

Review Article

Incidental and Prophylactic Appendectomy in Clinical Practice: A Review Article

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Abstract

Although appendectomy has very low rates of morbidity and mortality, the surgical removal of a normal appendix remains controversial. The incidental appendectomy is performed when a normal appendix is removed during another abdominal procedure, whereas in the prophylactic appendectomy patients undergone surgery specifically to remove the appendix. The purpose of this article is to present a review of the literature on current concepts about “incidental appendectomy” and “prophylactic appendectomy”. Although the exact organic function of the vermiform appendix is not clear, this tubular organ is useful for reconstructive surgery in urological, biliary and pediatric procedures. Since there is no reliable predictor for developing acute appendicitis, prophylactic and incidental appendectomy should be performed in specific situations for selected patients with low risk for surgical complications.

INTRODUCTION

The vermiform appendix is more frequently found in the right lower abdominal quadrant near the convergence of the colonic taenias. Nevertheless, it can vary in its location and can also be found in the pelvis or in the left side of the abdomen [1]. Although the appendix is considered a vestigial organ in humans, previous studies have already suggested a role for this organ in the neuroendocrine and immunological systems [2].

Appendectomy is the most common surgical procedure of the abdomen at the emergency department since it is the standard treatment when the diagnosis of acute appendicitis is suspected or confirmed [3]. Patients undergoing minimally invasive surgery for uncomplicated appendicitis can be discharged within 24 hours after surgical treatment [4]. Although appendectomy has very low rates of morbidity and mortality, the surgical removal of a normal appendix remains controversial [5].

In this study, we present a review article based on references found in the Pubmed and Scielo using the keywords “incidental appendectomy” and “prophylactic appendectomy”.

Incidental appendectomy

The preoperative diagnosis of acute appendicitis can be established based on clinical examination, laboratory tests and image exams in the majority of cases, but in some atypical cases the correct diagnosis is not clear and the surgeon may found a healthy appendix during surgical exploration [6,7]. The incidental

appendectomy is defined when a normal appendix is removed during another surgical procedure unrelated to appendicitis or other disease of the appendix. For example, The American College of Obstetrics and Gynecology recommends prophylactic appendectomy in young women undergoing pelvic surgery [8,9]. Women diagnosed with pelvic endometriosis with recurrent pain in the right lower quadrant may benefit from the resection of the appendix due to the differential diagnosis with appendicitis (Figure 1).

More recently, Choksuwanttanakul et al. [10], published a prospective cross-sectional study in which 141 patients

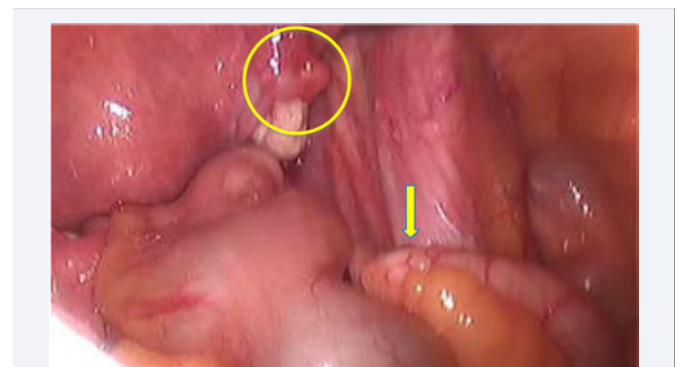


Figure 1 Tip of a normal appendix located in the pelvis (arrow) in a patient with pelvic and ovarian endometriosis (circle).

who underwent incidental appendectomy and post-partum sterilization (PPS) were compared with 182 that underwent only PPS. There were no differences on complications rate, with only 7.5 minutes added to the procedure. Incidental appendectomy was also evaluated in robotic procedures. Hüttenbrink et al. [11], related 53 patients who underwent incidental appendectomy during robotic-assisted laparoscopic radical prostatectomy. There were no complications related to the appendectomy.

Surgeons who speak in favor of incidental appendectomy argue about its benefits, since it is an easy to perform procedure, with low rate of complications and no additional anesthetic risk is needed in this situation. The previous removal of the appendix avoids future acute appendicitis which has a life time risk of about 7% in the population [2]. Incidental appendectomy also eliminates confusion over future conflicting diagnosis involving appendicitis. On the other hand, some authors advocate that opening an organ containing feces may contaminate the site of surgery leading to morbidly and infectious complication [8].

Incidental appendectomy is up to 12 times more frequent in woman between 35-44 years than in men at the same age. This high incidence is probably a result of a great number of surgeries in this female group due to symptoms in the lower abdomen and gynecological conditions such as endometriosis (Figure 1) [8]. The removal of an apparently normal appendix was also described during cholecystectomy, urological surgery such as cystectomy and urinary diversion and during trauma surgery with low rates of morbidity [5].

Another concern that supports incidental appendectomy is the probability to find an appendicular tumor. However since pseudomyxomaperitonei secondary to appendicular neoplastic or neuroendocrine tumor are very rare, some authors advocate that it is necessary. In the Hüttenbrink [11] series the authors found appendiceal mucinous neoplasm in 2 patients out 53 incidental appendectomies (3,8%) [11]. In another series, Khan et al. [12], found that 7 out 169 patients (4%) who underwent colorectal resections for colorectal cancers had synchronous appendicealneoplasia. Among the 7 patients, 3 had mucinous cystadenomas, 2 cytoadenocarcinomas, 1 carcinoid tumor and 1 villous adenoma. These authors concluded that incidental appendectomy should be performed in this setting.

Prophylactic appendectomy

While incidental appendectomy is performed in association with another abdominal procedure (for example: oophorectomy, hysterectomy, cholecystectomy, etc.), prophylactic appendectomy occurs when of a healthy appendix is removed in the absence of any other abdominal procedures [5]. In this situation, the patient is referred to the operating room only to resect the appendix. It was described for people who were going to stay a long period of time without healthy assistance on military, polar or space missions, for example [13]. The risk of acute appendicitis during space flight or polar mission is unknown. The Antarctic program described 1 death and high rate of perioperative complication due to acute appendicitis [14].

Even though appendectomy is a simple and safe procedure, some complications have been described [5,15, 16]. A postoperative adhesion and consequently ileal necrosis was

described by Davis [5] after prophylactic appendectomy in a special forces operative before military operation.

Foreign bodies have been described in the lumen of the appendix. In this situation prophylactic removal of the appendix is recommend in order to reduce the risk of appendicitis, potential perforation and possibly systemic toxicity (after ingestion of elemental mercury, for example) [17,18].

DISCUSSION AND CONCLUSION

Despite the absense of evidence on the exact organic function of the vermiform appendix, it has been well recognized as a tubular structure adequate to be used in some reconstructive surgical procedures. In 1980, Mitrofanoff described an appendicovesicostomy that permitted cateterization of the bladder and treatment of its neurogenic dysfunction [19]. Another operation, the Malone procedure connects the cecum to the abdominal wall (Figure 2a-b-c) through the appendix for antegrade colonic irrigation in patients with fecal incontinence or severe constipation mainly in neurological diseases [20]. The appendix can also be useful in biliary reconstruction [21]. Incidental and prophylatic appendectomy should be avoided in a scenario of a disease that might need this tubular organ for any reconstructive surgery.



Figure 2a Schema about the antegrade continence enema (Malone) procedure. The appendix is sutured to the skin, the points B-B' and C-C' are approximate for the tunneling of the appendicular lumen.

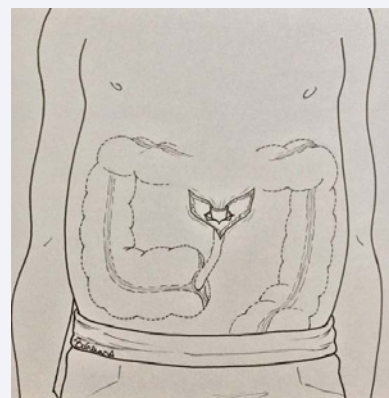


Figure 2b Schema about the antegrade continence enema (Malone) procedure.



Figure 2c Postoperative aspect of laparoscopic antegrade continence enema (Malone) procedure.

The risk of appendicitis decreases with age in adults and it is half among people aged 50-54 years compared with people aged 30-34 years [14]. Acute appendicitis is diagnosed in 8% of children with abdominal pain in the emergency service. The incidence of appendicitis in the first 4 years of life is 1-6 patients per 10,000 and 19-28 per 10,000 in children with 5-14 year-olds [21]. The incidence of complications of removal of healthy appendix is not well known in the childhood since this procedure is uncommon in young people with no abdominal comorbidities. Due to lack of evidence, prophylactic and incidental appendectomies are not routinely recommended in children [8,20,21].

Until this date, no case of acute appendicitis has been described during space flight but the absence of a surgeon and the impossibility of an emergency surgical procedure could lead to death in a mission out of the Earth. More studies are essential on space station inhabitants regarding the immunological response and possible increase in bacterial virulence. The influence of environmental changes as the low temperatures or the zero-gravity on human physiology and clinical manifestation of common diseases are still not well understood [14].

Although some studies suggested that appendectomy is potentially cost savings for younger patients undergoing an elective laparoscopic procedure, this benefit cannot be generalized on a large scale for the various populations with different socioeconomic backgrounds [3]. The cost of a prophylactic appendectomy is estimated between \$660 to \$1873 [3]. Further studies on postoperative complications and consequences of appendectomy should be performed in order to indicate the removal of a normal appendix based on the cost-effectiveness.

The authors recommend considering the incidental appendectomy when the appendix is localized out of the right lower quadrant of the abdomen. This situation can be found in intestinal malrotation, mobile cecum syndrome or more frequently when the cecum is released from the retroperitoneum for an anastomosis and the appendix goes to the pelvis or any other abdominal quadrant [22,23]. Incidental removal of the appendix should also be performed when another cause for pain was not found during surgery or for uncontrolled endometriosis to avoid future misdiagnosis [23].

Even though appendectomy is a well-standardized procedure between surgeons, carrying a patient to the operation room for removal of a normal appendix under anesthesia requires ethical discussion [8]. Information to the patient about the potential for postoperative complications and providing informed consent form for surgery permission are highly recommended.

In the recent decades, the advent of minimally invasive surgery increased the number of laparoscopic abdominal examination to investigate diseases of the abdomen, which allows an adequate and easy investigation of the entire abdominal cavity [24]. Consequently, the number of incidental appendectomies tends to increase.

Unfortunately there is a lack of controlled trials analyzing the risks of incidental and prophylactic appendectomy. Furthermore, there is no reliable predictor for developing acute appendicitis and the population at high risk cannot be identified. In conclusion, prophylactic and incidental appendectomy should be performed in a specific context of risks and benefits to select eligible patients in daily clinical practice.

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