CHAPTER 3

Ultrasonic diagnosis of clinical oesophagostomiasis: a novel cause of ‘target’ colonic lesions

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Human infection with *Oesophagostomum bifurcum*, a parasitic intestinal helminth, is highly endemic in parts of West Africa, where an estimated 250,000 people are infected and more than 1 million are at risk. *O. bifurcum* juveniles develop in the colonic wall, causing pus-filled granulomas. The pathology has two distinct clinical presentations. Multinodular oesophagostomiasis comprises hundreds of pea-sized nodules within a thickened, oedematous wall of the large intestine, and presents with the vague symptoms of general abdominal pain, persistent diarrhoea, and severe weight loss. Uninodular oesophagostomiasis, called the Dapaong tumour, presents as a painful, 30 - 60 mm, granulomatous mass in the abdominal wall or within the abdominal cavity which is often associated with fever.

Diagnosis of oesophagostomiasis on clinical grounds alone is difficult. In this report, we describe two cases illustrating the ultrasonic appearance of the two presentations of the disease. Multinodular disease shows nodular ‘target’ and ‘pseudokidney’ colonic lesions. The Dapaong tumour is an echo-free, ovoid lumen enveloped within a well-defined, poorly reflective wall. A definitive pre-surgical diagnosis of oesophagostomiasis is now obtainable, and conservative chemotherapeutic treatment of non-acute cases using ultrasound to monitor the efficacy of therapy is a possibility.
INTRODUCTION

*Oesophagostomum bifurcum* is a human parasitic intestinal helminth. In parts of West Africa, it is highly and focally endemic, with village infection prevalence ranging from 0% to 70%. An estimated 250,000 people are infected, and 1 million are at risk.

114 cases of human oesophagostomiasis have been reported in the literature, originating from all areas of the world, including East, West and South Africa, South America, and the Far East. 11 patients were Europeans or North Americans with a travel history.In the Nalerigu hospital, northern Ghana, at the heart of the West African endemic area, oesophagostomiasis accounts for approximately 1% of the annual major surgical procedures and 0.2% of out patient presentations.

*O. bifurcum* juveniles develop in the colonic wall, causing pus-filled granulomas. Many people appear to tolerate this histotropic developmental phase of the worm’s life cycle, but there are two distinct clinical presentations of the pathology. Multinodular oesophagostomiasis (Figures 1a & b) comprises hundreds of pea-sized nodules in the thickened, oedematous submucosa and subserosa of the colonic wall, but has no distinctive clinical findings: weight loss, persistent mucus diarrhoea, and diffuse abdominal pain. Rectal bleeding is occasionally reported. Surgical emergency can result from luminal narrowing of the colon, or bowel obstruction secondary to inflammatory adhesions. The uninodular disease, called the Dapaong tumour (Figure 2), presents as a painful, 30 - 60 mm, ‘wooden’ mass in the abdominal wall or within the abdominal cavity, often associated with fever.

Cutaneous abscesses and fistulas, peritonitis secondary to nodule rupture, bowel obstruction secondary to inflammatory adhesions, incarcerated inguinal hernia, and volvulus can occur. One case describes a cutaneous nodule in the midline of the back at the level of the 6th thoracic vertebrae containing *Oesophagostomum species*.

Diagnosis of oesophagostomiasis is problematic. In the majority of case reports, a diagnosis was not achieved until a pathologist’s report following an exploratory laparotomy. Clinical symptoms are often vague and indeterminate: appendicitis, desmoid tumours, actinomycosis, abdominal tuberculosis, inflammatory bowel disease or cancer, along with the many causes of acute abdomen, may be mimicked. Stool cultures, useful for identification of *O. bifurcum* infection, detect colonic-lumen-dwelling egg-laying adult worms, and hence are unreliable for detection of the juvenile tissue-living stages.
of the parasite.

In this paper, we present the ultrasonic appearance of the two presentations of oesophagostomiasis, in an attempt to provide clinicians with guidelines to aid pre-surgical diagnosis.

![Figure 1a: Thickened oedematous transverse colon studded with pale, pea-sized, worm-containing nodules.](image1)

![Figure 1b: Pea-sized nodules on colon and mesentery.](image2)

**Patients**

We describe two representative patients from a total of 156 cases of oesophagostomiasis that presented to the Nalerigu hospital in northern Ghana between January 1996 and October 1998. A Siemens LS portable ultrasound machine equipped with a 5MHz linear array transducer was used for the ultrasonic investigation. We present stool culture results, as *O. bifurcum* eggs are morphological similar to those of hookworm.

**Case A**

A twenty year old female presented on 15th September 1997 with a two month history of
lower abdominal pain, loose mucus-containing stool (without blood), occasional vomiting and severe weight loss. The pain was maximal around the umbilicus and in the right lower quadrant (RLQ). The abdomen was found to be distended and guarded with rebound tenderness. No masses were palpable. A pelvic examination was acutely painful, but no structural abnormalities were found. A stool smear revealed hookworm-like eggs, and a stool culture was positive for *O. bifurcum* and hookworm third stage larvae.

**Ultrasound**

The colon displayed ‘target’ or ‘bulls eye’ and ‘pseudokidney’ appearances (Figures 3a & b), both well recognised signs of inflammatory bowel disease. The lesion was continuous from the caecum to the proximal descending colon. The highly reflective central lumen appeared as a thin band of a few millimetres diameter, and in the surrounding wall, distinct echo-free nodules could be seen. The largest nodule was 23
mm in diameter, and the largest cross-sectional diameter of the colon was 60 mm. The caecum and proximal ascending colon were not moving with respiration. The small bowel, the uterus and the ovaries were floating free in ascitic fluid filling the lower abdomen. The liver was normal.

**Surgery**
Exploratory laparotomy revealed a serous fluid filled abdominal cavity with adhesions present in the RLQ. The bowel wall, from the terminal ileum to the third section of the transverse colon, was friable, thickened and oedematous, and was covered with hundreds of pale, pea-sized nodules. The caecum and ascending colon were fixed to the lateral abdominal wall by adhesions. When the bowel was dissected away from the wall, several of the nodules ruptured, and thick yellow pus leaked out. Further exploration into the abscess-like structure which was surrounded by massive thickening of the colon wall revealed more pus, but there was no communication with the colonic lumen. In the wall of the terminal ileum and protruding into the peritoneal cavity were another three pea-sized nodules. The largest of these was opened to reveal an 11 mm long, white worm actively moving in the thick yellow pus contents. The worm was a juvenile male *O. bifurcum*.

**Figure 2:** Painful, hard, supra-umbilical mass adhered to abdominal wall and protruding through skin.

**Outcome**
As opposed to colectomy, conservative treatment was attempted, with 400 mg albendazole (10 mg/Kg) once daily for five days. The post-surgical recovery was uneventful, and during the next eight weeks, the clinical symptoms and signs of the disease resolved. Nine weeks after surgery, the ultrasonic appearance of the colon wall was normal. This was the first case of multinodular oesophagostomiasis to be observed by ultrasound and to be successfully treated with albendazole.
Case B
A six year old female presented on 25th October 1997 with a one week history of a painful abdominal mass in her upper abdomen associated with fever. The contour of the abdomen was normal, but on palpation, a hard, smooth mass, 60 by 60 mm, was found in the right upper quadrant (RUQ) abutting the costal margin. It was adherent to the abdominal wall, but the overlying skin was freely mobile. The mass was static during deep inspiration, and remained palpable when the patient's head and shoulders were raised off the pillow. Mild pain was localised to the mass, and a central fluctuant area was detected. A stool smear contained hookworm eggs, and a culture was positive for hookworm L3.

Ultrasound
An echo-free lesion of 40 x 40 x 30 mm was observed in the RUQ abdominal wall, surrounded by a 10 mm thick poorly reflective wall which was invading into the
abdominal wall musculature (Figures 4a & b). The hepatic flexure of the colon was freely moving during respiration. No other such lesions were seen in the abdomen.

**Surgery**
Under local anaesthetic, the fluctuant weak spot was incised (without ultrasonic assistance), and together with approximately 10 ml of thick yellow pus, there emerged an actively moving, white worm 13 mm in length. It was later identified to be a non-gravid, juvenile female *O. bifurcum*.

**Outcome**
An uneventful post-surgical recovery was attained: the nodule was no longer palpable or visible by ultrasound five weeks after surgery.

**DISCUSSION**
‘Target’ and ‘pseudokidney’ lesions have been reported on ultrasound in many inflammatory and vascular colonic pathologies, and appear similar to the case shown here. However, the presence of distinct nodularity within an echo-free colonic wall is unique, enabling differentiation of multinodular oesophagostomiasis from other etiology. Abdominal wall and intra-abdominal poorly reflective lesions are also common, but a well-defined poorly reflective wall enclosing an echo-free ovoid lumen is highly suggestive of a Dapaong tumour.

The advantage of a pre-surgical diagnosis of acute oesophagostomiasis in terms of pre-operative chemotherapy, anaesthetic and incision type cannot be underestimated. For non-acute cases, the ability to ultrasonically diagnose oesophagostomiasis alleviates the need for exploratory surgery and allows conservative chemotherapeutic treatment: ultrasound can be used to monitor the efficacy of therapy. Conservative treatment has several advantages in an African situation: major surgery comprises even more risk than in the West, and requires extra time and effort for already over-worked staff. A colectomy procedure on a friable and degenerated colon can be untenable, and bowel perforation during incision and drainage of a Dapaong tumour could occur. Resolution of the colonic inflammation with chemotherapy as opposed to surgical removal of the colon may also be beneficial for the future life quality of patients.

Within the endemic area, knowledge of the ultrasonic appearance of oesophagostomiasis is lacking. Diagnosis with ultrasound is now possible in northern Ghana due to a
Ultrasound diagnosis

recent action by the Ministry of Health. Earlier this year, partly in response to these discoveries, all their Regional Hospitals were issued with high quality ultrasound equipment and local personnel were trained. Four of those hospitals receive patients from the endemic area of *O. bifurcum*.

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