Is NSAP A Myth In Today's World? Laparoscopy As A Diagnostic Tool In The Diagnosis Of (Nsap) Nonspecific Abdominal Pain: A Peripheral County Hospital Experience

S Biswas, K McDonald, N Gleeson, L Falke

INTRODUCTION

Acute abdominal pain is a very common presenting symptom in casualty departments but an international prospective multicenter trial has shown that 43% of such patients admitted to the hospital are discharged without a diagnosis. A study from Oxford reported that undiagnosed abdominal pain to be the sixth common cause of hospital admissions in females.

Diagnostic laparoscopy plays a significant role in the evaluation of acute and chronic abdominal pain in the era of therapeutic laparoscopic surgery. Incorporation of a laparoscopy may improve the management of emergency admissions and may also have cost benefits by rendering hospital stay and readmission rates.

The mean hospital stay for patients admitted with NSAP ranges from 4.1 and 6 days using the traditional wait and watch management. This includes repeated clinical examination radiological investigations and a gynecological opinion. A delay in surgical intervention while further investigations are performed may increase morbidity and prolong hospital stay. The end result may be an unsatisfactory discharge from hospital after a stay of 4 to 6 days with a diagnosis of NSAP by exclusion.

If a definite diagnosis of NSAP could be made earlier and patients discharged this could reduce the cost. A normal laparoscopy may allow the surgeon to discharge patients who are still symptomatic confident that there is no requirement for laparotomy. This may also reduce rates for readmission for the same problem. Laparoscopy within the first 24 hours of admission may therefore improve the outcome of patients admitted with acute NSAP.

The purpose of this retrospective study is to review the collected data from our large series of patients who were admitted with abdominal pain and after baseline investigations and clinical examination failed to underline the cause undergone laparoscopy. We carried out an analysis of duration of hospital stay, extent of investigations, previous admissions with similar complaints and laparoscopy if done, recurrence of symptoms and definitive diagnosis after laparoscopy and complications of the procedure if any.

METHODS & MATERIALS

362 consecutive patients admitted between January 1997 and December 31st 1999 with abdominal pain to the surgical ward, Tralee General Hospital, who underwent laparoscopy were studied. All patients were examined by the SHO (Senior House Officer) on call and later by the consultant surgeon and patients with a definitive clinical diagnosis of acute appendicitis were eliminated from the study. Appendectomies were performed by conventional Lanz incision / laparoscopically in these cases (depending on the surgeon's choice).

Age, sex, quadrant of tenderness, previous surgery if any, type of anesthesia, past history of admission with similar abdominal pain, past history of complications were recorded. The program was designed in EXCEL and each individual patient information was inserted in the master database.

The quadrant of tenderness was divided into:
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Figure 1

i. RIF vi. Periumbilical
ii. LIF vii. Suprapubic
iii. Lower Abdomen viii. Renal
iv. RUQ ix. Epigastric
v. LUQ x. Diffuse

Baseline investigations included a full blood count, measurement of urea, electrolytes and serum amylase, urine culture, a pregnancy test in women of reproductive age, and a chest or abdominal radiograph if indicated clinically.

Where laparoscopy and appendectomy were performed all specimens were subject to histopathological examination.

All patients in our study (laparoscopy findings) were categorized into 8 categories which were:

1. Essentially normal / NSAP
2. Acute inflammation of appendix w / wo perforation / gangrene
3. Adhesions
4. Mesenteric Lymphadenopathy
5. Small bowel/ cecal / colonic pathology excluding appendicitis
6. Gynecological
7. Metastatic deposits
8. Others (which cannot be fitted into the previous 7 categories)

Acute abdominal pain was defined as of less than 7 days for which the patient sought medical advice. Some of the patients had either peritoneal findings or an increased WBC count, indicating a peritoneal process. Rest of the patients had acute abdominal pain but an inflammatory process was not evident on physical examination or from laboratory data.

Chronic abdominal pain was defined as being present for greater than 1 week but not necessarily continuously. The majority of the chronic pain group had symptoms for many years and had undergone multiple non-invasive tests over that time. Some of the patients with chronic abdominal pain had previous surgery of the abdomen often multiple.

PROCEDURE

Laparoscopy was performed under GA by the consultant surgeon by open Hasson technique / closed technique depending on surgeon preference. Prophylactic antibiotics (metronidazole 500mg) was administered IV and the urinary bladder was catheterized.

For the 1st port placement in the umbilical area with one 5mm port in the midline suprapubic area and a 3rd port if necessary.

The laparoscopy was categorized under two headings

1. Within 24 hours of admission
2. Greater than 24 hours of admission

FOLLOW-UP

All patients with a definitive laparoscopic finding including the NSAP group were requested to attend the SOPD(Surgical outpatient) clinic within 6 / 52 days of discharge and subsequent follow-up by GP.

RESULTS

Between January 1, 1997 and December 31st, 1999, 1809 patients were admitted in the Tralee General Hospital with complaint of abdominal pain in the department of surgery either through Accident-Emergency or as GP referral to the wards. 222 patients, diagnosed as acute appendicitis based on clinical examination and baseline investigations could not provide a definite diagnosis. 7 patients were excluded because they were admitted in a different hospital during the study period. Deceased patients, elective laparoscopic hernia repair and planned laparoscopic colectomies, as well as interval appendectomies were not included in the study.
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Figure 2
Table 1: Patient Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Total abdominal pain</th>
<th>Clinical appendicitis</th>
<th>NSAP</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of patients: (1997-1999)</td>
<td>1939</td>
<td>222</td>
<td>369</td>
</tr>
<tr>
<td>Sex: Male</td>
<td>603</td>
<td>109</td>
<td>80</td>
</tr>
<tr>
<td>Female</td>
<td>1146</td>
<td>113</td>
<td>262</td>
</tr>
<tr>
<td>Median Age: Male</td>
<td>33 years</td>
<td>25 years</td>
<td>33 years</td>
</tr>
<tr>
<td>Female</td>
<td>34 years</td>
<td>21 years</td>
<td>27 years</td>
</tr>
<tr>
<td>Mean Hospital stay: Male</td>
<td>2.93 days</td>
<td>5 days</td>
<td>5.53 days</td>
</tr>
<tr>
<td>Female</td>
<td>2.90 days</td>
<td>4.38 days</td>
<td>4.04 days</td>
</tr>
</tbody>
</table>

P.J.Borrgstein, R.V. Gordijn et al (9) showed the mean length of hospital stay was 1.7 days when diagnostic laparoscopy was the only procedure. In comparison if appendectomy was performed the stay was similar whether appendix was inflamed or not, respectively, 3.6 and 3.4 days. Whether there was any significant improvement in morbidity and mortality rates, duration of hospital stay or re-admission rates needs to be studied further.

Figure 3
Table 2: Diagnostic Laparoscopy For Nsap

<table>
<thead>
<tr>
<th>YEAR</th>
<th>ABD-O-PAIN</th>
<th>LAPAROSCOPY</th>
<th>PERCENTAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>97</td>
<td>N.763</td>
<td>N.174</td>
<td>23.00%</td>
</tr>
<tr>
<td>98</td>
<td>N.579</td>
<td>N.118</td>
<td>21.00%</td>
</tr>
<tr>
<td>99</td>
<td>N.467</td>
<td>N.70</td>
<td>15.00%</td>
</tr>
<tr>
<td>1809</td>
<td></td>
<td>362</td>
<td></td>
</tr>
</tbody>
</table>

174 patients (approx 22%) underwent laparoscopy for nonspecific abdominal pain (NSAP) in 1997 compared to 118 patients (approx 21%) in 1998 and 70 patients (approx 15%) in 1999. As is evident from the table there was a drop in the total number of surgical admissions for abdominal pain from 1997 to 1999, the percentage of diagnostic laparoscopy decreased from 21% in 1997 to 15% in 1999.

Figure 4
Table 3: Diagnosis Overall

Diagnostic laparoscopy showed that 113 patients (31.21%) suffered from gynaecological pathology. The gynaecological pathology included ovarian cyst, pelvic inflammatory disease (PID), ovarian tumor, endometriosis, retrograde menstruation, fibroid uterus.

48 patients (13.25%) had adhesions as the cause of the abdominal pain while 28 (7.73%) patients had inflammation of the appendix.

But the highest group of patients 36.18% (n = 131) was that under the NSAP group or negative laparoscopy group where the laparoscopy failed to show a definitive cause of the abdominal pain.

De Dombal et al (10) have reported that 10% of patients aged over 50 years who presented with NSAP later developed gastrointestinal malignancy. 10 patients who were diagnosed with metastatic deposits on laparoscopy were above 50 years of age. Only 1 patient who presented with nonspecific lower abdominal pain had abdominal Burkitts lymphoma was 14 years old.

In patients with intra-abdominal malignancy, the benefit from laparoscopy often extends beyond establishing a diagnosis as the procedure provides invaluable information on staging and often identifies inoperability, thereby avoiding needless laparotomy (11,12,13,14). In this respect, laparoscopy is the only reliable method for the detection of peritoneal deposits (11,12,15).

Figure 5
Table 4: Radiological Investigations In Patients With Nsap

<table>
<thead>
<tr>
<th>INVESTIGATIONS</th>
<th>EARLY LAP. GROUP (&lt;24HRS)</th>
<th>LATE LAP. GROUP (&gt;24HRS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CX/PPFA</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>ABD &amp; PELV USG</td>
<td>56</td>
<td>47</td>
</tr>
<tr>
<td>N.P</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>OLED</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>EARL. ENEMA</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>OTHERS</td>
<td>9</td>
<td>15</td>
</tr>
</tbody>
</table>

**EARLY LAPAROSCOPY (<24HR GROUP)**

55 patients had abdominal and/or pelvic ultrasound prior to laparoscopy. 6 patients had CX/PPFA, 6 patients had intravenous pyelography, 6 patients had oesophago-gastro-duodeno-scopescopy, and 5 patients had Barium enema. In the “others” group 3 patients underwent colonoscopy, 1 patient had sigmoidoscopy, 3 patients had barium meal study, and 1 patient underwent cystoscopy.

**LATE LAPAROSCOPY (>24 HR GROUP)**

47 patients underwent abdominal and/or pelvic ultrasound, 7
patients had chest X-ray/plain film abdomen, 7 patients had IVP, 8 patients had OGD, 5 patients had barium enema. 15 patients were included in the “others” category - 4 patients had colonoscopy, 2 patients had sigmoidoscopy, 2 patients had barium meal study, 5 patients had cystoscopy, 1 patient had abd CT, while 1 patient had bone scan.

Figure 6
Table 5: Laparoscopy In NSAP (N = 362)

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>85</td>
<td>37%</td>
</tr>
<tr>
<td>1998</td>
<td>42</td>
<td>35%</td>
</tr>
<tr>
<td>1999</td>
<td>24</td>
<td>34%</td>
</tr>
</tbody>
</table>

As is evident from table-2 there has been a decrease in the number of surgical admission with c/o abdominal pain from 1997 to 1999. There has also been a decrease in the number of diagnostic laparoscopies from approx 23% in 1997 to 15% in 1999. But interestingly the percentage of NSAP (negative laparoscopy) has remained fairly constant over the 3 years study period.

Figure 7
Table 6: Diagnostic Laparoscopy For NSAP

<table>
<thead>
<tr>
<th>Year</th>
<th>&lt; 24 hr</th>
<th>&gt; 24 hr</th>
</tr>
</thead>
<tbody>
<tr>
<td>1997</td>
<td>102 (59%)</td>
<td>72</td>
</tr>
<tr>
<td>1998</td>
<td>87 (74%)</td>
<td>31</td>
</tr>
<tr>
<td>1999</td>
<td>52 (74%)</td>
<td>18</td>
</tr>
</tbody>
</table>

59% of patients underwent diagnostic laparoscopy within the first 24 hours of admission in 1997, which increased to 74% in both 1998 and 1999. The data obtained clearly support a policy of early laparoscopy in preference to multiple and expensive investigations before recourse to this examination – the decision based solely on the clinical judgment of the surgeons.

Figure 8
Table 7: Unexpected Appendicitis In NSAP

<table>
<thead>
<tr>
<th>Year</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>97</td>
<td>22</td>
<td>12.7%</td>
</tr>
<tr>
<td>98</td>
<td>4</td>
<td>3.4%</td>
</tr>
<tr>
<td>99</td>
<td>2</td>
<td>2.9%</td>
</tr>
</tbody>
</table>

In 1997 there were significant 22 cases (12.7%) in the number of unexpected appendicitis within the NSAP group, the incidence however dropped to 3.4% in 1998 and even further to 2.9% in 1999. These 28 patients (unexpected appendicitis) were not included in the 222 patients initially diagnosed with acute appendicitis. The surgeons making the decisions over the period of study (1997-1999) remained the same.

The policy was not to remove the appendix during laparoscopy if no other clear cause of pain was found and the appendix looked externally normal. This approach was in contrast to that adopted by previous authors who found external inspection of the appendix at laparoscopy to be an unreliable guide to the presence of appendicitis. (16, 17).

Figure 9
Table 8

The outcome of 2 groups is summarized:

**EARLY LAPAROSCOPY GROUP**
In 1997, 102 patients underwent diagnostic laparoscopy for nonspecific abdominal pain. A positive diagnosis was reached in 66 of them. In 1998, 54 patients had a positive laparoscopy out of 87, while in 1999 a positive diagnosis was reached in 32 out of the total 52 patients who underwent diagnostic laparoscopy. 3 patients had to be converted to laparotomy.

**LATE LAPAROSCOPY GROUP**
In 1997, 72 patients underwent diagnostic laparoscopy - a positive diagnosis was established in 43 while in 1998, 22 patients had a positive laparoscopy out of 31 and 14 out of 18 in 1999. 2 patients needed to be converted to laparotomy.

The conversion to laparotomy was based on laparoscopy findings along with clinical judgment and worsening patient
condition (+/- peritonitis)

**DISCUSSION**

NSAP is a significant problem in general surgery and accounts for an estimated 13-40% of all emergency surgical admissions (18).

A range of causes of NSAP have been proposed (19). Evidence of viral infection has shown in 18% of children with NSAP, but no studies have investigated the role of viruses in adults with NSAP. Yersinia infection has been implicated in Scandinavian studies but is an uncommon cause of NSAP in this part of the world (21). Enterobius vermicularis has frequently been blamed but worms of their ova are common in asymptomatic patients so their significance is dubious. A nerve entrapment syndrome affecting the abdominal wall musculature has been suggested but there is little evidence to support it. Irritable bowel syndrome has a chronic recurrent pattern unlike the isolated episode of pain that occurs in almost 80% of patients with NSAP. Given the excess of young females with NSAP (2), gynaecological causes have been suggested. The diagnosis of PID is difficult to make accurately so it may account for some cases of NSAP. Mittelschmerz is a cyclical pain unlike NSAP. Psychosomatic causes are favoured by many surgeons, however there is sparse evidence that emotional instability plays a role (22).

This retrospective study has shown that early laparoscopy results in a higher diagnostic rate and significantly improved patient well being 6 weeks after admission. All patients admitted in the surgical ward who underwent diagnostic laparoscopy were reviewed again in the surgical outpatient 6 weeks after discharge from the hospital.

**NSAP IN LITERATURE**

**Figure 10**

<table>
<thead>
<tr>
<th>AUTHOR</th>
<th>JOURNAL</th>
<th>PATIENTS (n)</th>
<th>POSITIVE LAPAROSCOPY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Borgstein et al (9)</td>
<td>Surg. Endoscopy'97</td>
<td>161</td>
<td>78%</td>
</tr>
<tr>
<td>Saito et al (25)</td>
<td>Surg. Endoscopy'98</td>
<td>388</td>
<td>82%</td>
</tr>
<tr>
<td>Lavonious et al (33)</td>
<td>Surg Laparoscopy'99</td>
<td>46</td>
<td>68%</td>
</tr>
<tr>
<td>Decadt et al (18)</td>
<td>British J Surgery'99</td>
<td>48</td>
<td>81%</td>
</tr>
<tr>
<td>Udvardi T.E. (84)</td>
<td>Surg Endoscopy2004</td>
<td>3200</td>
<td>84%</td>
</tr>
</tbody>
</table>

Laparoscopy within the first 24 hours produced an overall final diagnosis rate of approx 65% of cases in our study.

An early definitive diagnosis made by laparoscopy was often valuable: laparotomy was often avoided, patients were reassured and appropriate treatment was started. Emergency laparoscopy was particularly useful in young women of childbearing age who have a wider differential diagnosis for intraperitoneal inflammation (20,21,22). Without laparoscopy the overall rate of unnecessary appendectomy in women is reported to be approximately 39% compared with 15% in men.

Early laparoscopy also has the benefit that a number of therapeutic options are available (23). B. Decadt, L Sussman et al (24) found diagnostic laparoscopy became therapeutic in 59% cases randomized to early laparoscopy.

Ovarian cysts can be drained and an ovarian torsion treated with immediate relief of symptoms. Purulent fluid collection secondary to pelvic inflammatory disease (PID) or diverticulitis can be drained (25). Early recognition of PID enables early treatment which is important if complications such as infertility are to be minimized (26). Women with endometriosis may benefit from early diagnosis (27). An inflamed appendix can be removed safely and effectively laparoscopically (28). Laparoscopic adhesiolysis is possible (29).

Diagnostic laparoscopy has a role to play in both penetrating and blunt trauma. It has value in confirming or excluding the diagnosis of acalculus cholecystitis, particularly in the ICU setting - the objective being to avoid unnecessary surgery or to expedite and plan surgery if indicated (30). DL is also helpful in the diagnosis and management of ischemic bowel disease. After surgery, a plastic trocar is placed in the region of the anastomosis to permit a “second look” at the bedside after 2 or 3 days to ensure viability of the bowel.

Laparoscopy is one of the techniques available to the surgeon to look directly at abdominal mass / tumors and obtain tissue to discover a definitive diagnosis before appropriate therapy or treatment can be recommended.

Laparoscopy is also used to determine the cause of ascites especially when the cause of fluid accumulation cannot be found without looking into the abdominal cavity.

Laparoscopy is one of the safest and most accurate ways to obtain tissue for biopsy to sample the liver or mass without actually opening the abdomen. Diagnostic laparoscopy is also used as a second look procedure or cancer staging. Several studies have reported the usefulness and reliability of laparoscopy in the detection of advanced inoperable disease (31,32). A point not readily appreciated by the
surgeon is that with the help of the fore-oblique lens, alteration of the pneumoperitoneum volume and the patient's position, and use of the probe, more than 75% of the liver surface is visible at laparoscopy which is much more than that seen during open surgery. Furthermore, patients suffering from pancreatic cancer, surgery to relieve the obstructive jaundice and when present duodenal obstruction, can be conducted laparoscopically, thereby avoiding the complications associated with stent insertion. It is often used before planning a formal exploration of the abdomen, chemotherapy or radiation therapy.

RECENT ADVANCES

New technical advances such as contact ultrasound scanning with linear array high resolution laparoscopic probes have enhanced the diagnostic yield of laparoscopy. In addition, target needle biopsy and fine needle cytology carried out under laparoscopic guidance permit definitive diagnosis of suspect lesions.

CONCLUSION

Studies confirm that achievement of a high proportion of specific diagnoses in patients with acute NSAP is often difficult and, with ever improving technology, this target is constantly moving. Management of acute NSAP needs to be periodically adjusted to get the best outcomes at the lowest cost and with the most appropriate diagnostic and therapeutic tools.

Early laparoscopy is valuable as a diagnostic tool in the management of NSAP. It provides a significantly higher diagnostic accuracy and a better improvement in quality of life than the more traditional approach of active observation. Laparoscopy, however, must not be used as an alternative to good clinical judgment. The surgeons should keep the delicate balance between aggressive pursuit of the diagnosis and the avoidance of unnecessary surgery.

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