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ORIGINAL ARTICLE

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Frequency Of Congenital Adhesion Bands In Children With Small Bowel Obstruction

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ABSTRACT

OBJECTIVES: To determine the frequency of congenital adhesion bands in children with small bowel obstruction.

METHODOLOGY: This study was designed as a Descriptive Cross Sectional Study. It was carried out from May 1st 2021 to October 31st 2021 in the department of Pediatric Surgery, MTI, KTH Peshawar. A total of 101 children of both gender with small bowel obstruction were included in the study. After taking detailed history, thorough clinical examinations and relevant investigations of all the children were done according to the study protocols. Patients were followed till surgery and peroperative findings noted. Data analysis was performed using SPSS version 22.0.

RESULTS: The age range in this study spans from birth till 14years of age with mean age of 5.445±3.10 years, mean height 39.703±7.22 inches and mean weight was 15.079±4.45 Kg. Congenital adhesion band was observed in 45.5% patients.

CONCLUSION: Congenital adhesion band should be among the key differential diagnosis while assessing pediatric patients who present with acute abdomen, or signs and symptoms of intestinal obstruction.

KEY WORDS: Children, Small bowel obstruction, Congenital adhesion band.

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INTRODUCTION

Intrinsic or extrinsic and congenital or acquired are the main groups of intestinal obstructions in children.[1] Examples of intrinsic congenital intestinal obstruction include meconium ileus, atresia, membrane and stenosis[2], whilst the extrinsic congenital obstructions are as a result of intestinal duplications, annular pancreas, , internal hernia, volvulus, retroperitoneal tumours and embryonic remnants or anomalous congenital bands. The most common acquired causes of extrinsic intestinal obstructions are often regarded to be postoperative adherences, invaginations or secondary inflammatory issues.[3,4]

Intestinal obstructions in children are normally caused by postoperative or inflammatory adherences in children which makes extrinsic congenital causes less than 1 percent of which obstructions caused by anomalous congenital band are very rare.[5,6]

Intestinal obstruction may occur when pediatric patients develop intestinal bands as a result of inflammation or surgery.[7] Intestinal obstruction in children is rare and is caused by congenital bands, which are not related to abdominal problems, such as surgery, trauma, or infection.[8,9] The pathogenesis of anomalous congenital bands is not well understood, and these were not found to be associated with any of the known embryonic remnants such as the omphalomesenteric duct or vitelline vessel remnants.[7] The most important thing about these bands is that they are very difficult to diagnose and in fact there are reported incidences of death when such diagnosis is not prompt and it is important to note that these bands should be detected early.[10]

In one of the reviewed studies, there were 16 cases of congenital adhesion bands leading to small bowel obstruction in

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children aged between 2 days and 16 years old, with a prominent male predominance, [14] boys, and 2 girls. Conversely, it was reported in 19 individuals in adults, aged 17-76 years.[11]

As per the other study, most of the patients under the study were managed by a straightforward adhesion resection. Others, however, needed larger operations, with the resection and anastomosis, or the caecostomy, of the intestine, as they were necrotic. Luckily, there were very few deaths in 1 case, a child of 9 days old, with a perforated colon and sepsis caused by peritonitis. It is also important to note that no patient involved in the study had a recurrence of intestinal obstruction.[12]

One of the largest series of cases of anomalous congenital bands in children was reported by Akgur et al. The total number of cases was 8. Nevertheless, a more recent review identified 14 cases reported in the English literature, and thus, it is the largest case series to date. In particular, the research found, that the majority of such bands were found in the ascending colon and the terminal ileum (50% of the cases, 4 out of 8 patients).[13]

The major contribution of this study is that it will help to increase awareness about the burden of this condition in our local population which will allow initiating future research projects. Being the initial local evidence of its kind, it provides evidence of the significance of identifying and managing such cases due to their long-term health implications. These patients are supposed to be considered a high-risk case and should be diagnosed, intervened, and followed up promptly. Results of the study will be useful in making recommendations and guidelines on how to diagnose and treat intestinal obstruction in the newborns and children especially as regards to the congenital bands.

METHODOLOGY

This research was designed as a descriptive cross-sectional study, conducted in the Department of Pediatric Surgery at MTI, KTH Peshawar. The study spanned a period of six months, from May 1st, 2021 to October 31st, 2021. Sample size was calculated using WHO sample size calculator. A total of 101 patients were included in the sample using following parameters[11].Hypothesized % frequency of outcome factor in the population (p): 7%+/-5Confidence limits as % of 100(absolute +/- %)(d):5%Design effect (for cluster surveys-DEFF):1 Using non-probability consecutive sampling, children aged 0-14 years with presence of intestinal obstruction symptoms such as bilious vomiting, abdominal distention, abdominal pain, and inability to pass stool or gas were included in the study. Those with previous abdominal surgery (hernia repair or laparotomy), presence of chronic illnesses, inability to obtain an informed consent, incomplete medical records or inadequate follow-up were excluded from the study. These conditions can act as confounders, potentially introducing bias into the study results if included.

Data collection was started after the study was approved by the ethics committee (IREB NO: 211/DME/KMC). Parents of eligible children were informed about the study and provided written consent, ensuring transparency about the purpose, risks, and benefits. History was obtained from both parents and the children themselves, when possible. All children underwent a comprehensive clinical examination, followed by protocol-based investigations which included complete blood count (CBC), blood grouping, erect abdominal X-ray, abdominal ultrasound and CT abdomen in selected cases. All patients received guideline-based management for intestinal obstruction and were followed untill surgery under the supervision of an experienced pediatric surgeon. Definitive diagnosis was made by peroperative finding of a single thicker string like fibrous band most of the time containing single vessel and causing small bowel obstruction by compressing it between band and root of mesentry. In order to distinguish (ACB) from other etiologies the surrounding tissues were assessed for signs of inflammation or previous surgery apart from assessing the number, vascularity and tensile strength of the band. Relevant data like presence/ absence of congenital adhesion band, site of obstruction, segmental gut ischemia, necrosis or perforation, were documented on a standardized proforma.

Data analysis was performed using SPSS version 22.0. Descriptive statistics included mean and standard deviation for age, height, and weight. Frequencies and percentages were calculated for congenital adhesion bands and intestinal obstruction. Further analysis was conducted to stratify congenital adhesion bands by age and gender. Results were presented in tables and charts as needed. A post-stratification chi-square test was applied, with $p \leq 0.05$ considered statistically significant.

RESULTS

The study included children ranging from newborns to 14 years old, with a mean age of 5.445 years (±3.10 years). The mean height and weight of the participants were 39.703 inches (±7.22 inches) and 15.079 kg (±4.45 kg), respectively, as detailed in Table-I.

The findings revealed that congenital adhesion bands were present in 45.5% (46/101) of the patients, as shown in Table-II and Figure 1.

Further analysis was conducted to examine the relationship between congenital adhesion bands and demographic factors. Specifically, the distribution of congenital adhesion bands was

Demographics	Mean±SD
Age (years)	5.445±3.10
Height (in)	39.703±7.22
Weight (Kg)	15.079±4.45

Table- I: Mean and Standard Deviation of Demographic Variables (age, height and weight)n=101

Congenital adhesion band	Frequency	%age	95% Confidence Interval
Yes	46	45.5%	35.8 – 55.2
No	55	54.5%	44.8 – 64.2
Total	101	100%	–

Table-2: Frequency and percentage % of patients according to Congenital Adhesion Bandsn=101

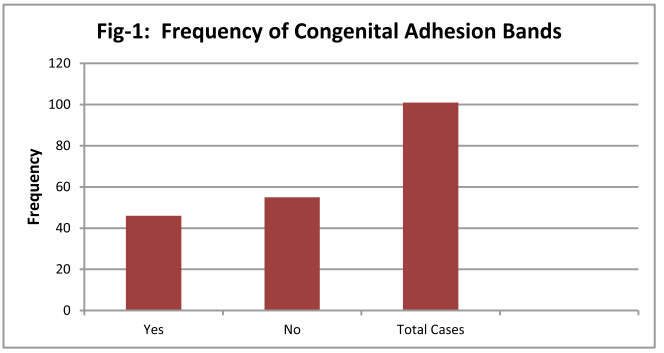

Fig-1: Frequency of Congenital Adhesion Bands

Age	Congenital adhesion band		p-value
	Yes	No	
1 month to 7 years	33(45.8%)	39(54.2%)	0.927
8 to 14 years	13(44.8%)	16(55.2%)	
Total	46(45.5%)	55(54.5%)	

Table 3: Stratification of congenital adhesion band by age.

Gender	Congenital adhesion band		p-value
	Yes	No	
Male	44(62%)	27(38%)	0.000
Female	2(6.7%)	28(93.3%)	
Total	46(45.5%)	55(54.5%)	

Table-4: Stratification of congenital adhesion band by gender.

stratified by age (Table-III) and gender (Table-IV) and Fig-2, providing insight into potential correlations.

DISCUSSION

Pediatric intestinal obstruction can be attributed to intestinal bands that form due to inflammation or even after surgical operations as established in prior work.[14] There are unusual annamolus congenital bands (ACB) in comparison with other varieties of intestinal bands where they are not related to the past abdominal conditions, like laparotomy, peritonitis or

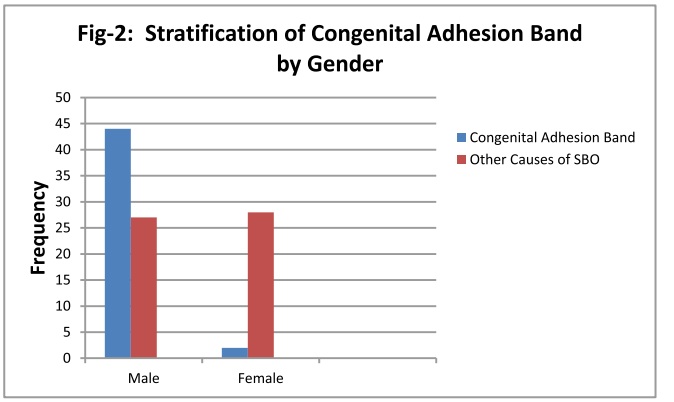

Fig-2: Stratification of Congenital Adhesion Band by Gender

trauma.[15] The incidence of adhesion without previous operations has been reported to range from 3.3 to 28% as determined by autopsy.[23]The etiology of (ACB) is still unknown7, and there are a limited number of case reports and a few series. The largest series was reported by Akgür et al.[21] In the series of Akgür et al.[21], the most common band location was the terminal ileum in 4 of 8 patients (50%). In our series, the most common location was also the terminal ileum (75%). Similarly in a retrsospective review done by K.H. Yang et all, an incidence of 5.9% (15/251) was found.[22] Although limited by regional restrictions congenital obstruction of the small intestine by these bands was detected in 45.5 percent of the cases in our study, which is one of the highest percentages in the literature. Two elements are crucial to the explanation of this finding:1 the inclusion criteria used in the study were strict, which made the discovery of cases of congenital band obstruction very specific and2 it is likely that the setting of such a high-volume tertiary care hospital with a large overall patient input allowed the study to identify a heterogeneous and representative sample of cases. The use of age groups contained in the current research was between children below the age of 7 years and those above the age of 8 years. Whilst the younger age cohort had a higher rate of the disease as revealed in table III, the variation was not appreciable (p-value = 0.927). As for as gender distribution is concerned the disease was observed to be more pronounced in males as shown in table IV with a p value of 0.000. these observations run parallel to previous studies.[14,22]

Touloukian was the first to describe anomalous congenital bands (ACB) in 1979.[14] In one form of band, intestinal malrotation may occur in which the band extends between the cecum on the upper quadrant to the second and third parts of the duodenum and when this occurs, it has a possibility of causing duodenal obstruction due to compression or midgut volvulus and this is referred to as Ladds band. There is also the presence of some bands which are a hypertrophied hepatoduodenal ligament which blocks the duodenum at the duodenal junction between part 1 and part 2. The others consist

of dense fibrous bands, which join the distal third portion of the duodenum to the prevertebral fascia that lead to extrinsic obstruction and are always termed as associated with incomplete rotation of the duodenum.

Anomalous Congenital Bands (ACB) may have variable and non-specific manifestations and they may include such common cases as frequent vomiting[18], abdominal pain[19], and constipation[20] to more serious complications, e.g. intestinal obstruction[21], and intra-abdominal hemorrhage.[19] As an example, in one of the studies by Basak Erginel et al., all their patients had acute intestinal obstruction[14], meaning there is a chance that the disease can be severe. Abdominal distension will probably be the initial clinical feature in a neonatal patient but more commonly, the infant will experience abdominal pain and vomiting.[14]

Anomalous Congenital Bands (ACB) are difficult to diagnose before surgery, and the majority of them are usually detected intraoperatively.[22] Nevertheless, not much can be found on the imaging-based diagnosis of intestinal obstruction caused by these bands. As an example, Sarkar et al. used contrast enema studies which indicated external compression instead of intrinsic stenosis.[20] Also, Masaki Miyao et al. managed to preoperatively diagnose ACB with the help of Computed Tomography (CT) scans that showed a band running between the umbilicus and the right lower quadrant of the abdomen.[22] There are no preoperative diagnosis of Anomalous Congenital Bands (ACB) in the present study. Rather, the diagnosis was reached intraoperatively during surgical exploration, and this was triggered by clinical suspicion and the elimination of the possibility of other potential causes of intestinal obstruction.

Anomalous Congenital Bands (ACB) have been described in different locations by previous studies. Our findings in the study concur with the published literature declaring the terminal ileum the most frequently affected part of the gut. According to Akgur et al.[23], in 4 of 8 patients, the band was between the terminal ileum and ascending colon. On the same note, Kwang et al.24 reported that the ileum was the most popular location of small intestinal bands in 7 of 10 pediatric patients. The same result was noticed in another research with ileum as the most common site, and 12 patients out of the 14 had the disease.[24] This uniformity in the studies illustrates the need to be cautious on considering the terminal ileum as a possible area of invasion of ACB related complications.

SBO is most of the time surgical emergency where the success of treatment when using non-operative measures is low.[24] The main mechanism of treatment of Anomalous Congenital Bands in our study was mainly (95%) the release of the band done by open surgery. Five cases resulted in resection anastomosis and only one ended in stoma formation. In different studies, different surgical procedures and results were documented. According to the findings of Akgur et al.[23], 62.5 percent of patients received laparotomy with band excision, 25 percent had to be resection anastomosed because of the gangrene intestine, and 12.5 percent received cecostomy in the case of colonic perforation. According to Kwang et al.[22] ,30 percent of patients needed laparotomy, and excision of the band, and 7 patients using laparotomy were subjected to segmental resection. On the same note, Basak et al.[14] reported that the most frequently used intervention was laparotomy with excision of bands, other patients needed resection anastomosis or wedge removal. Laparoscopic procedures have become the trend over the past years in adult patients for adhenolysis and the success rate has been reported to be 46% to 87%.[24] Similarly its emerging in pediatric surgery aswell. [25]

This study has several limitations. Firstly, it's a single-center study conducted at a specific department, which might limit the generalizability of the results. Additionally, the study's duration is relatively short, spanning only six months. we recommend that congenital adhesion bands be considered a primary differential diagnosis in pediatric patients presenting with acute abdomen or intestinal obstruction symptoms. Further multi-center studies with larger sample sizes and longer durations are needed to confirm these findings. Developing guidelines for early diagnosis and management of congenital adhesion bands can improve patient outcomes.

CONCLUSION

Childhood Congenital adhesion bands are important cause of acute intestinal obstruction in children, and they can be difficult to diagnose before surgery. Although they are rare, they must be included in the differential diagnosis of acute abdomen of children that present with symptoms of intestinal obstruction and no previous trauma or surgery. It is important to provide surgical intervention as soon as possible because morbidity caused by ischemic bowel damage can be severe with delayed treatment. Surgery is a diagnostic and therapeutic tool to deal with congenital adhesion bands.

Conflicts of interest: None

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CONFLICT OF INTEREST

Author declared no conflict of interest

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AUTHORS CONTRIBUTIONS

SA: Conception, Design of the work, Data collection, and Drafting, Reviewed, Final approval, Agreement to be accountable

MI: Conception, Design of the work, Acquistion, Data Analysis, and Drafting, Reviewed, Final approval, Agreement to be accountable.

HU: Conception, Design of the work, Interpretation of data for the work, and Drafting, Reviewed, Final approval, Agreement to be accountable.

KS: Conception, Design of the work, Data collection, and Drafting, Reviewed, Final approval, Agreement to be accountable .

MR: Conception, Design of the work, Acquistion, Data Analysis, Data Collection and Drafting, Reviewed, Final approval, Agreement to be accountable.

DATA SHARING POLICY

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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