SURGICAL MANAGEMENT OF OMPHALOMESENTERIC DUCT REMNANTS IN CHILDREN

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ABSTRACT

Objective: *To study the clinical presentation and surgical management of omphalomesenteric duct (OMD) remnants.*

Material and Methods: *This was a prospective, descriptive study conducted at Pediatric surgery unit of Lady Reading Hospital, Peshawar from 1st January 2005 to 31st January 2008.Children below 15 years of age with operative diagnosis of omphalomesenteric duct (OMD) remnants were included in the study. Data was collected on a pre-designed standard proforma and patients were divided into three groups on the basis of operative procedure used to deal with OMD remnants. Group I included the patients in whom 'Wedge resection' of OMD remnants was performed. Group II included patients with 'Segmental ileal resection and end to end anastomosis' and Group III included patients having 'Ileostomy'. All the cases were followed for 6 months after operation.*

Results: *Mean age was 4.23+3.53 years and Male: Female ratio was 2.6:1. Intestinal obstruction (44.7%) was the commonest presenting feature followed by diverticulitis (27.5%), intestinal perforation (10.3%), umblical discharge (10.3%) and duct prolapse (6.8%). Only one patient (3.4%) presented with haemorrhage. Overall mortality was 6.8% and hospital stay in cases of wedge resection was 9+2.179 days, in segmental ileal resection was 6.88+2.34 days and in Ileostomy was 4.67+0.57 days.*

Conclusion: *Presentation of OMD remnants varies in different areas and the surgical protocols to deal with symptomatic cases of these malformations should be standardized through further studies.*

Key Words (3-10): Meckel's Diverticulum, Omphalomesenteric, Vitelline, Intestinal, Duct, Obstruction.

INTRODUCTION

Omphalomesenteric duct (OMD) remnants account for most of the gastrointestinal congenital anomalies[1,2]. These may range from a completely patent omphalomesenteric duct (umbilical intestinal fistula) to enterocysts, fibrous cords connecting to umbilicus, granulation tissue at umbilicus, umbilical polyp, umbilical hernias, meso-diverticular bands and Meckel's diverticulum[1,2,3]. Omphalomesenteric duct (OMD) remnants affect nearly 2% of the population[4,5]. In embryo midgut is attached with yolk sac through vitelline or omphalomesenteric duct which obliterates during 5th- 6th week of embryonic life[6]. Incomplete obliteration of this duct leads to various malformations as mentioned above. Meckel's diverticulum is located at anti-mesenteric border of ileum about 40-100 cm proximal to ileo-caecal junction. It contains all layers of ileum. It is usually 2 cm wide and 5cm long but size may vary a lot and only one in five becomes symptomatic[6,7,8]. Common symptoms are intestinal obstruction, pain abdomen, intussusception, volvulus, Littre's hernia, umbilical-intestinal fistula, prolapsed T shaped vitello-intestinal duct, diverticulitis, malena, hematochaezia, torsion of Meckel's dieverticulum, gangrene and perforation with frank peritonitis[9,10,11]. Intestinal obstruction is caused by fibrous cords, meso-diverticular bands, volvulus and invagination of Meckel's diverticulum.[6]

VARIOUS PRESENTATIONS OF OMPHALOMESENTERIC DUCT REMNANTS

Presenting Feature	Operative Findings	Wedge Resection	Segmental Ileal Resection	Ileostomy	Total
Intestinal Obstruction	Bands	3(10.3%)	4(13.4%)	2(6.8%)	9(31%)
	Intussusception	-	2(6.8%)	-	2(6.8%)
	Volvulus	-	2(6.8%)	-	2(6.8%)
Abdominal Pain	Diverticulitis	5(17.2%)	2(6.8%)	-	7(24%)
Hemorrhage			1(3.4%)		1(3.4%)
Umblical discharge	Patent OMD	1(3.4%)	2(6.8%)	-	3(10.3%)
Peritonitis	Intestinal perforation	-	2(6.8%)	1(3.4%)	3(10.3%)
Prolapsed OMD	Prolapsed OMD	-	2(6.8%)	-	2(6.8%)
Total		9(31%)	17(58.6%)	3(10.3%	29(100%)

Table 1

Almost half of the diverticulae contain ectopic mucosa, 60-85 % of which is gastric mucosa and 5-16% pancreatic tissue[9]. "Meckel's diverticulum is frequently suspected, often looked for and seldom found"[12]. There is a hectic debate going on whether to remove an incidentally found Meckel's diverticulum or not[2,3,11-15]. More than 1600 papers have been published on the subject but literature is still deficient as to which type of surgical excision is appropriate for removal of Meckel's diverticulum or when dealing with other remnants of omphalomesenteric duct[3].

Various methods used to deal with Meckel's diverticulum are simple diverticulectomy, inversion of the diverticulum, Laparoscopic diverticulectomy, Wedge ileal resection and segmental ileal resection with end to end anastomosis[3,9,13].

MATERIAL AND METHODS

This study prospective and descriptive study was conducted at Pediatric Surgical Unit of Lady Reading Hospital, Peshawar from 1st January 2005 to 31st January 2008. All the cases with operative diagnosis of symptomatic OMD remnants were included in the study. The patients with incidental finding of non-symptomatic OMD remnants and Meckel's diverticulum were not included in the study. Children below 15 years of age were included in the study. The relevant information was collected on pre-designed standard proforma and kept on the patient's document file for further follow up. Daily clinical progress was recorded in the Unit as well as after discharge. Clinical outcome at 10th, 30th, 45th and 180th post-operative day was also recorded.

All the intestinal anastomoses were performed with interrupted delayed absorbable sutures using 3/0 Poly glactin [Vicryl 3/0 by Ethicon]. Naso-gastric tube was passed in all cases and was removed on return of bowel sounds on auscultation. Patients were allowed to take orally after four hours of removal of Xaso-gastric tube.

The patient record was entered in SPSS data sheet at the time of discharge. Subsequent visits were directly entered into the data sheet. The Statistical Program for Social Sciences (SPSS) student version 11 was used for statistical analysis and making cross tables and bar charts.

RESULTS

Twenty-nine patients were studied during 30 months, which included 21(72.4%) males and 8(27.5%) females. Male to female ratio was 2.6:1. The mean age in years was 4.83±3.536 and median was 5 years. The youngest patient was 2 days old and the eldest was 14 years of age. Twenty-one patients (72.4%) presented as emergency while eight patients (27.6%) had an elective admission from outpatient clinic.

Wedge resection was done in nine (31%)cases, segmental ileal resection and end-to-end anastomosis was performed in 17 (58.6%) cases while ileostomy was done in three cases (10.3%). Mean hospital stay was 7.31±2.509 days as a whole while in cases dealt with Wedge resection it was 9±2.179 days, in segmental ileal resection 6.88±2.342 days and in Ileostomy it was 4.67±0.577days. Detail of hospital stay in various cases is shown in Figure-1.

Two cases died in this series thus mortality was 6.8%. Both these cases presented late with frank peritonitis. Six patients (20.6%) had a prolonged postoperative ileus and five (83%)

ILLUSTRATIONS (FIGURES)

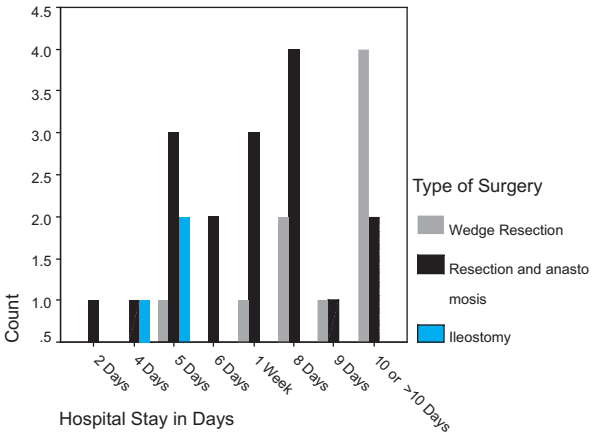

Figure-**1**. Hospital stay in days for different cases according to type of surgery.
Legend:Count = Number of Cases

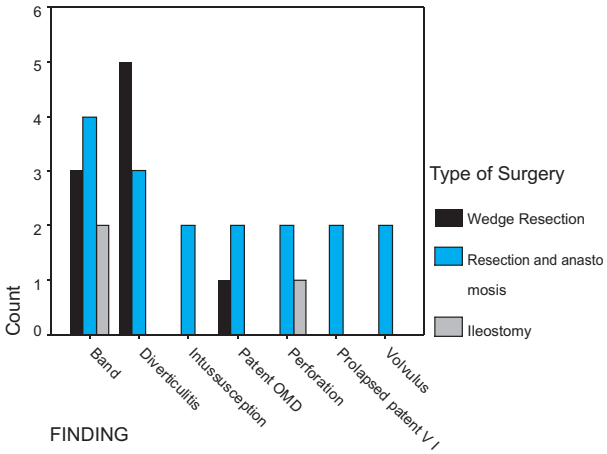

Figure-**2**. Operative findings in various cases according to type of surgery.
Legend:Count = Number of Cases
OMD Omphalomesenteric duct
VIDVitello-Intestinal duct

ABBREVIATIONS AND SYMBOLS

OMD	Omphalomesenteric duct
VID	Vitello-Intestinal duct
MD	Meckel's Diverticulum

of them had undergone wedge resection. Wound sepsis was recorded in 3 cases (10.3%), leostomy diaorrhea in one case (3.4%), hypertrophic scar in one case (3.4%), loss of umbilicus in one case (3.4%),, Incisional hernia in one case (3.4%), and post operative intestinal obstruction in two cases (6.8%). All the patients (100%) came for stitch removal while 22 patients (72.7%) came for follow up at 10 days after discharge. Only 9 patients (31%) came at 6 weeks and only 4 patients (13.7%) showed up at 6 months for follow up visits. All the three cases (100%) of Ileostomy came back for closure of stoma at 2 months after operation and Ileostomy closure was done.

Intestinal obstruction was the commonest presenting feature present in 13 (44.7%) cases. Rest of the presenting features are given in table-I. Diverticulitis with or without perforation was seen in 8 (27.5%) cases. Meso-diverticular and fibrous bands were the most common cause of Intestinal obstruction (69.2%%) followed by Intussusception (15.4%) and volvulus (15.4%). Operative findings in different groups according to type of surgery are shown in Figure-2

DISCUSSION

Omphalomesenteric duct remnants and Meckel's diverticulum are present in both sexes but men are more prone to develop symptoms and complications. There was a male predominance in our study M: F ratio 2.6:1, which is consistent with other reports from Pakistan and abroad. St-Vil D[11] et al reports a M: F ratio of 2.27:1, Cullen JJ et al [2]from their epidemiological study presents 2.4:1 in symptomatic cases, Das PC[12] from India reports 4:1, Rosi p et al[6] 2.4:1, Taj H et al[16] from Quetta 9:1, Park JJ et al[3] 3:1, Martin JP et al[9] 3:2 and Inayat et al[17] from Khyber Teaching hospital Peshawar reports 3:1. The mean age of 5 years was also comparable with St-Vil et al[11] and Vane DW et al[14] but it was more than reported by Inayat et al[17], Rasool N et al[18] and Das PC et al[12].

In our patients more than two third were admitted through emergency. Taj et al[16] reports 90% emergency cases in his series and Rasool N et al[18] 60% emergency cases. Thus it is evident that these patients are difficult to diagnose till they develop complications. Interestingly it was noted that most of the cases presenting to us with obstruction or peritonitis had previous history of vague symptoms especially of sub acute intestinal obstruction on and off that improved with non-surgical treatment.

Most common presenting feature in our study was intestinal obstruction followed by pain abdomen and peritonitis due to intestinal perforation. Only one case presented with bleeding per rectum. These results were in accordance with the reports from Pakistan by Taj H et al[16], Inayat et al[17] and Rasool N et al[18]. Das PC[12] from India also had similar results with intestinal obstruction as major presenting feature in OMD remnants. St-Vil et al[11], Vane DW et al[14], Rosi P et al[6] and Park JJ et al[3] also had the same results from abroad. The occurrence of intussusception and patent OMD was less frequent in our series as com pared to Rosi P et al[6], St-Vil et al[11] and Rasool et al[18]. Hemorrhage was far less frequent as compared to western reports but it was noted that hemorrhage was not

reported as a common presenting feature in any study from the Indian sub-continent[19-22]. Thus we support the idea of Inayat et al[17] that there appears to be geographical differences in presentations of Meckel's diverticulum. Meso-diverticular bands and fibrous cords attached to the apex of diverticulum were the most frequent cause of obstruction, which is consistent with other studies[23,24].

Cullen JJ et al[2] in their population based study reported 58 symptomatic cases operated for Meckel's Diverticulum and 3.5 % had wedge resection, 65.5 % had diverticulectomy and 31 % had segmental ileal resection. Incidentally found Meckel's was removed in 87 cases 2% had wedge resection, 92 % had diverticulectomy and 6 had segmental ileal resection. Das PC et al[12] from India reports 12 wedge resection/ diverticulectomies and 9 segmental ileal resections in his 21 case series. Taj H et al[16] from Quetta reports 5 wedge resections and 15 segmental ileal resections in his 20 cases. Vane DW et al[14] reports 4 wedge resections, 189 diverticulectomies and 24 segmental ileal resections in his 217 cases. None of them has compared the results of these different surgical techniques and it is still doubtful that which is ideal for removal of a Meckel's diverticulum or OMD remnants. Park JJ[3] et al says that we did not know whether the complication rates differ between the removal of Meckel's diverticulum with small bowel resection and a simple diverticulectomy. An unresolved question is whether a simple diverticulectomy or wedge resection is sufficient for removal of Meckel's? Probably "no" as 62% of the ectopic tissue is not palpable and can be left after diverticulectomy[25]. In our study we noted that there was increased incidence of post operative ileus in cases of wedge resection and hospital stay was also slightly prolonged as compared to segmental ileal resection and ileostomy. A bias was also developed in our study because as the results became evident the primary surgeons were a bit inclined to perform segmental ileal resections more frequently towards the end of study. Due to small sample size we cannot comment on the relative efficacy of either method of removal of OMD remnants and Meckel's Diverticulum.

CONCLUSION

It is evident that presentation of OMD remnants including Meckel's diverticulum varies in different geographical regions and the ideal surgical technique to deal with these malformations still needs to be standardized.

RECOMMENDATIONS

In our opinion segmental ileal resection and end to end anastomosis is better than wedge resection while dealing with OMD remnants especially Meckel's Diverticulum but further studies should be conducted regarding surgical management of omphalo-mesenteric duct malformations to reach a consensus.

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