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ORIGINAL ARTICLE

Abdominal unplanned reoperations in the Service of General Surgery, University Hospital of Puebla

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Abstract

Introduction: *The reoperation is considered as the access to the abdominal cavity before complete healing of the surgical wound from a previous operation within the first 60 days after the first procedure. It occurs in 0.5 to 15% of patients undergoing abdominal surgery and generates significant increase in morbidity and mortality in patients undergoing abdominal surgery.* **Objectives:** *Identify the number of unplanned abdominal surgical reoperations and identify the causes of these unplanned reoperations were performed in our department.* **Methodology:** *This is a retrospective study conducted at the University Hospital of Puebla in the period between April 2009 to February 2012, a total of 1,709 abdominal surgeries performed by the Service of General Surgery were included.* **Results:** *Ninety-seven cases of reoperation of which 50 cases were not planned surgery cases were identified; 72% (36 cases) from emergency operations, and 28% of elective surgery.* **Conclusions:** *The incidence found in our study is low compared to similar studies. Prospective studies and focus on risk factors and causes of unplanned reoperations are required, in order to know them in detail and, consequently, reduce its incidence and morbidity and mortality they add.* (Gac Med Mex. 2016;152:457-63)

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Introduction

Surgical reinterventions have an incidence that ranges from 0.5 to 15% of performed interventions[1]. These procedures increase each patient's morbidity and mortality and are associated with complications resulting from, among many other causes, progression of the pathology, transoperative findings, local tissue conditions, patient general health status and, finally, sometimes dependent on the surgical technique or strategy[2]. Reoperations alter homeostatic balance, thus generating new complications added to those inherent to the underlying pathology[3]. The risk of reoperation increases in patients with chronic administration of non-steroid anti-inflammatory drugs or antibiotics prior to the surgical abdominal pathology diagnosis[4].

For their study, and as a form of classification, reoperations can be divided in two types:

- Unplanned and urgent reoperations, when carried out within the first 24 hours of the first operation; medium-term, when performed during the hospitalization period, and late, when practiced after patient discharge.

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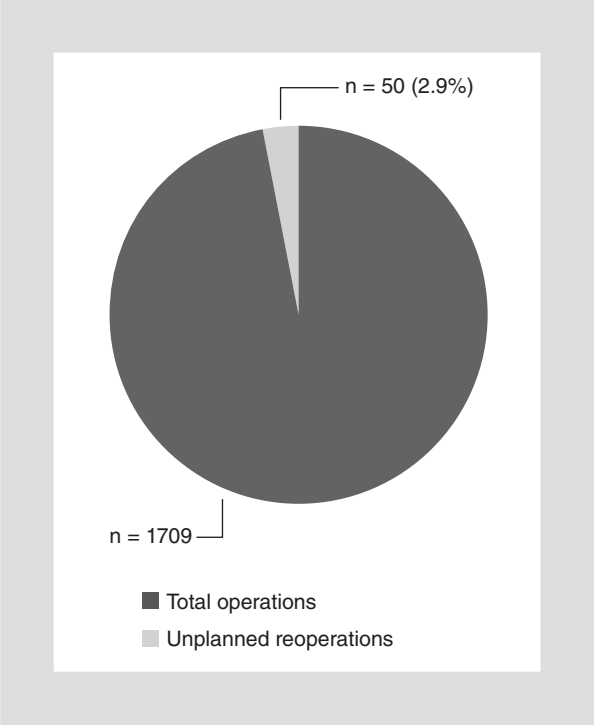

Figure 1. *Unplanned reoperations percentage with regard to total surgical interventions practiced at the General Surgery Department.*

– Programmed or planned reoperations, generally planned during an emergency surgery, although also practiced during elective surgery with less frequently, when partial or temporal procedures are carried out, or sequential operations are decided in order to reduce surgical trauma.

Some published studies use a cutoff point of 30 or 60 days after the first operation to classify interventions performed after the first surgery as reoperations[5-7]. Other way to classify reoperations, in addition to the time when they are performed, is the anatomical site where they are practiced, being classified as local when performed on the same anatomical site or same organ or adjacent organ, and as regional when practiced either through the same incision or a new one but on another anatomical site or organ[8].

Reoperations have been used as a surgical care quality index, and world literature has identified an incidence ranging from 1 to 20%, but this data is thought to be founded on databases that have not been specifically designed with the purpose to prospectively assess reinterventions[9].

The main causes of reoperation include different pathologies such as residual peritonitis (22.3%), suture dehiscence (18.5%), intra-abdominal bleeding (17.1%), localized intra-abdominal abscess (10.4%), evisceration (7.6%), intestinal occlusion (6.5%), colostomy disorders (6.6%), Douglas pouch fluid collection (5.9%), upper gastrointestinal tract bleeding (2.6%), postsurgical jaundice (1.3%), and prevesical hematoma (1.3%); with up to 20.6% mortality[10,11].

Objectives

The purposes of this study are: To identify the number of unplanned abdominal reoperations and find out the causes whereby these unplanned reoperations were carried out in our department.

To quantify the number of unplanned abdominal surgical reinterventions, to determine the causes of unplanned abdominal reoperations and to identify how many unplanned abdominal reoperation cases are derived from emergency or urgent surgery.

To identify how many unplanned abdominal reoperation cases are derived from elective surgery and to determine the differences between the causes of unplanned abdominal reoperation derived from emergency surgery in comparison with those of elective surgery.

Material and methods

All medical files from patients with elective or emergency abdominal surgery practiced at the Puebla University Hospital General Surgery Department on the period encompassed from April 2009 through February 2012 were analyzed. Patients experiencing one or more unplanned abdominal reoperations during their hospital stay or in the outpatient control by the General Surgery Department were included in this study.

Patients who had an initial surgery in some place other than our institution were excluded from this study. Data analysis was carried out with the Microsoft Excel 2007 program, with the results expressed as central tendency measures and dispersion measures; these measures are expressed by means of tables and graphs.

Results

A total of 1,709 abdominal surgeries practiced by the General Surgery Department were identified, out of which 97 cases corresponded to reoperations, with 50 of these cases corresponding to unplanned abdominal reoperations (Fig. 1).

Of the 50 found cases, 24 patients were male and 26 female (48 and 52%, respectively), with age ranging

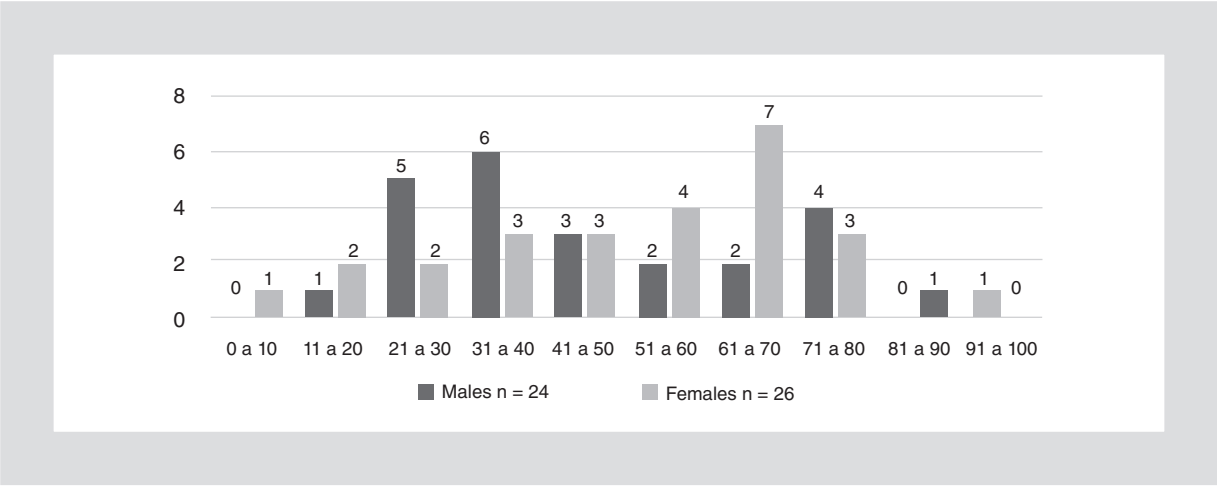

Figure 2. *Distribution of unplanned abdominal reoperation cases by age group.*

from 30 days to 94 years, and an average age of 49.8 years (Fig. 2).

With regard to unplanned reoperations, 72% (36 cases) were derived from emergency surgeries and the remaining 28% corresponded to elective procedures, as shown in figure 3.

As for the type of initial procedure, 16 exploratory laparotomies, 8 cases of Tenckoff catheter insertion, 8 cases of hernioplasty, 7 appendectomies, and 6 cases of cholecystectomy were identified. Other procedures that also required unplanned reoperation can be observed in table 1.

The causes that motivated unplanned reoperations can be seen in table 2. Among them, surgical wound dehiscence (8 cases), Tenckhoff catheter dysfunction (8 cases), postsurgical hemorrhage (4 cases; 2 of them classified as class IV hypovolemic shock) and surgical site infection (2 cases) stand out.

According to the classification of surgical complications proposed by Clavien-Dindo, only 2 patients died (grade V), 3 cases required intensive care due to failure of more than one organ (grade IVb), and 9 required intensive care owing to failure of at least one organ (grade IVa); 23 patients underwent abdominal reoperation under general anesthesia (grade IIIb), and the remaining 23 were reintervened with regional anesthesia (grade IIIa). Of the 2 patients who died, one was reintervened in 4 occasions, while the other only in two. In grade IVb, the highest number of reoperations was 2, in two patients. In the cases classified as IVa, there were 2 reinterventions in 4 patients. For grade IIIb there were 8 reoperations in one patient and, finally, for grade IIIa there were 3 reinterventions in two patients (Fig. 4).

The highest number of postoperative days of hospital-stay after unplanned reoperations was 50 days in one patient, in spite of having undergone only one reoperation and belonging to surgical complications group IVb; the cause for the unplanned reoperation was the development of abdominal compartment syndrome. The patient who underwent the highest number of reoperations (8 in total) had a hospital stay of 39 days postoperatively, and belonged to surgical complications group IIIb; the reason for his reoperations was surgical wound dehiscence. The cases of decease (grade V) are shown in table 3.

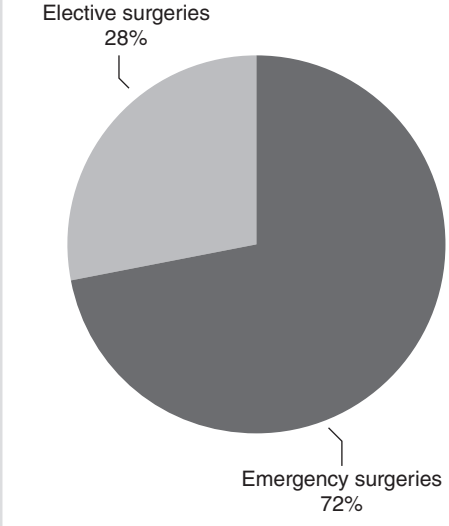

Figure 3. *Distribution of cases by type of initial surgery.*

Table 1. Distribution of cases according to initial surgery

Initial intervention	Emergency (%)	Elective (%)	Total (%)
Exploratory laparotomy	14 (28)	2 (4)	16 (32)
Tenckhoff catheter insertion	8 (16)	0 (0)	8 (16)
Appendectomy	6 (12)	0 (0)	6 (12)
Inguinal plasty	0 (0)	3 (6)	3 (6)
Open cholecystectomy	2 (4)	0 (0)	2 (4)
Open cholecystectomy with CBD exploration	1 (2)	1 (2)	2 (4)
Abdominal wall plasty	1 (2)	1 (2)	2 (4)
Umbilical plasty	2 (4)	0 (0)	2 (4)
Appendectomy plus right salpingo-oophorectomy	1 (2)	0 (0)	1 (2)
Cholecystectomy with laparoscopic CBD exploration	0 (0)	1 (2)	1 (2)
Laparoscopic cholecystectomy	0 (0)	1 (2)	1 (2)
Laparoscopic Roux-en-Y gastrojejunal bypass	0 (0)	1 (2)	1 (2)
Laparoscopic umbilical plasty	0 (0)	1 (2)	1 (2)
Intestinal reconnection plus abdominal plasty	0 (0)	1 (2)	1 (2)
Restitution of intestinal transit	0 (0)	1 (2)	1 (2)
Tenckhoff catheter removal	1 (2)	0 (0)	1 (2)
Tumorectomy plus cholecystectomy	0 (0)	1 (2)	1 (2)

Discussion

In the present study, a rate of abdominal reoperations of 2.9% was found. Similar figures for unplanned reoperations have been reported by other authors, such as Birkmeyer et al.[12], who report, in a prospective study, an incidence of unplanned reoperations of 3.5% (107 of their 3,044 cases). However, there are differences between their study and ours; for example, although all interventions were carried out at the General Surgery Department, these were not restricted to abdominal reoperations and, therefore, we don't know the exact incidence and cannot fully compare it.

Another report with similar results is one by Betancourt et al.[13], where the incidence for abdominal surgery reinterventions was 2.1%, in a group of 3,148 patients where 67 were reintervened. In this work, reoperations were classified as open abdomen management (28.4%), programmed (11.9%) and not programmed or on-demand reoperation (59.7%). The difference with this study is that only surgeries and reoperations carried out inside the abdominal cavity were included, without including abdominal wall procedures, such as hernia repair, which were included in our case series.

An interesting point is the fact that open abdomen management is classified as a different category to scheduled reoperations, when leaving the abdomen open will eventually require one reoperation, or perhaps more, at least for abdominal closure. In our series, patients with open abdomen were excluded based on the above discussed arguments.

Martín et al.[14] assessed the risk factors for reoperation in gastrointestinal surgery, and found an incidence of 2.7%, similar to ours, but they do not adequately specify if the interventions were planned or not. This exemplifies the fact that works on surgical reinterventions have had many variants with regard to the form they can be studied. To date, we don't have a standard analytical model and, for this reason, the inferences obtained from current works might not be consistent. One work on reoperation characterization in general surgery[3] reported an incidence of 1.5% (172 reintervened cases out of a total of 11,403 patients), but planned or scheduled reoperations since the initial surgery were also not excluded.

Table 2. Distribution of cases by type of complication

Cause of reoperation	Cases
Surgical wound dehiscence	8 (16%)
Catheter dysfunction	8 (16%)
Postsurgical hemorrhage	4 (8%)
Incisional hernia	4 (8%)
Surgical site infection	2 (4%)
Prosthetic material rejection	2 (4%)
Hernia relapse	2 (4%)
Acute abdomen	1 (2%)
Pancreatic abscess	1 (2%)
Residual abscess	1 (2%)
Subphrenic abscess	1 (2%)
Necrotizing fasciitis due to abdominal sepsis	1 (2%)
Internal hernia	1 (2%)
Ovarian Ca debulking	1 (2%)
Spleen inadvertent, not incidental, lesion	1 (2%)
Colostomy necrosis	1 (2%)
Intestinal necrosis	1 (2%)
Intestinal occlusion	1 (2%)
Cholangitis	1 (2%)
Intestinal perforation	1 (2%)
Inadvertent intestinal perforation	1 (2%)
Biliary reflux	1 (2%)
Granuloma resection	1 (2%)
Textiloma removal	1 (2%)
Abdominal compartment syndrome	1 (2%)
Abdominal sepsis	1 (2%)
Mesenteric thrombosis	1 (2%)

In our work, unplanned reoperations were more common after emergency surgeries than after elective procedures; similar results can be observed in the study by Unalp et al.[7], where 70.3% of their patients (57 cases) were urgently intervened for their first surgery. In other report[5], a similar trend was found: 59.7% were initially urgently intervened and 40.3% electively. The causes that drive to an unplanned reoperation can be quite varied, and in an attempt to classify them, they have been grouped into 5 categories, as in Unalp et al.[7] and Birkmeyer et al.[12] works. These are: 1) hemorrhagic; 2) infectious, which can be diffused or localized; 3) by mechanical occlusion or ileus; 4) wound-derived, either by infection or wound dehiscence, and 5) miscellaneous. In their study, Unalp et al. report 18.51% hemorrhagic, 9.87% infectious and 9.87% intestinal perforation causes, whereas in Birkmeyer et al. study, 23% was attributed to wound-derived causes (including infections and dehiscence), 18% to infectious causes and, finally, 14% to hemorrhagic causes.

In our series, we decided not to group causes into these categories, owing to ambiguity that can occur when classifying them. In this regard, many patients can, within their evolution, have more than one cause, simultaneous or not, that requires unplanned reoperation, which renders them belonging to more than one category and their classification being difficult. However, it should be mentioned that in our study there were no infectious complications in the group of cases that were electively intervened on initial surgery, but it was also in this group where the most important reoperations took place, owing to postsurgical hemorrhage (two hypovolemic shock cases).

Guevara et al.[5] –to continue discussing the causes– list at first place surgical wound dehiscence (14.7%), followed by upper gastrointestinal tract leak-control (12.6%), hemoperitoneum (11.6%) and peritonitis (10.5%), but they also fail to mention if there was more than one complication causing the reoperations.

Betancourt et al.[13] list the causes found in their series as follows: intra-abdominal fluid collection (35.8%), generalized peritonitis (19.4%), hemoperitoneum (8%) and evisceration (7.5%). As shown in the results, one textiloma removal case was found, which, initially, underwent a programmed reoperation and, subsequently, an additional, non-programmed reintervention to remove the textiloma. The report on textiles and surgical instruments final count was found to be complete in both surgeries prior to the textiloma removal reoperation. In this regard, there are several reports about cases where objects are left in the abdominal cavity, and this is more common in cases where the material final count is reported as correct.

We did not find reports including in their study peritoneal dialysis catheters (Tenckhoff) insertion and/or removal and the reoperations they cause. In our hospital, the General Surgery Department is in charge of Tenckhoff catheters insertion, in the operating room and under regional anesthesia. For this reason, we decided to include this procedure in our work.

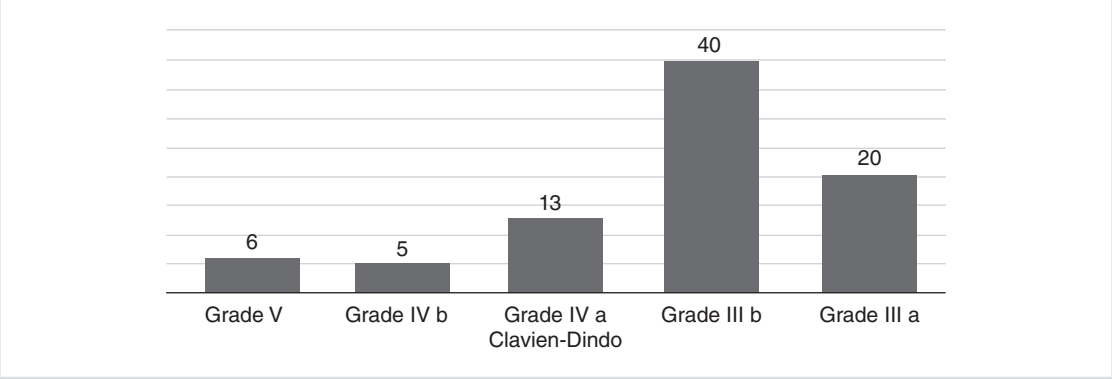

Figure 4. *Number of reoperations according to the complication degree based on the Clavien-Dindo classification.*

Table 3. Description of cases of decease

Clavien-Dindo grade of complication	Number of reoperations	Days of stay	Initial intervention	Type of surgery	Postoperative diagnosis	Mortality % (n = 2)
V	2	4	Exploratory laparotomy	Emergency	Mesenteric thrombosis	4%
V	4	45	Exploratory laparotomy	Emergency	Ischemia and intestinal necrosis	4%

In the case of textile materials or surgical instruments retention in the abdominal cavity after surgery, it is important knowing that it is not classified as a complication, but as an error, but in most cases it is a cause for unplanned reoperation for removal. Only in some cases where removal of a foreign body represents major risk against its permanence, it is decided not to remove it at the moment it is identified.

In Matos et al.[3] series, acute appendicitis is reported as the main diagnosis for initial surgery, with 1.6% of reoperations, followed by vesicular lithiasis with 1.2% of reoperations. Unfortunately, their percentages are calculated with regard to total patients admitted with each diagnosis, and not to total unplanned reoperations, in addition to extending beyond abdominal reoperations; therefore, their findings cannot be compared with our results.

As for the classification proposed by Clavien-Dindo[15] for surgical complications in our series, the vast majority of cases were grade IIIb, which only means that they were reintervened under general anesthesia. One of the limitations of this classification lies in the fact that it depends on the need for intensive care and/or postsurgical findings to be able to be applied to reoperations. It doesn't tell us about the risk for new reoperations. Still, our results are similar in the sense that the longer time of stay of cases with complications is shown by those who belong to grade IVb, as shown by Dindo et al.[8] in the results of the article where they propose this classification. In our results, the longest postoperative stay was 50 days, and was in a case classified as grade IVb complication.

With regard to mortality, in our results it was 4%, and this is quite lower than currently published figures. On this regard, in the study by Rodríguez et al. on mortality and reinterventions in general surgery[16], a mortality rate of 24.5% can be observed, which is equivalent to 24 of their 172 reoperation cases. In the same study, the authors explain the difficulty of comparison with other published studies, and that this is because many of them are limited with regard to body regions or specific system organ classes. However, intra-abdominal abscess, evisceration and postsurgical bleeding can be observed among the causes found for reoperation.

Mortality increases when there are infectious causes for abdominal reoperation, and it has also been found to directly increase in proportion to the number of reoperations, with its occurrence ranging from 17.4% to

up to 52.4%. Interestingly, in our series, none of both cases of death was associated with abdominal cavity septic process, with reoperation causes being mesenteric circulation both ischemic and necrotic processes. This was observed in spite of the fact that, in one of both cases, the diagnostic suspicion at initial surgery was acute appendicitis.

Conclusions

The incidence found in our study is low in comparison with similar studies.

In elective surgeries, we did not find septic complications-derived reoperations. Probably this is due to the preparation usually made in these patients.

Prospective studies are required with a focus on risk factors and causes for unplanned reoperations, in order to know them in detail and, consequently, decrease their incidence and the morbidity and mortality these procedures add.

Conflict of interests

The authors declare there are no conflicts of interests relevant to this publication.

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