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ORIGINAL ARTICLE

TYPES, SITES AND CAUSES OF MECHANICAL INTESTINAL OBSTRUCTION

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ABSTRACT

Background: The pattern of types, sites and causes of intestinal obstruction is changing continuously from time to time and region to region. The objectives of this study were to determine the types, sites and causes of mechanical intestinal obstruction in our population.

Materials & Methods: This cross-sectional study was conducted at DHQ Hospital, Karak, Khyber Pakhtunkhwa, Pakistan from January 2011 to July 2014. A sample of 95 patients with age more than 14 years with mechanical intestinal obstruction was selected from an estimated at risk population of 1,000 individuals from district Karak. Sex, age, types, sites and causes of mechanical intestinal obstruction were variables. Except age all other variables were nominal and described by count and percentage with estimated parameters.

Results: Out of 95 patients, 57 (60%) were men and 38 (40%) women with ratio of 1.5:1. Mean age was 41.15±12.63 (18-70) with a range of 52 years. Type of presentation was acute in 35 (36.84%), chronic in 25 (26.31%) and acute on chronic in 35 (36.84%) cases. Level of intestinal obstruction was small gut in 70 (73.68%), large gut in 23 (24.21%) and both in two (02.11%) cases. Cause of obstruction was adhesions in 27 (28.42%), abdominal hernias in 25 (26.32%) and malignancies in 15 (15.78%) cases.

Conclusion: In our population of mechanical intestinal obstruction patients, type of presentation was equal by acute and chronic, site of intestinal obstruction was small gut in maximum cases and cause of obstruction was adhesions on top followed by abdominal hernias and malignancies.

KEY WORDS: Intestinal Obstruction; Laparotomy; Gynecological Surgery; Peritonitis; Appendectomy; Indirect Inguinal Hernia; Umbilical Hernia; Incisional Hernia; Intestinal Volvulus. Intestinal Pseudo-Obstruction.

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INTRODUCTION

Intestinal obstruction involves a partial or complete blockage of the bowel that results in the failure of the intestinal contents to pass through. Obstruction of the bowel may be caused by ileus, in which the bowel does not function correctly but there is no mechanical problem, or by mechanical causes. Mechanical obstruction occurs when movement of material through the intestine is physically blocked.[1]

The mechanical causes of obstruction are numerous like adhesions, hernias, tumors, granulomatous diseases, intussusceptions, volvulus, impacted faeces, worms and many other rare causes. The pattern of these causes has changed over the past century. Gut can get obstructed in four ways; simple gut obstruction, closed loop obstruction, strangulated and incarcerated gut obstruction. If the obstruction blocks the blood supply to the intestine, the tissue may die, causing infection and gangrene. Symptoms include; abdominal pain, vomiting, distension and constipation. Bowel sounds are high pitched initially but if the obstruction persists too long or the bowel gets significantly damaged, bowel sounds decrease and eventually become silent.[2]

Tests that show obstruction include; barium enema, abdominal CT Scan, upper GI and small bowel series and abdominal films. The work up of this urgent surgical condition must above all be clinical, even though new technologies will probably improve their diagnosis and treatment (CT scan). These new tech-

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nologies still have to be documented and validated.[3]

The objective of treatment is to decompress the intestine with suction using nasogastric tube inserted into the stomach or intestine. Surgery to relieve the obstruction may be necessary if decompression by nasogastric tube does not relieve the symptoms or if the tissue death is suspected. The outcome and prevention depends on the cause.

The objectives of this study were to determine the types, sites and causes of mechanical intestinal obstruction in our population. The importance of this topic lies not only in the fact that general surgeons are becoming increasingly restricted to gut surgery because of division of surgery into many subspecialties but also that intestinal obstruction remains a leading cause of admission to emergency wards around the world.[4,5] These results will then be disseminated to other local health professionals so that future guidelines may be formulated.

MATERIALS AND METHODS

Design, Settings & Duration: This cross-sectional study was carried out in Surgical Unit of District Headquarter Hospital, Karak, Khyber Pakhtunkhwa, Pakistan over a period of three and a half years from January 2011 to July 2014.

Population & Sampling: A population of 10,000 individuals was estimated at risk for mechanical intestinal obstruction in the catchment area of DHQ Hospital Karak, covering population from district Karak. A sample size of 95 subjects was calculated with margin of error of 6.55%, confidence level of 80%, population of 10,000 and response distribution of 50% through an online sample size calculator Raosoft®.[6] Sampling technique was consecutive non-probability. Written consent was obtained from the patients following explanation of the entire procedure.

All patients older than 14 years with clinical and radiological evidence of intestinal obstruction were included in the study. Patients with clinical evidence of pregnancy, coagulopathies on screening tests, life threatening medical comorbid conditions and cases treated conservatively were excluded from the study.

Procedure of Conduct, Intervention & Follow up: Following admission, all patients were subjected to detailed history and clinical examination. The investigations done to establish the diagnosis on case to case basis were; abdominal ultrasound, X-ray abdomen, barium studies, C.T scan abdomen and tests for fitness for general anesthesia; full blood count, liver function tests, renal function tests, serum electrolytes, X- Ray chest, ECG, and coagulation profile.

All procedures were performed by consultant surgeon (RA) having sufficient experience in abdominal surgery. All patients undergoing laparotomy were resuscitated before intervention. Prophylactic antibiotics (ceftriaxone 1 gm+ metronidazole 500 mg) were administered intravenously at the time of induction of anesthesia and further doses by I/V route post operatively and discharged on oral antibiotics for five days. All patients were followed for four weeks post operatively for histopathology results. Patients were advised to report to OPD when received histopathology report or any other problem in between the follow up visits.

Data Collection & Analysis Plan: Sex (men & women) and age in years were two demographic variables. Type of presentation of intestinal obstruction, site of intestinal obstruction and cause of intestinal obstruction were three research variables. Age in years was measured on ratio (numeric) scale while all other variables were measured on nominal scale. Age in years was analyzed by mean, SD, minimum, maximum and range while all other variables were analyzed by frequency and percentage. Estimation of parameter for proportion for population was presented as interval estimate (lower, upper) at 80% confidence level, calculated through an online statistical calculator.[7]

RESULTS

Descriptive Analysis and Estimation of Parameters: A total of 95 patients studied who underwent laparotomy for intestinal obstruction included 57 (60%, 80% CL 50.15, 69.85%) men and 38 (40%, 80% CL 30.15, 49.85%) women with men to women ratio of 1.5:1. The mean age was 41.15 ±12.63 (18-70) with a range of 52 years.

Type of presentation of intestinal obstruction was acute in 35 (36.84%, 80% CL 27.14, 46.54%), chronic in 25 (26.32%, 80% CL 17.46, 35.18%) and acute on chronic in 35 (36.84%, 80% CL 27.14, 46.54%) cases respectively.

Site of intestinal obstruction was small gut in 70 (73.68%, 80% CL 64.82, 82.54%), large gut in 23 (24.21%, 80% CL 15.6, 32.82%) and both in two (02.11%, 80% CL -.78, 5.0%) cases respectively.

Causes of mechanical intestinal obstruction are shown in table 1. Here twenty diseases from S.No. 1 to 20 are categorized under six headings from A to F and described by count and percentage category wise and disease wise with total counts (%) for categories with corresponding population parameters for proportions.

DISCUSSION

Intestinal obstruction remains a leading cause of admission to surgical units across the globe. There are well studied causes of intestinal obstruction but their pattern is changing continuously from time to time, country to country, region to region and even hospital to hospital.[8] The obstructing mechanism can be mechanical or non-mechanical. Mechanical factor can be anything that causes narrowing of the intes-

Table 1: Causes of mechanical intestinal obstruction in sample and estimated parameters for population at 80% CI in admitted surgical patients of Karak, Pakistan (n=95)

S.No.	Cause	Count	%	Total Count (%)	80% CI	
					Lower	Upper
1	Gynecological surgery	08	8.41		4.76	12.06
2	Peritonitis	06	6.32		3.12	9.52
3	Gut resection and anastomosis	06	6.32		3.12	9.52
4	Post laparotomies (blunt trauma & firearm)	06	6.32		3.12	9.52
5	Appendectomy	01	1.05		-0.29	2.39
A	**Postoperative adhesions**			**27 (28.42)**	22.49	34.35
7	Indirect inguinal hernia	11	11.58		7.37	15.79
8	Para umbilical hernia	7	7.37		3.93	10.81
9	Umbilical hernia	6	6.32		3.12	9.52
10	Incisional hernia	1	1.05		-0.29	2.39
B	**External abdominal hernias**			**25 (26.32)**	20.53	32.11
11	Carcinoma rectum	8	8.42		4.77	12.07
12	Carcinoma left colon	7	7.36		3.93	10.79
C	**Malignancies**			**15 (15.78)**	10.99	20.57
D/ 13	**Intestinal tuberculosis**	13	13.68		9.16	18.20
E/ 14	**Intestinal volvulus**	09	9.48		5.63	13.33
F/ 15-20	**Others (six diseases)**			**06 (6.32)**	3.12	9.52
Total		**95**	**100 %**			

"Others" six causes in the table included faecal impaction, Meckle's diverticulum, intestinal worms, gall stone ileus, lymphoma gut and intestinal pseudo-Obstruction, each in one case (1.05% each) with 80% CI of -0.29-2.39% each.

tinal lumen e.g. adhesions, hernias, inflammations, neoplasms, volvulus or compression from outside the intestinal tract. Non-mechanical factors include those that interfere with the muscle action or innervations of the bowel e.g. paralytic ileus, mesenteric thrombus or embolus and hypokalemia.[9]

Eighty percent of the bowel obstructions occur in the small intestine. The other 20% occur in the colon.[10] In our study bowel obstructions are seen frequently in the ileum. Small bowel obstructions (73.68%) are caused frequently by adhesions, or hernias; whereas large bowel obstructions (24.21%) are caused commonly be carcinomas, volvulus or diverticulitis. The presentation of obstruction will relate to whether the small or large intestine is involved.

A change in the pattern of causes of intestinal obstruction has occurred over the years. Early studies have shown that external abdominal hernias was the top most common cause of intestinal obstruction throughout the world.[7,8] Hernias now rank second or third to adhesions in the list of intestinal obstruction in developed countries. Similarly, volvulus colon is more common in certain races and regions than the others. Intestinal tuberculosis is seen less frequently in the west and developed countries while it still remains an important cause in our country. Malignancies of gut cause obstruction in significant numbers in both the developed and under developed countries. Crohn's disease is more common in west and developed world. Worms cause obstruction more in people of poor countries.

This change in pattern has occurred because of early repairs of hernias, easy accessibility to the health care system, better diagnostic facilities, and frequent abdominal surgery in the developed countries. Anesthesia has become very safe in these countries and so is elective and emergency surgery. This differing frequency of varying etiological factors in the causation of bowel obstruction undoubtedly reflects the type of practice in the county and region and nature of referral pattern to a given institution.[11]

With improvement in the health facilities, early hernias repairs, frequent surgical procedures, high prevalence of chronic pelvic inflammatory diseases and increased use of therapeutic radiation; adhesive intestinal obstruction has emerged as the leading cause of intestinal obstruction in the west.[12]

According to one study, 5% of all laparotomies will be complicated with adhesive obstruction and it is a problem that is predicted to grow further. Though

controversies exist regarding operative or conservative management of adhesive intestinal obstruction, preventive measures include prompt and repaid diagnosis, early control of the inflammatory process, minimal and careful handling of the gut during surgery.[13-15] Laparoscopic adhesiolysis is emerging as a safe and effective procedure for releasing adhesive intestinal obstruction. The procedure is however, highly skill dependent. Research regarding prevention and treatment is going on. Common procedures, resulting in postoperative adhesive intestinal obstruction are; gynecological procedures, peritonitis, gut perforations, gut resections and anastomosis, laparotomies and appendicectomies.[16]

In contrast to other national studies, we found adhesive intestinal obstruction in our population to be the top most common cause. Postoperative peritoneal adhesions caused obstruction in 28.42% (27/95) cases of our sample with estimated prevalence of 22.49-34.35% in our population. Patients having heard of laparoscopy would come for consultations after getting fed up of multiple conservative trials somewhere open else. Secondly, many patients with post op intestinal obstruction were afraid of undergoing open surgeries. Laparoscopic surgeon had a magic role in their minds.

External abdominal hernias caused obstruction in 26.32% (25/95) cases of our sample with estimated prevalence of 20.53-32.11% in our population. Several studies have shown that hernias mainly cause small bowel obstruction. This was also seen in our study.

Intestinal tuberculosis was found in 13.68% (13/95) of our series with estimated of 9.16-18.20% prevalence in our population. Intestinal tuberculosis is commonly encountered in this part of the world.[17] The clinical presentation ranges from acute or sub-acute intestinal obstruction to vague abdominal pain, low grade fever, anemia and generalized ill health. It is rare form of obstruction in the west.[18] Confirmation of intestinal obstruction is not difficult but diagnosis of intestinal tuberculosis as a cause of intestinal obstruction is often omitted because of the vague signs and symptoms, especially in the early stage. Some authors do not agree with this and according to them preoperative diagnosis is easy if proper clinical history is evaluated. We were however, not able to pick a single case short of laparotomy except in those who were already harboring mycobacteria in their lungs. Patients usually present late with the complications like intestinal obstruction, mass right iliac fossa, gut perforation, adhesions and tuberculosis peritonitis. Multiple strictures in the ileum were the commonest operative finding in our study. This is in accordance with that of Muzaffar, et al, like his findings intestinal tuberculosis was more common in females from low socioeconomic class. Some have found iliocaecal tuberculosis to be the commonest form. Surgery as treatment option is reserved for the complications of the disease because of the advent of strong and effective chemotherapy.[19]

Rare causes include worms, dental impaction, intussusceptions, gall stone ileus, Meckel's diverticulum and blunt abdominal trauma. These remained rare in our study as well.

CONCLUSIONS

In our population of mechanical intestinal obstruction patients, type of presentation was equal by acute and chronic, site of intestinal obstruction was small gut in maximum cases and cause of obstruction was postoperative adhesions on top followed by external abdominal hernias and malignancies.

Limitations and Recommendations: The limitation of this study included small sample size. Further we were also unable to study the types of presentation, sites and causes of mechanical intestinal obstruction as distributed by person, place and time. We recommend multicenter cross-sectional studies with larger sample sizes in different populations to substantiate our findings.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	RA, MA
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All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.