Stump appendicitis – a systematic analysis

Sajad Ahmad Salati
Department of Surgery, College of Medicine, Qassim University, Saudi Arabia

ABSTRACT: Aim: The study was conducted to analyze stump appendicitis which is a long-term complication of appendectomy – the otherwise commonest general surgical procedure conducted in the world.

Methods: 48 cases included from 36 articles published in the peer reviewed journals of repute were evaluated for eight variables including: (I) age of the patient, (II) gender, (III) duration of symptoms, (IV) imaging, (V) interval time since initial operation, (VI) details of initial operation, (VII) management, (VIII) stump length if managed by operation.

Results: 48 cases (27 males and 19 females) ranging in age from 2 to 72 years reported after a wide range of time (3 days – 46 years) after primary appendectomy. The duration of symptoms ranged from 1 day to 7 months. As many as 31 (64.5%) cases had inflamed stump appendix whereas 17 (33.5%) had perforation. Twenty-one (43.7%) had undergone laparoscopic primary appendectomy and 27 (56.3%) had undergone open appendectomy. Management of the retained stump included stump appendectomy in 42 (87.5%), right hemicolectomy in 2 (4.2%) and conservative in 4 (8.3%) cases. In the 44 cases managed by surgical intervention, the approach was open in 27 (61.4%) and laparoscopic in 17 (38.6%) cases. The length of the retained appendix stump ranged from 0.5 cm to 6.5 cm (mean 2.14 cm).

Conclusion: Stump appendicitis is an entity that a physician needs to suspect if a patient reports with features of appendicitis even after appendectomy had been conducted. Management is generally surgical and aimed at removal of the retained appendiceal stump.

KEYWORDS: appendectomy, completion appendectomy, laparoscopy, perforation, stump appendicitis (SA), stump length

ABBREVIATIONS

CA – Completion appendectomy
CECT – Contrast Enhanced Computed Tomography
SA – Stump appendicitis

INTRODUCTION

Appendicitis is the commonest surgical emergency all over the world and hence appendectomy, open or laparoscopic, remains one of the most commonly performed general surgical procedures [1]. The lifetime risk of developing appendicitis is estimated to be 8.6% for men and 6.7% for women [2].

Although appendectomy is a relatively simple procedure, various complications after surgery can occur, which include: (I) short-term complications such as pain, bleeding, and surgical site infection, and (II) delayed complications, including nerve injury, adhesions, incisional hernias, small bowel obstruction and stump appendicitis (SA) [3].

SA is a less common long-term complication with a reported incidence of about 1 in 50, 000 cases but it is likely that this entity may be underestimated and hence underreported in literature [4]. It is defined as an interval development of inflammation of the remaining appendix post-appendectomy [5]. SA usually occurs when the remaining residual appendix at primary appendectomy is kept longer than 0.5 cm [3, 6].

SA occurs between a few days to even years after appendectomy and the clinical features are the same as appendicitis and the previous history of appendectomy can create a diagnostic dilemma, difficult to solve, if the surgeon is not well aware of this pathology and its clinical presentation [6]. This often leads to delayed or missed diagnosis and the perforation rate reportedly ranges from 40 to 70% [1, 6].

It is against this background that this systematic metanalysis was undertaken to elucidate the salient features associated with SA and thereby to popularize them, so that the diagnosis may be achieved early, thereby avoiding the complications.

MATERIALS AND METHODS

Methods

Systematic literature search was conducted through electronic databases, including PubMed, Science Direct, ResearchGate and Scopus using the key-words “stump appendicitis, residual appendix, retained appendix, completion appendectomy, recurrent appendicitis, appendicular stump”. The search was carried out by using individual keywords with a combination of Boolean Logics (AND). Furthermore, only studies that were published in English were considered for inclusion in this study. No timeframe was fixed for inclusion of studies though preference was given to articles published over the last decade.

Criteria for considering studies

Articles including reviews, case series and case reports were included for the review process. No original article satisfied the criteria of inclusion.
Participants and Outcome measures

Only those cases were included where diagnosis had been established by imaging and/or histopathology. The following eight variables (Tab. I.) were reported and analysed: (I) age of the patient, (II) gender, (III) duration of symptoms, (IV) imaging, (V) interval time since initial operation, (VI) details of initial operation, (VII) management, (VIII) stump length if managed by operation.

Exclusion

All such articles were excluded that were deficient in clear information related to conclusive evidence of stump appendicitis, either by imaging or histopathology.

Methodological quality checking

Checklist items used in well cited studies were selected randomly and considered for comparison with the checklist self-drafted for this study.

Data extracted and analysed

Data were extracted on the number of cases and the eight variables (Tab. I.). The collected data was entered into Statistical Package for Social Sciences (IBM-SPSS version 27.0) and Microsoft Excel (Office Version 16) for analysis. Descriptive statistical analyses such as simple frequencies, measures of central tendency, and measures of variability were used to describe the characteristics of participants. Then, the information was presented using frequencies, summary measures, tables, and figures as shown in the results. P < 0.05 and 95% confidence level were used as a difference of statistical significance. Drawing a conclusion was based on high-quality studies that reported the effectiveness of and suggestions for clinical application. Moreover, the details of included studies were clarified in the form of Tab. I.

RESULTS

Study selection

The electronic database search resulted in a total of 153 articles; 69 were identified in PubMed, 24 in ResearchGate, 28 in Science Direct and 32 in Scopus. After excluding 107 duplicated articles, 46 were used to screen titles and abstracts, after which, 42 potentially relevant articles in English language were assessed for the eligibility criteria. Finally, 36 articles were included in the review after detection of deficient data in 6 articles as shown in Tab. I.

Study characteristics

Study characteristics are summarized in Tab. I. There were 36 articles including 29 single case reports, 1 letter to editor and 6 case series/case reports (with multiple patients).

There was a total of 48 cases (27 males and 19 females) ranging in age from 2 to 72 years. The time of onset of symptoms since the primary appendectomy had a wide range from as short as 3 days to as long as 46 years. Nine cases reported after at least 10 years
### Tab. I. Characteristics of the patients of stump appendicitis.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Geraci [1]</td>
<td>54 - 1</td>
<td>46 y</td>
<td>22</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2.4</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Shah [12]</td>
<td>35 - 1</td>
<td>4.5 m</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1.5</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Rao [25]</td>
<td>15 - 1</td>
<td>5 m</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0.7</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>O’Leary [26]</td>
<td>43 - 1</td>
<td>10 y</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Chikamori [27]</td>
<td>24 - 1</td>
<td>4 d</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Gacek et al. [28]</td>
<td>15 - 1</td>
<td>7 y</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Durgun [29]</td>
<td>68 - 1</td>
<td>8 m</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>Sieg [30]</td>
<td>51 - 1</td>
<td>23 y</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>9</td>
<td>Ramroz [31]</td>
<td>43 - 1</td>
<td>1 y</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>10</td>
<td>Gupta [32]</td>
<td>11 - 1</td>
<td>2 y</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>11</td>
<td>Baldi et al. [33]</td>
<td>19 - 1</td>
<td>2 m</td>
<td>15</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>12</td>
<td>Gom el et al. [34]</td>
<td>9 - 1</td>
<td>3 y</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>13</td>
<td>Milne [35]</td>
<td>25 - 1</td>
<td>18 m</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>14</td>
<td>Lai [36]</td>
<td>32 - 1</td>
<td>5 m</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>15</td>
<td>Devereaux et al. [37]</td>
<td>49 - 1</td>
<td>2 m</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>16</td>
<td>Kost [38]</td>
<td>35 - 1</td>
<td>1 y</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>17</td>
<td>Roberts et al. [39]</td>
<td>48 - 2</td>
<td>10 y.</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>18</td>
<td>Dikker et al. [40]</td>
<td>32 - 1</td>
<td>4 y</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>19</td>
<td>Wolf [41]</td>
<td>25 - 1</td>
<td>2 m</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>20</td>
<td>Bohlke et al. [42]</td>
<td>32 - 1</td>
<td>3 y</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

---

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>19 Shin et al. [35]</td>
<td>1</td>
<td>41</td>
<td>1</td>
<td>-</td>
<td>2 m</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>6.5</td>
</tr>
<tr>
<td>20 Eisenmacher et al. [37]</td>
<td>2</td>
<td>11, 11</td>
<td>1</td>
<td>1</td>
<td>19 m, 2 m</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>2.5</td>
</tr>
<tr>
<td>21 Uludag et al. [38]</td>
<td>1</td>
<td>47</td>
<td>1</td>
<td>-</td>
<td>20 y</td>
<td>6</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>22 Lipe D.N. [23]</td>
<td>1</td>
<td>33</td>
<td>1</td>
<td>-</td>
<td>6 m</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>NA</td>
</tr>
<tr>
<td>23 Kumar A. [39]</td>
<td>1</td>
<td>18</td>
<td>1</td>
<td>-</td>
<td>2 m</td>
<td>3</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>24 Artul et al. [18]</td>
<td>1</td>
<td>20</td>
<td>1</td>
<td>-</td>
<td>2 m</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1.8</td>
</tr>
<tr>
<td>25 Monsomboon et al. [40]</td>
<td>1</td>
<td>69</td>
<td>-</td>
<td>1</td>
<td>27 y</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>NA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26 Baek et al. [41]</td>
<td>1</td>
<td>27</td>
<td>-</td>
<td>1</td>
<td>15 m</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>27 Mentes et al. [42]</td>
<td>1</td>
<td>32</td>
<td>1</td>
<td>-</td>
<td>12 y</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1.5</td>
</tr>
<tr>
<td>28 Roche-Nagle [43]</td>
<td>1</td>
<td>35</td>
<td>1</td>
<td>-</td>
<td>14 y</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>29 Mirza M.S. [44]</td>
<td>1</td>
<td>41</td>
<td>-</td>
<td>1</td>
<td>3 y</td>
<td>10</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>2.7</td>
<td></td>
</tr>
<tr>
<td>30 Reddan [45]</td>
<td>2</td>
<td>9, 9</td>
<td>2</td>
<td>-</td>
<td>13 d, 25 d</td>
<td>6.1</td>
<td>2</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>0.9, 0.5</td>
<td></td>
</tr>
<tr>
<td>31 Awe et al. [19]</td>
<td>1</td>
<td>23</td>
<td>-</td>
<td>1</td>
<td>4.5 m</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>32 Minguez et al. [46]</td>
<td>3</td>
<td>67, 30, 24</td>
<td>1</td>
<td>2</td>
<td>7 m, 6 m, 3 d</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>2, 3, NA</td>
</tr>
<tr>
<td>33 Parthsarat et al. [15]</td>
<td>1</td>
<td>13</td>
<td>1</td>
<td>-</td>
<td>3 m</td>
<td>30</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>34 Gotliboym et al. [47]</td>
<td>3</td>
<td>45, 72, 51</td>
<td>2</td>
<td>1</td>
<td>9 m, 9 m, 6 m</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>3.1, NA</td>
</tr>
<tr>
<td>35 von Einem et al. [48]</td>
<td>1</td>
<td>46</td>
<td>1</td>
<td>-</td>
<td>2 m</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>36 Botian u et al. [20]</td>
<td>1</td>
<td>41</td>
<td>-</td>
<td>1</td>
<td>7 m</td>
<td>210</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
following primary appendectomy whereas 4 cases reported after more than 20 years. The duration of symptoms ranged from 1 day to 7 months. Symptoms were acute in most of the patients and 18 (37.5%) of them reported within 24 hours and only 5 (10.4%) reported with complaints lasting for more than 2 weeks. Thirty-one (64.5%) cases had inflamed stump appendix whereas 17 (33.5%) had frank perforation with localised or generalized peritonitis. The retained stump was managed by stump appendectomy in 42 (87.5%), right hemicolecotomy in 2 (4.2%) and conservatively in 4 (8.3%) cases. In the 44 cases managed by surgical intervention, the approach was open in 27 (61.4%) and laparoscopic in 17 (38.6%) cases. The length of the retained appendix stump ranged from 0.5 cm to 6.5 cm (mean 2.14 cm).

**DISCUSSION**

Stump appendicitis (SA) is an interval development of inflammation in the remaining portion of appendix post-appendectomy [5]. Rose was the first to describe stump appendicitis when he published a case report in 1945 [7]. Patients typically report with signs and symptoms similar to appendicitis [8]; however, the diagnosis is often delayed owing to the low index of suspicion as the previous history of appendectomy misleads the physician into thinking that this patient could never have appendicitis again, thereby resulting in complications including perforation and gangrene [9, 10]. In a series of 60 cases analysed by Leff et al. [11], due to past history of appendectomy, SA was frequently misdiagnosed as constipation or else gastroenteritis, with a significant delay to surgery and perforation with gangrene of the stump occurred in 40%. Some studies mention even higher perforation rate, i.e. of up to 70% [12]. In this study also, 17 (33.5%) of SA had perforation with localised or generalized peritonitis.

The exact causes behind this condition are still unclear but complicated surgery or difficult dissection of the appendix is considered a risk factor for stump appendicitis and hence knowledge of a difficult approach at the primary surgery should however raise the level of suspicion. Conversely, adequate visualization of the appendiceal base during appendectomy have been found to be associated with a lower risk for SA [3, 13]. Another factor considered to be causative is the excess length of the appendiceal stump left behind at appendectomy. Mangi and Berger have suggested that the incidence of stump appendicitis can be decreased by proper identification of the base of the appendix and by leaving an appendiceal stump of < 3 mm long [14]. Shah et al. [13] and Parthasarathi et al. [15] also found a stump measuring less than 3 to 5 mm to be a protective factor.

This study also points towards the same as none of the 48 cases had stump smaller than 5 mm. Some authors have suggested stump inversion routinely in all cases after clear identification of the base and removal of the appendix as a way of minimizing the incidence of stump appendicitis, but others studies do consider it necessary as long an appendiceal stump of not more than 3–5 mm is left behind [16].

SA may complicate both open as well as laparoscopic appendicectomy [10, 11]. In the series by Leff et al. [10] SA followed appendicectomy in 58% of open and 31.6% of laparoscopic procedures. In this series of 48 reviewed cases, the author found that 21 (43.7%) had undergone laparoscopic primary appendectomy and 27 (56.3%) had undergone open appendectomy. Liang et al. [5] in their series of 36 reviewed cases from literature found that only 34% of cases were initially performed laparoscopically, and 66% were initially performed as open surgeries. Some authors in 1990s had tried to link the than evolving laparoscopic appendectomy with SA as it’s restricted vision, the unavailable three-dimensionality, the limitations in palpation and careful preparation of the caecum base with the diathermy instruments, might possibly play a role in the misidentification of the base thereby increasing the chances of development of stump appendicitis [17] but many other later series hold an opposite view and do not find laparoscopic appendectomy to be a risk factor [8].

CT scan and ultrasound of the abdomen are both equally helpful for the diagnosis of stump appendicitis and the imaging findings may be similar to those seen in acute appendicitis. But usually because of uncommon occurrence, it is preferable to obtain cross-sectional image by CECT (Contrast Enhanced Computed Tomography) to confirm the diagnosis after performing ultrasound [5, 18, 19]. CECT may show distended appendiceal stump, pericolic inflammatory changes, abscess formation, fluid in the right paracolic gutter, caecal wall thickening or an ileocecal mass [19]. In some doubtful cases with persistent abdominal symptoms, if other pathologies are ruled out by extensive imaging, diagnostic laparoscopy has a role and it may allow safe completion appendectomy simultaneously if the diagnosis of stump appendicitis is confirmed [20].

Completion appendectomy (CA) with or without stump inversion is the treatment of choice for stump appendicitis, performed either as an open operation or else by laparoscopic approach, depending upon various factors like the patient’s clinical condition and the local expertise/resources [8]. Laparoscopy is reported by many workers as being superior to open surgery because it provides a better viewing angle, which leads to a better differential diagnosis but there is no standardized surgical approach for probable stump appendicitis [21]. Furthermore, in cases of significant inflammation around the ileocecal region with abscesses, an ileocecectomy or even right hemicolecotomy is needed [22]. In this study, stump appendectomy was performed in 42 (87.5%) whereas right hemicolecotomy was required in 2 (4.2%) cases and surgery was accomplished by open method in 31 (64.6%) and through laparoscopic route in rest of the 17 (35.4%) cases.

This study recorded 4 (8.3%) cases that were managed successfully conservatively with antibiotics. Lipe [23] managed a 33-year-old otherwise healthy male, for SA and recorded complete resolution of inflammatory process at the appendiceal stump with chronic scarring at a repeat CT scan taken of the abdomen and pelvis 3 weeks after discharge. Hendahewa et al. [3] however recorded a failure when they tried to manage a 72-year-old female on anticoagulants by conservative approach. Recently, some cases of appendicolith-induced SA have been reported to be managed non-surgically through colonoscopic approach. An incision is made into the appendiceal orifice with an IT knife and the appendicolith removed by widening the appendiceal orifice, or draining by inserting a biliary stent into the appendiceal orifice or sucking the pus using a cap for endoscopic variceal ligation [24]. Geraci et al. reported the use of colonoscopic washing-suction of appendicular lumen by peristaltic pump but did not achieve dislodgement of appendicolith [1].
CONCLUSION

Stump appendicitis is a real entity not often considered when evaluating patients with features similar to appendicitis after open or laparoscopic appendectomy. The condition appears to be an underreported problem and there is a need to spread awareness about it so that the clinicians exercise a high index of suspicion in such cases to avoid morbidity due to delayed diagnosis. Adequate visualization of the appendiceal base during appendectomy and a stump measuring less than 3 to 5 mm is likely to reduce the risk for stump appendicitis.

REFERENCES

The authors declare that they have no competing interests.

This material is available under the Creative Commons – Attribution-NonCommercial 4.0 International (CC BY-NC 4.0). The full terms of this license are available on: https://creativecommons.org/licenses/by-nc/4.0/legalcode

Dr. Sajad Ahmad Salati MBBS MS MRCS (Glasgow) Associate Professor of Surgery Unaizah College of Medicine, Qassim University, Saudi Arabia; Phone: +966 530435652; E-mail: docsjad@gmail.com

Cite this article as: Salati S.A.: Stump appendicitis – a systematic analysis; Pol Przegl Chir 2021; 93: (1–7); DOI: 10.5604/01.3001.0015.4553 (Advanced online publication)