Management Outcome and Associated Factors among Intestinal Obstruction Patients Treated Surgically, Eastern Ethiopia

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Abstract

Background Intestinal obstruction is a global problem consuming much in terms of surgical services. It is a common surgical emergency and a significant health problem in Ethiopia. Several factors contribute to poor management outcomes in the case of intestinal obstruction. Post-operative mortality rate ranges from 3% to 30%. Despite this high rate of mortality, there is no recently published literature that has explored Intestinal Obstruction and its associated factors at Chiro General Hospital. Methods Institution based cross-sectional study was conducted among 254 of patients admitted with Intestinal obstruction who treated surgically at Chiro General Hospital. Data were collected using checklists from individual patient cards by trained three BSc nurses from 13 to 18 July 2018 and completeness of data collection was checked every day by the principal Investigator. Data were entered to Epi-Data version 3.1 computer software and exported to SPSS statistical software version 22 for analysis. Bivariable binary logistic regression was used to saw the association between each independent variable and dependent variable. All variables with P-value < 0.2 during bi-variable analyses were considered for multivariable logistic regression analyses. Odds ratio along with 95%CI were estimated to measure the strength of the association. Level of statistical significance was declared at p value less or equal to 0.05. Results In this study the magnitude of unfavorable outcome of Intestinal Obstruction was 21.3% (95% CI: (16.5, 26.4). Age group of 55 years or above [AOR=2.9, 95%CI: (1.03, 8.4)], duration of illness of 24hrs or above [AOR=3.1, 95%CI: (1.03, 9.4)], pre-operative diagnosis of gangrenous SBO & gangrenous LBO [(AOR=3.6, 95%CI: (1.3, 9.8)), (AOR=4.2, 95%CI: (1.3, 13.7))], respectively were significantly associated with unfavorable outcome. Conclusions The magnitude of unfavourable management outcome of patients with Intestinal obstruction who treated surgically in this study was high. Old age, late presentation of illness and gangrenous bowel obstruction were significantly associated with unfavourable management outcome. So that early detection prompt management of patients with Intestinal obstruction reduce the occurrence of unfavourable outcome of patients.

Background

Intestinal obstruction (IO) occurs when there is an interruption in the forward flow of intestinal contents. This interruption can occur at any point along the length of the gastrointestinal tract, and clinical symptoms often vary based on the level of obstruction. Intestinal obstruction may be of acute or chronic onset. It may be classified as dynamic obstruction (mechanical obstruction) or adynamic obstruction (paralytic ileus and pseudo-obstruction). It may also be classified as small bowel and large bowel obstruction[1]

Intestinal Obstruction is a major cause of morbidity worldwide. Intestinal obstruction is one of the commonest abdominal surgical emergencies. When intestinal obstruction is not relieved in time, the patient may die. Early diagnosis and prompt management are therefore mandatory. Intestinal obstruction is a global problem consuming much in terms of surgical services. It is a common surgical emergency and a significant health problem in Ethiopia [2, 3]. IO has been the leading cause of acute abdomen in

several African countries whereas acute appendicitis is the most frequently seen cause in the developed world.

Most of the gas that accumulates originates from swallowed air, although some is produced within the intestine. The fluid consists of swallowed liquids and gastrointestinal secretions (obstruction stimulates intestinal epithelial water secretion). With ongoing gas and fluid accumulation, the bowel distends and intraluminal and intramural pressures rise. If the intramural pressure becomes high enough, micro vascular perfusion to the intestine is impaired, leading to intestinal ischemia, and, ultimately, necrosis. This condition is termed strangulating bowel obstruction[4].

Intestinal obstruction continues to remain a challenge to surgeon despite advances in field of medicine, path physiology, surgical technique and conservative management and accounts for a large percentage of surgical admissions for acute abdominal pain and high mortality ranges from 3% to 30% all over the world. Universally, intestinal obstruction varies from country to country or regions in terms of its incidence, causes and management outcomes depending on ethnicity, age group, dietary habits, and geographic location, among other factors as well as living condition of the community[5, 6].

The leading causes of intestinal obstruction in Africans have mostly been hernia and volvulus whereas adhesions are most frequent in the developed world. There are, however, some African studies which are pointing to a change in these established patterns. Late presentation in case of intestinal obstruction accounts for disastrous outcomes, notably high rate of complications, long hospital stay and high mortality rates[2].

With only a few studies conducted in north and central Ethiopia [5, 7] there is a paucity of research about management outcome of IO in Ethiopia, particularly in the West Hararge. Furthermore, there is no recently published literature that has explored IO in rural and regional hospitals. Thus, this study was conducted to fill this information gap and generate base line information about management outcome of IO in CGH, Eastern Ethiopia.

Methods

Study design, period, setting, and population

Institutional based cross sectional study was conducted from June 13-18 2018 at Chiro General Hospital, Eastern Ethiopia. Chiro town is found at 328 km to the east of Addis Ababa. The hospital has been provided health care service for more than 1,441, 008 populations in its catchment area in the eastern part of Ethiopia with a total of 166 beds. All medical records of patients surgically treated for intestinal obstruction from from 1 January 2014 to 31 December 2017 were the study populations. 254 patient cards were included in the study.

Data Collection Methods

Data were collected based on structured data abstraction sheet from medical records and registers. The abstraction sheet includes sociodemographic, type of procedure, and duration of illness variables. The data was extracted from selected medical charts documented from 1 January 2014 to 31 December 2017. The data was collected by 3 BSc nurses and 1 MSc clinical Midwifery supervisors. Completeness of each recording format was checked before collecting the data.

Variables

Dependent variable

Management outcome (Unfavorable outcome, Favorable outcome,)

Independent Variables

Socio-demographical characteristics (Age, sex, Residence)

Duration of illness, cause, Procedure done, Intra-operative findings

Operational definitions

Surgical treatment: means surgical exploration of the abdomen which is determined by the nature of obstruction[6].

Surgical site infections (SSI): Infection following surgical incisions and classified as [8]

Superficial Incisional SSI: Infection occurs within 30 days after the operation and infection involves only skin or subcutaneous tissue of the incision.

Deep Incisional SSI: Infection occurs within 30 days after the operation and infection involves deep soft tissues (e.g., facial and muscle layers) of the incision.

Organ/Space SSI: Infection with anastomotic leak occurs within 30 days after the operation.

Facial dehiscence: is facial disruption due to abdominal wall tension overcoming tissue or suture strength, or knot security after surgical treatment[4].

Postoperative pneumonia: suspected in a patient with clinical findings of infection including fever, cough or purulent sputum in the post-operative period[4].

Procedure done: the main procedure done after laparatomy to relieve the obstruction[9].

Unfavorable management outcome: the condition of the patient after the procedure has been done that develops any postoperative complications or died until the patient discharged from hospital[10].

Favorable management outcome the condition of the patient after the procedure has been done and a patient does not develops postoperative complications until the patient discharged from hospital[10].

Data Quality Control

Pretest was done on 5% of the sample size. Training was given for data collectors and supervisors on data collection tools and data collection procedure for one day. Data collectors had been supervised closely by the supervisors and the principal investigator. Completeness of each abstraction sheet had been checked by the principal investigator and the supervisors in a daily base. Double data entry was done by two data clerks and consistency of the entered data was cross-checked by SPSS software.

Data processing and analysis

Data were entered, coded, cleaned and checked by EpiData statistical software version 4.2.0.0 and analysis was done by using SPSS Version 14 statistical software. Descriptive statistics of different variables had been presented by frequency, percentage tables, and pie chart. Binary logistic regression was used to saw the association between each independent variable with dependent Variable. Descriptive statistics such as proportions, percentages, ratios, frequency distributions and appropriate graphic presentations were used for describing the data. During bi-variable analysis P-value < 0.3, seven variables were considered for multivariable logistic regression analysis. All variable during bi-variable analysis, standard of error was below 2.0, hence multi-colliniarity was not present between variables. On multivariable logistic regression analysis, the value of Hosmer lemeshow fit model test was 0.58. Odds ratio along with 95% CI was estimated to identify factors associated with the outcome variable. Level of significance was declared at P-value ≤ 0.05.

Ethical Considerations

Ethical clearance was obtained from Haramaya University, College of Health and Medical Sciences, Institutional Health Research Ethics Review Committee (IHRERC).Then Official letter had been written to Chiro General Hospital for permission and support. The medical record identification information (name and card number) had not been collected and confidentiality maintained. All data collected from the chart kept strictly confidential and used only for the study purpose.

Results

Socio-demographic characteristics of study participants

Among 274 patients who were treated surgically for IO during the study periods, 20(7.3%) patients' cards were incomplete files. Therefore, the remaining 254 patients cards treated surgically for intestinal

obstruction during the study period were retrieved. The age ranged from 1 to 90 years with a mean age of 34 years and SD of 16.24 years. Thirty two (12%) patients were in age group 55 years or above while the remaining 222 (87%) were in the age group below 55 years. There were 226(89%) males' and 28(11%) females' patients and M: F ratio was 8:1. There were 198(78%) patients from out of Chiro resident and 56(22%) patients from Chiro (Table 1).

Clinical presentation, Duration and Preoperative Diagnosis of IO

All patients presented with the clinical symptoms of abdominal pain whereas 245(96.6%), 242(95.3%), 232(91.3%) patients present with vomiting, abdominal distension and failure to pass flatus and faeces respectively while 22 (8.7 %) patients had history of groin swelling additionally. Patients diagnosed simple SBO were 167(65.7%) and 35(13.8%) were suspected gangrenous SBO. On the other hand, patients diagnosed simple LBO were 34(13.4%) and 18(7.1%) were suspected gangrenous LBO (Figure 1).

Intravenous fluid resuscitation was given for 251(98.8%) patients and NGT inserted for 249(98%) patients whereas antibiotics initiated for 251(98.8%) patients before operation. Ceftriaxone and metronidazole were initiated for 249(98.4%) patients before operation whereas ampicillin and chloramphenicol were initiated for one (0.4%) patients. Out of 254 patients, 81 (31.9%) patient were present before 24 hours and 173 patients (68.1%) were present after 24 hour of duration (Figure 2)

Intra-operative Finding & Surgical procedures done

Small bowel volvulus 121(47.6%) was the leading cause of intestinal obstruction, followed by adhesion& bands 42 (16.5%), sigmoid volvulus 35(13.8%), Intussusception 22 (8.7%) and Hernia 21(8.3%) respectively. The most common procedure done was Derotation and decompression 107 (42.1%) followed by Resection and anastomosis 75(29.5%) & Adhesiolysis & band release 38(15%) respectively (Table 2).

Magnitude of Unfavourable management outcome of IO

Among 254 patients with IO who treated surgically,54 patients were develop unfavorable outcome, as a result, the magnitude of unfavourable management outcome of IO at Chiro General Hospital was 21.3% (95%CI;16.5-26.4). The most unfavourable management outcome of IO was wound site Infection (hematoma& incisional SSI) 30(55.5%) followed by post-operative pneumonia 08(14.8%), Anastomotic leak 06(11.1%), facial dehiscence 05(9.3%) and others 05(9.3%) patients respectively (Figure 3). The overall mortality rate in this study was 3.9%.

Factors Associated with Unfavourable Management Outcome of IO

A binary logistic regression was done to identify the association between unfavorable outcome of IO and independent variables. In the bivariate analysis age group of 55 years or above, out of Chiro residence, duration of illness of 24hr.or above, pre-operative diagnosis of gangrenous SBO & gangrenous LBO, operative finding of gangrenous SBV and operative procedure of DD & RA were identified to be factors significantly (p<0.3) associated with unfavorable outcome of IO. However, the final outcome of the multiple logistic regression analysis were, only age group of 55 years or above, duration of illness of 24hr.or above and pre-operative diagnosis of gangrenous SBO & gangrenous LBO were significantly associated with unfavorable outcome of IO. While other factors out of Chiro residence,operative finding of gangrenous SBV and operative procedure of DD & RA were dropped from the model .

In adjusted analysis age greater or equal to 55years were significant statistical association with unfavorable outcome of IO [AOR=2.9, 95%CI: (1.03,8.4)], old age group (55 years or above) were nearly three times more likely to develop an unfavorable outcome of IO, compared with patients whose age group of less than 55 years. Patients who presented after 24 hours of symptom were significant statistical association with unfavorable outcome of IO [AOR=3.1, 95%CI: (1.03, 9.4)], patients who came late (≥24hr.) were about three times more likely to develop an unfavorable outcome, compared with patients who came early (<24 hr.). The other factors which had a significant statistical association with the development of unfavorable outcome of IO were Gangrenous LBO and Gangrenous SBO [(AOR=3.6, 95%CI: (1.3, 9.8)), (AOR=4.2, 95%CI: (1.3, 13.7))], respectively (Table 3).

Discussion

The magnitude of unfavourable management outcome of IO at Chiro General Hospital was 21.3%. The most unfavourable management outcome of IO was wound site Infection. In current study Old age, late presentation of illness and pre-operative diagnosis of gangrenous bowel were significantly associated with the occurrence of unfavorable management outcome of Intestinal Obstruction.
This is in line with the study done Adama(24.6%)[10] and India (25.89%)[11]. But the magnitude of unfavourable management outcome of IO in this study was low compared with the reported studies done at Canada (64%)[12] and Nigeria(66.5%)[13] . This difference may be the cause of IO and type of procedure done (intussusception was the most cause of IO by which highest R&A was done while R&A was significantly associated with management outcome) a study done at Nigeria. This difference may be different studying population and different mean age a study done in both studies. On the contrary, this magnitude was higher than the study done in Kenya (13.6%)[14]. The possible difference may be residence of a patient in which there were lower proportion of patient came from rural dweller (58.7%)[14] than this study (78%). Patient who came from urban area or area near to hospital have good awareness on the importance of getting health service early, hence early intervention had lower unfavourable outcome. The other possible reason for the difference SOP (Standard of Procedure) may be applied more

properly in the study area of Kenya. Following SOP for every procedure decrease the acquisition of microorganism into surgical wound, hence the lower the infectious organism, the lower the magnitude of unfavourable outcome.

The most post-operative complication was wound site infection (hematoma& incisional SSI) 30(55.5%) followed by post-operative pneumonia 08(14.8%), Anastomotic leak 06(11.1%), 05(9.3%) respectively. The most post-operative complication was similar a study done at Adama, Kenya and Nigeria which accounts 39.3%, 33% and 31.4% respectively among patient develop complication [10, 13, 14]. But a study done at Canada the most post-operative complication was respiratory complication like pneumonia [12] which is second complication in this study. This difference may be the lower proportion of malnutrition patient & poor health-seeking behavior and higher standard of life modification style including hygiene in developed nation such as Canada than developing nation such as Ethiopia and other African countries.

Unfavorable outcome of patients with IO was affected by the cause of obstruction, duration of illness, age and complication detection time. [15].

In this study, being old age (age ≥55 years) was nearly 3 times more likely to develop unfavourable management outcome of IO, compared with those patients whose ages less than 55 years. This was in line with a study done Gondar [5]. This study was contradict with a study done in Adama [10],in which age of patients were not significant predictor of unfavourable outcome. This may be due to old age group in study area may came early, hence high proportion of favourable outcome.

Generally outcome of patient with surgically treated for IO might be affected by different factors, such as age of patient, residence of patient, duration of illness, cause of obstruction, viability of bowel, type of procedure done and length of hospital stays.

Duration of illness before surgical intervention has significant statistical association with unfavorable management outcome of patients with IO. Patient who came late were about three times more likely to develop unfavorable management outcome, compared patients who came early. This study was similar a studies done in Adama [10] and Gondar [5], in which patients who came late had higher propotion of poor outcome. This was possibly due to poor health-seeking behavior and poor transportation system in this sub-region. Late presentation in case of intestinal obstruction accounts for disastrous outcomes, notably high rate of complications, long hospital stay and high mortality rates[2].

In this study unfavorable management outcome of patient with IO were significantly affected by intra-operative finding of gangrenous bowel. Patients with gangrenous SBO and gangrenous LBO were more likely to develop unfavorable management outcome of patient with IO, compared with patients with simple SBO. This study was in line with a study done at Adama [10].

In this study gender of the patients did not influence the outcome of treatment in terms of morbidity and mortality. This also same in study done at Adama, Nigeria, Ruanda [10, 13, 16].

In this study unfavorable management outcome were not significantly affected by Intra-operative procedures of bowel resection and anastomosis. This was in contrary with a studies done at Nigeria, Kenya and Adama [10, 13],in which RA were significantly increase the outcome of unfavourable management outcome.

Limitation of the study

· In this study since it was a document review ,some data's were incomplete, as well poor hand writing in some cards and even few cards were missed.

· It was impossible to measure some essential parameters, which may significantly contribute for Unfavorable outcome of IO like Educational status of the patients, Occupational status, and House hold income per month since, secondary data was utilized in this study.

· There was scarcity of data available in the country, and no similar published data from the region which makes difficult in comparisons of the study.

· The results of the study may not show the actual picture of the problem in the community since this study was a facility based study.

Conclusions

In conclusion, the magnitude of unfavourable management outcome of patients with IO who treated surgically at Chiro General Hospital was high; this can result in significant morbidity and mortality. The common factors associated with unfavourable management outcome of patients with IO who treated surgically were old age, late presentation of illness and gangrenous bowel obstruction. But still magnitude of unfavourable management outcome can be reduced largely through: early detection, fluid resuscitation and electrolyte balance, administration of prophylactic antibiotics prior to operation and properly applying infection prevention protocol and SOP.

Even though, the occurrence of unfavourable management outcome is not preventable but still it can be decreased largely through assessing the risk factors, early recognition and following the standardized management protocol

List Of Abbreviations

AOR:Adjusted Odd Ratio; BLH:Black line hospital;CGH:Chiro General Hospital;COR:Crude Odd Ratio;CHMS:College of Health and Medical Sciences;GLBO:Gangrenous Large Bowel Obstruction;GSBO:Gangrenous Small Bowel Obstruction;GUH:Gondar university hospital;Hrs:Hours;HU:Haramaya University;IHRERC:Institutional Health Research Ethics Review Committee;IO:Intestinal obstruction;LBO:Large bowel obstruction;MRN:Medical Record Number;NGT:

Naso-Gastric Tube;PI:Personal Investigator ;R&A:Resection and anastomosis;SBO:Small bowel obstruction;SBV: Small Bowel Volvulus;SOP:Standard of Procedure;SSI:Surgical site incision;

Declarations

Ethics approval and consent to participate: Ethical clearance was obtained from Haramaya University, College of Health and Medical Sciences, Institutional Health Research Ethics Review Committee (IHRERC).

Consent to publication: Not applicable

Availability of data and materials: Data will be available upon request from the corresponding author.

Competing interests: The authors declare that they have no competing interests.

Funding: Not applicable

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Tables

Table *1*: Socio-demographic distribution of patients surgically treated for IO at CGH (1 January 2014- 31 December 2017), (N=254).

Category	Frequency	Percent
Age		
< 55	222	87
>= 55	32	12
Sex		
Male	226	89
Female	28	11
Residence		
Chiro	56	22
Out of Chiro	198	78

Table *2*: Intra-operative Finding & Surgical Procedures done for patients with IO who treated surgically at CGH (from 1 January 2014 to 31 December 2017), (N=254)

Variables	Frequency	Percent (%)
Intra-operative finding		
Small Bowel Volvulus	212	47.6
Adhesion and Bands	42	16.5
Sigmoid Volvulus	35	13.8
Intussusception	22	8.7
Strangulated Hernia	21	8.3
Others	13	5.1
Type of Procedures done		
Derotation and decompression	107	42.1
Resection and anastomosis	75	29.5
Adhesiolysis & band release	38	15.0
Herniorrhaphy	13	5.1
Hartman's colostomy	10	3.9
Reduction	9	3.5
Other procedure	6	2.4

Table 3: Bivariable and multivariable analysis for independent variables with management outcome of IO at CGH (1 Jan2014- 31 Dec.2017), (N=254)

Variables	Management outcome			
	Unfavourable (%)	Favourable (%)	COR:95% C.I.	COR:95% C.I.
Age				
>= 55	12(37.5)	20(62.5)	2.6(1.2-5.7)	**2.9(1.03-8.4)***
< 55	42(18.9)	180(81.1)	1	1
Residence				
Out of Chiro	48(24.2)	150(75.8)	2.7(1.1-6.6)	2.7(0.9-7.6)
Chiro	6(10.7)	50(89.3)	1	1
Duration of Illness				
>=24	49(28.3)	124(71.7)	6(2.3-15.7)	**3.1(1.03-9.4)***
<24 hr.	5(6.2)	76(93.8)	1	1
Pre-operative diagnosis of IO				
Simple LBO	6(17.6)	28(82.4)	1.7(0.6-4.6)	1.5(0.5-4.5)
Gangrenous SBO	21(60.0)	14(40.0)	11.7(5.1-26.7)	**3.6(1.3-9.8)***
Gangrenous LBO	8(44.4)	10(55.6)	6.2(2.2-17.7)	**4.2(1.3-13.7)***
Simple SBO	19(11.4)	148(88.6)	1	1
Intra-operative Procedure done				
DD	9(8.4)	98(91.6)	0.2(0.1-0.5)	0.7(0.3-1.9)
Other procedure	45(30.6)	102(69.4)	1	1
RA	34(45.3)	41(54.7)	6.6(3.4-12.6)	2.0(0.8-5.3)
Other procedure	20(11.2)	159(88.8)	1	1
Intra-operative Finding				
Gangrenous SBV	19(59.4)	13(40.6)	7.8(3.5-17.2)	2.1(0.7-6.2)
Other Finding	35(15.8)	187(84.2)	1	1

*Significant at p-value<0.05, 1 is reference, **SBO=** Small Bowel Obstruction, **LBO=** Large Bowel Obstruction, **DD=**Derotation & Decompression, **RA=**Resection & Anastomosis, **SBV=**Small Bowel Volvulus, SV=Sigmoid Volvulus.
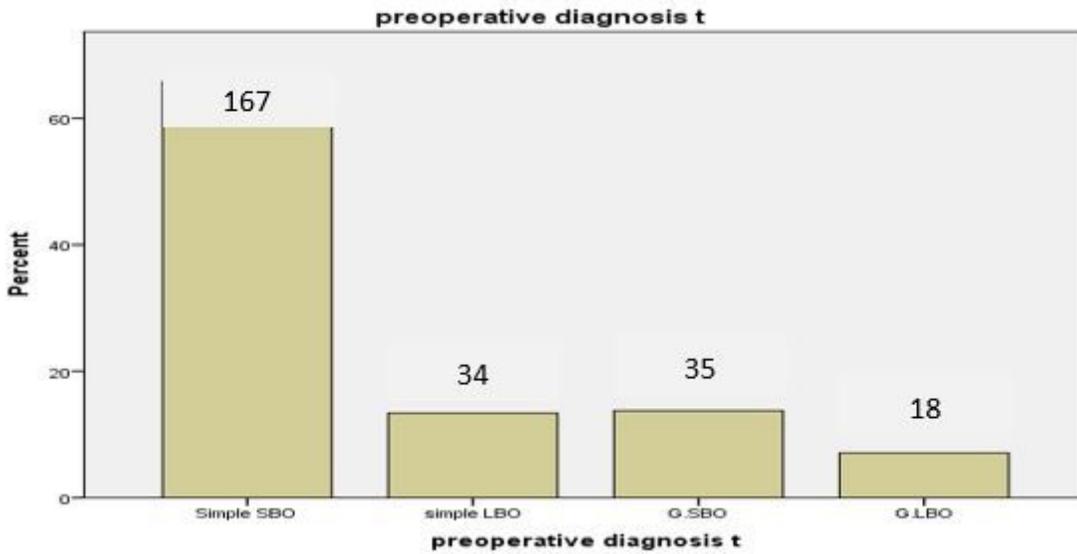
Figures

Figure 1

Clinical diagnosis of patients with IO who treated surgically at CGH (from 1 January 2014 to 31 December 2017), (N=254)
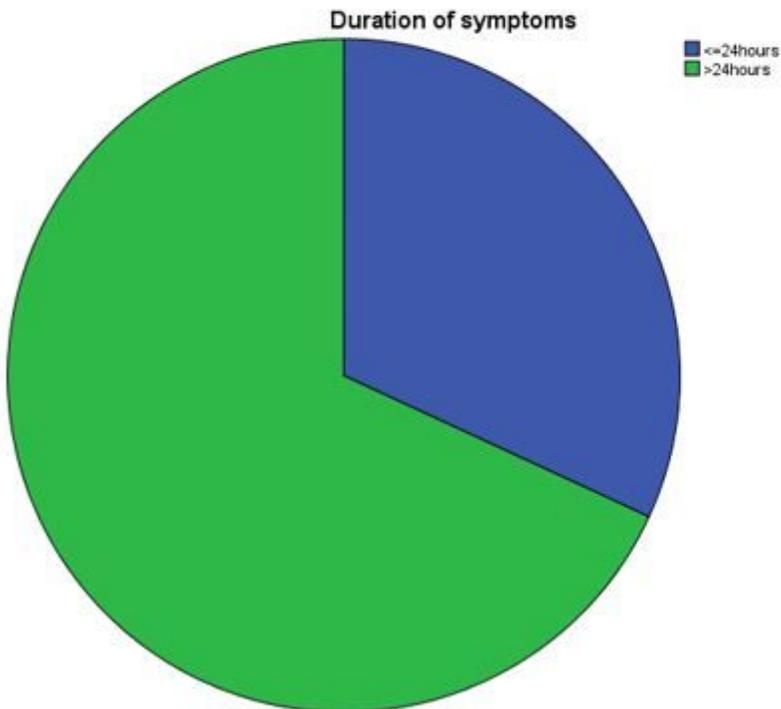

Figure 2

Duration of illness of patients with IO who treated surgically at CGH (from 1 January 2014 to 31 December 2017), (N=254)

complication encountered

Legend:
- superficial incisional SSI
- organ/space SSI (Anastomotic leak)
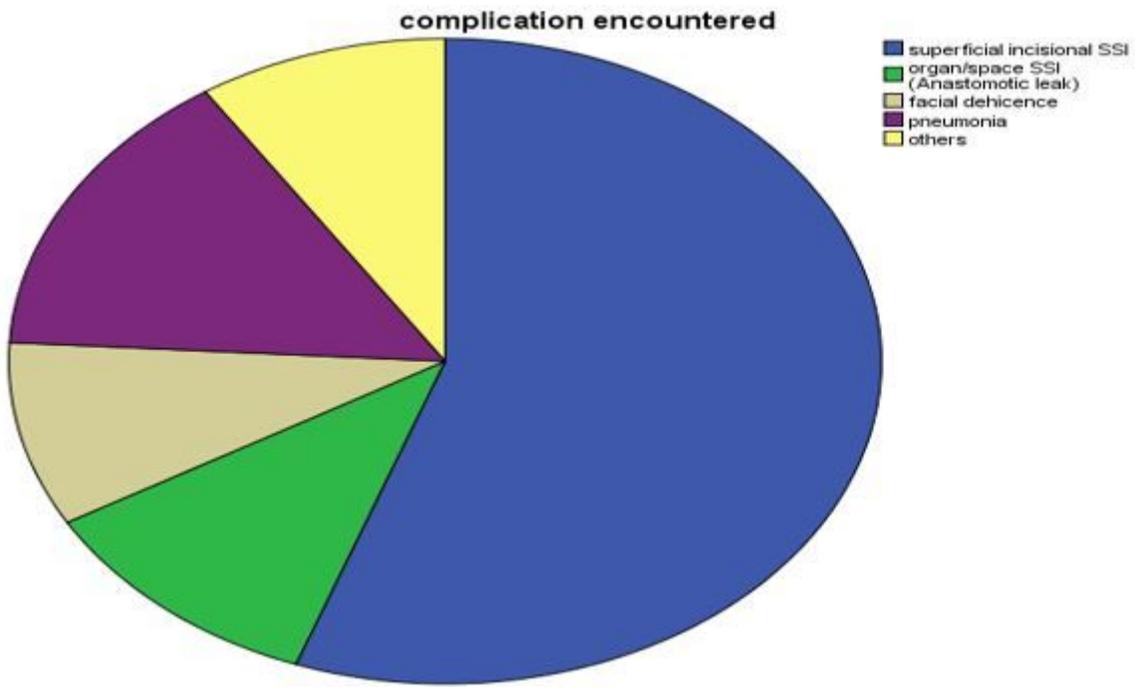- facial dehicence
- pneumonia
- others

Figure 3

Type of complication of patients surgically managed for IO at CGH (1 Jan.2014- 31 Dec.2017), (N=54).