

# 1 Small Bowel Atresia in Khartoum Teaching Hospital

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## 6 **Abstract**

7 Introduction: Intestinal atresia is a common cause of neonatal intestinal obstruction. Duodenal  
8 atresia occurs most properly due to failure of recanalization of the foregut, while jejuno-ileal  
9 atresia is due to intra uterine ischemia. Objectives: To describe the pattern, clinical  
10 presentation, surgical treatment and outcome of bowel atresia. Patients Method: The study  
11 was Observational, analytic, hospital based study. Result: Study of 40 patients with small  
12 bowel atresia showed that; more than 80

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14 **Index terms**— duodenal atresia, jejunal atresia, ileal atresia.

## 15 **1 Introduction**

16 Atresia is a congenital disorder characterized by complete occlusion of bowel lumen. Stenosis refers to a partial  
17 occlusion with incomplete obstruction [1]. It is one of the three common causes of neonatal intestinal obstruction,  
18 the other two being Hirschsprung's disease and anorectal malformations [2]. The incidence of jejunoileal atresia  
19 is 1 per 5000 live births [3], while duodenal atresia has an incidence of about 1 per 5000-10,000 lives births [4].  
20 Jejuno-ileal atresia (JIA) usually associated with gastro intestinal anomalies like malrotation, internal hernia  
21 & gastroschisis [5], on the other hand duodenal atresia (DA) commonly associated with systemic anomalies like  
22 Down's syndrome, cardiac and renal anomalies [6].

23 Jejunoileal atresia classified to 4 types as follow: type 1: is a mucosal (septal) atresia, type 2: a fibrous cord  
24 (band) separates both atretic segments, the mesentery is usually intact, and length of the intestine is normal.  
25 Type 3: has two sub-division: type 3a in this type of atresia, both blind ends are completely separated without  
26 a fibrous cord between them. The atresia has a V-shaped mesenteric gap, and the intestine is shortened, while  
27 in Type 3b (apple-peel deformity) Christmas-tree deformity, both intestinal segments are separated as in type  
28 3a, and the mesenteric defect is large. In type 4: atresia refers to any number and combination of atresias type  
29 1 to 3 [7]. Duodenal atresia has three types; type 1 just membrane or web it is the commonest, type 2 is fibrotic  
30 cord separates proximal & distal bowel and type 3 is a complete separation of the atretic segments [8].

31 Patients with duodenal atresia usually presents with vomiting, most the time it's bilious, failure to gain weight,  
32 epigastric fullness, delayed passage of meconium & aspiration also may occur [9]. Presentation of jejunoileal atresia  
33 depends on the location of the obstruction, although the majority is present with bilious emesis, distal atresia  
34 is usually present with abdominal distention & delayed passage of meconium [9]. Polyhydromnia is frequently  
35 occur with small bowel atresia [10].

36 Prenatal diagnosis can be achieved in 46% of DA and 41% of JIA [9], double bubble and triple bubble is  
37 characteristic of DA and JIA respectively [11].

## 38 **2 a) Objectives**

39 To describe the patterns of small bowel atresia in Khartoum Teaching Hospital, study the clinical presentation,  
40 to know the modalities of surgery & outcome in patients with small bowel atresia and report the association with  
41 other anomalies & maternal diseases.

### 42 3 b) Patients & Method

43 The study was Observational, analytic, hospital based study it include 40 patients that were admitted Khartoum  
44 Teaching hospital department of Pediatric Surgery in the period between Sep. 2011 and May. 2013, Patients  
45 were referred from all parts of Sudan.

46 A Study variables included were age, gender, and residence, presenting symptoms, clinical sign and  
47 postoperative outcomes. Data was collected using a structured, pretested questionnaire and analyzed using  
48 a computer program-Statistical Package for Social Sciences (SPSS) version 20. Results were presented in tables  
49 and graphs.

### 50 4 II.

### 51 5 Result a) Patients characteristic

52 This study included 40 patients with small bowel atresia, mean age 47.0 (SD±150) days; it ranged 2-900 days.  
53 The great majority of our patients 33 (82.5%) were neonate. Males were 23 (57.5%) and female 17 (42.5%) with  
54 a male to female ratio of 1.4:1. Of the neonates 21 (63.6%) were males.

### 55 6 b) Low birth weight and prematurity

56 The mean body weight was 2.8% (SD ± 1.2), in the range 2-8 kg. Eighteen (45%) of our patients were of low  
57 birth weight (weight less than 2.5 kg at birth). Prematurity was found in 8 (20%) patients that were born at less  
58 than 37 weeks' gestation.

### 59 7 c) Site and type of atresia

60 Distal atresia was the commonest of the small bowel accounting for 72.5% (jejunal 57.5 and ileal 15%) whereas  
61 duodenal atresia was seen in 11 (27.5%).

### 62 8 d) Classification of Jejuno-ileal type

63 Type 1 and type 2 were the commonest types of distal small bowel atresia accounting for 10 (34.5%) and 7  
64 (24.1%) respectively. The other types ranged from 10-17%.

### 65 9 e) Clinical presentation

66 The common presenting symptoms to our patients were; vomiting to all of them which was bilious almost to  
67 39 (97.5%), Delayed passage of meconium 33 (82.5%) and constipation26 (65.0%). Dehydration 32 (80.0%) and  
68 abdominal distension 27 (67.5%) were the major physical signs detected in addition to jaundice, wasting and  
69 visible peristalsis in varying percentage.

70 Common presentation of small bowel atresia that scoring greater than 70% in each of the three different types  
71 were found as follow: duodenal atresia (bilious vomiting, delayed passage of meconium and dehydration); jejunal  
72 atresia (bilious vomiting, abdominal distension delayed passage of meconium, constipation and dehydration)  
73 and ileal atresia (bilious vomiting, abdominal distension and constipation). The constipation and abdominal  
74 distension were significantly characterizing distal atresia with P values of 0.008 and 0.002 respectively.  
75 Polyhydromnias was occurred in 26 patients, six were duodenal (i.e. 54.5% of patients of DA) and twenty  
76 were jejunoleal (i.e. 69% of patients of JIA). f) Similar condition in siblings and associate anomalies History of  
77 similar conditions in siblings was noted in six patients (15%) while other congenital anomalies were evident in  
78 five patients (12.5%) and Down's syndrome was seen in four patients (10%). The association of Down's syndrome  
79 with duodenal atresia was found to be significant P value 0.003. Other congenital anomalies were found to be  
80 associated with duodenal atresia in four patients (80%) and jejunal atresia in one patient(20 %) and this as well  
81 was statistically significant P value 0.018. However, similar history in siblings was not significant for the type of  
82 small bowel atresia P value 0.362.

### 83 10 g) Investigations

84 Blood Anaemia was seen in two patients (05.00%), hypokalaemia in 11 (27.5%), hyponatraemia in a single patient  
85 whereas elevated blood urea and electrolytes in eight patients (20%).

### 86 11 h) Plain abdominal X-ray

87 This modality of investigation was done to all patients, it demonstrated air fluid level in 25 patients (62.5%) all of  
88 them were distal atresia 19 (76.0%) jejunal and 06 (24.0%) ileal, and this was found statistically to be significant  
89 (P value 0.000).Double bubble sign was significantly noted in 11 patients (27.7%) seven patients of them (63.6%)  
90 were cases of duodenal atresia and four patients (36.4%) were jejunal atresia (P value 0.005).

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## 91 **12 i) Treatment**

92 After stabilization operative management was done to all patients, resection and anastomosis was the commonest  
93 operation performed 25 (62.5%), Duodenotomy and enterotomy were the least modalities of surgery to be done,  
94 each in a single patient. Other types of operation performed were duodenoduodenostomy, duodenojejunostomy  
95 and jejunoplasty. For patients with duodenal atresia, five (45.5%) ended with duodenoduodenostomy and a similar  
96 number with duodenojejunostomy. Resection and anastomosis was done to 19 (76.0%) jejunal and six (24.0%)  
97 ileal atresia. The modalities of surgery for the type of atresia was found to be significant (P value 0.000).

## 98 **13 j) Outcome**

99 Eighteen patients (45.0%) were discharged home in good general condition, morbidity was seen in eight patients  
100 (20.0%) and the mortality rate was 14 (35%).

## 101 **14 k) Mortality**

102 The majority of the deaths 10 (71.5%) were cases of jejunal atresia, three (21.4%) of duodenal atresia and a single  
103 case (7.1%) of ileal atresia. after resection and anastomosis 8 (57.1%), three (21.4%) after duodenoduodenostomy,  
104 two cases (14.2%) of jejunoplasty and the rest of the mortality among the others.

## 105 **15 III.**

## 106 **16 Discussion**

107 Small intestinal atresia is a major cause of intestinal obstruction especially in the neonatal period. This study  
108 was conducted in department of pediatric surgery in Khartoum Teaching Hospital between Sep 2011 to Aug 2013.

109 Our study of forty patients showed that; males were preponderance females (males: females = 1.4: 1). This is  
110 matching with other international studies [9,12].

111 The ages of patients was extended from two days to three years, but more than 80% of cases were in the  
112 neonatal period, this is equivocal to other international series [12]. We found that prematurity was associated  
113 with 20% of patients, Thamar &et al found that prematurity was associated with 52% of JIA.

114 In current study jejunal atresia is the commonest type (57.5%) followed by duodenal (27.5%) & ileal (15%),  
115 Chirdanetal found in their study of 24 patients of bowel atresia that 19 were JIA, 5 were duodenal & 1 patient  
116 was colonic [12]. Sathyaprasad B etal in their study found same result that JIA was more common than duodenal  
117 [9].

118 On the other hand Hannah G etal in their study of 132 patients found that duodenal atresia is common than  
119 JIA [13], also Kate E etal reported same result [14]. So there is no commonest site of small bowel atresia.

120 Our study found that the commonest type of JIA was type 1(34.5%), and the least common was type 3b  
121 (10.3%), the second one was type 4 (24.2%), then type 2 (17.2%). In study that done in Iraq Waad M S etal  
122 reported that the commonest type of jejunoleal atresia was type I and occurred in (30%), the second was type  
123 IIIa occurred in (20%).The least frequent type was type IV (6%) [7].Other study done in Nigeria by Ekwunife O  
124 H etal showed that Type I atresia occurred with most frequency then type IIIb followed by type IV [15]. Type  
125 1 seems to be the commonest type.

126 Vomiting was the commonest presentation in our, it occurred in all patients; it was bilious in all patients  
127 except only one with JIA, study that done by Hayrettin et al in Turkey found that vomiting occurred in all cases  
128 of duodenal atresia and in 21 out of 24 of JIA [16].

129 Abdominal distention occurred in 27 patients; 24 patients of them were jejunoleal and just 3 patients were  
130 duodenal (epigastric mainly). It is similar to literature series that found 23 patients of JIA out of 24 had  
131 abdominal distention and there was no distention in duodenal atresia [16].

132 Regarding passage of meconium, 24 patients of JIA (82.8%), nine patients of DA (81.8%) had delaying passage  
133 of meconium. in compare to international literature there is study reported that , 17 patients of JIA out of 24  
134 had delayed passage of meconium, no patients of DA had delayed passage of meconium [16].

135 Jaundice occurred in two patients of DA (18%) and 11 patients of JIA (38%), this is similar to international  
136 study; Chirdanetal found that jaundice occurred in 20% (1 out of 5) of patients of duodena atresia [12], in JIA  
137 Waadetal in their study of 50 patients of JIA found that jaundice occurred in 15 patients (30%) [7].

138 Features of Dawn syndrome were found in four patients, all of them had DA they represented 36%of patients of  
139 DA. Rangsanetal in their study of 277 patients of congenital obstruction found that features of Dawn syndrome  
140 were found in 86 patients it equal 37.9%of patients which is similar to our result [17]. Mauricio Aetal found  
141 features of Dawn syndrome in 27% of their patients [18].

142 Congenital cardiac anomalies were found in two patients; both of them were duodenal equal 18.2% of patients  
143 of DA. Kate E etal in their study found that congenital heart disease were found in 12.3% of patients of DA [14].  
144 In Mauricio Aetal study congenital heart diseases were found in 46 patients (27%) [18], Sathyaprasadetal found  
145 congenital heart disease in 49% of patients of duodenal atresia [9].

146 Malrotation was found in three patients; one was duodenal equal 9%, two were JIA equal 6.9%, in compare;  
147 it is near the results in international series that found malrotation in 8% of JIA and [9] .Hayrettin Oztruketal

## 17 CONCLUSION

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148 found that malrotation occurred in two patient out of 20 of DA(10%), and in three out of 24 patients of JIA  
149 (12.5%) [16].

150 We found that Polyhydromnias occurred in 54.5 % of DA, Diagnosis of the patients depend on clinical finding  
151 plus plain abdominal x ray which was done in all patients, double bubble signs was found in seven patients of  
152 DA , also it was found in three patients of proximal jejunal atresia this is similar to international series [12].  
153 Unfortunately pre natal ultra sound was not done.

154 DA was treated surgically by either duodenoduodenostomy which was done for six patients, one of them was  
155 failed and operated for the second time, or duodenojejunostomy which was done for five patients, the anastomosis  
156 is side to side diamond shape, it is the same international series [18,12]. Duodenotomy was done for one patient  
157 of stenosis.

158 In JIA the most common operation used was resection of proximal part and end to end anastomosis it was  
159 done in 25 patients out of 29( 86%) JIA.Waadetal used resection and anastomosis in 78% [7], Thamar H etal  
160 were used resection & anastomosis in 69% [5].

161 Tapering enteroplasty was done for three patients due short bowel length [12].

162 Enterostomy was done for patient with perforation & peritonitis, this is similar to which was reported by  
163 Thamar et al in their study [5] Nineteen patients were discharged in a good condition (47.5%), prolonged ileus  
164 was occurred in 20% of patients, and two patients (5%) had wound infection (they died).

165 Mortality rate of the current study was 32.5, it's too much in compare to mortality rate in USA & Europe;  
166 Sathyaprasad etal in their study found that in 59 patients of DA mortality rate was zero, in 63 patients of JIA  
167 mortality rate was 11% (7patients) [9]. But our mortality rate is reasonable to some extent if it is compared  
168 with the mortality reports in studies that were conducted in developing country; Chirdan etal in their study of  
169 24 patients of bowel atresia in Nigeria found that mortality rate was 41.7% [12].

170 IV.

## 171 17 Conclusion

172 In our country lack of neonatal intensive care unit and total parenteral nutrition increases the mortality rate,  
173 availability of these things plus pre natal diagnosis will improve the outcome.

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