Pathology is common in subsequent visits after admission for non-specific abdominal pain

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ABSTRACT

INTRODUCTION: Although not supported by evidence, there may be a risk of overlooking pathological findings at patients' return visit after emergency admission for non-specific abdominal pain (NSAP). The primary aim of this study was to evaluate the risk of missed acute pathology in patients primarily discharged with NSAP and re-admitted within three months.

METHODS: This was a retrospective review of hospital records within a three-month period (1 September-30 November, 2014) in a university hospital with unrestricted referral of abdominal emergency patients. Patients fulfilling the criteria for NSAP were included in the study.

RESULTS: Among the 1,474 patients admitted with acute abdominal pain, 390 (26%) were discharged with NSAP; 16% of the patients who were discharged with NSAP were re-admitted for abdominal pain. At their return visit, 39% received a verified specific diagnosis, corresponding to 6% of all patients with the NSAP diagnosis. A total of 40% of the early re-admissions of patients with NSAP were related to the biliary tract (cholelithiatis, cholangitis and cholecystitis). Co-morbidity, nausea, vomiting and increased white blood cell count at the primary admission were significantly associated with a risk of missing a specific diagnosis ($p < 0.05$).

CONCLUSIONS: This study found that only 6% of the patients who were admitted for acute abdominal pain and were discharged with no diagnosis had a somatic condition. However, risk of pathological findings at the return visit was relatively high among patients discharged with NSAP.

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Abdominal pain is one of the most common symptoms leading to acute hospital admission [1]. Approximately one third of patients admitted with abdominal pain are not diagnosed with any specific pathological condition but are discharged with a diagnosis of non-specific abdominal pain (NSAP) [2].

NSAP can be defined as acute abdominal pain of less than one-week's duration for which there is no specific pathological explanation despite basic investigations [3]. As NSAP is an exclusion diagnosis primarily based on clinical judgement, supplemented by simple biochemical tests, the diagnostic process may result in diagnostic inaccuracy. In a crowded emergency department, there may be a risk of misdiagnosis or lack of pathophysiological findings in line with the NSAP diagnosis, but evidence for this is currently scarce [4, 5].

The primary aim of this study was to evaluate the short-term (< 3 months) risk and characteristics of missed pathology in patients primarily discharged with NSAP from a surgical emergency department.

METHODS

This was a retrospective single-centre study in a university hospital with unrestricted referral of abdominal emergency patients. The hospital's uptake area has a population of 515,000 and provides a full 24-hour emergency service including surgery, radiology, gynaecology, anaesthesiology and internal medicine. Patients admitted to the Surgical Emergency Department (Hvidovre Hospital, University of Copenhagen) were primarily evaluated by surgical trainees (interns and junior residents). Blood samples for analysis of electrolytes, white blood cells, C-reactive protein and liver function tests were standard care. Imaging modalities or diagnostic laparoscopy were performed at the discretion of the attending surgeon.

The study period was three months, from September 1 to November 30, 2014. Patients were followed for three months after discharge, and patient data were retrieved from the local and national electronic patient record databases and cross-linked with the National Patient Register for identification of any subsequent hospital contacts. Return visits at any hospital in Denmark were included for analysis.

NSAP was defined as acute abdominal pain with a duration of less than one week for which there was no specific pathological explanation despite basic investigations (clinical evaluation, biochemical tests, CT and ultrasound or laparoscopy, performed at the discretion of the surgical team) [3]. The following exclusion criteria were decided upon before commencing the study: Patients with pathological findings according to clinical assessment, routine blood samples, radiological examinations and/or diagnostic laparoscopy during the primary admittance to hospital. Moreover, abdominal pain should diminish to low levels before discharge as assessed by clinical assessment. In patients with a

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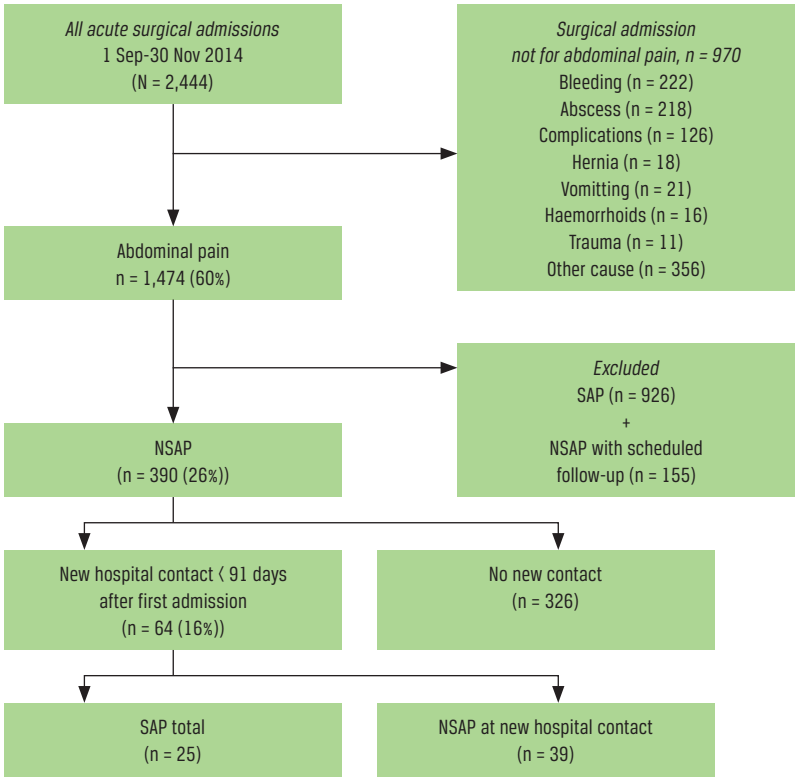
FIGURE 1

Patient inclusion flow chart.



NSAP = non-specific abdominal pain; SAP = specific abdominal pain.

known history of chronic abdominal pain, the acute pain should be of a novel character or location, as noted in the patient file after clinical examination. We also excluded patients younger than 16 years, patients with an abdominal trauma, invasive abdominal procedure (in the month leading up to admission), a history of haematemesis, melena or rectal bleeding, pregnancy diagnosed at primary admission, incomplete medical records from admission and a malignant diagnosis. Finally, patients with a scheduled ambulatory follow-up after discharge were excluded. In addition, before commencing the study, a return visit was defined as a hospital contact for abdominal pain (acute readmission or outpatient hospital contact) within three months from discharge. Only the first hospital contact after the primary admission was reviewed.

The following variables were registered from the hospital files: gender, age, number of hospital admissions one year prior to admission, previous abdominal surgery, location of pain (upper-right quadrant, lower-right quadrant, epigastric, lower-left quadrant, other or unspecified location), accompanying symptoms (nausea, vomiting), results from initial routine blood samples (white blood cell count, C-reactive protein (CRP), liver function tests), length of hospital stay (hours), temperature and diagnostic work-up (transabdominal ultrasonography, CT, diagnostic laparoscopy). The Charlson Comorbidity Index was used to define co-morbidity [6]. Days from the primary discharge until the return visit and pathological finding/diagnosis were recorded.

Statistics

The study was explorative, and a pre-study sample size calculation was not possible. Results are presented as numbers and percentages (95% confidence intervals (CI)) or medians (with interquartile ranges (IQR)) and means, as relevant. The association between the registered variables and a missed specific diagnosis on re-admission was evaluated by univariate logistic regression (the low number of readmissions in relation to number of variables precluded formal multivariate analysis). A p-value below 0.05 was considered statistically significant.

Trial registration: not relevant.

RESULTS

In total, 2,444 patients were admitted to the surgical emergency department in the three-month study period. Of these, 1,474 patients were admitted for the evaluation of acute abdominal pain (**Figure 1**). A total of 390 (26% (95% CI: 24-29%)) patients with abdominal pain were discharged without a specific diagnosis and were defined as patients suffering from NSAP. The median age of patients suffering from NSAP was 32 years (IQR: 23-53 years), and 69% were female. Sixteen patients (4% (95% CI: 2-7%)) underwent a diagnostic laparoscopy without any abnormal findings. In total, 75% (n = 293) were discharged without a radiological or laparoscopic procedure. The median length of stay was nine hours (IQR: 5-17 hours).

A total of 64 (16% (95% CI: 13-21%)) patients discharged with NSAP were re-admitted for abdominal pain within the follow-up period (Figure 1). In 25 (39% (95% CI: 27-52%)) of these patients, a relevant diagnosis explaining the episode of acute abdominal pain was obtained (**Table 1**). Known co-morbidity, pain located under upper-right quadrant, nausea and vomiting, and increased white blood cell count (WBC) at the primary admission were independent risk factors for missing a diagnosis at the primary admission ($p < 0.05$) (**Table 2**). In patients obtaining a specific diagnosis at re-admission, the time to the return visit was four days (95% CI: 2-14 days) compared with 13 days (95% CI: 4-33 days) for patients obtaining no specific diagnosis (**Figure 2**). There were no deaths, and no patients were diagnosed with a malignant disease at the primary admission or during follow up.

DISCUSSION

Overall, this study found that a quarter of patients admitted with acute abdominal pain and subjected to a standard diagnostic work-up were discharged with NSAP. Of these, 16% had a return visit due to recurrence of their abdominal symptoms. Of the patients returning, 39 had a specific disease or condition, corresponding to 6% of the patient population discharged with NSAP.

NSAP is probably the single most common acute surgical condition. The majority of patients in the present study who were discharged with NSAP and subsequently had a specific pathology returned within only a few days after discharge. Fortunately, only a few patients discharged with NSAP subsequently had a potentially life-threatening diagnosis, and there were no deaths or patients with a missed malignant diagnosis. This is in accordance with the literature showing that the most frequently missed diagnoses were gallbladder pathology and urinary infections, and that biliary tract disorders were accountable for 40% of the missed NSAP diagnoses [7].

There are only few studies on the long-time prognosis, quality of life and readmission after discharge with NSAP with a 1-5-year follow-up period [3, 8, 9] and one study investigating readmission with a short follow-up period [10]. In this study [8], the authors reported a readmission rate after admission due to acute abdominal pain of 9% within 30 days and in a total of 0.08% of the patients discharged with NSAP. This is

TABLE 1

The distribution of diagnoses at return visit within 90 days after discharge with non-specific abdominal pain.

Diagnosis at return visit	Patients, n (%)
Non-specific abdominal pain	39 (64)
Biliary pathology	
Cholelithiasis	7 (11)
Cholecystitis	1 (1,6)
Cholecystitis with sepsis	1 (1,6)
Cholangitis	1 (1,6)
Subtotal	10 (16)
Appendicitis	
Appendicitis without perforation	2 (3,1)
Appendicitis with perforation	2 (3,1)
Subtotal	4 (6,3)
Constipation	1 (1,6)
Pregnancy	1 (1,6)
Partial bowel obstruction	3 (4,7)
Terminal ileitis	2 (3,1)
Diverticulitis	1 (1,6)
Adnexal torsion	1 (1,6)
Total	64 (100)

TABLE 2

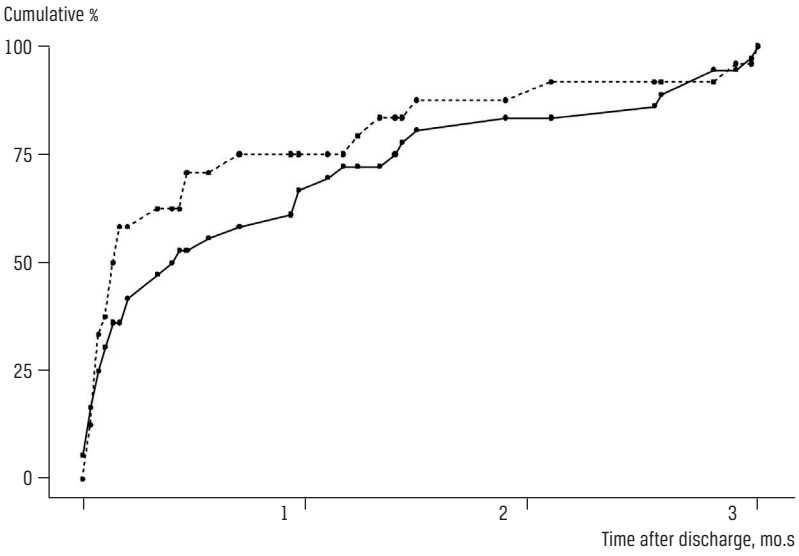
Independent variables (gender, co-morbidity etc.) in patients discharged with non-specific abdominal pain (NSAP) and specific abdominal pain (SAP).

	Discharged with NSAP at 1st admission, n (n = 390)	SAP at re-admission, n (%) (n = 25)	p-value[a]
Gender			
Female	271	18 (7)	Ref.
Male	119	7 (6)	0,778
Co-morbidity			
Yes	67	11 (16)	Ref.
No	297	13 (4)	0.0008
Unknown	26	1 (4)	0.1374
Admissions last year, n			
0	215	11 (5)	Ref.
1-3	136	10 (7)	0.392
≥ 4	36	4 (11)	0.171
Unknown	3	0	0.988
History of abdominal surgery			
Yes	109	11 (10)	Ref.
No	263	14 (5)	0.0999
Unknown	18	0	0.9868
Location of pain			
Right fossa	84	6 (7)	Ref.
Left fossa	20	1 (5)	0.7324
Epigastria	53	3 (6)	0.7336
Right costal margin	13	4 (31)	0.0171
Other	220	11 (5)	0.4694
Accompanying symptoms			
Nausea:			
Yes	168	16 (10)	0.0477
No	122	4 (3)	Ref.
Unknown	100	5 (5)	0.5206
Vomiting:			
Yes	116	15 (13)	0.00414
No	238	10 (4)	Ref.
Unknown	36	0	0.98867
White blood cell count $> 11 \times 10^9$/l			
No	293	14 (5)	Ref.
Yes	90	11 (12)	0.0157
Examinations			
Blood tests, n:			
0	6	0	Ref.
1-2	345	21 (6)	0.989
≥ 3	39	4 (10)	0.989
CT or MRI:			
Yes	37	2 (5)	0.793
No	353	23 (7)	Ref.
Laparoscopy:			
Yes	16	0	Ref.
No	374	25 (7)	0.988
Sonography:			
Yes	51	3 (6)	0.869
No	339	22 (6)	Ref.
Contacts with physician, n:			
1	82	2 (2)	Ref.
2-3	254	19 (8)	0.118
≥ 4	54	4 (7)	0.189

Ref. = reference.

FIGURE 2

Cumulative percentage of patients with a return visit by number of days after discharge. The patients are divided into two groups: those continuously diagnosed with non-specific abdominal pain (–) and those diagnosed with specific abdominal pain (- - -) at return visit.



considerably lower than the present findings and may be explained, in part, by differences in follow-up periods, classification of NSAP or diagnostic work-up. The diagnostic practice was not defined. In the present study, patients were identified using relatively well-defined pre-analysis criteria for NSAP, which may, in part, also explain the higher return rate. In a long-term follow-up study from 2010 including 146 patients discharged with NSAP, 30% were diagnosed during a five-year follow-up period [3] and these findings therefore cannot be compared with those of the present study.

A recent large prospective Swedish study by Laurell et al, [11, 12] investigated the diagnostic precision in patients admitted to surgical emergency departments due to abdominal pain. A total of 2,851 consecutive patients with abdominal pain were included. The preliminary diagnosis of admission and the final diagnosis at the one-year follow-up were registered. Comparing the Swedish study to our study is very difficult due to lack of information about diagnosis at discharge from the primary admission and lack of information about change of the NSAP diagnosis at follow-up.

A strategy to reduce the risk of missed diagnoses could be the use of scoring systems to identify high-risk patients [13]. Computer-aided clinical decision-making has been suggested to improve the diagnostic criteria of NSAP [14, 15], but it may be argued that the present analysis was not based on firm criteria for acute CT or ultrasound indication, all patients were screened with blood samples of CRP, WBC and liver enzyme. In patients with suspicion of appendicitis, the result of CRP and WBC have not been shown to improve the clinical decision-making in acute appendicitis [16] and CRP and WBC probably do discriminate NSAP from pathological conditions [17]. In the present study, there were several independent patient factors with the potential to predict re-admittance with specific abdominal pain. However, and in accordance with the literature, the low number of patients included in the present study and its retrospective single-centre nature preclude the use of a multivariable prediction model. Thus, large-scaled randomised studies and validated clinical database studies with well-defined variables are needed to establish reliable predictors for a successful outcome.

The low number of NSAP – only 6% of patients having a missed specific diagnosis – supports a work-up strategy using clinical judgement in selecting patients for further work-up, including the use of diagnostic imaging at primary admission. A selection of high-risk candidates for diagnostic imaging (instead of a routine CT for patients admitted with acute abdomen) will probably reduce the risk of overtreatment as imaging carries a risk of false positive results [18] and a risk of overdiagnosis due to transient acute conditions with no important pathology [19].

A review and guideline from 2014 [20] found that transabdominal ultrasonography offered a correct final diagnosis in 70% of patients with urgent abdominal pain, and negative or inconclusive ultrasonography should be followed by an emergency CT [18, 20]. The method to assure the completeness of patients admitted with emergency abdominal pain may be one reason explaining differences compared with previous studies, as mentioned above.

There are several limitations of the present study including that it was a retrospective single-centre study with a relatively low number of patients included for analysis. Also, the initial screening of patients was not based on a well-defined diagnostic algorithm. Finally, the condition causing the pain at the return visit could, in principle, be unrelated to the abdominal pain presented at the initial admission. However, the fact that there was only a median of four days from discharge to return seems to indicate a likely association.

Future studies should focus on establishing evidence-based clinical decision-making based protocolised diagnostic surgical pathways in patients with suspicion of NSAP.

CONCLUSIONS

Patients returning to hospital after discharge with an NSAP diagnosis have a relatively high risk of being diagnosed with a somatic condition. The present findings generate hypotheses, and future studies using a

firm evidence-based diagnostic surgical algorithm are warranted.

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