



Outcome of Gastroschisis in a Developing Country: Where to Focus?

By Md. Samiul Hasan, Kazi Md Noor-ul Ferdous, Abdul Aziz, Ayub Ali
& Proshanto Kumar Biswas

Abstract- Background: Gastroschisis is a common congenital anterior abdominal wall defect. With the advancement of neonatal care outcome of gastroschisis is improving worldwide but the result is disappointing in our center. Several factors adversely affect the outcome. The aim of this study was to identify the factors influencing the adverse outcome and where to focus to improve the situation.

Materials and methods: It was a retrospective analytical study done in Dhaka Shishu (Children) Hospital from March 2014 to April 2017. Data were collected from hospital record. All patients admitted with gastroschisis during the study period were included and grouped into A (survived) and B (expired). Factors influencing the outcome were compared between two groups. Statistical analysis was done using SPSS version 22.

Results: Out of 75 neonates 43 were male and 32 were female. Only 14 patients survived (18.7%). Prenatal diagnosis was done in only 3 patients. Mean gestational age, mean birth weight & mean time from delivery to surgery between two groups found statistically significant. Type of surgery was also found significantly affecting outcome.

Keywords: *gastroschisis, silo repair.*

GJMR-I Classification: *NLMC Code: WI 900*



OUTCOME OF GASTROSCHISIS IN A DEVELOPING COUNTRY WHERE TO FOCUS?

Strictly as per the compliance and regulations of:



RESEARCH | DIVERSITY | ETHICS

Outcome of Gastroschisis in a Developing Country: Where to Focus?

Md. Samiul Hasan ^α, Kazi Md Noor-ul Ferdous ^σ, Abdul Aziz ^ρ, Ayub Ali ^ω & Proshanto Kumar Biswas [¥]

Abstract- Background: Gastroschisis is a common congenital anterior abdominal wall defect. With the advancement of neonatal care outcome of gastroschisis is improving worldwide but the result is disappointing in our center. Several factors adversely affect the outcome. The aim of this study was to identify the factors influencing the adverse outcome and where to focus to improve the situation.

Materials and methods: It was a retrospective analytical study done in Dhaka Shishu (Children) Hospital from March 2014 to April 2017. Data were collected from hospital record. All patients admitted with gastroschisis during the study period were included and grouped into A (survived) and B (expired). Factors influencing the outcome were compared between two groups. Statistical analysis was done using SPSS version 22.

Results: Out of 75 neonates 43 were male and 32 were female. Only 14 patients survived (18.7%). Prenatal diagnosis was done in only 3 patients. Mean gestational age, mean birth weight & mean time from delivery to surgery between two groups found statistically significant. Type of surgery was also found significantly affecting outcome.

Conclusion: Awareness regarding prenatal diagnosis & planning of delivery should be developed. Intensive perinatal care and earliest possible surgery are the key factor for better outcome in gastroschisis.

Keywords: gastroschisis, silo repair.

I. INTRODUCTION

Gastroschisis is a congenital defect in the anterior abdominal wall right to the umbilical cord resulting from incomplete closure of the lateral folds during sixth weeks of gestation¹. As a result the small bowel and other viscera are exposed to amniotic fluid until delivery and to environment after. Incidence varies from 1 in 4000 to 1 in 10000 live birth² and this is increasing world wide⁸. In contrast to omphalocele associated anomalies are infrequent³. The outcome of neonates with gastroschisis has improved over past decades. Though most series claims survival rates over 90%^{4,5,6}, our experience is still frustrating. Several factors are associated with adverse outcome in gastroschisis, including prematurity, low birth weight, absence of

prenatal diagnosis, place of delivery, timing of repair, type of repair, associated anomaly and sepsis^{5, 6}. The aim of this study was to evaluate the outcome and identify the factors influencing the outcome and how to address these factors to improve outcome in gastroschisis in a tertiary care pediatric surgery center of Bangladesh.

II. MATERIALS AND METHODS

It was a retrospective analytical study done in Dhaka Shishu (Children) Hospital from March 2014 to April 2017. Hospital records of all patients with gastroschisis were reviewed. Immediately after admission, exposed viscera (photograph 1) were covered with plastic bag (photograph 2). Patients were covered with cotton sheet, kept nothing per oral; an 8Fr feeding tube was inserted for nasogastric suction. Intravenous fluid resuscitation and antibiotic started immediately. All patients received injection vitamin K. Investigations performed on admission were blood grouping and Rh typing, random plasma sugar, serum electrolytes. After initial resuscitation patients were taken to Operation Theater and reposition & primary repair tried under general anaesthesia (photograph 3). When reposition was not possible, silo was performed with sterile saline bag or urobag (photograph 4). After operation patients kept nothing per oral, NG suction and intravenous nutrition maintained until abdominal distention reduced & bowel movement established. Silo was squeezed every alternate day and repair performed when complete reposition was possible. Neonates were divided into two groups. Group A (Neonates who survived), Group B (Neonates who expired). Data were collected regarding prenatal diagnosis, gestational age, birth weight, place of delivery, associated anomaly, time from delivery to surgery and final outcome. Ethical clearance was taken from hospital ethical committee. Statistical analysis was done using SPSS Version 22 software. Associations of continuous data were assessed using student t- test. Associations of categorical data were assessed using Chi-square test and Fisher's exact test. For both test, p<0.05 was considered significant.

Author α: Registrar, Division of Pediatric Surgery, Dhaka Shishu (Children) Hospital. e-mail: samiulo45@gmail.com

Author σ: Assistant Professor, Division Pediatric Surgery, Dhaka Shishu (Children) Hospital.

Author ρ: Professor, Division Pediatric Surgery, Dhaka Shishu (Children) Hospital.

Author ω: Resident surgeon, Dhaka Shishu (Children) Hospital.

Author ¥: Resident Medical Officer, Division Pediatric Surgery, Dhaka Shishu (Children) Hospital.



Photograph 1: Exposed edematous viscera



Photograph 2: Initial covering with plastic bag



Photograph 3: Primary repair



Photograph 4: Silo formation

III. RESULTS

Out of 75 neonates admitted during the study period, 43 were male and 32 were female (figure 5). Only 14 patients survived (18.7%). Prenatal diagnosis was done in only 3 patients among whom 2 patients survived. Mean gestational age was 35.71 ± 1.06 weeks in group A and 34.34 ± 1.42 weeks in group B. This difference was statistically significant. Mean birth weight was 2.19 ± 0.14 kg in group A and 2.00 ± 0.20 kg in

group B. Eight patients out of 14 in group A were delivered within Dhaka division in group A and only 18 patients out of 61 in group B were delivered within Dhaka division. Six patients had associated intestinal atresia, all of them expired. Mean time from delivery to surgery in group A was 13.14 ± 2.41 hours and in group B was 18.75 ± 3.86 hours. Silo performed in 40 patients. Among them only one survived. Thirty five patients had primary repair of which 13 survived (table 1).

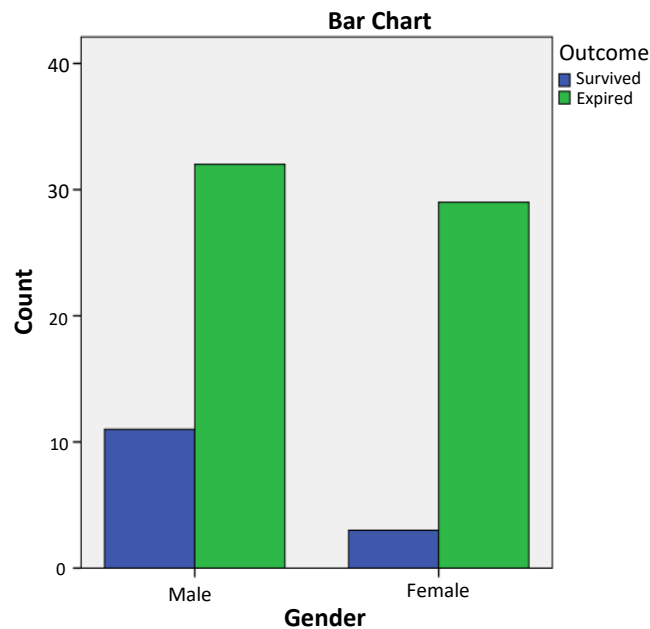


Figure 5: Gender distribution between survived & expired group

Table 1: Factors influencing outcome of gastroschisis

Factors	Group A: Survived (n=14)	Group B: Expired (n =61)	P value
Prenatal diagnosis	2	1	
Mean gestational age (weeks)	35.71±1.06	34.34±1.42	.001
Mean birth weight (kg)	2.19±0.14	2.00±0.20	.001
Place of delivery	within Dhaka= 8 Outside Dhaka=6	Within Dhaka=18 Outside Dhaka= 43	
Mean time from delivery to surgery (hour)	13.14±2.41	18.75±3.86	.001
Intestinal atresia	1	5	
Type of surgery	Repair=13, Silo=1	Repair=22, Silo=39	.001

IV. DISCUSSION

Pediatric surgery division of Dhaka Shishu (Children) Hospital is the largest tertiary care pediatric surgery center in Bangladesh. With limited resource we are continuously trying to improve our service. When it comes to gastroschisis, we are still struggling. So, we tried to find out where to focus.

We found more male patients than female in this study. Owen A et al. found same⁷ but Bradnock T J et al found opposite⁸. According to Klein M D gastroschisis occur predominantly in male but definite explanation yet to found³.

Prenatal diagnosis is believed to improve outcome in gastroschisis by optimizing time, place and mode of delivery. In most reported studies prenatal diagnosis significantly affected outcome^{2,6,8}. But we found only 4% (3/75) patient with prenatal diagnosis. This is due to less public awareness about prenatal care & screening in a developing country like Bangladesh. Limited experience of radiologists and primary care giver at rural area might also be a contributing factor. In advanced centers prenatally diagnosed cases are delivered in regional centers and after delivery, herniated bowel immediately placed in plastic bag to prevent hypothermia and hypovolemia⁶. Quirk J G et al demanded resuscitation and stabilization of neonates with gastroschisis by an experienced team of neonatologists. Advantages include the prevention of hypothermia, hypovolemia and assurance of nasogastric drainage².

Quirk J G et al showed delivery in the regional center is associated with the better outcome². We found same result. This is due to early transport and closure of the defect. Fasching G et al & Quirk J G et al reported no significant difference in outcome with mode of delivery^{2, 11}. Time from delivery to surgery is crucial. In this study we found huge difference with most reported studies. Most authors urges earliest possible repair of gastroschisis and they do it within 5 hours of delivery². In our center it is much delayed as most of the babies come from outside Dhaka. When we received the neonates the exposed viscera were already swollen and

edematous and patients were in severe hypovolemia & hypothermia. It further delays the surgery and made reposition very difficult. Hence silo was performed in most patients though primary repair is treatment of choice^{5,6}. Several studies reported better outcome using preformed silo^{4,7}. We used sterile saline bag or urobag to form a silo. Almost all of this patients developed sepsis & were associated with poor outcome.

Mean gestational age & birth weight was significantly higher in survivor group. This finding is similar to most of the series^{4, 5, 6, 8}. Fasching G et al however showed gestational age has no influence on outcome. This is because of advanced neonatal intensive care (NICU) and nutritional support⁹. In our center NICU support is not always available for these babies and it is very difficult to manage these premature low birth weight babies in ward. Most of them suffer from hypothermia, sepsis and acidosis. Watanabe et al & Calcagnotto et al reported low birth weight in gastroschisis as a factor for increased mortality^{9,10}.

Intestinal atresia is another poor prognostic factor in neonates with gastroschisis. In this series we found 83.33% mortality (5/6). Driver et al & Snyder et al reported increased morbidity but not mortality in these cases^{5,6}. This is may be due to advanced NICU support & facilities for prolonged parenteral nutrition, which are not available in our setup.

V. CONCLUSION

Factors adversely influence the outcome are absence of prenatal diagnosis & planning of delivery, prematurity & low birth weight, associated intestinal atresia and duration from delivery to surgery. Immediate resuscitation & covering of exposed viscera after delivery is also of great importance. Efforts must continue to raise awareness among general people as well as among obstetricians to increase prenatal diagnosis and to instruct newborn care providers in peripheral hospitals in the appropriate initial care of these high risk neonates. Neonatal surgical intensive care is a crucial factor as almost all neonates are premature.

REFERENCES RÉFÉRENCES REFERENCIAS

1. DeVries PA. The pathogenesis of gastroschisis and Omphalocele. *Journal of pediatric Surgery*. 1980; 15: 245-51
2. Quirk JG, Fortney J, Collins H B, West J, Hassad SJ, Wagner C. Outcome of newborns with gastroschisis: the effects of mode of delivery, site of delivery and interval from birth to surgery. *American Journal of Obstetrics and Gynecology*. 1996; 174: 1134-38.
3. Klein MD. Congenital defects of the abdominal wall. In: Coran AG, Adzick NS, Krummel TM, Laberge J, Shamberger RC, Caldamone AA. editors. *Pediatric Surgery*. 7th edition. Philadelphia: Elsevier; 2012. p. 973-84.
4. Schlatter M, Norris K, Uitvlugt N, Decou J, Connors R. Improved outcome in the treatment of gastroschisis using a preformed silo and delayed repair approach. *Journal of pediatric surgery*. 2003; 38(3): 459-64.
5. Snyder CL. Outcome analysis of Gastroschisis. *Journal of Pediatric Surgery*. 1999; 34(8): 1253-56.
6. Driver CP, Bianchi BA, Doig CM, Dickson AP, Bowen J. The contemporary outcome of gastroschisis. *Journal of Pediatric Surgery*. 2000; 35(12): 1719-23.
7. Owen A, Marven S, Jackson L, Antao B, Roberts j, Walker J. et al. Experience of bedside preformed silo staged reduction and closure for gastroschisis. *Journal of Pediatric Surgery*. 2006; 41:1830-35.
8. Bradnock TJ, Marven S, Owen A, Johnson P, Kurinczuk J, Spark P. et al. *British Medical Journal*. 2011; 343: 01-09 doi: 101136/bmj.d6749.
9. Watanabe S, Suzuki T, Hara F, Yasui T, Uga N, Naoe A. Omphalocele and gastroschisis in newborns: over 16 years of experience from a single clinic. *J Neonat Surg*. 2017; 6: 27.
10. Calcagnotto H, Müller AL, Leite JC, Sanseverino MT, Gomes KW, Magalhães JA. Associated factors for perinatal mortality in gastroschisis. *Rev Bras Ginecol Obstet*. 2013; 35: 549-53.
11. Fasching G, Mayr J, Sauer H. The effect of mode of delivery on outcome in foetuses with gastroschisis. *Pediatric Surgery International*. 1996; 11(2): 100-02.