducted in King Abdulaziz Medical City tertiary hospital in Nursery Intensive Care Unit from 2004 to 2015 with a total number of 50 cases. Each case was matched with two control groups: a female and a male; the matching was based on the date of birth. **Results:** Our study showed an interesting results with esophageal atresia being the most common type (n = 16, 32%) after that jejunoileal (n = 11, 22%). Both genders were affected almost equally with no gender predominance. Twenty-six (51%) of the cases were having below normal birth weight (odds ratio [OR] =0.07; 95% confidence interval [CI] =0.03–0.2). One mother of the control groups had cesarean section in comparison to 15 mothers from the cases (OR 42.4; 95% CI 5.4–333.09). The study also showed that there is no correlation between the number of pregnancies and the risk of atresia (P = 0.798) (OR 0.9; 95% CI 0.72–1.3). **Conclusion:** Unlike western countries, esophageal atresia was the most common type with no gender differences. Interestingly, both groups had high rates of low birth weight.

Keywords: Atresia, bowel atresia, intestinal atresia, risk factors, short outcome

Introduction

Bowel atresia is a rare congenital anomaly that can affect any part of the bowel lumen. It is categorized based on the type of block whether complete, webbed, or double-blind. Then, there is the stenosis which is narrowing in any part of the bowel lumen. Each affected part is then classified based on the location of the atresia or stenosis.[1] Best *et al*. reported that jejunoileal atresia is the most common type with an incidence rate of 1 in 1500 births,[2] while colonic atresia is the least common type with an incidence rate of 1 in 66,000 newborns.[3] There are different signs and symptoms in which an atresia infant usually presents, but the most common and frequent ones are distended abdomen, feeding intolerance, failure of passing meconium for the first 24 h, and bilious vomiting.[4] While on X-ray, it commonly appears either as a multiple air-filled distended bowel loops or as a double bubble or in some cases as a dilated loop proximal to the site of the atresia.[3] There are a lot of unknown risk factors for atresia, but we know that genetics caused by deletion of certain chromosomes have been linked in the development of the digestive system. In addition, an association between bowel atresia and Down syndrome was found in about 8% of Down syndrome patients.[5] It could also be due to poor prenatal care. Some studies found that ethnicity could play a role, where africans are more at risk than Caucasians. Another factor is low birth weight; the lower the weight, the more the risks.[6] Our study is aimed to examine the risk factors of both the mother and the infant in addition to the short-term outcome of the patient.

Patients and Methods

This is a case–control study conducted in King Abdulaziz Medical City (KAMC) tertiary hospital in Nursery Intensive Care Unit from 2004 to 2015. Patients with esophageal, duodenal, jejunoileal, colonic, and anal atresia were included in this study as the case

Access this article online

Quick Response Code:

Website: www.afrjpaedsurg.org

DOI: 10.4103/ajps.AJPS_65_17

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How to cite this article: Al-Jahdali F, Alsania MA, Almagushi AA, Alsaqqat MT, Alnamshan MK. Risk factors and short outcome of bowel atresia in neonates at Tertiary Hospital. Afr J Paediatr Surg 2018;15:108-10.

group, and we have ended with a total number of 50 cases. The criteria of exclusion were any patient who was born outside KAMC or with incomplete data. Each case was matched with two control groups: a female and a male. The matching was based on the same date of birth. A predesigned data collection sheet was designed to look into some specific variables, and it was divided into two main domains: baby's variables and mother's variables. For the baby's variables, we looked into gender, gestational age, birth weight, and Apgar score at 1 and 5 min. For the mother's variables, we looked into age, mode of delivery, and polyhydramnios.

Statistical analysis

The statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) version 24 (IBM Corp., Armonk, NY, USA). Descriptive statistics was presented using percentages and frequencies. Chi-square or Fisher's exact tests were used to assess differences in categorical data between different groups. Two-sided $P < 0.05$ was considered statistically significant. Multivariate analysis using logistic regression was used to examine the multiple risk factors for intestinal atresia.

Results

Our results showed that esophageal atresia was the most common type ($n = 16$, 32%), after that was jejunoileal ($n = 11$, 22%), then anal ($n = 11$, 21.6%), and duodenal ($n = 7$, 14%) with only one case of colonic atresia. [Figure 1]. There is no difference between females and males as a predisposing factor ($n = 27$, 54%) and ($n = 23$, 46%), respectively (odds ratio [OR] 0.94; 95% confidence interval [CI] 0.41–2.13 $P = 0.89$) [Table 1]. The weight between the two groups was statistically significant, as more than 51% of the cases ($n = 26$) were having a weight less than normal at birth while only ($n = 6$, 6.0%) from the control group (OR 0.98; 95% CI 0.98–0.99; $P = 0.0001$).

The risk of premature labor was almost equal between the two groups without any significance ($n = 32$, 37.3%) cases and ($n = 30$, 30%) of the control group (OR 1.1; 95% CI 0.87–1.17).

Apgar score at 1 min was affected in cases more than control (OR 0.5; 95% CI 0.3–0.8 $P = 0.007$) while Apgar score at 10 min was not (OR 2.1; 95% CI 1.02–4.78; $P = 0.043$).

As it is shown in Figure 2, the majority of the cases' mothers were below the age of 25, while the majority of control group were between the ages of 25 and 30 (OR 0.8; 95% CI; 0.6–1.1).

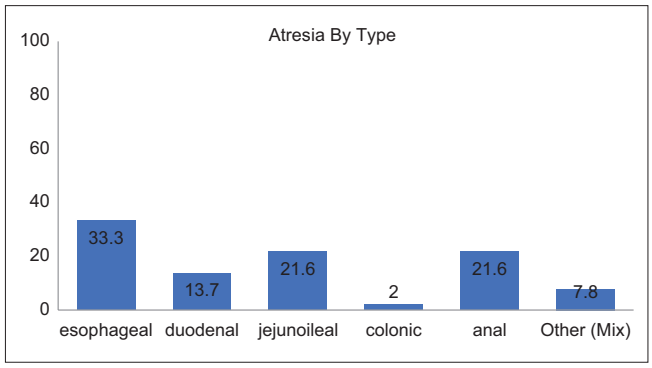

Figure 1: Sample population distribution according to the type of atresia

Ninety-nine of the controlled mothers (99.0%) and 36 of cases' mothers (70.7%) had normal delivery, while 15 (29.4%) of the mothers had C-section compared to only one (1%) of the control mothers (OR 42.4; 95% CI 5.4–333.09; $P = 0.001$).

There is no correlation between the number of pregnancies and the risk of developing bowel atresia (OR 0.9; 95% CI 0.72–1.3; $P = 0.798$). Polyhydramnios was found more in the cases where 10 (19.6%) mothers and one mother of the control (1%) had polyhydramnios (OR 0.04; 95% CI 0.006–0.38; $P = 0.001$).

Discussion

This study aimed to compare infants with atresia and normal infants to examine the risk factors for developing atresia. When comparing our results with the literature, our results interestingly showed that esophageal atresia was the most common type, while worldwide jejunoileal atresia is known to be the most common type with the highest incidence rate as reported by some studies.[2,7] Gender as a risk factor is still unclear, but most of the studies showed that females are more commonly affected than males and they are at a higher risk.[2,3,8-10] our study showed an interesting result as males and females were almost equally affected with no gender predominance. We looked at the weight of atresia infants at the time of delivery, and we found that 51% of the cases were born with low birth weight. It was reported in numerous other studies that bowel atresia has been associated with low birth weight.[3,7,11] The majority of atresia infants (62.7%) were delivered prematurely which is defined as gestational age ≤37 weeks.[3] Intestinal atresia increases the risk of morbidity and mortality in infants as they are at higher rate of prematurity and low birth weight; interestingly, our results showed that both groups had high rates of low birth weight.

Moreover, we think that the reason of this narrow difference between both groups in regard to the low birth weight is due to the huge numbers of *in vitro* fertilization as we have one of the biggest centers that is specialized in this field. Apgar scores showed huge discrepancy between the 1st min when compared

Table 1: Sample population distribution according to gender (baby's variables)

Gender	Case, frequency (%)
Female	23 (46)
Male	27 (54)
Total	50 (100.0)

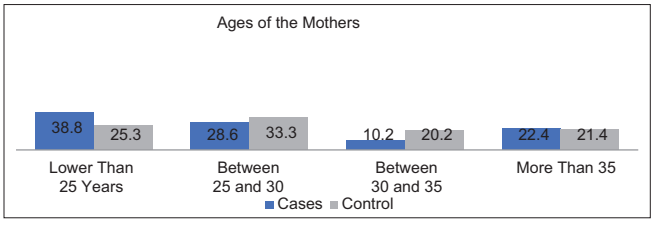

Figure 2: Sample population distribution according to age (mother's variables)

to 5 min, as the 1st min was more crucially affected. The efficacy of Apgar score at 1 min and its beneficence is still one of the controversial issues as a lot of studies do not correlate the 1st min with the well-being of the child.[12] Our study showed an interesting variation as the 1st min was remarkably decreased yet after 5 min, all the cases had normal Apgar scores.

With the early diagnosis and the advancement of treatment, the mortality rate has decreased around the world; it used to reach 30%, now it has decreased substantially to 8%. To the best of our knowledge, our study is the first to examine the rate of survival as it reached 92.2% with mortality of 7.8%;[13] Figure 3 and this could be attributed to the good antenatal care, early diagnosis, intervention, and postoperative nutritional support. As inadequate nutritional support increases the mortality and morbidity rate in such cases,[14] all of the aforementioned risk factors were related to the baby condition; we also tried to take a closer look at the mother's risk factors. When we looked into the age of the mothers, we found that the majority of the affected babies were born from mothers aged 25 or younger; one huge study revealed that the younger the mother, the higher the risk to have a baby with a congenital anomaly according to PWG *et al*., 2010, while another study showed that mothers aged <25 are at lower risks as the older the mother, the higher the risk.

Our study showed that the majority of the mothers were younger than 30 years; this could be explained either by our cultural customs as most of the Saudi population marry at younger ages compared to western countries or could be explained by the consanguinity.[6,7] When we compared the mode of delivery, it was really interesting that there is an increased propensity toward C-section in mothers with atresia infants than in those with normal babies, which could be as reported by Aviram *et al*., 2015, saying the C-section mode is sometimes more beneficial than vaginal delivery in such cases and this is attributed to high risk for placental abruption, labor induction, and other complications.[11,15] Polyhydramnios is a well-established association with intestinal atresia, and it is related to the fact that the fetus is unable to swallow the amniotic fluid and absorb it in their digestive tract due to the atresia; surprisingly, our study showed only 10 cases having polyhydramnios while the rest of the cases did not, so having intestinal atresia is not always associated with polyhydramnios and it should always be in mind.[4] The main limitation of our study is the low sample size which could be due to the rarity of the disease in our country and in general. Furthermore, it is a one-centered study which could lead to selection bias and explains the low number of cases. Further multicentered studies investigating and focusing on genetic and consanguinity are needed.

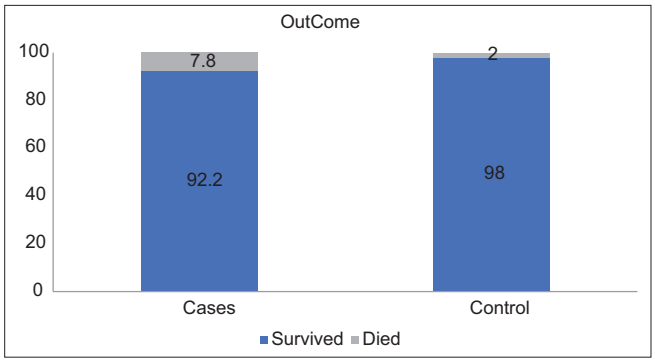

Figure 3: Survival and mortality rate

Conclusion

Gender does not increase the risk to develop intestinal atresia, with esophageal atresia being the most common type. Large number of the bowel atresia babies showed a low birth weight and premature delivery in comparison to the control group. Younger mothers were at higher risk to have a baby with a congenial anomaly. Our study showed and examined some risk factors for intestinal atresia, but due to the low incidence rate and the low number of cases.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest

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