A prospective study of antenatal and clinical suspected duodenal obstruction with their etiological diversities.

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Abstract:

Introduction: Congenital duodenum obstruction is usually diagnosed in the neonatal period, but partial obstruction may present at a later age. A prospective study of 84 congenital duodenal obstruction cases was conducted at our institute from July 2012 to October 2016. **Materials and method:** The cases were selected by antenatal diagnosis and postnatal clinical manifestation. We included antenatal diagnosis, age at presentation, gender distribution, clinical manifestation, investigation, diagnosis, associated anomalies, intra-operative finding, surgical procedure, complications and outcomes as study parameters. **Result:** Congenital duodenal obstruction was diagnosed in 60.71 % (n=51) patients in neonatal life, 21.4 % (n=18) patients below 1 year and 17.89% (n=15) patients after 1 year. Eighteen cases were diagnosed on antenatal ultrasonography. Forty patients (48.5%) were diagnosed on plain X-ray. Ultrasonography and Contrast study were required in 44 cases (51.5%). We found complete obstruction in 40 (48.5%) cases (duodenal atresia- 34, annular pancreas-6) and partial obstruction in 44 (51.5 %) cases (malrotation-32, duodenal web-12).Kimura's Duodeno-duodenostomy was performed in 40 patients (34-duodenal atresia, 6-annular pancreas). Duodenotomy with web excision and duodenoplasty was done for 12 patients. Ladd's procedure was performed for 32 patients. Twelve patients (14.28%) died postoperatively. **Conclusion:** Congenital duodenal obstruction is a common surgical entity in neonates with diversity of embryonic developmental etiologies. Duodenal atresia is most common cause. Antenatal ultrasonography is important in early diagnosis. The treatment is always surgical.

Keywords: -Congenital duodenal obstruction; Duodenal atresia; Kimura's duodenoduodenostomy.

Introduction:

Congenital duodenal obstruction is a common cause of intestinal obstruction. The incidence is around 1:10000 to 1:40000 with a male preponderance[1]. It is usually detected in antenatal period by fetal ultrasonography. A neonate with bilious vomiting is a classical presentation[2].In some cases, it may progress to severe electrolyte imbalance and dehydration. The duodenal obstruction could be partial or complete. There are intrinsic or extrinsic causes[3].Intrinsic causes include atresia, stenosis or web, while extrinsic causes are annular pancreas and congenital duodenal band[4]. Congenital duodenal obstruction generally presents in the neonatal period but it can be seen in the older child also[5]. It is a dictum that any newborn who presents with bilious vomiting and scaphoid abdomen or a stat aspirate of bile>15ml should be evaluated for In older child, recurrent bilious vomiting associated with loss of weight and failure to thrive raises the suspicion of congenital duodenal obstruction[5]. Congenital duodenal obstruction with their different causes and management has been reviewed in 84 patients.

Material and methods:

A prospective study of 84 patients with congenital duodenal obstruction was conducted at our pediatric surgery department from July 2012 to October 2016.

We included antenatal diagnosis, age at presentation, gender distribution, clinical manifestation, investigation, diagnosis, associated anomalies, intra-operative finding, surgical procedure, complications and outcomes as study parameters.

The sample was selected on the basis of the antenatal diagnosis of congenital duodenal obstruction and postnatal clinical manife-station especially bilious vomiting. The age and gender of patients were recorded. Initially, patients were stabilized clinically and fluid and electrolyte

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imbalances were corrected.

The abdomen X-ray was evaluated for double bubble. Ultrasonography was significant in the diagnosis of the malrotation with or without volvulus and associated abdominal and urological anomalies. Upper GI dye study was done selectively for confirmation of diagnosis in case of partial obstruction or inconclusive ultrasonography finding in case of malrotation. Karyotyping and 2-D echo were done as and when required. Associated anomalies were recorded.

After confirmation of diagnosis, patient was subjected to surgical intervention. The type of surgery was depended on the intra-operative finding. Post-operatively, the patient was kept in neonatal surgical ICU. The patient was kept nil by mouth till the bilious aspirate cleared. Feeding was started and gradually advanced. They were discharged in a stable clinical condition with tolerating oral feeds adequately. Outcome and complications were recorded.

Result

There were 84 cases of congenital duodenal obstruction in our study.There were 55 male and 29 female patients. One third of the patients have premature birth. Antenatal ultrasonography was done in 73 patients. Duodenal obstruction was detected only in 18 (24.65%) cases.

Congenital duodenal obstruction was diagnosed in the neonatal period in 60.71 %(n=51) patients, while 21.4 %(n=18) patients presented between 1 month to 12 months of age. Fifteen patients presented after 1 year of age (17.89%). Bilious vomiting was the most common clinical manifestation found in 80% of the patients. Only 2 patients had non-bilious vomiting in our study. Associated dehydration with electrolyte imbalance was found in 40% patients.

Congenital duodenal obstruction was diagnosed by X-ray abdomen in 40 (48.5%) patients, while 44 patients (51.5%) required ultrasonography and upper GI contrast study for diagnosis.

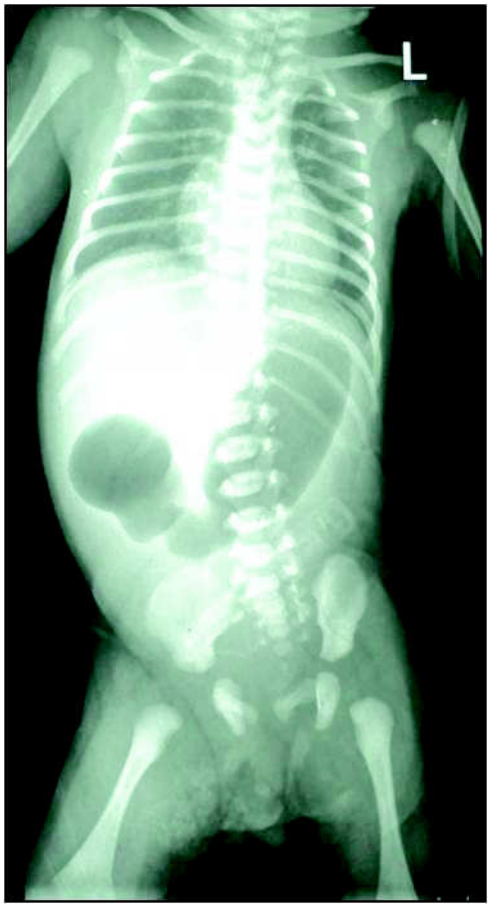

Image 1: Preoperative X-ray

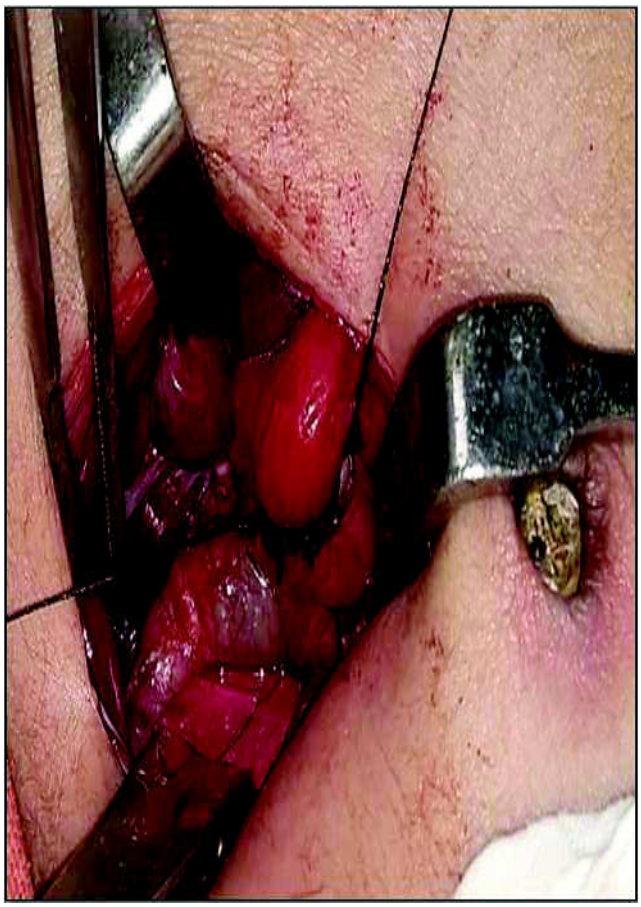

Image 2: Anastomosis

We found complete duodenal obstruction in 40(48.5%) cases (duodenal atresia- 34, annular Pancreas-6), while partial obstruction was detected in 44(51.5 %) patients (malrotation-32, duodenal web-12). We performed Kimura's diamond shaped duodenoduodenostomy in 40 patients (34-duodenal atresia, 6-annular pancreas). Duodenotomy with excision of web and duodenoplasty was done for 12 patients in case of duodenal web. Ladd's procedure was performed for 32 patients in case of gut malrotation.

We found associated congenital anomalies in 34 (40.47%) patients. Cardiac anomalies were the most common found in 14.28% patients (n=12). Down's syndrome was detected in 11.9% patients (n=10). Esophageal atresia with trachea-esophageal fistula, anorectal malformation and limb deformities were detected in 4.75 %(n=4), 3.6 %(n=3) and 6% (n=5) cases respectively.

In our study, the mortality rate was 14.28% (n=12). Gestational age was an important factor for survival. There were 8preterm babies with low birth weight in our study. Triple atresia in the form of duodenal atresia, esophageal atresia and anorectal malformation (DA+EA+ARM) was found in 2 patients. Double atresia (DA+EA, DA +ARM) was found in 4 patients. Sepsis developed in 8 (9.25%) patients. Anastomotic leak was found in 8 patients (9.52%).

Discussion:

Congenital duodenal obstruction was found in 84 patients during our study period. The male preponderance is comparable with Osifo OD study[7]. (Table 1)

Table 1: Gender Distribution

Sex	Present study	Hamza MU et al study[6]	Osifo OD study[7]
Male	55(65.47%)	20(40%)	41(65.07%)
Female	29(34.52%)	30(60%)	22(34.92%)

Almost, one third of the patients were delivered prematurely, which is quite high compared to Hamza et al study. (Table 2)

Table 2: Maturity at Presentation

Maturity	Present study	Hamza MU et al study[6]	Kaddah SN et al study[8]
Full term	58(69.04%)	42(84%)	56(78.87%)
Preterm	26(30.95%)	8(16%)	15(21.12%)

In our study of 84 cases, 73 patients had undergone antenatal ultrasonography. Congenital duodenal obstruction was detected only in 18 (24.65%) cases. It could be suspected in presence of dilated stomach/duodenum or large fluid bubble with or without polyhydroamnios in antenatal ultrasonography[9].Partial obstructions may go unnoticed during antenatal period. Lawrence MJ et al study showed 87% detection rate of double bubble and diagnosis of congenital duodenal obstruction on antenatal fetal ultrasonography[2].

Table 3: Mean age at presentation as per cause of congenital duodenal obstruction

Causes	Number of patient	Mean age at presentation	Mean age at presentation in Osifo OD study[7]
Duodenal atresia	34(40.47%)	4days	8 days±1.4
Annular pancreas	6(7.15%)	3.5days	15days±0.2
Duodenal web	12(14.28%)	9.5 months	22 days±2.1
Malro tation	32(38.1%)	30 days	2.5 years±3.5
Other causes	0	0	Variable

Congenital duodenal obstruction was diagnosed in the neonatal period in 60.71 %(n=51) patients, while 21.4 %(n=18) patients presented between 1 month to 12 months of age. Fifteen patients presented after 1 year of age (17.89%).When we consider age at presentation, patients with duodenal atresia and annular pancreas presented in the neonatal period. Patients with malrotation commonly presented from early neonatal life to infancy, but sometimes presented in the older age group also. Duodenal web was usually found in younger children (Table 3)[10] .The age at presentation was earlier as compared to the study by Osifo OD [7].

We found complete duodenal obstruction in 40(48.5%) cases (duodenal atresia- 34, annular Pancreas-6), while partial obstruction was detected in 44(51.5 %) cases (malrotation-32, duodenal web-12).

Bilious vomiting was the most common clinical manifestation seen in 80% of the patients. Only 2 patients had non-bilious vomiting in our study.

Associated dehydration with electrolyte imbalance was found in 40% patients. This result is comparable with Hamza MU et al study, in which bilious vomiting; non-bilious vomiting and dehydration were presenting manifestation in 84%, 4% and 30% patients' respectively[8].

In our experience, 40 patients (48.5%) were diagnosed with X-ray abdomen only (Image 1), while 44 cases (51.5%) required ultrasonography and upper GI contrast study for diagnosis. In study by Chen QJ et al, they demonstrated typical double bubble sign or air fluid level on plain X-ray in 68.64 patients, while confirmatory upper GI dye study and ultrasonography were done in 64.11% of patients[1].

atresia with trachea-esophageal fistula, anorectal malformation and limb deformities were detected in 4.75 %(n=4), 3.6 %(n=3) and 6% (n=5) cases respectively. In the study by Hamza MU et al, associated anomalies were detected in 36 %(n=18) cases which is comparable with our study[8]. These included Down syndrome (20%), GIT anomalies (6%), genitourinary (4%), cardiac (4%) and multiples anomalies (2%). Duodenal atresia has a 16% association rate with other system anomalies[6,13,14].

Age at presentation, maturity of the neonate, severity of associated anomalies, sepsis and availability of proper NSICU care are the main factors affecting the surgical outcome in case of

Table 4: Causes of duodenal obstruction

Causes of duodenal obstruction	Present study	Hamza MU et al study[6]	Osifo OD study[7]	Kaddah SN et al study[8]
Duodenal Atresia Type 1	34 (40.47%)	15(30%)	12(19.04%)	37(52.11%)
Duodenal Web	12(14.28%)	12(24%)	8(12.69%)	12(16.90%)
Annular Pancreas	6 (7.15 %)	7(14%)	5(7.93%)	8(11.26%)
Malrotation	32 (38.1%)	10(20%)	19(30.15%)	14(19.71%)
Other causes	0	6 (12%)	19(30.15%)	0

Patients were admitted, resuscitated and stabilized. Once the diagnosis was confirmed, the surgical management was straight forward and well standardized. In our series of 84 patients, we performed Kimura's diamond shaped duodeno-duodenostomy in 40 patients (34-duodenal atresia, 6-annular pancreas). Duodenotomy with excision of web and duodenoplasty was done for 12 patients in case of duodenal web. Ladd's procedure was performed for 32 patients in case of gut malrotation[3,11].Uncommon causes of congenital duodenal obstruction like duodenal duplication cyst or pancreatic cysts were not demonstrated in our study. Our study result is comparable with the study by Kaddah SN et al[12].Hamza MU et al[8] and Osifo OD[7] have reported some cases of uncommon causes of congenital duodenal obstruction. (Table 4)

In our experience, we found associated congenital anomalies in 40.47%(n=34) patients. Cardiac anomalies were the most common seen in 14.28% patients (n=12). Down's syndrome was detected in 11.9% patients (n=10). Esophageal

duodenal obstruction[15]. Mortality generally occurs due to prematurity, late presentation with sepsis or associated complex congenital anomalies. In our study, the mortality rate was 14.28% (n=12). Gestational age was an important factor for survival. There were 8preterm babies with low birth weight in our study. Triple atresia in the form of duodenal atresia, esophageal atresia and anorectal malformation (DA+EA+ARM) was found in 2 patients. Double atresia (DA+EA, DA +ARM) was found in 4 patients. Eight of our patients (9.52%) developed sepsis. Anastomotic leak was found in 8 patients (9.52%). This rate is comparable with the study by Kaddah SN et al [12]whereas Osifo OD reported a higher rate. (Table 5)

Table 5: Postoperative outcome and complications

Complications	Present study	Osifo OD study[7]	Kaddah SN et al study[8]
Sepsis 8	(9.52%)	34(54%)	9(12%)
Ileus	12(14.28%)	15(23.8%)	22(32%)
Anastomotic leak	8(9.52%)	2(3.2%)	-

Adhesion obstruction	11(13.09%)	-	-
Death	12(14.28%)	24(38.12%)	15(21.1%)

Overall survival is good and long term prognosis is excellent in the absence of complex congenital anomalies and complications.

Conclusion:

Congenital duodenal obstruction is one of the most common conditions in neonate with diversity of embryonic developmental etiologies. Duodenal atresia is the commonest cause of congenital duodenal obstruction presenting in the early neonatal life, while duodenal web and malrotation are common in the older children. Antenatal ultrasonography plays an important role for early diagnosis and management. Bilious vomiting is the commonest clinical manifestation of congenital duodenal obstruction. X-ray abdomen is the single most important investigation for diagnosis of congenital duodenal obstruction. Age at presentation, maturity, associated congenital anomalies, sepsis and electrolyte disturbance are important factors for survival. Timely surgery and proper post-operative management is essential for a good outcome.

Conflict of interest: There is no conflict of interest.

Abbreviations:

USG- Ultrasonography
NSICU- Neonatal Surgical Intensive Care Unit
NG- Nasogastric
GI- Gastrointestinal
DA- Duodenal atresia
ARM- Anorectal malformation
TEF- Tracheo-esophageal fistula

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