Post-Operative Adhesive Intestinal Obstruction, Risk Factors and Complications.

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ABSTRACT :

BACKGROUND :

Post-operative adhesions form a main lifelong surgical issue, Adhesive intestinal obstruction remains the main complications of adhesions.multiple Risk factors play an important role in the initiation of the disease and its Management.

OBJECTIVE:

To identify the risk factors that increases the incidence of Adhesive intestinal obstruction and the complication of surgical intervention.

PATIENTS AND METHODS :

One hundred and eight patients with adhesive Intestinal obstruction (out of two hundreds and ten patients with acute intestinal Obstruction) were admitted to the surgical wards of Al-Yarmouk Teaching Hospital, studied prospectively for the period between the 1st of January 2013 and the 30th of April 2014 . Data obtained regarding different parameters like Age ,sex, number and types of previous operations,management of those patient Whether conservative or operative.

RESULTS:

Adhesive intestinal obstructions are (51.43%) of the total cases with Acute intestinal obstruction. The highest incidence was among age group between 30-39Year, (32.4%). Explorative laparotomy are the main risk factors for postoperative adhesions with an incidence of 29.6%. The recurrence rate after surgery For adhesive intestinal obstruction is 13.8%.

CONCLUSION:

Since the recurrence rate after surgical Intervention in adhesive intestinal obstruction is relatively low, the role for conservative measures may be limited to a short period of time.

KEYWORDS: postoperative adhesions, complications, adhesive small bowel obstruction.

INTRODUCTION:

postoperative intraperitoneal adhesions or bands can Result from any type of abdominal surgery,postoperative adhesions are the main Cause of adhesive postoperative small bowel obstructions,which represent a lifelong Issue.(1)

Peritoneal adhesions are pathological connections that typically form between the Omentum, the small bowel, the large bowels, the abdominal wall, and other intra-abdominal organs. These connections may be a thin film of connective tissue , a thick Fibrous bridge containing blood vessels and nerve tissue, or a direct adhesion between two organ surfaces.(1)

Small bowel obstruction due to postoperative adhesions develops in 6% to 11% of All patients undergoing laparotomy.It may occur at any time after the initial Laparotomy and result in frequent re-admissions in subsequent years.(2)

Al- Yarmouk Teaching Hospital.

Peritoneal adhesions can be classified as congenital or acquired. Congenital Adhesions are present since birth like vitello- intestinal band, while acquired Adhesions are subdivided into post-inflammatory and post-operative.(3)

Some researchers suggest that adhesions could also be classified in three major Groups: adhesions formed at operative sites, adhesions formed de novo at non-Operative sites, and adhesions formed after the lysis of previous adhesions.(4)

Vasoactive substances such as histamines and kinins are released by the disruption Of stromal mast cells increasing vascular permeability,which contributes to the Collection of a fibrin-rich exudate that covers the injured area.(5)

After abdominal surgery, the equilibrium between coagulation and fibrinolysis is Disturbed ,in favor of the coagulation system,peritoneal adhesions may be formed.(6)

Surgery has been shown to diminish fibrinolytic activity in two ways ,it increases Levels of plasminogen activator inhibitors,and ,it reduces tissue oxygenation.(7)

Preoperative risk factors are:age, gender, physical status, number and sites of Previous operations. Intraoperative risk factors for adhesions include any Intraoperative infective process , intraperitoneal fluid collection ,the organ involved In the initial operation.(8)

A previous operation for adhesive postoperative small bowel obstruction and the Elapsed time from the latest operation to the inclusion of adhesive postoperative Small bowel obstruction operation were also noted to influence the incidence of Adhesive intestinal obstruction.(9)

Other factors associated with the formation of postsurgical adhesions include Trauma, thermal injury,ischemia, and foreign bodies.(10)

Multiple other factors including tight suturing , abrasion , exposure to foreign Bodies such as talc and powders from gloves,lint from abdominal packs,reactive Sutures.(11,12)

The type of surgical approach and type of surgery are another factors that are Important in the development of postoperative adhesions.(13,14)

Various methods of prevention of recurrence of adhesive obstructions were tried in Adult patients.plication of the small intestine is often performed in situations Suggesting an increased risk of adhesive obstruction.(15,16)

This can be accomplished by the external suture methods of Nobel.(17,18)

OBJECTIVE:

To identify the risk factors of post-operative adhesive intestinal obstruction.

To identify the complications that develops after surgical intervention for the Treatment of adhesive intestinal obstruction.

To identify the management measures and its relation to the risk factors.

PATIENTS AND METHODS :

Two hundreds and ten patients were admitted to the surgical wards of Al-Yarmouk Teaching Hospital with a Diagnosis of Acute Intestinal Obstruction for the period from 1st of January 2013 to the 30th of April 2014.

A prospective study involving 108 patients (out of those 210 patients) with a Diagnosis of adhesive intestinal obstruction with an age range from 14-75 years. The Diagnosis of "adhesive intestinal obstruction" was made on clinical basis which Include the evidence of previous surgery, clinical picture of small bowel obstruction, Exclusion of any other causes of small bowel obstruction such as hernia, Intussusception …etc. In addition to clinical basis, the diagnosis of " adhesive Intestinal obstruction " was made based on radiological evidence as well, those Evidence include abdominal X-ray confirmation of small bowel obstruction, CT scan Exclusion of any other causes for intestinal obstruction like tumors.

Data were collected initially on admission regarding age,gender, occupation, Number of previous operations, time and type of previous operations, any previous Admission for intestinal obstruction and any comorbidity conditions.

Details about previous operations were also collected regarding the type of Operations whether emergency or elective operations, the operative During previous operation whether located in the upper abdomen or in the lower Abdomen.

Patients were followed up during the period of the study whether they Managed conservatively or operatively. For patients who managed with conservative Measures, data were collected regarding the average hospital stay and any recurrent Attack during the period of the study.

For patients who managed operatively, data were collected regarding the Exact cause of obstruction, average hospital stay, post-operative complications and Any recurrent attack during the period of the study.

Data were collected from patients directly or from their medical records or From my colleagues who were responsible for their management. For 15 patients, Data was not collected properly for many reasons like (insufficient history about Previous surgery, patient left the hospital on his own responsibility, etc…), those Patients were excluded from the study, while 108 patients were included in our study.

All these data were studied, categorized in tables to find any relations Between many risk factors and the incidence of adhesive intestinal obstruction as Well as any complication developed postoperatively and any recurrence occurs.

Statistical analysis was performed using the software SPSS and chi-square Test. A P- value less than 0.05 was considered statistically significant.

RESULTS:

Two hundreds and ten patients were admitted to the surgical wards of Al-Yarmouk Teaching

Hospital between the 1st of January 2013 and the 30th of April 2014. Out of those 210 patients, one hundreds and eight (51.43 %) patients diagnosed With adhesive intestinal obstruction.

The ages of 108 patients with a diagnosis of acute adhesive intestinal Obstruction range from 14 years and 75 years with a median age of 38.47. Sixty eight (62.96 %) were male patient while 40 (37.03 %) were female patients (P = 0.078) .

The highest incidence (32.4%, 35 patients) was among patients with an age Range from 30 years to 39 years, while the lowest incidence (2.77%, 3 patients) was In patients with an age of more than 70 years (P < 0.05).

There was no patient with an age of less than 14 years, while the number of Patients with an age range from 14 years to 19 years was 12 patients (11.11%).

The number of patients with an age range from 20 years to 29 years was 18 Patients (16.66%), and this is the same number of patients (18 patients) for patients With an age group between 40 and 49 years (P < 0.05).

The number of patients between 50 and 59 years was also similar to the Number of patients between 60 and 69 years, 11 patients (10.18%). As shown in {Table 1}

Table 1:

Age (y)	Male (n=68)		Female (n=40)		Total		P Value
	n	%	n	%	N	%	
14-19 y	8	7.4	4	3.70	12	11.11	0.001*
20-29 y	13	12.03	5	4.62	18	16.66	
30-39 y	16	14.81	19	17.59	35	32.40	
40-49 y	9	8.33	9	8.33	18	16.66	
50-59 y	9	8.33	2	1.85	11	10.18	
60-69 y	10	9.25	1	0.92	11	10.18	
>70 y	3	2.77	0	0	3	2.77	
Total	68	62.97	40	37.03	108	100	
	P value = 0.078						

Age and sex distribution

All patients have a positive past surgical history, either emergency or elective Surgery. Fifty seven patients (52.72%) have a previous emergency surgery, 38 males (38.88%) and 19 females (24.07%), while 51 patients (47.22 %) mentioned a history Of previous elective surgery (*P = 0.05*)as shown in { Table 2 }.

Table 2: The incidence of adhesive intestinal obstruction in relation to the type of previous surgery

	Male		Female		Total		P Value
	n	%	n	%	n	%	
Previous emergency surgery	38	35.19	19	17.59	57	52.72	*0.05*
Previous elective surgery	30	27.77	21	19.44	51	47.22	
Total	68	62.96	40	37.04	108	100	

Regarding the management of 108 patients with adhesive intestinal Obstruction, 67 patients (62.03%) responded to conservative measures while 41 Patients (37.97%) required surgical intervention to relieve obstruction (***P < 0.05***) As show in **{ Table 3 }**.

Table 3:Type of management used for patients with adhesive intestinal obstruction.

	Male		Female		Total		PValue
	N	%	n	%	N	%	
Respond to conservative measures	43	39.81	24	22.22	67	62.03	0.008*
Required surgical intervention	25	23.14	16	14.83	41	37.97	
Total	68	62.95	40	37.05	108	100	

There was a strong relation between the number of previous attacks of Adhesive intestinal obstruction and the outcome of the patients.
Thirty five patients (52.23%) (out of 67 patients treated conservatively) Present with first attack or previous single attack of adhesive intestinal obstruction, While only 7 patients (6.48 %) (out of 41 patients who treated operatively) present With first attack or previous single attack (P < 0.05).
Only five patients (7.64%) (out of 67 patients who treated conservatively) have previous three or more attacks of adhesive intestinal , while 20 patients (48.78%) (out of 41 patients who treated operatively) have three or more attacks (P < 0.05) as shown in {table 4}.

Table 4:

		Male	Female	Total		P Value
				n	%	
Patients who respond to conservative measures	First episode or Previous one episode	21	14	35	52.23	0.025*
	Previous 2 episodes	19	8	27	40.29	0.35
	Previous 3 or more episodes	3	2	5	7.64	0.001*
	Total	43	24	67	100%	
Patients who required surgical intervention	First episode or Previous one episode	5	2	7	17.07	0.025*
	Previous 2 episodes	8	6	14	34.14	0.35
	Previous 3 or more episodes	12	8	20	48.78	0.001*
	Total	25	16	41	100	

The correlation between the number of previous attack(s) and the outcome of patients with adhesive intestinal obstruction

Fifteen patients (13.8 %) out of 108 patients (with adhesive intestinal Obstruction) have a previous surgery to relieve adhesive intestinal obstruction in the Past while the majority of patients { 93 patients (86.2 %)} don't have such a Previous surgery (P < 0.05), as shown in { Table 5 }.

Table 5:
Relation between the outcome of adhesive intestinal obstruction and previous surgery for the same condition.

	Male		Female		Total		PValue
	Required surgical intervention	Managed by conservative measures	Required surgical intervention	Managed by conservative measures	N	%	
Have the last surgery for AIO*	4 (3.7 %)	6 (5.55%)	1 (0.09%)	4 (3.70%)	15	13.8%	0.001*
The last surgery is not for AIO*	21 (19.44%)	37 (34.25%)	15 (13.88%)	20 (18.51%)	93	86.2%	
Total	25 (23.14%)	43 (39.81)	16 (14.81%)	24 (22.22%)	108	100%	

*AIO: adhesive intestinal obstruction

The incidence of adhesive intestinal obstruction was different in regard To the previous operative procedure and organs involved in previous surgery. Explorative laparotomies for any indication (trauma as well as non-trauma) have the Higher incidence of 29.62 % (32 patients) (*P < 0.05*).

Upper abdominal (Foregut, which include stomach, deudenum to the Entrance of common bile duct, liver, spleen and pancreas) surgeries shows the least Incidence of 7.38% (8 patients), two of them with previous cholecystectomy, three Of them with previous liver hydatid cystectomy and three patients with previous Elective spleenectomy (*P = 0.738*).The number of Patients with history of previous surgery involving mid Gut (from the entrance of common bile duct to the end of proximal two thirds of the Transverse colon) was 15 (13.88%). two of them (1.85%) have a history of previous Surgery of small bowel, while the other 13 have a history of previous surgery Involving the right sided large bowel (*P =0.072*).Eighteen patients (16.66%) have a history of previous surgery involving The hindgut (extending from the distal third of the transverse colon to the anus), 8 (7.40%) left hemicolectomy for malignant tumor, three (2.77%) patients with left Hemicolectomy for diverticulosis, and seven patients (6.48%) with previous surgery of sigmoid colon and rectum (*P = 0.054*).Sixteen patients (14.81 %) out of 108 patients with adhesive intestinal Obstruction have a history of previous appendectomy (*P = 0.091*).Nineteen female patients (17.5%) out of total 40 female patients (37.02%) with a percentage of 47.5% have previous gynecological procedures (12 Patients with previous hysterectomy and 7 patients with previous ovarian surgery) (*P < 0.05*). As shown in {table 6}.The number of patients developed postoperative complications was 11 Patients (26.82 %). Three patients out of 11 patients developed more than one Complication.Four patients (9.7%) had a iatrogenic bowel injury during adhesiolysis, One of them with large bowel injury that managed by primary repair. The other three Patients had small bowel injury, all of them managed by primary repair. Out of those Three patients with small bowel injury, one patient developed postoperative Intraperitoneal collection and enterocutaneous fistula later on. Two patients (4.8 %) developed postoperative enterocutaneous fistula. One patient with enterocutaneous fistula managed conservatively, the other patient Required re exploration after 2 weeks of conservative measures. Three patients (7.3%) developed postoperative intraperitoneal collection. Two patients out of three patients with intraperitoneal collection had a small bowel Resection and end to end anastomosis. All of the (three patients) respond to Conservative measures.

Table 6:

Incidence of adhesive intestinal obstruction in relation to the organ or region involve in a previous surgery

		Male		Female		Total		P Value
		n	%	N	%	n	%	
Foregut		5	4.62	3	2.77	8	7.39	0.738
Midgut	small intestine	2	1.85	0	0	2	1.85	0.072
	Large intestine	9	8.33	4	3.70	13	12.03	
Hind gut		15	13.88	3	2.77	18	16.66	0.054
Appendix		12	11.11	4	3.70	16	14.81	0.091
Female genitourinary organs		0	0	19	17.5	19	17.5	0.014*
Explorative laparotomy including trauma patients		25	23.14	7	6.48	32	29.62	0.006*
Total		68	62.96	40	37.04	108	100	

The overall mortality rate was 2.77 % (three patients), one of them died During the course of conservative measure when he admitted with severe dehydration And acute renal failure
Two patients (4.8 %) died due to post-operative complication, one of Them died due to acute myocardial infarction that developed postoperatively. The Other patient died due to medical co morbidities (old age, hypertensive and history of Ischemic heart disease). As shown in { Table 7 }.

Table 7:
Post-operative complications

complications	n	%
Iatrogenic bowel injury	4	9.7
Enterocutaneous fistula	2	4.8
Intraperitoneal collection	3	7.3
Death	2	4.8
Total	11	26.82

DISCUSSION:

Two hundreds and ten cases were admitted to the surgical wards of Al-Yarmouk Teaching Hospital between the 1st of January 2013 and the 30th of April 2014. Out of those 210 patients, one hundreds and eight (51.43 %) patients were Diagnosed with adhesive intestinal obstruction. This incidence differ from the overall Incidence of adhesive intestinal obstruction (40.2%) found by Ketan R. Vagholkar in Pensylvania,2001.[23] The increasing number of explorative laparotomies for trauma In our country now a days may be responsible for this difference.
The highest incidence of adhesive intestinal obstruction was among patients With age group (30 – 39y), the incidence was 32.40 % (35 patients). The lower Incidence was 2.77 % (3 patients) in age group (> 70 y). This is similar to the result Obtained by R.T. Kuremu and G. Jumbi in South Africa, 2006.[24] They found the Peak incidence of adhesive intestinal obstruction was 32.1 % among age group (30-39y), and a lowest incidence of 5.2% in patients with age group (> 70).
The total number of male patients was 68 (62.97 %), while female patients Were 40 (37.03 %). The male to female ratio was 1.7:1, and this

shows a slight Increase in the incidence of post-operative adhesive intestinal obstruction in male Gender. This is similar to the results obtained by R.T kuremu and G. Jubi in south Africa 2006.[24] they found that the male to female ratio was 1.6:1.

There was a slight increase in the incidence of adhesive intestinal obstruction Among those patients with previous emergency surgery (57 patients with an Incidence of 52.78%) as compared to those with previous elective surgery (51 Patients with an incidence of 47.22%) as shown in [Table 2]. These results are Similar to those obtained by Matter I , Khalemsky …et al. in 1997 when they found That the overall incidence of adhesive intestinal obstruction after emergency surgery Is 48.84 %.[25]

Out of the 108 patients with adhesive intestinal obstruction, 67 patients (62.03%) (43 males and 24 females) were managed conservatively with nothing per Oral, NG tube decompression, intravenous fluid replacement and observation Providing that the patients shows no signs of peritonitis nor vital signs instability [Table 3]. The conservative management last for an average of 2 days (range from 1 Day to 3 days). Other 41 (37.97%) patients required surgical intervention to relief Obstruction. The indications of surgery were signs of hemodynamic instability, signs Of peritonitis or failure of conservative measures for 72 hours. This is similar to data Obtained by R. T. Kuremu and G. Jumbi in South Africa, 2006. They found that 42% Of patients with adhesive intestinal obstruction require surgical intervention[24] But These results differ from data obtained by Williams SB, Greenspon J …et al. in Washington D.C. in 2005 where they found that 57% of patients with adhesive Intestinal obstruction require surgical intervention.[26] This difference may be Explained by variety of protocols regarding surgical intervention in adhesive Intestinal obstruction.

The number of previous attacks of adhesive intestinal obstruction plays an Important role in the management strategy and outcome [Table 4]. Those who have Their first attack or have only one previous attack are more likely to respond to Conservative measures, 35 patients out of 67 patients managed conservatively with a Percentage of 52.22%. While those patients who have three or more previous attacks Are more likely to be managed surgically, 20 patients out of 41 patients treated Surgically have three or more previous attacks with a percentage of 48.88%. These Results are similar to those obtained by Howard Barkan, Steven Webster in 1995 When they concluded that, the number of prior episodes is the strongest predictor of Recurrence. The optimal management strategy is a function of the number of prior Episodes a patient has experienced. Nonoperative management appears reasonable For stable patients who are having their first episode.[27]

Patients with a previous surgery for adhesive intestinal obstruction may Develop recurrence. In this study, fifteen patients (13.8 %) have previous surgery to Relief adhesive intestinal obstruction while 93 patients (86.2%) don't have such Surgery [table 5]. Five patients out of 41 patients treated surgically in our study have Previous surgery for adhesive intestinal obstruction. The overall recurrence rate after Surgical intervention is 13.8% and this is similar to data obtained by Jean-Jacques Duron, Nathalie Jourdan-Da Silva in a multicenteric study in 2006 when they found That the recurrence rate after surgical intervention in adhesive intestinal obstruction Is 10%.[28] Also these results are similar to the results obtained by Teixeira PG, Karamanos E, Talving P, Inaba K, Lam L, Demetriades D. in 2013 when they Conclude that, operatively treated patients had a lower frequency of recurrence and a Longer time interval to recurrence; however, they also had a longer hospital stay than That of patients treated nonoperatively.[29]

The type of the previous surgery and the operative field of concern as well as The organs involved, all have a great influence on the development of adhesions as Show in **[Table 6]**. Explorative laparotomies being the highest risk for adhesion Development in 32 patients (29.62 %), this is due to the inflammatory process that Is usually accompanied conditions that required explorative laparotomies. Lower Abdominal procedures (appendectomies and lower GIT procedures) also carry a Significant risk for the development of adhesions, 16 patients (14.81%) with prior Appendectomy, 16 patients (14.81%) for procedures involving the rectum or sigmoid Colon. Gynaecological procedures show a significant risk for adhesive intestinal Obstruction, 19 patients (17.5%) with a prior gynaecological procedure develop Adhesive intestinal obstruction in our study. These result were approximate to results Obtained by Wael Lutfy in Egypt, 2010 when he found that the incidence of adhesive Intestinal obstruction after

various surgical procedures as follows, 12.5% for Appendectomy, 16% for gynecological procedures.[30] Also results were similar to Those obtained by Williams SB and Greenspon J in washington 2005, when they Showed a percentage of 14% for appendectomies, 10% for upper abdominal Procedures and 30% for colorectal procedures.[26]

There was a significant difference regarding explorative laparotomies, our Study showed an incidence of 29.62% in developing adhesive intestinal obstruction While other two studies (Wael lutfy in Egypt 2010 and William SB and Greenspon j In Washington 2005) showed a percentage of 20%, this difference may be due to Increased number of explorative laparotomies for extensive trauma in our country Which causes more adhesions.

The overall complication rate was 26.82% (11 patients) with iatrogenic bowel Injury during adhesiolysis (4 cases (9.7 %)) being the most encountered Complications.

During the period of the study, three patients died with a mortality rate of 2.77%. Only two patients (4.8 %) died due to post-operative complications. These Results were similar to results obtained by R.T. Kumeru and G. Jumbi in south Africa 2006, when they found the mortality rate after surgery for adhesive intestinal Obstruction was 3.8% (4.8% in our study) and the rate of enterocutaneous fistula Was 4.2% (4.8 % in our study).[24] Also these results are similar to those obtained by Van Goor in 2007 in Netherland.[31]

CONCLUSION:

- Postoperative adhesions are the most common cause of acute intestinal obstruction.
- Young age group patients are the most common age group susceptible to develop adhesive intestinal obstruction.
- Patients with previous emergency surgery or previous gynecological procedures are more vulnerable to develop postoperative adhesive intestinal obstruction.
- The number of previous attacks of adhesive intestinal obstruction is an important indicator for the type of management and the recurrence rate.
- Many patients with adhesive intestinal obstruction respond to conservative treatme.

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