

## Minireview Article

### Intestinal Invaginations in Adults

#### Abstract

Intestinal invaginations in adults are rare—~~phenomenon~~ ~~phenomena~~. The most ~~critical~~ ~~important~~ etiological causes are malignancies. The most common symptoms are abdominal pain, nausea, vomiting, inability to pass flatus and defecation, and ~~distention~~ ~~distention~~ in the abdomen due to intestinal obstruction. On physical examination, abdominal distention, decreased bowel sounds, and sometimes a mass may be palpable on deep palpation.

In direct radiography, ~~air-liquid~~ levels can be seen. A mass can be detected in the invagination area on ultrasonography. Definitive diagnosis is usually made by computerized tomography.

Treatment of intestinal invaginations in adults is usually surgery. It can be done by laparoscopic or open surgery.

As a result, we think that when a definitive diagnosis is made in adults, intestinal invagination should be treated surgically ~~under~~ ~~in accordance with~~ oncological principles, since the etiological factor is mostly malignancy.

**Keywords:** ~~ileocele~~ ~~ileocele~~, adult invagination, intussusception, diagnosis, treatment.

## Introduction

Intestinal invagination (intussusception) is ~~the interlineation~~ ~~intertwining~~ of the intestinal segments like a ~~telescope~~ ~~telescop~~. Invaginations may occur in ileoileal, ileocecal or colocolic form. The most common type is ileocecal invaginations.<sup>1-4</sup> Intestinal intussusception ~~are-is~~ especially common in children under ~~1-one~~ year of age.<sup>5</sup> They are rare in adults and are about 1-5% cause of bowel obstruction.<sup>1,3,4</sup>

A wide variety of factors might play a role in intestinal invaginations; The most important cause of intestinal invaginations in adults is malignancies.<sup>1,3,4,6-12</sup> It has also been reported that the etiologic ~~cause-reason~~ is malignancy, especially in colonic invaginations.<sup>13</sup>

In a study by Cherni et al., it was reported that nitric oxide (NO) is the major inhibitory neurotransmitter in the enteric nervous system, inflammatory events cause excessive NO release in cases of ~~ileocecal~~ ~~ileocecal~~ invagination, which results in severe relaxation of the ~~ileocecal~~ ~~ileocecal~~ valve and ultimately ~~ileocecal~~ ~~ileocecal~~ invaginations.<sup>14</sup> In a similar study by Kaemmerer et al., it was reported that adenovirus infections cause CD3 positive lymphocyte infiltration, which causes enlargement of ~~peyer's~~ ~~Peyer's~~ patches and mesenteric lymph nodes due to inflammatory neuropathy in the mesenteric plexus, which is the cause of ~~ileocecal~~ ~~ileocecal~~ invaginations.<sup>5</sup>

~~Some cases are~~ ~~There are cases that are~~ etiologically less common in adults, including intraluminal lipoma in the ileum<sup>15-17</sup>, endometriosis in the appendix and ileum<sup>18</sup>, inflammatory fibroid polyp (Vanek tumor)<sup>19,20</sup>, due to colonoscopy<sup>21</sup>, Meckel's diverticulum<sup>22</sup>, intestinal tuberculosis<sup>4</sup>, transmural diffuse large B cell lymphoma infiltration<sup>23</sup>, idiopathic<sup>24</sup>, submucosal colonic lipoma<sup>2,25</sup>, Chron's disease<sup>26</sup>, leiomyoma in the ileum<sup>27</sup>, Burkitt lymphoma<sup>28</sup>, cases of induced intestinal invagination have been reported.

A case of double ilio-caeco-colic invagination due to the tumor was reported in a case report by Saclo et al.<sup>29</sup>

Zhang et al. reported an infrequent ~~a very rare~~ case of duodeno-duodenal invagination in a 23-year-old male patient.<sup>30</sup>

In cases of invagination, patients are usually admitted to the hospital with symptoms such as abdominal pain, nausea, vomiting, inability to pass flatus and defecation, and abdominal distention ~~distention~~ due to intestinal obstruction.

Depending on the obstruction site in the intestines, air-fluid levels may appear on the abdomen x-ray. Enlarged bowel loops and air-fluid classes levels may be revealed ~~be reveal~~ on ultrasonography.<sup>1,6</sup>

The “pseudo- kidney” appearance formed by the invaginated intestines on abdominal ultrasonography might be diagnostic.<sup>7</sup>

In intestinal invaginations, CT has the high sensitivity and specificity rates in diagnosis.<sup>2,6,15,17,19,28</sup>

According to the results of the study by Peters et al., CT alone is sufficient for a definitive diagnosis in intestinal invaginations.<sup>15</sup>

According to a study by Treppiedi et al., using "contrast-enhanced tomography" instead of classical CT in intestinal invaginations can significantly increase the rate of correct diagnosis.<sup>31</sup>

Although ileocecal invaginations are rare in adults, they are cases that should be handled carefully during follow-up and treatment, as malignant causes usually play a role in etiology.

Therefore, some authors do not recommend reducing ~~attempting a reduction~~ before or during the operation, considering the oncological risks.<sup>3,7,8</sup>

However, in a retrospective study, Honjo et al. reported that 28 of 44 adult invagination cases had a reduction, which and reduction should be attempted before or during surgery.<sup>1</sup>

Yakan et al. reported that reduction should only be attempted in ileoileal intussusceptions without a suspected malignancy in their study in an invagination case series of 20 cases.<sup>13</sup>

In cases of invagination, a reduction is generally performed by pneumatic or enema.<sup>31,32</sup>

Treppiedi et al. reported in their study that pneumatic reduction should be tried before surgery in cases of invagination.<sup>31</sup>

Zhang et al. reported that they achieved successful results with an endoscopic reduction in a-the case of duodeno-duodenal invagination.<sup>30</sup> Surgical applications in intestinal invaginations may differ according to the etiological factor, open or laparoscopic surgery can be applied.<sup>32</sup>

The width of the operation to be performed should be kept large considering the risk of malignancy, and "en bloc" resection should be performed.<sup>2,8,29</sup>

Honjo et al. in 12 adult intussusception cases<sup>1</sup>, Saito et al. in a case caused by an intestinal pedicled lipoma<sup>16</sup>, Hong performed laparoscopic resection and anastomosis in a case of lipoma-induced invagination.<sup>17</sup> However, as seen in the literature reviews, there are no cases of laparoscopic ileocecal iliocecal invagination resection in large series in adults yet.

In a study conducted by Bahman, the reduction was tried 3-three times with an interval of 2-4 hours in invagination cases, successful results were obtained in 85% of the cases, and 52 patients cases of unsuccessful intestinal invagination were randomly divided into 2-two groups: Laparoscopic surgery was performed in the first group of 26 people, and open surgery was performed in the other group of 26 people, and the duration of the operation, the transition period to oral nutrition, hospitalization times, wound infection rates were compared. According to the results obtained in the study; operation times were found to be significantly higher in the laparoscopic group than compared to open surgery, and no

significant difference was found between the two groups in terms of other criteria.<sup>32</sup> For this reason, it has been reported that reduction should be attempted primarily in cases of intestinal invagination and that laparoscopic surgery is as safe as open surgery.

## **Conclusion**

According to the results of our study, the most common cause of intestinal invaginations in adults is malignancies. CT is the gold standard in diagnosis. However, in many cases, the diagnosis can be made with USG. In invagination cases with suspected malignancy, oncological principles should be followed. Open or endoscopic methods can be used safely in surgical treatment.

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