

## CASE REPORT

# Endoscopy as a diagnostic and therapeutic alternative technique of taeniasis

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## ABSTRACT

Despite a low incidence in developed countries, gastrointestinal taeniasis should be suspected in patients with abdominal pain, diarrhea, anemia, and/or malabsorption of unknown origin, even more so if they come from endemic regions or areas with poor hygienic and alimentary habits. Diagnosis is traditionally reached by identifying the parasite in stools, but more recently both serological and immunological approaches are also available. Based on a patient diagnosed by gastroscopy, a literature review was undertaken of patients diagnosed by endoscopy. We discuss endoscopy as diagnostic modality, and the effectiveness and safety that endoscopic treatment may provide in view of the potential risk for neurocysticercosis.

**Key words:** *Taenia saginata*. Diarrhea. Diagnosis. Treatment. Endoscopy.

## INTRODUCTION

Intestinal taeniasis is a universal zoonosis. It is caused by three different species: *Taenia saginata* (beef tapeworm), *Taenia solium* (pork tapeworm), and *Taenia asiatica*, the primary risk factors for infection being the ingestion of undercooked or raw contaminated meat and poor hygienic habits. It may present with a variety of manifestations ranging from asymptomatic or oligosymptomatic forms with mild diarrhea, abdominal pain or malabsorption to severe illness with high morbidity and mortality, including cholangitis and intestinal perforation (1). Traditionally, its diagnosis results from the identification of parasites in the stools, with serological and immunological approaches being more recently available. Only a few case reports (2-20) refer to endoscopy as diagnostic method, and information in the literature on the effectiveness, technical aspects, and safety of endoscopic treatment is nearly

nonexistent. In the wake of patient diagnosed by gastroscopy, we review the series of case reports in the literature that were diagnosed using endoscopy, emphasizing the diagnostic aspect of endoscopy as well as the efficacy and safety of endoscopic treatment.

## CASE REPORT

A 43-year-old man with no allergies and with a history of smoking, alcoholism, past cocaine abuse, gastric ulcer, and uncontrolled HCV infection presents with intermittent diarrhea flare-ups for the past 10 years. He arrives at the ER following 10 days of malaise, asthenia, intermittent upper abdominal stabbing pain, and significant weight loss (18 kg) in the last 7 months. No changes in bowel movements or voiding are reported. No fever, cough, nocturnal sweating, or neurological complaints. No trips to tropical countries or epidemic family environment. Physical examination reveals hemodynamic stability, normal skin color, absence of fever, no adenopathies, and a soft, depressible abdomen without ascites. Weight was 52 kg. Laboratory tests showed no leukocytosis or anemia, and presence of parameters suggestive of advanced liver disease. Feces were negative. A gastroscopy was performed, which visualized a flat, mother-of-pearl, very long, mobile structure suggestive of being a parasite (Figs. 1 A-C). Removal with biopsy forceps was attempted (Fig. 1D), which failed to be complete - the parasite was easily fragmented, and the head could not be found or withdrawn. Using H-E techniques the pathology study confirmed a *Taenia saginata* specimen (Fig. 2). Treatment was completed with single-dose niclosamide 2 g, and the patient was discharged for outpatient follow-up. He returned after 6 months with a weight of 68 kg, and was completely asymptomatic.

Received: 28/10/2014

Accepted: 13/05/2015

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Canaval-Zuleta HJ, Company-Campins MM, Dolz-Abadía C. Endoscopy as a diagnostic and therapeutic alternative technique of taeniasis. Rev Esp Enferm Dig 2016;108:371-376.

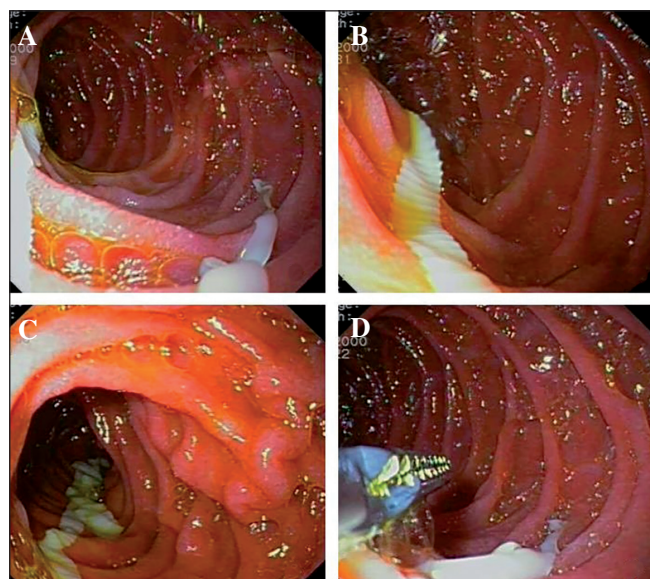


Fig. 1. A. Visualization of *Taenia* with its proximal end (head) anchored to the second duodenal portion. B and C. Typical macroscopic view of a tapeworm during gastroscopy as a very long, flat, whitish, segmented, mobile structure. D. Attempt at scolex removal with biopsy forceps.

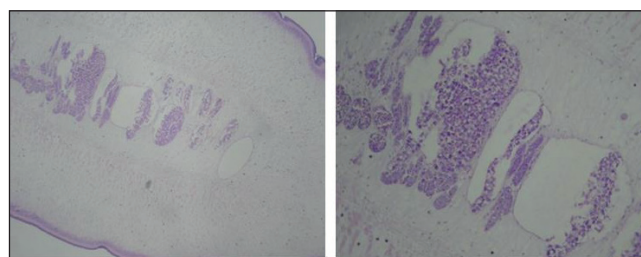


Fig. 2. Microphotographs of *T. saginata* stained with hematoxylin-eosin (H-E).

Table I. Search terms and strategy on PubMed

Search terms
1. Endoscopy
2. Gastroscopy
3. Colonoscopy
4. Capsule endoscopy
5. Enteroscopy
6. 1 or 2 or 3 or 4 or 5 or 6
7. <i>Taenia saginata</i>
8. 6 and 7

## Method

Search results from PubMed, MEDLINE, Embase, Web of Science, and Google Scholar regarding cases of infection with *Taenia saginata* clearly diagnosed by digestive endoscopy were reviewed, and therapeutic intent for endoscopy was assessed. Search terms included: “taenia”, “taenia saginata” and “endoscopy” (“gastroscopy”, “colonoscopy”, “capsule endoscopy”, “enteroscopy”), both in English and in Spanish. The search strategy used on PubMed is shown in table I. Our search revealed 25 cases, of which, 7 were excluded because the lack of endoscopic diagnosis. Of all 17 selected cases, 7 were diagnosed by gastroscopy, 6 by capsule endoscopy, 2 by colonoscopy, and 2 by double balloon enteroscopy (Table II).

## DISCUSSION

While many patients with taeniasis remain asymptomatic, this zoonosis may present with highly variable manifestations resulting from a number of mechanisms, including parasite-released toxic metabolites eventually absorbed by the bowel mucosa, gastrointestinal irritation/mechanical obstruction, and intestinal malabsorption. Major signs and symptoms reported include proglottid release, abdominal pain predominant in the epigastrium, nausea, vomiting, hunger, diarrhea, anal pruritus, anemia, eosinophilia, and less commonly urticaria, evidence of hypersensitivity, and even severe acute medical or surgical conditions such as constitutional syndrome, acute appendicitis, Meckel’s

diverticulitis, cholangitis from obstructed Wirsung duct, acute pancreatitis, gangrenous cholecystitis, intestinal obstruction or perforation, enteric anastomosis dehiscence (2), and gastrointestinal bleeding as hematemesis/melena (7). From all the above, a high index of clinical suspicion, diagnostic testing, and effective treatment are of utmost importance.

In our case, core symptoms included intermittent chronic diarrhea in association with upper abdominal pain and constitutional syndrome; the diagnostic studies performed ultimately led to the diagnosis of taeniasis, as the parasite was found at the second duodenal portion and was proven to be the origin of symptoms, which improved following specific therapy.

Diagnosis in the literature is traditionally described as the result of stool testing, and endoscopic diagnosis is usually overlooked, which is reasonable in the initial setting given endoscopy is an invasive, costly technique that requires the availability of specifically qualified personnel. However, endoscopy is actually a highly efficient, valid approach that provides certainty in diagnosing taeniasis by allowing the direct visualization of the tapeworm at some point within the gastrointestinal tract, the parasite appearing as a long, flat, segmented, mobile structure with a whitish mother-of-pearl color. Moreover, even with a doubtless diagnosis of taeniasis, the main drawback of gross visualization, whether in the stools or during endoscopy, is that it will not inform on the type or species (*T. solium* or *T. saginata*). Such differentiation, which may only result from microscopic, serology testing (ELISA - PCR) (1), is very important from a clinical, epidemiological and thera-

Table II. Endoscopy and *Tenia saginata*

	Author	Year	Site	Management	Ref.
Gastroscopy	Descombes P, et al.	1981	Duodenum	Parasite removal	2
	Tamiki Arakaki, et al.	1988	Jejunum	Parasite removal	3
	Antaki N, et al.	2002	Bulb	Unknown	4
	Liu YM, et al.	2005	Duodenum	Parasite removal	5
	Liao WS, et al.	2007	Stomach	Unknown	6
	Masoudi M, et al.	2012	Stomach	Medical (praziquantel)	7
	Kalkan IH, et al.	2013	Stomach	Parasite removal	8
	Mercky P, et al.	2014	Jejunum	Parasite removal	9
	Caso actual	2015	Duodenum	Parasite removal/niclosamide	-
Capsule endoscopy	Martines H, et al.	2006	Duodenum	Unknown	10
	Barnett K, et al.	2007	Jejunum	Unknown	11
	Howell J, et al.	2008	Jejunum	Medical (praziquantel)	12
	Hosoe N, et al.	2011	Jejunum	Unknown	13
	Galán MT, et al.	2012	Intestine	Unknown	14
	Shorbagi A, et al.	2012	Jejunum	Medical (niclosamide)	15
Colonoscopy	Vuylsteke P, et al	2004	Colon	Medical	16
	Patel NM, et al.	2007	Colon	Unknown	17
	Guzman, et al.	2012	Left colon	Removal (polypectomy snare)	18
Double balloon enteroscopy	Akarsu M, et al.	2010	Duodenum	Medical (niclosamide)	19
	Li ZL, et al.	2014	Ileum	Gastrografin infusion	20

peutic perspective, since *T. solium* confers a potential risk of neurocysticercosis.

Following a careful literature review, we found several cases of endoscopic diagnosis, the first one dating back to 1981. The endoscopic technique with more diagnoses reported is gastroscopy, followed by capsule endoscopy, colonoscopy, and double balloon enteroscopy, in this order. Of note, some of these diagnoses were incidental findings, and for most patients symptom etiology remained unknown despite a workup including stool testing, as was the case with our patient, and the diagnosis was finally provided by endoscopy (Table I).

While, reportedly, the parasite is usually encountered in the jejunum, case reports with a gastroscopic diagnosis show that tapeworms may also be found in the second duodenal segment, duodenal bulb, and even the stomach (6-8); however, no reports describe the finding of a scolex anchored to the gastric mucosa, hence the parasite's presence in the stomach may well be due to the tapeworm moving back and forth across the pylorus. In fact, the report by Kalkan et al. describes that advanced age associated with hypochlorhydria from chronic atrophic gastritis might account for the parasite's migration into the stomach (8).

Parasite eradication is the goal of treatment, and from the tapeworm's life cycle we know that the scolex anchored to the mucosa with its suckers must be removed. In fact, recovering and identifying the parasite's cephalic portion is the only means to ensure treatment effectiveness. If left in the bowel, the tapeworm will grow to its original length

within 3 months. Traditionally, this may be confirmed by sifting through the stools collected for 24 h after treatment. This is of course an impractical method that is only used either exceptionally or for research purposes, and cannot be applied to the general population. Additional fecal testing at 1-3 months after treatment for *T. saginata* eggs is recommended to make sure the infestation has fully cleared.

As regards endoscopic treatment, our review found 5 cases of endoscopic diagnosis with therapeutic intent using gastroscopy (2,3,5,8,9), where peroral removal of the parasite or fragments thereof was accomplished without recording scolex recovery, which is nevertheless controversial and dangerous to some extent, as gross inspection cannot distinguish between species, and should *T. solium* be involved, the theoretical risk exists that self-infestation and neurocysticercosis may develop.

From all the above, two questions arise before endoscopic removal: Is endoscopic treatment effective? Is it safe? In theory, endoscopy may be most effective, even providing certainty of immediate cure should the parasite's anchored scolex be removed. If the scolex fails to be detached from the intestinal mucosa, the parasite will grow to its original length within approximately 3 months. Hence our suggestion for endoscopy is that one should refrain from advancing along the duodenum to visualize the parasite's whole length; instead, the goal of endoscopic management should be the identification of the tapeworm's proximal end and of the anchoring point for the head or scolex, followed by an attempt at removal. The use of for-



ceps or even a polypectomy snare may be considered to this end, trying to recover a specimen for study and eradication assurance. When considering that tapeworms primarily attach to the duodenum, gastroscopy should be the technique of choice. In our patient scolex removal could not be confirmed by pathology, hence treatment was completed with oral niclosamide.

Regarding safety, in addition to the risks inherent in the technique, endoscopic treatment entails a theoretical risk of auto-infection with neurocysticercosis should the infestation be with *T. solium*. In fact, evidence for auto-infection with neurocysticercosis is small. Some studies have shown that, in patients with neurocysticercosis, intestinal taeniasis has an incidence of around 21-25%, ranging from 16% for mild-moderate infection to 82% for severe infection (21-24). The main route for auto-infection is likely fecal-oral, the primary risk being poor hygienic conditions. However, there is also a theoretical internal route that has not been proven yet, but would entail endoscopic management risks. The risk of gastroscopy with peroral parasite removal would stem from tapeworm fragmentation leaving fertile *T. solium* proglottids in the stomach, where eggs would be released by enzymes or direct rupture into the small bowel, whence they would spread around the body via the bloodstream with risk for neurocysticercosis. This risk, although unproven, seems reasonable, and a single case has been reported of taeniasis and widespread cysticercosis where internal auto-infection was highly suspected (25).

Our recommendation to minimize or eliminate this risk of internal auto-infection is that endoscopic management be restricted to removal of only the parasite's head, with the subsequent use of some laxative to ensure parasite expulsion; peroral parasite removal would be absolutely contraindicated. The risk of auto-infection also exists after therapy with niclosamide, as this medication destroys proglottids while leaving the eggs unscathed (26); hence the administration of a laxative at one to two hours after therapy should be considered nearly mandatory to facilitate proglottid expulsion. When taeniasis is highly suspected in connection with *Taenia solium* (endemic regions, contact with pigs, poor hygienic-environmental conditions), in association with concurrent neurologic symptoms of unclear origin, neurocysticercosis should be ruled out before any attempts at endoscopic or even medical treatment, and in such cases albendazole plus a steroid should be preferred to praziquantel, as the latter may destroy cysticercs and induce pericysticercal inflammation with a high risk of neurological involvement and seizures (27). Other drugs shown to be safe, effective and low-cost include nitazoxanide (28,29) and quinacrine (30), their use being also recommended for patients resistant to niclosamide and praziquantel.

We recommend:

- Suspect taeniasis in the presence of chronic diarrhea, anemia, upper abdominal pain, weight loss with negative fecal tests, and particularly contact with endemic areas or poor hygienic-environmental conditions.
- Endoscopy, mainly gastroscopy/capsule endoscopy, would be of choice for the diagnosis of taeniasis in subjects with negative stool tests and persistent clinical suspicion.
- Gastroscopy should be restricted to searching and removing (forceps, snare) the scolex, with oral parasite removal being contraindicated in order to minimize the risk of internal auto-infection.
- If taeniasis is suspected with a high risk for *Taenia solium* in association with concomitant neurologic symptoms of unclear origin, neurocysticercosis should be ruled out before any attempts at endoscopic or even medical treatment.
- An anterograde cathartic preparation should be administered after the endoscopic procedure to lower the risk of internal auto-infection.

## ACKNOWLEDGEMENTS

We are grateful to the staff of the Digestive Endoscopy Unit at Hospital Son Llàtzer.

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