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Exploring Anatomical Variations of the Vermiform Appendix on Multidetector CT

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Abstract

Acute appendicitis is the most common cause of acute abdominal pain requiring urgent abdominal surgery. CT is the preferred imaging examination for evaluation of patients. The appendix is a highly variable organ with many possible configurations of its location. Depending on its position, the signs and symptoms of appendicitis may also vary and mimic other surgical conditions. The study aims to describe the prevalence of anatomical variations of the vermiform appendix on multidetector CT. A retrospective review of consecutive abdominal CT exams (age ≥ 15) was done. The final cohort was 669 patients. The location of the appendix was subcecal in 26.9%, pelvic in 22.9%, midline in 19.4%, retrocecal in 14.9%, postileal in 4.3%, paracecal in 3%, others in 2.8%, antececal in 2.7%, hepatic in 2.1%, preileal in 0.9%. The pelvic and postileal positions of the appendix were statistically significantly higher in females compared to males. In Conclusion, the most common position for the visible appendix on multidetector CT is subcecal. The prevalence of specific locations of the appendix also differs according to patient gender. To improve patient diagnosis of acute appendicitis in clinical and surgical settings, it is important to take into account the frequency of different appendix positions.

Keywords: Acute Appendicitis; Appendix Apex Position; Multidetector CT; Anatomical Variations; Gender-Specific Variations.

INTRODUCTION

Acute appendicitis is the most common cause of acute abdominal pain requiring urgent abdominal surgical intervention in order to avoid serious complications such as ileus, peritonitis, and even death (Guan et al., 2023; Zacharzewska- Gondec et al., 2019). There is an 8.6 % and 6.7% lifetime risk of developing appendicitis for males and females, respectively (Guan et al., 2023; Kryzak & Mulrooney, 2020). The appendectomy procedure is one of the most commonly performed general surgeries and carries a reported mortality rate between 0.03 and 0.24% (de Wijkerslooth, 2020; Kacprzyk et al., 2020).

Imaging has become central to the diagnosis of appendicitis (Monsonis et al., 2020). Routine imaging is associated with a reduction in the negative appendectomy rate to 4.5% compared to a 15.4% negative appendectomy rate without pre-operative imaging. It not only reduces unnecessary operations but also results in considerable healthcare savings and better outcomes for patients (Drake et al., 2012; D'Souza et al., 2018). Computed tomography (CT) is the preferred imaging examination for patient evaluation due to the high sensitivity and specificity of over 95% (Krisem et al., 2023). The development of the Multidetector CT (MDCT) is considered a significant advancement in CT imaging, "MDCT has a higher acquisition speed than conventional CT; and more importantly, MDCT acquires volume data instead of individual slice data. These two factors, together with thin section slices, enable the new technique to provide almost isotropic data that can be arranged in different planes without compromising the spatial resolution of the original axial images" (Burrill et al., 2007).

The high temporal and spatial resolution of MDCT has therefore increased the visualization of the appendix imaging (Charoensak et al., 2010). Understanding the anatomy and dimensions of the normal appendix on CT is required for radiologists in order to diagnose appendicitis (Kacprzyk et al., 2020). The vermiform appendix is a cecal diverticulum, which usually lies in the right lower quadrant of the abdomen. However, the appendix is a highly variable viscus with many possible configurations of its location (Whitley et al., 2009; Zacharzewska-Gondec et al., 2019). Depending on the position of the appendix, the signs and symptoms of appendicitis may also vary and mimic other surgical conditions, which makes the diagnosis challenging for radiologists (Kacprzyk et al., 2020; Lee et al., 2014). The anatomical relationship between the ileocecal valve and the appendix helps the identification of the appendix on CT (Whitley et al., 2009). Different locations of the appendix have been identified in literature with widely variable classifications and reported incidence (Kacprzyk et al., 2020; Lee et al., 2014). The most typical appendix position, according to the traditional standard surgical textbook, is retrocecal. However, the results of several recent studies regarding the position of the appendix revealed contradictory results to this claim (Lee et al., 2014). In the literature, only three recent studies could be found regarding the position of the appendix using a CT abdomen (De León et al., 2021; Lee et al., 2014; Willekens et al., 2014). The most recent report based on CT abdomen revealed the deep pelvis as the most common position of the appendix (De León et al., 2021).

The main aim of this study was to investigate the frequency of different locations of the vermiform appendix on MDCT and to assess whether gender is related to the appendix location. Secondary aims were to describe the location of the appendix base relative to the ileocecal valve, the morphology of the visible appendix in terms of maximal outer diameter, the single wall thickness, and intraluminal content, and to assess whether age and gender are related to appendiceal diameter.

MATERIALS AND METHODS

Study design and population:

This study is a retrospective study of consecutive abdominal CT scans performed from January to November 2021 period at the radiology department of Omer Almukhtar Hospital. Abdominal CT images of 823 consecutive patients aged 15 years or older who had undergone CT abdomen or CT chest and abdomen with various indications were initially included. After image reviewing, patients who were excluded from the study consisted of:

-Patients with a non-visualized appendix on CT images.
-Patients with CT evidence of appendicitis including periappendiceal fat stranding, phlegmon, fluid collection, periappendiceal air, periappendiceal fluid and ascites.
The final study population consisted of 669 patients, 317 men and 352 women. The mean age was 51.85 years ± 16.39 (SD), and the age range was 15-91 years.

CT scan technique

All CT images were obtained from the hepatic dome to the pelvic floor, using a 16-detector row 32-slice scanner (Aquilion, Canon (Toshiba) Medical systems Sensation) with 120 kVp and automatic exposure controls of the tube current. The CT parameters included 16-slice acquisition with a slice thickness of 0.8 mm; beam collimation, 16x1.5 mm; a reconstruction interval of 4 mm for axial and coronal images; helical pitch, 1.5; gantry rotation time, 0.75.

367 (55%) of all patients received 80-100 mL of intravenous contrast material (Iohexol, omnipaque 350 mg I/mL, GE HealthCare; Iopromide, Ultravist 370 mg I/mL, Bayer AG, Germany), thirty-four patients received oral contrast material.

Image review process:

The CT studies were retrospectively obtained from the picture archiving and communicating system (PACS) of CharruaSoft (Version 6.31.0) on a hard disc. The CT images were later evaluated on RadiAnt DICOM viewer (2020.2.3 version) by the radiologist with no prior knowledge of the clinical history of the patients. The axial and coronal reformatted images of each study were analyzed simultaneously, and images were magnified to optimize the visualization of the appendix.

Attention was paid to the following five details regarding the appendix:

1- The position of the appendix apex which was redefined and reclassified to include all possible appendix locations. The modified classification system used in this study was reproduced from the classification system used by Kacbprzyk et al. (2020) and Lee et al. (2014).

Ten possible locations of the appendix apex (examples are shown in Fig. 1) are described as follows:

Type 1- Retrocecal, the apex of the appendix is located behind the cecum and/or ascending colon (Fig. 1a).

Type 2- Pelvic, the appendix is directed downward over the psoas muscle with the apex located within the pelvic peritoneal cavity i.e. below the right external iliac vessels (Fig. 1b).

Type 3- Midline, the appendix is directed toward the midline with the apex within the peritoneal cavity above or at the sacral promontory level (Fig. 1c).

Type 4- Subcecal, the appendix is located below the level of the cecum with the apex within the right lower quadrant or iliac fossa but not medial to the right external iliac vessels (Fig. 1d).

Type 5- Preileal, the apex is directed upward anterior to the terminal ileum (Fig. 1e).

Type 6- Postileal, the apex is directed upward posterior to the terminal ileum (Fig. 1f).

Type 7- Paracecal, the apex is located lateral or posterolateral to the cecum and/or the ascending colon (Fig. 1g).

Type 8- Antececal, the apex is located anterior to the cecum and/or ascending colon (Fig. 1h).

Type 9- Hepatic, the appendix is directed upwards with the apex located in the subhepatic space (Fig.1i).

Type 10- Others, the position of the appendix apex does not fit into any of the above locations.

The remaining details noted about the appendix were:

2- The location of the base of the appendix concerning the ileocecal valve was described as superior or inferior, anterior or posterior, and medial or lateral to the ileocecal valve.

3- Measuring the maximal outer diameter of the appendix. All measuring procedures were performed with an electronic caliper after magnifying the actual images.

4- Measuring single wall thickness. All measurements were done to the nearest 0.1 mm.

5- Identifying the content of the appendiceal lumen as faeces, air, fluid, contrast, appendicolith (solid high attenuation intraluminal contents), non-solid high-density material, low-density material, or collapsed with no content.

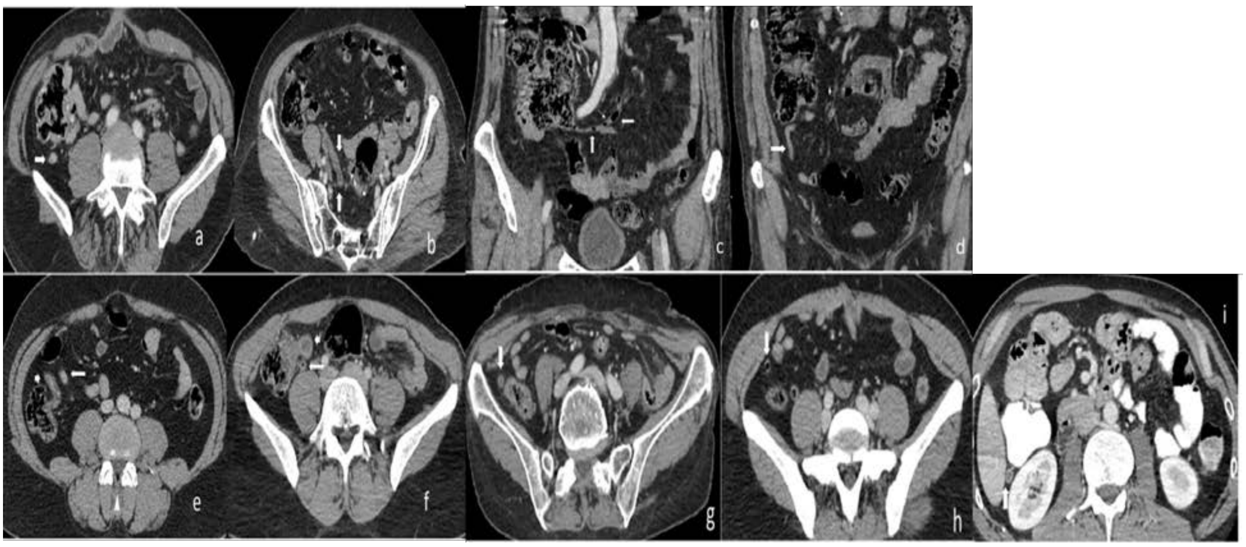


Figure (1): Examples of the classification types used for the appendix apex positions. (a,b,e,f,g,h,i) are axial, (c,d) are coronal reformatted contrast-enhanced CT images. Type 1 (retrocecal) is shown in image a, the appendix apex (arrow) is located behind the cecum. Type 2 (pelvic) is shown in image b, the appendix (arrows) located at the pelvis medial to right external iliac vessels. Type 3 (midline) is shown in image c, the appendix (arrows) directed toward the midline. Type 4 (subcecal) is shown in image d, the appendix (arrow) directed below the cecum. Type 5 (preileal) is shown in image e, the appendix (arrow) is located anterior to the terminal ileum (arrowhead). Type 6 (post-ileal) is shown in image f, the appendix (arrow) is located posterior to the terminal ileum (arrowhead). Type 7 (paracecal) is shown in image g, the appendix (arrow) is located lateral to the cecum. Type 8 (antececal) is shown in image h, the appendix (arrow) is located anterior to the cecum. Type 9 (hepatic) is shown in image i, the appendix (arrow) is located in subhepatic space.

Statistical analysis:

The chi-square test was used to compare the frequencies of the appendiceal apex positions in relationship to the patient's gender. The mean and range of the maximum appendiceal diameter and the appendiceal wall thickness were calculated.

The Welch’s t-test (unequal variance t-test) was used to determine the correlation between gender and appendiceal diameter. Pearson Correlation was used to determine the correlation between age and appendiceal diameter. A p-value of < 0.05 was considered statistically significant. Statistical analysis was performed using MedCalc software Ltd, version 20.027.

RESULTS

The most common location of appendix apex in the study population was the subcecal position, encountered in 180 (26.9%) out of the 669 patients, followed by the pelvic position in 153 (22.9%) patients, and the midline position in 130 (19.4%) patients. The appendiceal apex position was retrocecal in 100 (14.9%), postileal in 29 (4.3%), paracecal in 20 (3%), others in 19 (2.8%), antececal in 18 (2.7%), hepatic in 14 (2.1%), preileal in 6 (0.9%) patients.

The relative frequency of appendiceal apex positions in relationship to patient gender are summarized in Table 1 and Fig.2, and their P values are summarized in Table 1.

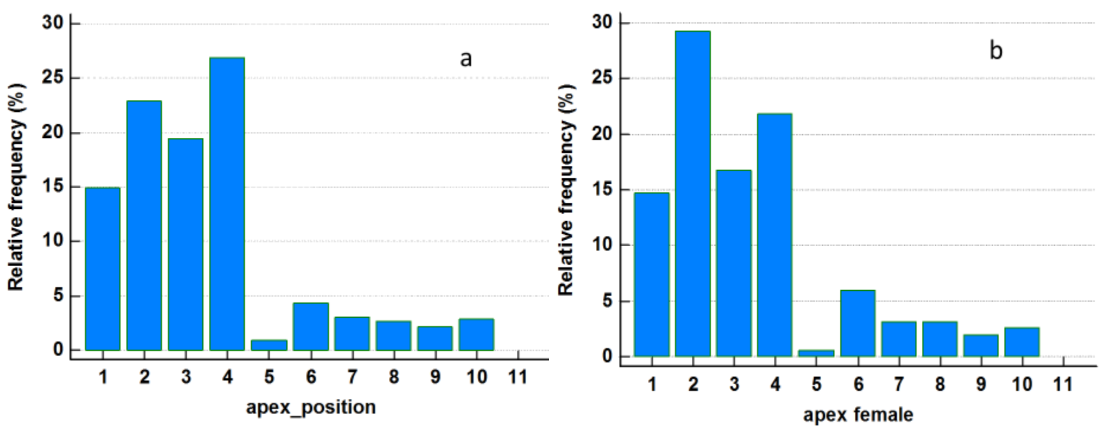
The most common position of appendix apex in the female subgroup was the pelvic position (103 (29.3%) of 352 females) whereas the subcecal position was the most common in the male subgroup (103 (22.4%) of 317 males).

According to patient gender, the pelvic and postileal positions of the appendix were statistically significantly higher in females compared to males; the pelvic appendix was present in 103 (29.3%) in female subgroup vs. 50 (15.8%) in male subgroup, (P<0.0001), and the postileal appendix was present in 21 (6%) in female subgroup vs. 8 (2.5%) in male subgroup, (P=0.0158).

Table (1): Frequency of appendiceal apex positions according to patient gender

positions	All patients	Male	Female	P value
Retrocecal	100 (14.9%)	48 (15.1%)	52 (14.8%)	0.6892
Pelvic	153 (22.9%)	50 (15.8%)	103 (29.3%)	<0.0001
Midline	130 (19.4%)	71 (22.4%)	59 (16.8%)	0.2926
Subcecal	180 (26.9%)	103 (32.5%)	77 (21.9%)	0.0526
Preileal	6 (0.9%)	4 (1.3%)	2 (0.6%)	0.4142
Postileal	29 (4.3%)	8 (2.5%)	21 (6%)	0.0158
Paracecal	20 (3%)	9 (2.8%)	11 (3.1%)	0.6547
Antececal	18 (2.7%)	7 (2.2%)	11 (3.1%)	0.3458
Hepatic	14 (2.1%)	7 (2.2%)	7 (2%)	1.0000
Others	19 (2.8%)	10 (3.2%)	9 (2.6%)	0.8185
Total	669 (100%)	317 (100%)	352 (100%)	

Note. All figures are numbers (%).



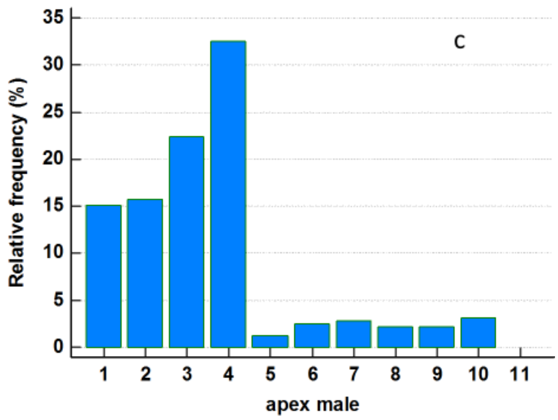


Figure (2): Histograms illustrating the relative frequency of appendix apex positions in all patients (a), female subgroup (b), and male subgroup (c). 1 retrocecal; 2 pelvic; 3 midline; 4 subcecal; 5 preileal; 6 psotileal; 7 paracecal; 8 antececal; 9 hepatic; 10 others.

Regarding the appendix base, the most common location relative to the ileocecal valve was inferior, posterior, and medial in 230 (34.4%) of 669 patients. The appendiceal base was inferior and medial in 118 (17.6%); inferior and posterior in 72 (10.8%); inferior, posterior, and lateral in 53 (7.9%); inferior in 39 (5.8%); inferior, anterior, and medial in 36 (5.4%); posterior and medial in 35 (5.2%); inferior and lateral in 20 (3%); posterior and lateral in 14 (2.1%); inferior, anterior, and lateral in 12 (1.8%) patients. Other locations were posterior in 10 (1.5%); inferior and anterior in 10 (1.5%); medial in 6 (0.9%); superior, posterior, and medial in 4 (0.6%); superior, posterior, and lateral in 4 (0.6%); superior and posterior in 2 (0.3%); anterior and medial in 2 (0.3%); superior, anterior, and medial in 1 (0.1%); superior and medial in 1 (0.1%) patients. see Table 2.

Table (2): The total number and percentage of appendiceal base locations relative to the ileocecal valve.

Superior	Inferior	Not sup nor inf.	anterior	posterior	Not ant nor post	Medial	lateral	Not med nor lat
12/669 (1.8%)	590/669 (88.2%)	67/669 (10%)	61/669 (9.1%)	424/669 (63.4%)	184/669 (27.5%)	433/669 (64.7%)	103/669 (15.4%)	133/669 (19.9%)

The most common appendix base location was inferior, posterior, and medial in most appendix apex positions including retrocecal, (22%, 22 of 100), pelvic (35%, 54 of 153), midline (42%, 55 of 130), subcecal (37.7%, 68 of 180), postileal (48%, 14 of 29), antececal (38.8%, 7 of 18) and others (31.5%, 6 of 19) appendices. Whereas, inferior, posterior, and lateral were the most common base locations encountered in paracecal (20%, 4 of 20), and hepatic (28.5%, 4 of 14) appendices.

Regarding the maximum appendix diameter, the mean of the maximum appendiceal diameter was 5.36 mm ± 1.73 (SD), range (2-23 mm). The maximum appendiceal diameter was greater than 6 mm but not greater than 10 mm in 154 patients (23%) and was greater than 10 mm in eight patients (1.2%), see Fig 3.

The appendix with the largest diameter (23 mm) had a focal saccular-like dilated segment that contained faeces, air, and appendicolith, see Fig. 4.

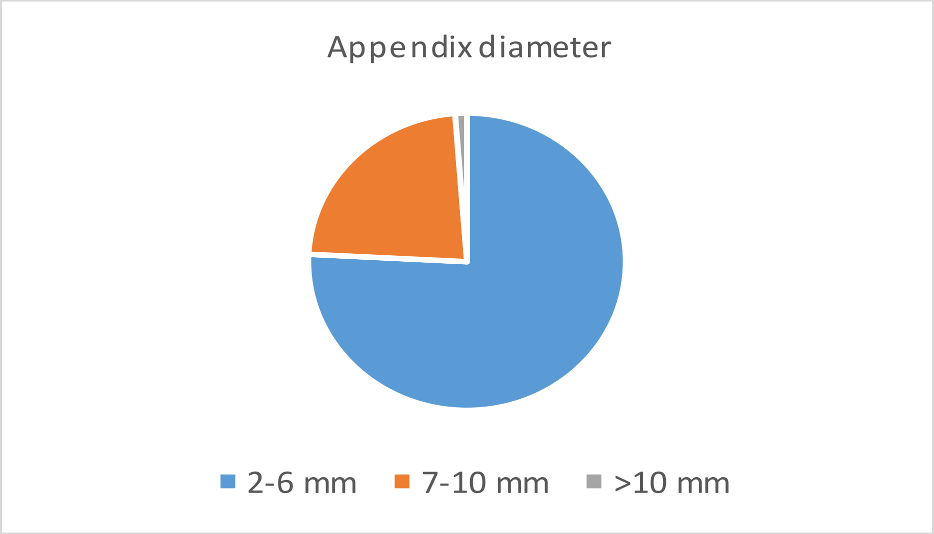


Figure (3): The chart shows the percentage of appendices with a diameter ≤ 6mm, 7-10 mm, and > 10 mm.

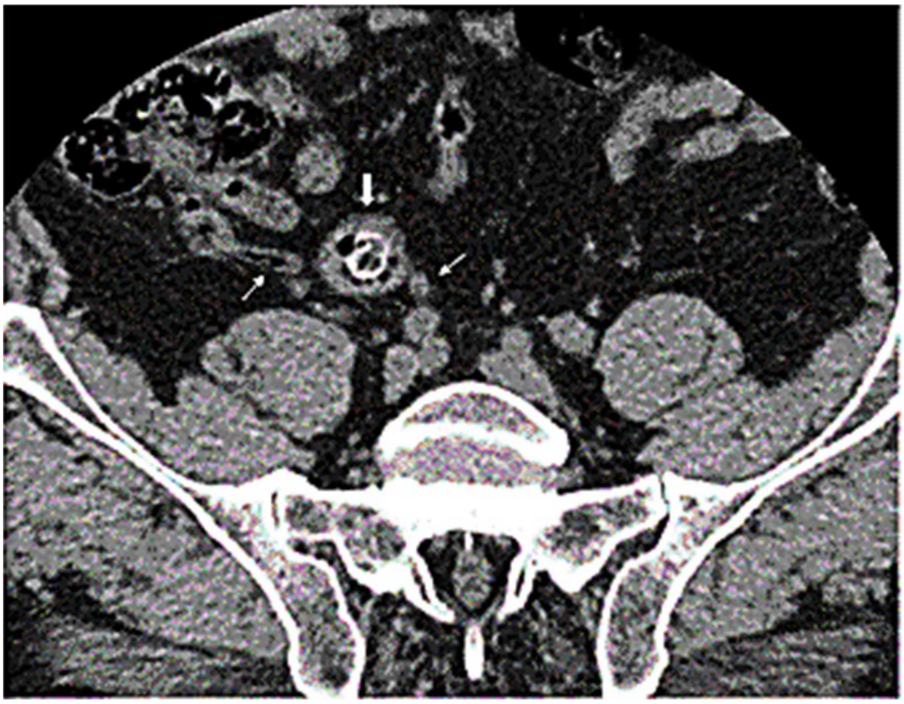


Figure (4): The appendix that had the greatest diameter contained air, fecal content, and appendicolith at the largest segment (thick white arrow). The thin white arrows point to the much smaller appendix segments.

According to patient gender, the mean of maximum appendiceal diameter was 5.64 mm ± 1.96 (SD), (range; 2-23 mm) in men, and 5.11 mm ± 1.45 (SD), (range; 2-12 mm) in women. There was a statistically significant correlation between appendix diameter and gender (P=0.0001).

There was no statistically significant correlation between diameter and patient age (P=0.3866).

As for measurement results of the single wall thickness of the appendix, the single wall thickness was indiscernible in 205 of 699 patients due to a collapsed appendix lumen with no content in 197 patients or collapsed lumen with small appendicoliths in eight patients. In the remaining

464 patients, the single wall thickness of the appendix ranged from 0.3 to 3.5 mm and a mean value of 1.03 mm ± 0.43 (SD).

The luminal contents of the appendix were identified in 472 patients (70.6%) out of 669 patients. In the remaining 197 patients (29.4%), the appendix was collapsed with no luminal content. The most common luminal content encountered in the study group was air only (280/669 patients, 41.8%). The appendix contained air and faeces (32/669, 4.8%); air and appendicoliths (32/669, 4.8%); air and fluid (24/669, 3.6%); air and non-solid high density (23/669, 3.4%). Fluid only (15/669, 2.2%); appendicoliths only (13/669, 1.9%); faeces only (12/669, 1.8%); low density (12/669, 1.8%); air, faeces, and appendicoliths (7/669, 1%), fluid and appendicoliths (4/669, 0.6%); air, fluid, and appendicoliths (2/669, 0.3%).

Overall, appendicoliths were detected in 58 patients (8.7%). Of the 34 patients, where oral contrast was given, the appendix lumen contained contrast medium in 16 patients (16/34, 47%).

DISCUSSION

The primary objective of this study was to estimate the prevalence of different locations of the visible normal appendix on MDCT. Despite the surgical and pathological importance of the appendix, there is no standardized classification method for the anatomical location of the appendix. In this study, a clear and basic classification system was employed. It included all the typical locations (retrocecal, pelvic, Midline, subcecal, ileal, paracecal, and antececal) plus hepatic and other locations. All are clinically relevant and were regularly described in the literature (De León et al., 2021; Kacprzyk et al., 2020; Lee et al., 2014; Mwachaka et al., 2014; Willekens et al., 2014). Knowledge of all these possible locations of the appendix should facilitate the regular identification of the appendix on CT abdomen studies, therefore allowing early diagnosis and treatment of acute appendicitis, especially in cases with atypical presentation caused by appendix position (De Souza et al., 2015).

The amount of previous studies that describe the prevalence of anatomical variations of appendix position over the years is large and beyond the scope of this study. Moreover, they cannot be compared to the present study due to a different methodology in the analysis or different definitions of the appendix location have been used. Most of these studies whose analysis was intraoperative on inflamed appendices or postmortem on cadavers reported the retrocecal appendix as the most common (Chidambaram et al., 2021; De Souza et al., 2015; Mwachaka et al., 2014; Nur Bazlaah et al., 2021; Parmar et al., 2017). It has been hypothesized that the kinking of the appendix by loaded cecum or ascending colon may be the cause of the prevalence of retrocecal appendix among appendicitis patients (Khatun et al., 2019). In addition, the change in intraabdominal pressure and the effect of gravity postmortem may change the position of the appendix relative to the in vivo location (Lee et al., 2014).

In the current study, whose analysis was based on the in vivo location of the vermiform appendix on MDCT, most appendices were subcecal (27%) followed by pelvic (23%). These results are concordant with a similar study from Korea, which also found subcecal appendix prevalence (42.8 %) followed by pelvic (16.2%) (Lee et al., 2014). Other similar studies, contrary to the present study, reported a predominant pelvic position of the appendix, 66% in a study from Belgium (Willekens et al., 2014) and 24% in another study from Columbia (De León et al., 2021). The discrepancy in the results of the appendix apex position between the present study and the two previous studies could be explained by multiple factors. Firstly, the study sample size. The current study had a large sample size of 669 patients compared to the two studies, which had a smaller sample size of 186 and 83 cases, respectively. Secondly, there are ethnic and geographical variations between the populations studied, which may account for the anatomical differences in the appendix. Thirdly, Wilkenens et al. (2014) broadly classified the appendix location in their study into only four locations: retrocecal, paracecal, pelvic, and midline, which means all subcecal appendices were defined in their study as pelvic, resulting in a much higher percentage of pelvic appendix location.

Regarding patient gender, there were statistically significant gender differences in the pelvic and post-ileal appendiceal positions, with a higher prevalence in females ($P<0.0001$ and $P=0.015$, respectively). The higher female predominance in the pelvic position is likely due to anatomical variations between male and female pelvises. The male pelvis is taller, narrower, and more compact, while the female pelvis is larger and broader, allowing more space for the appendix to descend into the pelvis (Lewis et al., 2017). The finding of pelvic appendix position being the most common in females also has important clinical implications on diagnosing abdominal pain in female patients, as the pelvic appendix might be difficult to detect on CT in thin females with a crowded pelvis, efforts must be made to identify the appendix before rolling out appendicitis and narrowing the differential to gynecological etiology. Azhagiri et al. (2019), in their cohort of appendicitis cases examined by CT, reported the pelvic appendix position as the most common in females, in addition to a higher percentage of post ileal appendix found in females than in males. These results are in accordance with the results of the present study (table 1). Similar to the current study, Lee et al. (2014) also reported statistically significant results regarding gender differences in appendix position on MDCT. However, in contrast to the current study, they reported a higher male prevalence in the antececal, postileal, midline, and subcecal positions.

From clinical experience, a radiologist can identify the appendix position on MDCT studies by first identifying its base and then following along its course to the tip. The base of the appendix has a constant anatomical relationship to the ileocecal valve, which allows the identification of the appendix origin from the cecum on both ultrasound and CT (Whitley et al., 2009). To the best of my knowledge, only one study commented on the location of the base of the appendix identified on CT with respect to the ileocecal valve (Willekens et al., 2014). Similar to the present study, the most common location of the appendiceal base was inferior, posterior, and medial (37% compared to 34.4% in the current study). In the present study, the second most common location was inferior and medial (17.6%), followed by inferior and posterior (10.8%), while in Willekens et al. (2014) cohort, it was inferior, posterior, and lateral (17%), and inferior and medial (8.6%) respectively. Overall, in the present study, the base was more likely to be found inferior (88.2%) than superior (1.8%), posterior (63.4%) than anterior (9.1%), and medial (64.7%) than lateral (15.4%) relative to ileocecal valve (table 2), which was consistent with Willekens et al. (2014) results.

Regarding the diameter of the normal appendix, the 6 mm diameter cut-off value for detecting appendicitis was derived from ultrasound studies, which used a graded compression technique during the scan. Therefore, it cannot be adapted to a CT scan where the appendix is not compressed during acquisition (Krisem et al., 2023). Other authors suggested a threshold of 10 mm for appendicitis diagnosis on CT (Willekens et al. 2014). In the present study, the mean maximum appendiceal diameter was 5.64 mm ± 1.96 (SD). About 24% of visualized appendices had a diameter greater than 6mm, and only 1.5% of the appendices had a diameter greater than 10 mm. The lack of access in the current study to clinical information, limits the capacity of analysis in the large-diameter appendices, as clinical correlation is needed in such cases that do not exhibit periappendiceal fat stranding to suggest appendicitis. Other authors have reported that a normal appendix on CT scans can be distended to ≥10 mm (Charoensak et al., 2010; Whitley et al., 2008; Willekens et al., 2014). Charoensak et al. (2010) reported as high as 62% of normal appendices in their CT series had a maximum diameter greater than 6mm, and 2.5% were greater than 10 mm in diameter, which could explain the findings of the present study. These results support the claim that the appendiceal diameter alone should not be relied upon to diagnose appendicitis (Moskowitz et al., 2019).

The appendix with the maximum outer diameter in the present study was filled with air, faeces, and appendicolith at the distended segment, which is in accordance with previous reports that correlated the presence of intraluminal contents with a larger appendiceal diameter (Ozer et al., 2021; Tamburrini et al., 2005).

In the current study, there was a correlation between appendiceal diameter and gender, with larger appendices observed in males. To our knowledge, only one previous study examined the appendiceal diameter on CT according to gender. The mean appendix diameter was higher in males, but in contrast to the present study, the difference was not statistically significant (Ozer et al., 2021). There was no correlation between diameter and age.

The appendix wall thickness in the present study had a mean of 1.03 mm ± 0.43 (SD) and a range of 0.3 to 3.5 mm. The criteria suggested for the mural thickness of the appendix in appendicitis are variable between different reports, with a cutoff value of more than 3 mm being frequently used (Kim et al., 2014). The results of the current study are consistent with this value, as only one appendix (0.2%) had a mural thickness greater than 3 mm. A similar study by Wilekens et al. (2014) reported a wall thickness > 3 mm in 8% of normal appendices on CT.

The majority of the visible appendices had contents in their lumen, and most of the content was air. Air is a common finding in appendiceal CT. Hong et al. (2016) results indicated that Intra-appendiceal air is a typical finding in the normal appendix and is seen more frequently within the normal appendix than within the inflamed appendix. Appendicular appendicoliths were visualized in 8.7% (58/669). This is in accordance with one recent CT series that showed appendicoliths in 4.4% (11/248) of normal appendices (Ranieri et al., 2021). Appendicoliths are not specific signs of appendicitis and are usually found accidentally in abdominal CT (Kaya & Eris, 2011). However, they are more prevalent among appendicitis patients (nearly 40%) and associated with a higher risk of perforation (Ranieri et al., 2021).

CONCLUSION

Knowledge of anatomical variants of the vermiform appendix and reporting its location as a CT finding is important for the diagnosis of acute appendicitis. The most common position of the normal appendix seen on MDCT images is subcecal. The relative frequency of certain positions of the appendix also differs according to patient gender, with the pelvic and postileal positions being more predominant in females. Considering the prevalence of specific locations of the appendix is relevant in clinical and surgical settings for better diagnosis of patients.

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ETHICS

After approval by the hospital radiology department, a retrospective review of images was acquired in keeping with ethical standards.

Duality of interest: There is no duality of interest, no conflict of interests.

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