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Original Article

Surgery Section

Non-therapeutic Management of Adhesive Small Bowel Obstruction: A Descriptive Map of Practice Patterns among General Surgeons in Saudi Arabia

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ABSTRACT

Introduction: Adhesive Small Bowel Obstruction (ASBO) is a common postoperative complication, and its management is challenging and controversial. Published guidelines for management are inconsistent and therefore, management practices vary based on institutions and individual surgeons.

Aim: To evaluate variation of practice patterns among general surgeons and residents in investigation and non-therapeutic management of ASBO.

Materials and Methods: This descriptive multi-centric cross-sectional study was done on 250 general surgery trainees and practitioners who were selected to be part of the study between January-February 2020 by simple random sampling. The participants were evaluated by questionnaire method which included standard of care, current practices and variability in non-therapeutic management of ASBO.

Results: In total, 198 (79.2%) participants with mean (SD) age and duration of practice 36.5 (7.70) and 9.40 (7.26) years, responded, the majority (60%) of the respondents agreed on the use of routine abdominal Contrast-Enhanced Computed Tomography (CECT) for suspected ASBO. Resuscitation as per haemodynamics was preferred over positive fluid balance by 64.6%; nasogastric drainage was considered mandatory by 76.3% and the passage of flatus was considered the most important determinant of clinical resolution of the obstructive episode by 55.1% of respondents. Around a third of the respondents (36.4%) were of the opinion that resumption of oral intake should begin with sips of water and another 47.5% thought that 48 hours is the maximum waiting period for Non-operative Management (NOM).

Conclusion: This study demonstrates that there is high variability between general surgeons in most aspects of ASBO non-therapeutic management. The findings underscore the need for developing national standard consensus-based guidelines to allow timely and effective management of this complex and potentially life-threatening condition.

Keywords: Bowel adhesions, Questionnaire method, Survey

INTRODUCTION

Small Bowel Obstruction (SBO) accounts for more than 50% of all emergency laparotomies [1-3]. The most common cause of SBO is Intra-Abdominal Adhesions (IAA) which can be congenital (embryogenic) or acquired (inflammatory, neoplastic, post-surgical) [4-7]. It is estimated that 50-100% of post-laparotomy patients develop IAA [8,9]. In ASBO patients, such an event happens on the background of a previous abdominal intraperitoneal surgery, with high risks of re-operation owing to inadvertent enteric injury, bleeding from immature vascular adhesions, and recurrence of adhesions. A significant portion of patients (28-75%) will respond to NOM with spontaneous clinical resolution of obstructive symptoms within 24-72 hours [10-12], and the advent of more accurate imaging techniques could help in differentiating simple (non-strangulated/ischemic/perforative) from complicated ASBO cases [13-15]. The clinical focus is therefore to predict the failure of NOM early to avoid missing a complicated ASBO case, rather than on finding the grade or level of obstruction, or whether the culprit is a single adhesive band or matted adhesion. Even though there are many published guidelines [15,16,17], ASBO management practices remain highly variable between institutions and attending surgeons. Such high variability in practice patterns could lead to variability in patients' outcomes, and standardisation of practice patterns could help in reducing such variable outcomes. Currently, in Saudi Arabia, there are no studies on patterns of practice in terms of non-therapeutic management of ASBO. With these considerations, the current study was done to map the diagnosis and non-therapeutic management practices among general surgeons in Saudi Arabia for ASBO.

MATERIALS AND METHODS

A descriptive multi-centric cross-sectional study was carried on 250 general surgery trainees and practitioners between January-February 2020. The study protocol was approved by King Fahad Medical City, IRB Number 20-232E. Post-hoc analysis showed that the power was 87.7% with the attained sample size of 198, using one-sample t-test and assuming a two-sided alpha of 0.05 and a small effect size (d=0.2) [18].

The questionnaire [19] was developed after extensive literature search and reviewed by specialist in the field for its validity. To establish the reliability of questionnaire, pilot study was done on administering the questionnaire on 30 surgery residents in Tertiary Care Center. The Cronbach alpha coefficient calculated was found to be 0.79. The questionnaire included two sections; first section included 8 questions on the demographic information of residents, subspeciality, years of training and affiliation to academic or non-academic hospital. Second part of the questionnaire included 13 items, with responses graded from 1 to 5 on Likert scale. First 6 items included descriptive mapping of practice patterns on diagnostic controversies and remaining 7 items were targeted to describe the practice on resuscitation and non-specific non-therapeutic management controversies of ASBO in participants. On January 1st, 2020, three survey administrators administered the survey to general surgeons from 30 hospitals in five regions of

Saudi Arabia. The target population was 250, randomly selected members from the list of general surgeons in these hospitals. All participations were voluntary, and online consents were taken; no honorariums were awarded to participants. The survey was closed on February 29th, 2020.

Inclusion criteria: The study was designed to capture the information on the entire spectrum of surgeon's involved in general surgery practices in Saudi Arabia. All Saudi Board-certified surgeons were therefore eligible for inclusion. Besides, residents currently enrolled in General Surgical Programs accredited by the Saudi Committee of Health Specialities were also included, as they are the first responder in case of surgical emergencies at night and are being trained to become competent surgeons who can independently provide optimal care to patients.

Exclusion criteria: Retired surgeons or surgeons not in practice for the last six months, surgical specialities that do not cover general surgical on-calls (e.g., Breast and Endocrine, Vascular, and Thoracic surgery), residents, interns, and medical students who were rotating in general surgery from other surgical specialities, and those practicing outside of Saudi Arabia were excluded from this study.

The survey administrator was blinded to all questions. The statistician was blinded to all demographic variables, as they were coded. Sample size calculation was done in G-POWER software.

STATISTICAL ANALYSIS

Data were uploaded to the SPSS software version 26 (SPSS, Inc., Chicago, IL, USA). Descriptive statistical analyses were performed for each demographic variable and practice standard item. Results were presented either as proportions (for categorical responses) or as weighted mean with Standard Deviation (SD) (for Likert-scaled items).

Operational Definitions

Any item with more than 50% agreement (Strongly Agree, and Agree) was considered a favourable standard. Any item with more than 50% disagreement (Disagree, and Strongly Disagree) was considered an unfavourable standard. Any item that received less than 50% agreement and disagreement were considered a neutral standard. In items with a mean "weight" of a standard, the mean "weight" helped in pointing to trends favouring a specific answer. In items with no mean "weight" or "Agreement/Disagreement Ratio", options selected by more than 30% of the participants were considered an "acceptable variation" in the standard of practice and were indicated by an Asterix mark (*).

RESULTS

One hundred ninety-eight participants completed the survey out of the 250 targeted population, representing a 79.2% completion rate.

Characteristics of the Study Participants

Most of the participants were Saudi male general surgeons and residents under training in general surgery in an academically affiliated tertiary centre. The mean (SD) age and duration of practice of the participants were 36.5 (7.70) and 9.40 (7.26) years, respectively [Table/Fig-1].

Characteristics		n (%)
Total number of participants		198
Age (years)	Mean (SD)	36.5 (7.70)
Sex	Female	27 (13.6%)
	Male	171 (86.4%)
Subspeciality	None (General surgeons)	142 (71.7%)
	Acute care surgeons	18 (9.1%)
	Colorectal surgeons	22 (11.1%)
	Hepatopancreatobiliary surgeons	16 (8.1%)
Level of training	Attendant	83 (42.0%)
	Fellow in training	9 (4.5%)
	Board certified specialist in general surgery	27 (13.6%)
	Resident	79 (39.9%)
Years of practice	Mean (SD)	9.40 (7.26)
Centre designation	Secondary	54 (27.3%)
	Tertiary	144 (72.7%)
Affiliation	Academic	46 (23.2%)
	Non-academic	152 (76.8%)
Nationality	Saudi	173 (87.4%)
	Non-Saudi	25 (12.6%)

[Table/Fig-1]: Participants' characteristics.
SD: Standard deviation, #n: Number of participants, F: Female, M: Male

Diagnostic Modality

Sixty percent of the participants agreed that routine abdominal contrast-Enhanced Computed Tomography (CECT) for suspected ASBO is a favourable standard and the most important purpose of CECT was to rule out non-adhesive causes of SBO, rather than to confirm the diagnosis of SBO, or to differentiate between partial and complete obstruction, or to rule out ischemic or perforative complications of SBO [Table/Fig-2]. Participants were neutral on the mandatory status of a Gastrograffin (GG) challenge; however, the most common indication was its prognostic role in predicting a spontaneous resolution of SBO, and the most common concentration/volume used was 100 cc of GG/100 cc of H_2O taken orally within 1 hour [Table/Fig-2].

Resuscitation and Non-specific Management

All participants favoured isotonic crystalloids, with LR (Lactated Ringer's) as the most commonly used fluid for resuscitation, followed by isotonic normal saline (NS) solution [Table/Fig-3]. Most participants favoured selective and routine administration of "prophylactic" antibiotics and none considered it contraindicated [Table/Fig-3]. Most participants deemed opioids relatively contraindicated or non-indicated and only a few participants considered it selectively indicated. Most participants favoured titrating the resuscitation fluid balance to the patient's haemodynamic status. None of the participants favoured a negative or zero balance. Most participants considered nasogastric drainage as a mandatory standard of care. Most participants considered the passage of flatus as the minimum requirement for the clinical definition of obstructive episode resolution, followed by abdominal pain resolution. Most participants preferred resuming enteral intake with only sips of water, followed by clear liquids [Table/Fig-3].

DISCUSSION

The standardisation of practice patterns based on the best available evidence could lead to an improvement in patients' outcomes and resource utilisation. Variability in practice patterns on ASBO is well established, and the topic is rife with controversies, and most of the variabilities are based on the personal background of training and institutionally sanctioned practices [1,5,20]. To establish national evidence-based guidelines for the standardisation of practices on ASBO management, a survey-based mapping of current practice patterns in Saudi Arabia was conducted to identify any variability and controversy in such a practice.

"Initial" clinical assessment based on history, physical and laboratory examination, and radiological investigations are essential and there is a traditional consensus on such practices [1,5,21,22] However, such an assessment has been shown to be of low sensitivity and specificity in the diagnosis of ASBO or its complications [23-

Questions	Answers mapping #n (%)					Descriptive statistics	
Q	5 Strongly agree	4 Agree	3 Neutral	2 Disagree	1 Strongly disagree	Mean (SD)	Agreement/ Disagreement ratio (%)
Q1. Contrast Enhanced CT abdomen should be a routine investigation for all cases of adhesive SBO?	44 (22.2%)	75 (37.9%)	8 (4.0%)	66 (33.3%)	5 (2.6%)	3.44 (1.23)	Favourable 60.1/35.9
Q2. Contrast Enhanced CT abdomen can safely rule out ischemia (strangulation) in adhesive SBO?	29 (14.6%)	63 (31.8%)	42 (21.2%)	47 (23.8%)	17 (8.6%)	3.20 (1.19)	Neutral 46.4/32.4
Q3. Gastrografin challenge is a mandatory standard?	0 (0%)	72 (36.4%)	80 (40.4%)	46 (23.2%)	0 (0%)	3.13 (0.76)	Neutral 36.4/23.2
Q	Confirm the diagnosis of Adhesive SBO		To differentiate partial from complete adhesive SBO		To rule out ischemic or perforative complications of Adhesive SBO	To rule out nonadhesive causes of SBO	
Q4. What is the single most important purpose of Contrast Enhanced CT abdomen?	13 (6.5%)		31 (15.7%)		57 (28.8%)	97 (49.0%)*	
Q	100 cc of GG in 100 cc of water	200 cc of GG in 200 cc of water	500 cc of GG in 500 cc of Water	100 cc of GG in 200 cc of water	100 cc of GG in 500 cc of water	30 cc of GG in 1 L of water	
Q5. Which of the following definitions fit your perception of a Gastrografin challenge test?	78 (39.4%)*	23 (11.6%)	0 (0%)	14 (7.1%)	34 (17.2%)	49 (24.7%)	
Q	Diagnostic (to differentiate partial from complete SBO)	Diagnostic (to identify the level of obstruction, proximal vs. distal)	Diagnostic (confirmatory of SBO)	Prognostic (to predict the probability of spontaneous resolution of SBO nonoperatively vs. the early need for operative exploration)	Therapeutic (to improve the chances of spontaneous resolution of SBO and avoid the need for operative exploration)	Therapeutic (to expedite the process of spontaneous resolution of SBO nonoperatively	
Q6. Which is the single most important purpose of a gastrografin challenge?	25 (12.6%)	47 (23.7)	0 (0%)	64 (32.3%)*	41 (20.7%)	21 (10.7%)	

[Table/Fig-2]: Descriptive mapping of the practice patterns on diagnostic controversies of ASBO in participants.
(Mean value taken out of 5) Q: question, SD: Standard deviation, #n: Number of participants, %: Percentage, *Asterix: an "Acceptable Variation" standard of practice; ASBO: Adhesive small bowel obstruction; CT: computed tomography; GG: Gastrografin

Questions	Answers mapping #n (%)					
Q	Lactated ringer's solution	Isotonic normal saline	Hypertonic normal saline	Hypotonic	Albumin 5%	Other colloids
Q7. Which is your preferred resuscitation fluid?	107 (54.0%)*	91 (46.0%)*	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Q	Routinely indicated	Selectively indicated	Non-indicated	Relatively contra-indicated	Absolutely contra-indicated	
Q8. "Prophylactic" (non-therapeutic antibiotics in adhesive SBO are?	78 (39.4%)*	83 (41.9%)*	37 (18.7%)	0 (0%)	0 (0%)	
Q9. Opioids for pain management in adhesive SBO are?	0 (0%)	52 (26.3%)	41 (20.7%)	105 (53.0%)*	0 (0%)	
Q	Positive FB		Zero fluid balance		Negative FB	As per haemodynamic status
Q10. What is the preferred goal of fluid balance?	70 (35.4%)*		0 (0%)		0 (0%)	128 (64.6%)*
Q	Mandatory		Favourable		Optional	
Q11. Nasogastric drainage is?	151 (76.3%)*		38 (19.2%)		9 (4.5%)	
Q	Cessation of vomiting/Nasogastric drainage	Passage of flatus	Passage of stool	Resolution of abdominal pain	Resolution of anorexia	
Q12. Which of the following is the minimum acceptable definition of clinical resolution of obstruction for you?	3 (1.5%)	109 (55.1%)*	7 (3.5%)	79 (39.9%)*	0 (0%)	
Q	Sips of water		Clear fluids	Free fluids	Ad Lib/Regular Diet	
Q13. Upon clinical resolution, how would you resume enteral feeding?	68 (34.3%)*		61 (30.8%)*	53 (26.8%)	16 (8.1%)	

[Table/Fig-3]: Descriptive mapping of the practice patterns on resuscitation and non-specific controversies of ASBO in participants.
Q: Question, #n: Number of participants, FB: Fluid balance, %: Percentage, *Asterix: an "Acceptable Variation" standard of practice; ASBO: Adhesive small bowel obstruction; SBO: Small bowel obstruction

25]. For these reasons, the author did not include "initial" clinical assessment standards in the survey. The second line of clinical assessment studies include abdominal CECT and GG challenge; however, these are controversial practice standards [1,5,26,27]. In this study, most participants agreed that CECT should be used as a routine standard for all suspected cases and that the most important purpose of abdominal CECT was to rule out Non-ASBO (NASBO), rather than to confirm the diagnosis or identify the level or grade of ASBO. This observation is in line with findings of other studies that showed most general surgeons consider abdominal CECT as a routine standard for ASBO [28,29], and its main utility is to exclude causes of NASBO [16,18,30]. Regarding the GG challenge, one-third of the participants considered it to be a "mandatory" standard, and that its single most important purpose is to predict the probability of success of NOM in achieving spontaneous clinical resolution of obstructive symptoms.

This observation is in contrast to those other studies that showed

that most general surgeons (80-90%) consider GG challenge a mandatory standard and that its most important purpose is prognostic/therapeutic [1,31,32]. Only one-third of the participants agreed that abdominal CECT could safely rule out ischemic complications of ASBO and would consider such an application to be the most important purpose of abdominal CECT [Table/Fig-2], which is in contrast to studies that considered ruling out ischemic complications and predicting the need for early surgical exploration are the most important purpose of abdominal CECT [32,33]. Moreover, abdominal CECT has been reported to have a >90% sensitivity in detecting ischemic/strangulated ASBO [5,13-18,34-38]. However, result of the present study is in agreement with those of other studies that have shown poor sensitivity of abdominal CECT (30-40%) in detecting ischemic complications of ASBO, with an inter-observer agreement of 56-79% between radiologists [16,20,30,39]. This could corroborate abdominal CECT distrust shared by most participants in present study sample.

In this study, 40% of the sample favoured a high concentration and low volume (100 cc of GG/100 cc of H_2O) of contrast medium. This observation is similar to the findings of multiple studies that preferred 50-100 mL of undiluted GG contrast medium [5,40-43]. However, it should be noted that 25% of the sample chose an extremely diluted (30 cc of GG/1L of H_2O) contrast medium, which is usually reserved for purely diagnostic purposes on abdominal CECT, and has no prognostic or therapeutic benefits. Such an observation highlights a lack of evidence-based practice.

All participants preferred crystalloids as a resuscitative fluid, and most participants favoured a haemodynamics-guided resuscitation rather than an arbitrary positive fluid balance and considered nasogastric drainage as a mandatory standard. Such observations are consistent with those in other studies that showed these practices were evidence-based, reduced mortality and morbidity, and relieved symptoms [5,33,44-47]. Most participants considered opioids for pain relief to be relatively contraindicated and "prophylactic" antibiotics to be routinely/selectively indicated, which could be due to concerns of bacterial translocation in ASBO patients [48-50]. However, there are no data that support such indiscriminate use of antibiotics for simple cases (non-ischemic/perforative complicated) [40,51]. Moreover, a fifth of the sample considered prophylactic antibiotics to be non-indicated, which could be due to concerns of masking acute abdominal signs [52-56]. The avoidance of prescribing narcotics could be due to concerns of causing ileus or masking signs of acute abdomen and is consistent with findings in multiple studies [54-58].

Most participants would accept the passage of flatus and resolution of abdominal pain as the minimum requirement for the clinical definition of obstruction resolution. These conflicts with the findings of Lee MJ et al., that showed most general surgeons would accept a cessation of nasogastric drainage, followed by the passage of flatus, cessation of vomiting, the return of appetite, and resolution of abdominal pain as criteria for obstruction resolution [59]. The same study showed that most general surgeons would resume enteral feeding by clear fluids, followed by free fluids, sips of water, and regular diet [59]. Currently, there are no guidelines on the definition of clinical resolution of obstruction or resumption of oral intake protocols including the most comprehensive guidelines of Bologna (three versions - 2010, 2013, and 2017) [59].

This being the first study on practice patterns map for ASBO in Saudi Arabia, and elucidation of some of the most crucial decision-making determinants among general surgeons on non-therapeutic management of ASBO. Such determinants could be used to create a clinical decision index tool to "trained" and validated on a cohort of general surgeons. This study, along with more robust comparative studies, will help reduce significant variations in practices, improve patient-related outcomes, and create evidence-based national guidelines to standardise practice.

Limitation(s)

This study has a few limitations such as a potential for selection bias due to participants recruitment from multiple centers with a simple random sampling technique, descriptive design, lack of comparisons between any grouped variables (e.g., participants characteristics), risk of reducing a complex decision-making process into a series of abstract questions, and conclusions and results that could not be generalised to different populations.

CONCLUSION(S)

There is a considerable variation in non-therapeutic management practices of ASBO among general surgeons in Saudi Arabia. Further research should explore the issues of controversy and determine how these variations in practices affect patients' outcomes. Practice mapping studies, similar to the current study, are needed to understand the prevailing procedures and guidelines for the therapeutic management of ASBO. These critical inputs will be helpful in developing standard guidelines and improve adherence to such guidelines, ensuring timely and appropriate management of this potentially life threatening condition.

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