Laparoscopic appendectomy for appendicitis in uncommon situations: the advantages of a tailored approach

Palanivelu C, Rangarajan M, John S J, Senthilkumar R. Madhankumar M V

ABSTRACT

Introduction: Appendicitis in unusual locations or situations always poses a diagnostic dilemma and surgery is never straightforward. We aim to highlight the advantages of laparoscopy, including our own modifications, in some unusual presentations of appendicitis.

Methods: We treated a total of 7,210 patients with appendicitis over 14 years from 1992 to 2006. In this study, we included patients with subhepatic appendicitis (0.08 percent), appendectomy in midgut malrotation (0.09 percent), appendicitis in situs inversus totalis (0.01 percent) and appendicitis in the lateral pouch position (0.01 percent). All patients underwent laparoscopic appendectomy.

Results: Patients with subhepatic appendicitis, appendicitis in situs inversus and appendicitis in the lateral pouch position had an uneventful postoperative course. For the patients who underwent appendectomy as part of the treatment for malrotation and the patient with the perforated subhepatic appendix, hospital stay was slightly prolonged.

Conclusion: Most patients in our study did not have a confirmed preoperative diagnosis. Diagnostic laparoscopy through the umbilical port helped confirm the diagnosis. Port positions were then planned according to the exact position of the appendix and the technique was modified to suit each individual patient. In the surgical scenarios described here, laparoscopy is invaluable in both diagnosis and treatment.

Keywords: appendectomy, laparoscopic appendectomy, laparoscopic surgery, port sites

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INTRODUCTION

The appendix is a vestigial organ situated on the postero-medial aspect of the caecum, 2.5 cm below the ileocecal valve. It is the only organ in the body that has no constant position. The various positions are retrocecal (65.3%), pelvic (31%), subcecal (2.3%), preileal (1%) and postileal (0.4%). The rarer types include subhepatic, lateral pouch, mesocoeliac, left-sided (associated with situs viscerum inversus), intraherniary and lumbar appendicitis (appendix is posterior, lying against the peritoneum behind or below the caecum). There are only a few reports in the literature regarding surgery for these rare types of appendicitis.[1-3] In the open technique, we would require the extension of an incision after finding that the appendix is in an abnormal position. The aims of this study are to determine the incidence of each anatomical type, and the advantages and feasibility of our technique of laparoscopic appendectomy for appendicitis in some unusual situations.

METHODS

We treated a total of 7,210 patients with appendicitis in 14 years from 1992 to 2006. In this study, we included a total of 18 patients with subhepatic appendicitis (perforation in one patient), midgut malrotation, appendicitis in situs inversus totalis and appendicitis in a lateral pouch. All the patients with subhepatic appendicitis presented with fever, nausea, pain and tenderness in the right hypochondrium, mimicking acute cholecystitis. Ultrasonography (US) confirmed the diagnosis in only one case. The patient with the perforated subhepatic appendix was misdiagnosed as a liver abscess. Diagnosis of liver abscess was also made on US and computed tomography. US confirmed the appendicitis in the lateral pouch, though the pouch itself could not actually be visualised.

Diagnostic laparoscopy through an umbilical trocar (10 mm) was performed for all the patients. Depending

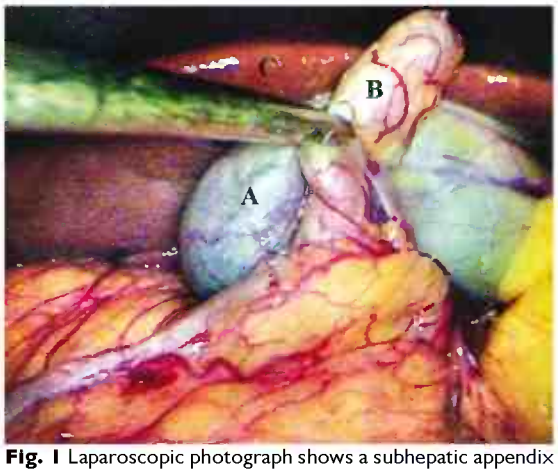

Fig. 1 Laparoscopic photograph shows a subhepatic appendix (A: gallbladder, B: appendix, C: liver).

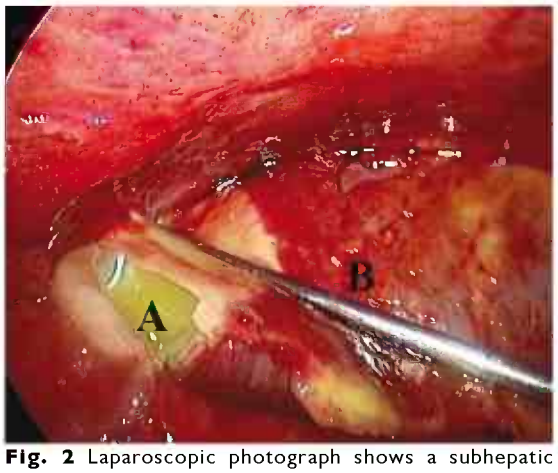

Fig. 2 Laparoscopic photograph shows a subhepatic (perforated) appendicular abscess (A) and the liver (B).

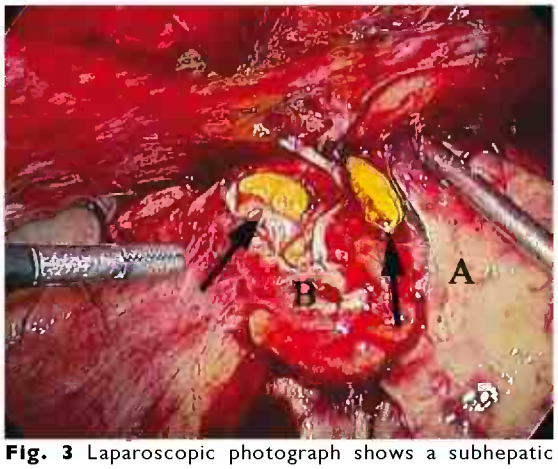

Fig. 3 Laparoscopic photograph shows a subhepatic (perforated) appendicular abscess (B), faecolith in abscess cavity (arrows) and liver (A).

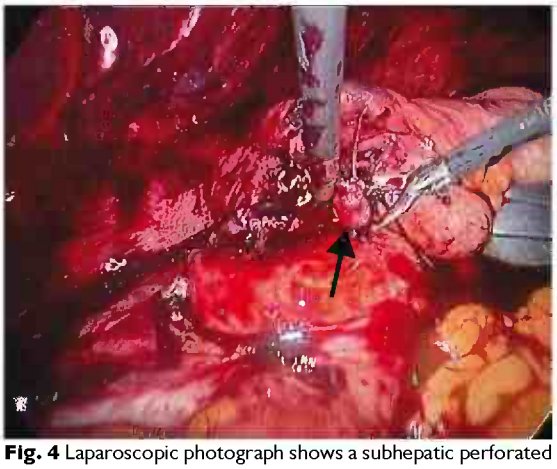

Fig. 4 Laparoscopic photograph shows a subhepatic perforated appendicular abscess-base after appendectomy (arrow).

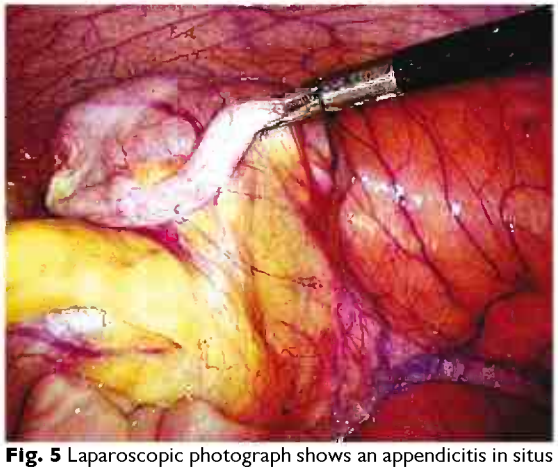

Fig. 5 Laparoscopic photograph shows an appendicitis in situs inversus.

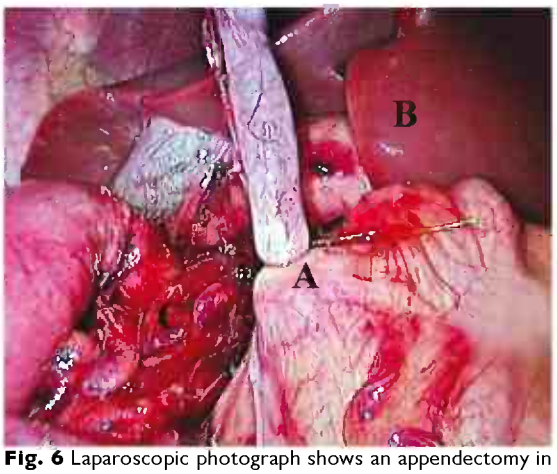

Fig. 6 Laparoscopic photograph shows an appendectomy in malrotation (A: appendix, B: liver, C: midgut volvulus).

on the position of the appendix, the other ports were placed. In the cases of subhepatic appendix (Fig. 1), a 5 mm trocar was inserted in the epigastrium and another 5 mm trocar in the right lumbar area. The monitor was placed exactly opposite to the surgeon who was standing at the level of the patient's left chest.

Appendectomy was commenced by dissection of the mesoappendix using ultrasonic shears and securing the base with two pretied endoloops. In one patient, the hepatic flexure had to be mobilised inferiorly and medially, as the appendix was found lying retroperitoneally and lateral to the second part of the duodenum.

For the patient with the perforated subhepatic appendix, the abscess was found adherent to the liver. The cavity was opened using the tip of a suction cannula and all the pus was sucked out (Fig. 2). A few large faecaliths were seen in the cavity, which were extracted (Fig. 3). Appendectomy was also done and the area was drained with a wide-bore tube (Fig. 4). In the patients with the appendix placed in the lateral pouch, a 30° telescope in the suprapubic port, a 10 mm umbilical port for the right working hand, and a 5 mm port in the right iliac fossa for left working hand were used to perform the appendectomy. The monitor was placed at the level of patient's right shoulder and the surgeon stood at the level of patient's left hip. The appendix and caecum were located in the left iliac fossa in situs inversus totalis where there was a "mirror image" displacement of bowels (Fig. 5). The surgeon operated on the right side of the patient. The 10 mm suprapubic port was used for the right working hand. An umbilical 5 mm port was used for the 30° telescope. The other condition was malrotation of the gut, where the appendix could lie anywhere in the peritoneum due to the mobile caecum. Appendectomy was performed as part of the correction of malrotation (Ladd's procedure) (Fig. 6).

RESULTS

Out of a total of 18 patients, subhepatic appendicitis was present in six cases, perforation in one case, appendicitis in midgut malrotation was found in eight cases (three children and five adults), appendicitis in one patient with situs inversus, and appendicitis in the lateral pouch position in three cases. The patients with the subhepatic appendicitis, appendicitis in situs inversus totalis and appendicitis in the lateral pouch position had an uneventful postoperative period, and were discharged on the first postoperative day (POD). For the patients who underwent appendectomy as part of the treatment for malrotation and for the patient with the perforated subhepatic appendix, the drainage tube was removed and oral fluids were allowed on the third POD. They were discharged on the fifth POD. All patients required intravenous analgesics for only one day, thereafter antiinflammatory suppositories were adequate for pain control. All 18 patients were followed up for 32 months. At 45 months, only 12 patients visited the outpatient department. Three patients had vague abdominal pain following surgery; they were successfully treated with antibiotics and analgesics. There were no problems in the other cases.

DISCUSSION

In our series, the incidence of subhepatic appendicitis was 0.09%, perforation in 0.01%, appendicectomy for midgut malrotation was found in 0.12%, appendicitis in situs inversus totalis was 0.01%, and appendicitis in the lateral pouch position was 0.04%. The lateral pouch is a rare anatomical position for an appendix. It is a small cavity adjacent to the caecum in the lateral abdominal wall, due to a developmental peritoneal fold extending from the lateral wall to the ileocecal junction as a septum. It is usually considered insignificant in the conventional open appendicectomy. But in the laparoscopic approach, if the umbilical port is used for the telescope, the vision is not adequate as the appendix and caecum are found lying above and lateral to the septum, which prevents adequate visualisation of the appendix. Also, there is no "triangulation" – making the handling of instruments somewhat clumsy. In our modification, the camera is placed in the suprapubic port, the right iliac fossa port is for the left working hand and the umbilical port is used for the working right hand. This camera position provides us with an "end-on" view of the area of concern, as well as the necessary triangulation. We have used this "two-handed" technique in all the patients undergoing laparoscopic appendectomies at our institute since 1995. Kollmar et al have reported the advantages of a similar approach in their series.[4]

Situs inversus totalis, with an incidence of 0.01%, is an uncommon condition caused by a single autosomal recessive gene of incomplete penetration. A potential diagnostic dilemma can occur, especially in the young female patient with a history of situs inversus and who presents with left iliac fossa pain.[3] After the initial diagnostic laparoscopy through the umbilical trocar, the exact position of the appendix could be determined and in this case, it was in the left iliac fossa. This allowed the other two ports to be strategically placed. Again, like conventional laparoscopic appendectomy, the camera was placed in the suprapubic port. The port positions have to be modified, as the appendix is in the left iliac fossa. So the umbilical port was used for the left working hand and a left iliac fossa port for the right working hand. This is a mirror image of the "two-handed" technique that we use for routine laparoscopic appendectomy. We believe that the laparoscopic approach for appendectomy is ideal in a patient with situs inversus and should even be performed at the time of laparoscopy performed for other reasons.

Arrested caecal descent occurs where the caecum lies in the subhepatic position but does not descend to the right iliac fossa. In the strictest use of the term,

this is not a malrotation but is instead a maldescent. Inflammation of a subhepatic appendix can mimic cholecystitis and perforation of a subhepatic appendix can mimic liver abscess.[5,6] Malrotation of the midgut can cause neonatal obstruction due to Ladd's bands. It can also cause partial recurrent volvulus in older children, due to the narrow mesenteric attachment between the caecum and the duodenojejunal flexure. The condition is often asymptomatic and may only cause problems if the patient develops acute appendicitis. In these situations, one cannot follow a definite pattern of port placement. Appendectomy should always be done in patients with malrotation and is a part of Ladd's procedure.[7] Laparoscopy is a valuable tool in situations where the diagnosis is in doubt. Not only can the location of the appendix be visualised, but the other organs can be inspected as well. It is far superior to the access that a McBurney incision provides. Obese patients benefit more from laparoscopy because they would need a larger incision than thinner patients, whereas in laparoscopy, the ports are the same for both. The laparoscopic approach has to be tailored in each individual case. There are no standard port positions in these situations and the surgeon has to modify the port placements, adhering to the basic principles of laparoscopy – triangulation and ergonomy.

In conclusion, laparoscopic appendectomy in rare anatomical positions is a better option than the big incisions needed for adequate access. In situations like what we have described, there can be no doubt that laparoscopy is invaluable in both diagnosis and treatment. Also, our "two-handed" technique provides for triangulation and a better view of the appendix.

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