



Cross-sectional Study



The dilemma of incidental findings in abdominal surgery: A cross-sectional study

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ABSTRACT

Introduction: Despite the recent development in diagnostic techniques, many surgeons experience unexpected findings during the course of surgery. We aim to examine the incidence of all IFs in abdominal surgery -laparoscopy or laparotomy- and identify possible associations.

Methods: This study is a cross-sectional study conducted in Aleppo University Hospital - Department of Surgery. We collected patients' data who underwent abdominal surgery during the period of the two-consecutive years 2018–2019.

Results: The data revealed detection of incidental findings during abdominal surgery -which included proper inspection of peritoneal cavity-in 6 out 543 cases (1.1%), whereas only one case included a misdiagnosis event (0.2%).

Conclusion: Epidemiological information about IFs in abdominal surgery can be extremely useful for the surgeons on various aspects, and can assist them with being more prepared for the surgery and the possible unexpected lesions that might be encountered. We strongly recommend that further studies with larger numbers of participants are conducted as they can provide more generalizable data.

1. Introduction

Despite the recent advancement in imaging techniques, many surgeons encounter till this day unexpected findings during the course of surgery [1,2]. Many authors defined an Incidental Finding (IF) as an unexpected lesion or condition found in an operation that is unrelated to the original condition that the patient had consented to.

IF may pose a hard challenge on the surgeon on several aspects. Firstly, the operating technique and instruments might differ according to the emerging IF; secondly, the patient did not consent to the new procedure for the IF, so this may render the surgeon hesitant whether to proceed or not.

Many studies reported the incidence of specific incidental findings in specific procedures; for example, Viscido et al. reported the incidence of Gastrointestinal Stromal Tumors (GISTs) in sleeve gastrectomy patients

[3]; however, to our knowledge, there is no study that reports the incidence of total IFs in all abdominal surgeries and the possible associations with specific patient characteristics or specific surgical indications.

We aim to investigate the incidence of all IFs in abdominal surgery (whether laparoscopy or laparotomy) and identify possible associations.

2. Methods

This is a cross-sectional study conducted in Aleppo University Hospital - Department of Surgery. We collected patients' data; who underwent abdominal surgery during the period of the two consecutive years 2018–2019, in a retrospective manner. Written informed consent was obtained from the patient for the purpose of publication of this cross-sectional study. All study has been conducted in compliance with STROCSS criteria [4]. This study has been registered in [ClinicalTrials](https://clinicaltrials.gov).

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Abbreviations

IF	Incidental Finding
GISTs	Gastrointestinal Stromal Tumors
PCO	Polycystic Ovary Syndrome
MRCP	Magnetic resonance Cholangiopancreatography
CT	Computed Tomography

gov public registry with the unique identifying number of “NCT05227911” <https://www.clinicaltrials.gov/ct2/show/NCT05227911?term=NCT+05227911&draw=2&rank=1> [5].

We collected data about patients' characteristics such as gender and age and specific information was collected regarding the abdominal surgery performed. For each operation, we collected data about the presence of IFs, and if present, how the surgeon dealt with it. We also collected data regarding any misdiagnosis event and how the surgeon approached the new condition. The data were assembled in an Excel sheet and then reviewed multiple times to check for integrity and flaws.

Inclusion criteria were: 1) patients older than 13 y/o 2) patients undergoing laparoscopy or laparotomy that must include a proper inspection of the abdominal cavity. Exclusion criteria: 1) patients aged 13 y/o or less 2) patients with incomplete data 3) gynecological procedures even if it involves laparotomy or laparoscopy.

We conducted Shapiro-Wilk Test of normality when required, and Fisher's exact test to study the possible associations in categorical data. Statistical significance level of 5% (p-value 0.05) was adopted. All statistical and analytical processes were done using MS Excel 2016 and SPSS version 26. The study was approved by the Ethical Committee in Aleppo University Hospital.

3. Results

After the application of eligibility criteria, a total of 534 patients were enrolled in the study during the period of two consecutive years (2018–2019). The data showed an incidence of incidental findings detection during abdominal surgery -which included proper inspection of the peritoneal cavity-of 6 in 543 cases (1.1%), whereas only one case included a misdiagnosis event (0.2%). The median age of the participants was 42 with a range of 72 (13–85) years. The study enrolled 383 females (71.7%) and 151 males (28.3%). Most of the operations were laparoscopic (68.9%), while only 166 operations (31.1%) were laparotomy.

The most common indication for abdominal surgery in the study was Cholecystitis with 356 cases (66.7%) followed by Appendicitis with 53 cases (9.9%). The majority of cholecystectomy patients were females 81.2%. Further information about the most common indications is illustrated in Table 1, and Table 2.

In order to investigate the association between the type of the procedure and the detection of incidental findings, we applied Fisher's exact test. A statistically significant association was not found (p-value = 0.381) between the type of the procedure -whether performed by laparoscopy or by laparotomy- and the detection of an IF, probably due to the limited number of patients. We studied also the association between the gender of the patient and the probability of detecting IFs using the same test, which also showed no statistically significant association

Table 1
Showing the distribution of gender in cholecystectomy patients.

Genders in Cholecystitis	Frequency	Percent	Cumulative percent
Female	289	81.2	81.2
Male	67	18.8	100
Total	365	100.0	

Table 2

This table shows the most common indications of abdominal surgery.

Indications	Frequency	Percent
Cholecystitis	356	66.7
Appendicitis	53	9.9
Liver Hydatid cyst	24	4.5
Colorectal tumor	16	3.0
Perforated hollow viscus	12	2.2
Bowel obstruction	10	1.9
Others	63	11.8
Total	534	100.0

between them. (p-value: 0.678)

Two out of six IFs were Polycystic Ovary Syndrome (PCO) and were managed with Ovarian drilling. Two out of six IFs were Appendicitis detected during bowel perforation procedures (one in the sigmoid and the other in the pylorus) and were resected. An ileocecal tumor was found during a cholecystitis procedure and the mass was resected; and at last, nodular lesions on the liver were found during a cholecystectomy procedure indicated for a gall bladder polyp and a biopsy of the nodules was obtained. Regarding the misdiagnosis event, the indication of the procedure was appendicitis but upon laparotomy, an ectopic pregnancy was diagnosed and managed accordingly. Table 3.

Noteworthy, although we did not consider a finding that is an extension of the same lesion as an IF, we will only report those cases in tumors. six cases (1.1%) with suspected or confirmed tumor indication were found to be much more extensive than suggested by preoperative imaging modalities.

4. Discussion

Abdominal surgery involving the abdominal cavity is one of the most common types of surgeries worldwide. An Incidental Findings (IF) in surgery is defined as an unexpected lesion that is found during the course of a surgical procedure and is not related or considered an extension of the original lesion. If the finding can be suspected by a competent surgeon (e.g., a more extensive lesion or a possible differential diagnosis) then it will not be considered as an IF [1,2].

IF may render the surgeon in a rather difficult challenge. First of all, the patient did not give the surgeon consent to deal with the recently identified lesion. Second of all, the surgeon might not be fully prepared to deal with the new lesions; whether prepared with the surgical equipment required for the procedure or with specific technical information regarding the surgical technique.

Few papers have reviewed the topic of IFs; however, they dealt mostly with specific types of surgeries and specific types of IFs related to them, for example, Cazzo et al. reported a 1.1% incidence of mesenchymal tumors discovered as an incidental finding during gastric Roux-en-Y gastric bypass surgery [6]. Others, such as Hall et al., provided several possibilities of IFs and recommendations on how to deal with them [7].

To our knowledge, there is no study to date that provides epidemiological data about IF for the surgeon in abdominal surgery, helps with the anticipation of what type of IF could be encountered, and what risk factors are associated with increased incidence of IFs. Such studies might be very helpful for the surgical team as they can be more prepared for the most probable IF according to the type of surgery and other various patients' related characteristics.

Our study reports a 1.1% incidence (6 out 534) of IFs in all indicated abdominal surgeries in our institution, and a 0.2% incidence (1 out of 534) of misdiagnosis. The most common indication for surgery was cholecystectomy accounting for 66.7% of all cases and followed by appendicitis (9.9%). No statistically significant association was found between the detection of IF and the gender or the type of surgery (laparoscopy or laparotomy). In 1.1% (6 out of 543) of the cases involved a

Table 3

This table shows the characteristics of cases with incidental finding or misdiagnosis.

Gender	Age	Indication	Type of surgery	Incidental findings	IF description	Misdiagnosis	Describe Misdiagnosis
Female	18	Cholecystitis	Laparoscopy	Yes	PCO	–	–
Female	26	Liver Hydatid cyst	Laparoscopy	Yes	PCO	–	–
Female	42	Cholecystitis	laparotomy	Yes	Ileocecal tumor	–	–
Female	33	Perforated hollow viscus	laparotomy	Yes	Appendicitis and Meckel's diverticulum	–	–
Male	40	Perforated hollow viscus	laparotomy	Yes	Appendicitis	–	–
Male	28	Gallbladder polyp	Laparoscopy	Yes	Liver nodules	–	–
Female	25	Appendicitis	Laparotomy	–	–	Yes	Ectopic pregnancy

AbbreviationsPCO: Polycystic Ovary.

tumor that was found more extensive than suggested by preoperative imaging. This is important as this might change the management plan of the patient; e.g., a 64-year-old female underwent a Magnetic resonance Cholangiopancreatography (MRCP) and Computed Tomography (CT) that showed a respectable pancreatic head tumor. Upon laparotomy, the mass was found to be more infiltrated than shown by imaging modalities and complete resection was impossible.

Reviewing the medical literature, we found multiple possibilities when facing an incidental finding (IF):

1. The surgeon might face an unexpected finding, however, the surgeon knows that there is nothing that needs to be done in this regard, for example, Eze et al. reported the presence of pancake kidney in an abdominal aortic aneurysm operation'; however, they did not make any intervention regarding this kidney [8].
2. The surgeon might confront an IF and know immediately that there is definitely something need to be done regarding this IF, for example, Khurana et al. found a small nodule of renal cell carcinoma in the kidney of the donor during kidney transplant operation, so they resected the small nodule immediately [9]. Another example reported by Wilson et al. in an inguinal hernia operation, where they found a ruptured abdominal aortic aneurysm and they managed the condition immediately [10].
3. However, most times, it is not as obvious as mentioned above, and the surgeon does not know immediately which decision falls better in the patient's best interest. Frequently, long discussions might be needed in the operation room among surgeons, followed by a prolonged explanation to the patient's legal representative to obtain consent to operate the new emerging condition; such situations can be very stressful for the patient's representative and mainly for the surgeon in the operation room. In this specific case, studies similar to this one can be very helpful to reduce such situations and help the surgeon be more prepared regarding the best practice on how to deal with most common encountered IFs; and even may prepare the patient previously by obtaining a clause in the consent regarding the management of IFs; this approach was strongly supported in the cross-sectional study conducted by McKenzie et al. [11].

Epidemiological information regarding IFs similar to the provided by this manuscript might be of great benefit for surgeons prior to surgery [6,7]. For example, several studies reported the incidence of mesenchymal tumors during bariatric surgeries, so when the surgeon has such knowledge in advance, this can facilitate the process of decision-making in surgery. The surgeon can obtain consent to proceed in operating the possible IF (in this example a mesenchymal tumor) from the patient prior to surgery, and can be better prepared to deal with this tumor scientifically and technically.

Regarding the patient's consent, this topic has been a long-standing debatable topic in the medical literature with no definite guideline. Many recommendations or instructions vary according to the laws of the country, the surgeon who is operating, the patient's perspectives, and the incidental condition itself. Although it is controversial in many cases to proceed to operate the IF without the consent of the patient, it is widely accepted by most of the authors and systems that the surgeon can

always proceed to operate any IF that may threaten the life of the patient if not treated immediately. Many authors such as Anderson et al., and Sarkar et al., proposed a traffic light tool to help the surgeons in the process of decision making in such situations [1,12]; however, these tools have not been yet tested in real practice.

The data in Table 3 show the types of IFs detected in our study. We encourage each surgeon to be prepared technically to deal with PCO if the operation is on a young female patient. The surgeon should always inspect the right iliac fossa properly to look for signs of an inflamed appendix. Good inspection of all cavities and mainly the areas of common tumors is mandatory; as a tumor, which has been overlooked by preoperational diagnostic modalities, might be detected. We also believe it is important to think beyond the findings of imaging modalities, as they can sometimes be insufficient or misleading especially in tumor staging. Finally, we recommend obtaining informed consent for these probable findings preoperatively, if a proper explanation for the patient can be delivered.

One limitation of the study was the relatively small number of participants which did not permit a proper identification of possible associations between IFs and specific patients' characteristics or specific surgical variables. Another limitation is the incomplete data for some patients, e.g., sometimes when multiple war-related injuries that overcome the capacity of the hospital were admitted, some patients' data were incomplete so we excluded these cases.

In conclusion, epidemiological information about IFs in abdominal surgery might be very helpful for the surgeon on various aspects and can help to be much more prepared for the surgery and the possible unexpected lesions that might appear. We strongly recommend that further studies with larger numbers of participants are conducted as they can provide more generalizable data and identify other possible associations or risk factors for IFs.

Ethical approval

Written informed consent was obtained from the patient for publication of this cross-sectional study and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

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Author contribution

Conception or design of the work: BS, ARR, KA.

Data collection: BS, ARR, JS, JK.

Performed the analysis: ARR, BS.

Drafting the article: JK, BS, JS, ARR.

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Trail Register.Number

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2. Unique Identifying number or registration ID: NCT 05227911.
3. Hyperlink to your specific registration (must be publicly accessible and will be checked): <https://clinicaltrials.gov/ct2/show/NCT05227911>

Guarantor

The Guarantor is: Baraa Shebli.

Consent

SA fully informed written and signed consent was obtained and documented in paper.

Provenance and peer review

Not commissioned, externally peer-reviewed.

Declaration of competing interest

There is not any kind of conflict of interest to disclose.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.amsu.2022.104470>.

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