Original Article

SIPES In Pediatric Appendicitis: An Unwonted Gateway to Minimally Invasive Surgery

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Abstract

Background: Single-incision pediatric endoscopic surgery (SIPES) is a minimally invasive technique that limits the surgical scar to a single incision, usually hidden within the umbilicus. It has been reported to give outcomes comparable to conventional multiport laparoscopy. Appendectomy is one of the most common procedures performed with this approach. We report a 10-year-old boy (33.9 kg) who presented with one day of acute, progressive abdominal pain, vomiting and loose stools, with tenderness and rebound tenderness in the right iliac fossa. Ultrasonography did not visualise the appendix but showed multiple mesenteric lymph nodes, and the radiologist's impression was acute appendicitis with mesenteric lymphadenopathy. He underwent single-incision laparoscopic appendectomy under general anaesthesia through a 20 mm supraumbilical incision. The appendix was retrocaecal, inflamed and adherent to the caecum; it was freed from the caecum, the meso-appendix was cauterised up to the base, the base was ligated, and the appendix was excised and extracted. Recovery was uneventful, and he was discharged on post-operative day 3. Sutures were removed on day 8, and histopathology confirmed acute appendicitis. This case shows that a difficult, adherent retrocaecal appendix can be removed safely through a single incision in a child, with a good early outcome.

Keywords: single-incision, pediatric endoscopic surgery, SIPES, appendectomy, acute appendicitis, laparoscopic.

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Introduction

Laparoscopic surgery has continued to evolve to reduce the number of access sites and the resulting scars in children. Single-incision pediatric endoscopic surgery (SIPES) is effective, feasible, and safe, with results comparable to multiport laparoscopy.[1] The single-incision approach to appendectomy dates back to the early 1990s, when Pelosi described laparoscopic appendectomy through a single umbilical puncture,[2] and single-trocar appendectomy in children was described by Esposito in 1998.[3]

SIPES appendectomy is reported to be among the most common procedures performed in pediatric surgical units, and its main attraction is the cosmetic result, since the incision is placed in the umbilicus and the abdomen appears scarless. Other recognised advantages include fewer incisions, ease of tissue retrieval and the ability to combine procedures through one site.[4] A relatively large umbilical incision also allows complete release of carbon dioxide, extraction of

larger specimens, and open-style irrigation and aspiration of the peritoneal cavity.[5] Individual case reports of how the technique performs in routine practice remain useful, and we report a child with acute retrocaecal appendicitis treated by single-incision laparoscopic appendectomy.

Case Report

A 10-year-old boy (weight 33.9 kg) presented to the Casualty with abdominal pain, vomiting (4–5 episodes), and one episode of loose stools, all for one day. The pain was acute in onset, progressive, dull and non-radiating. There was no fever, headache, neck pain, cough, cold or breathing difficulty. He had a history of one febrile seizure at 1½ years of age, and no previous surgery or blood transfusion. He was the first of twins, born by lower segment caesarean section (birth weight 2.8 kg, no NICU stay), was immunised for age, and had normal developmental milestones.

On examination, he was conscious, oriented and afebrile. Pulse was 98/min, blood pressure 106/66 mmHg, respiratory rate 23/min, SpO_2 99–100% on room air and temperature 98.2°F. Cardiovascular, respiratory and neurological examinations were normal. The abdomen was soft, with tenderness and rebound tenderness in the right iliac fossa and no guarding or rigidity. A clinical diagnosis of acute appendicitis was made, and he was admitted to the Pediatric ward and later shifted to the surgical ward.

The complete blood count showed haemoglobin 11.2 g/dL, total count 9,500/cumm (neutrophils 92%, lymphocytes 4%, eosinophils 2%, monocytes 2%) and platelets 2.08 lakhs/cumm.

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Ultrasound of the abdomen showed a normal liver (13 cm), spleen (10.4 cm), gallbladder, pancreas, kidneys and bladder, with no free fluid. The appendix was not visualised, but multiple mesenteric lymph nodes were seen. The radiologist's impression was features suggestive of acute appendicitis with mesenteric lymphadenopathy.



Figure 1: Supraumbilical incision of 20 mm

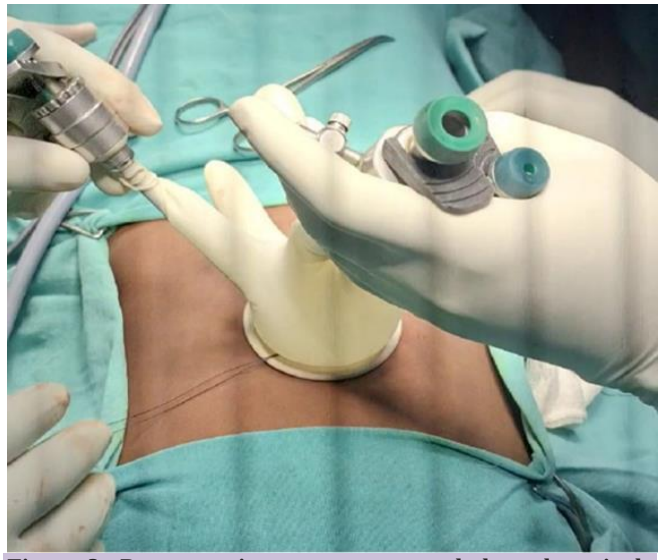


Figure 2: Pneumoperitoneum was created through a single port via the glove technique.

After pre-anaesthetic check-up (ASA grade 1, normal pre-operative vitals), he underwent single-incision laparoscopic appendectomy under general anaesthesia. Through a 20 mm supraumbilical incision [Figure 1], the peritoneal cavity was entered, and pneumoperitoneum was created through glove technique as a single port [Figure 2]. The appendix was retrocaecal, inflamed and adherent to the caecum. It was separated from the caecum, and the meso-appendix was cauterised up to the base. The base was ligated with 1-0 catgut [Figure 3], and the appendix was excised, extracted in 25 minutes and sent for histopathological examination. After haemostasis, the rectus was approximated, the subcutaneous layer was closed with 2-0 polyglactin and the skin with 2-0 prolene [Figure 4].

His post-operative recovery was uneventful, and he was discharged on post-operative day (POD) 3, tolerating an oral diet and mobilising, with no fever, normal vitals, mild abdominal tenderness and a healthy wound with intact sutures. On follow-up POD 8, sutures were removed. His histopathology report shows fibrous stroma and inflammatory infiltrates suggesting acute appendicitis. At the follow-up visits at 1 month and 3 months, he remained asymptomatic with a well-healed scar [Figure 5], and the course was uneventful.



Figure 3: Intraoperative view; the base was ligated with 1-0 catgut.



Figure 4: Supraumbilical incision closure.



Figure 5: At follow-up, well-healed scar.

Discussion

SIPES is increasingly used for appendectomy in children, mainly for its cosmetic result, and pain scores are equivalent to or lower than with multiport laparoscopy. Instrument collision and loss of triangulation may prolong operative time (mean 86 versus 70 minutes for conventional laparoscopy; about 71 minutes for specialists versus 95 for trainees), but SIPES is feasible and safe even in complicated appendicitis, with similar hospital stay (2.8 versus 2.6 days) and low complication rates (collection 2.2%, wound infection 0.7%, adhesion 1.5%). A learning curve exists, so surgeons need minimally invasive skills, and the technique can be taught to trainees.[4]

A relatively large umbilical incision (1.5–2 cm) eases specimen extraction, can be extended for open surgery while keeping a single scar, allows complete carbon dioxide disinflation and gives high cosmetic satisfaction; most patients are discharged on the first post-operative day, and reported complications include wound infection, intra-abdominal abscess and early adhesive obstruction. Subcuticular absorbable closure, as used by Yilmaz et al., avoids suture removal and improves cosmesis.[5] If exposure is difficult, an additional port can be added, which is conversion to mini-laparoscopy rather than failure. SIPES is feasible in acute and perforated appendicitis, including a series of 415 children.[6,7] Operative times differ from conventional laparoscopy by about 0 to 7 minutes in meta-analysis,[8] with a 7-minute increase in the largest single-institution review,[9] and operative time and pain medication were the only significant differences in one comparative study.[10] Evidence in children remains limited and may be affected by publication bias.

In our patient, acute appendicitis was diagnosed clinically and supported by ultrasonography, which did not visualise the appendix but showed mesenteric lymphadenopathy. Through a 20 mm supraumbilical incision, similar to the 1.5–2 cm incisions used in SIPES, the adherent retrocaecal appendix was freed, the meso-appendix divided with cautery and the base ligated before excision, following the same steps as the conventional procedure without an additional port. The operative time of 25 minutes was shorter than the mean of 86 minutes reported for SIPES,[4] despite the difficult anatomy. He was discharged on day 3, within the reported range,[4,5] without complications; sutures were removed on day 8. At the next visits at 1 and 3 months, he was asymptomatic with a well-healed scar, though cosmesis was not formally assessed. The limitations are a single patient, no comparison group, and the inability to assess late complications such as adhesive obstruction or incisional hernia.

Conclusion

Single-incision laparoscopic appendectomy through a 20 mm supraumbilical incision was performed safely in a 10-year-old boy with acute retrocaecal appendicitis in whom the inflamed appendix was adherent to the caecum. Recovery was uneventful, with discharge on post-operative day 3 and a healthy wound at day 8. This case supports the view that SIPES is a feasible and safe option for appendectomy in children, including in technically difficult cases, when performed by surgeons with laparoscopic experience, with the option of adding a port if required.

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Conflicts of interest

There are no conflicts of interest.

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