

# The Role of Diagnostic Laparoscopy in Ascites of Uudetermined Etiology- A Prospective Study

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## Abstract

Ascites of unknown etiology is defined as ascites the etiology of which cannot be determined after conventional laboratory examinations including cell count, albumin level, total protein level, Gram stain, culture and cytology and imaging investigations including ultrasound and computed tomography scan.

**Aims and Objective:** To evaluate the role of laparoscopy in determining the etiology ascitis of undetermined etiology.

**Conclusion:** The etiological diagnosis of exudative ascites remains a difficult challenge despite the availability of wide range of often complex and costly complementary investigations. Currently, laparoscopy with peritoneal biopsies to establish histopathological diagnosis remains the gold standard for etiologic diagnosis. Laparoscopy is able to achieve the final diagnosis and provide tissue diagnosis without any significant complication and less operative time. It can be safely concluded that diagnostic laparoscopy is a safe, quick, and effective adjunct to diagnostic modalities, for establishing a conclusive diagnosis, but, whether it should replace imaging studies as the primary modality for diagnosis, needs more evidence.

**Keywords:** Ascites; Laparoscopy; Tuberculosis; Peritoneal biopsy

## Introduction

Ascites is the pathologic accumulation of free fluid within the abdominal cavity. The causes of ascites are,

### 1. Normal peritoneum

- 1.1. Portal hypertension (SAAG>1.1g/dl).
- 1.2. Hypoalbuminemia (SAAG<1.1g/dl).
- 1.3. Miscellaneous conditions

- Chylous ascites
- Pancreatic ascites
- Bile ascites
- Nephrogenic ascites
- Uterine ascites
- Ovarian disease

### 2. Diseased peritoneum (SAAG<1.1g/dl)

#### 2.1. Infections

- Bacterial peritonitis
- Tuberculous peritonitis
- Fungal peritonitis
- Human immunodeficiency virus associated peritonitis

#### 2.2. Malignant conditions

- Peritoneal carcinomatosis
- Primary mesothelioma
- Pseudomyxomatous peritoneum
- Hepatocellular carcinoma

### 2.3. Other rare conditions

- Familial Mediterranean fever
- Vasculitis
- Granulomatous peritonitis
- Eosinophilic peritonitis

The term “ascites of unknown origin” was firstly expressed in literature by Ward in 1982.

Ascites of unknown etiology is defined as ascites the etiology of which cannot be determined after conventional laboratory examinations (including cell count, albumin level, total protein level, Gram stain, culture and Cytology) and further imaging investigations (including ultrasound and computed tomography scan) investigations.

## Rule of Laparoscopy in Ascites

1. Diagnostic rules
2. Pre therapeutic, observation and staging of diseases
3. Therapeutic rules

Diagnostic laparoscopy is a cost effective procedure with overall accuracy of 97% as lesions are seen under direct vision with magnification. Lesions less than 1 mm can be identified. Moreover, directed biopsies can be obtained with very low risk of complications. As diagnostic laparoscopy is an invasive procedure there are certain

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complications reported with this Procedure i.e. hemorrhage, perforation, and air embolism. Diagnostic laparoscopy is indicated for accurate diagnosis of ascites when abdominal ultrasonography, CT abdomen and diagnostic paracentesis have failed to determine the cause of ascites. Laparoscopy is very sensitive for small malignant or benign peritoneal lesions. If size of the peritoneal nodules is uniform these are more likely to be benign because in malignant peritoneal deposits the nodules are of varying sizes. Laparoscopic biopsy of these peritoneal implants can be obtained and sent for histo-pathological diagnosis. Other accepted indications of diagnostic laparoscopy are acute abdominal pain.

## Aims and Objective

To evaluate the role of laparoscopy in determining the etiology of undetermined ascites.

## Material and Methods

### Study Design

Prospective descriptive study

### Study Population

This was a prospective study including all the patients who have been explored for exudative ascites. The study was conducted at Sheri-Kashmir institute of medical science Srinagar in all patients admitted in the department of gastroenterology in collaboration with department of general surgery from June 2013 to June 2015. Fifty patients with low SAAG ascites were selected for laparoscopy.

### Inclusion Criteria

Patients with exudative ascites of undetermined etiology, after recording their clinical, biochemical, hematological and radiological imaging.

### Exclusion Criteria

1. Contraindication for pneumoperitoneum/laparoscopy.
2. Contraindication to general anesthesia
3. Patients with markedly distended bowel loops.
4. Uncorrected coagulopathy.

### Operative Technique

The patients were kept in 15 degree tendeleberg position during the course of surgery, depending on the individual patients requirement, adjustment in the position of operating table was made by tilting it various angles.

### Induction of Pneumoperitonium:

Automatic CO<sub>2</sub> insufflator is used to introduce gas in peritoneal cavity at the rate ranging from 1-3 litters/minute to present pressure 12 mmHg.

### Methods

- Closed method.
- Open method.

Pneumoperitonium was created mainly by closed method by using spring loaded verses needle and when required, open method was employed.

- Insertion of primary trocar and cannulea (supra/infra umbilical 10 mm port)
- Insertion of secondary trocar and canulae (dictated by the operative plan made following the preliminary telescope inspection of abdominal cavity.

Findings encountered during the performance of laparoscopy are:

- ❖ Ascites.
- ❖ Adhesions.
- ❖ Thickened and hyperemic peritoneum with or without tubercles, spleen liver and omentum were also studded with tubercles in some cases.

Tissues biopsy obtained during laparoscopic examination was sent to postgraduate department of pathology, sher-i- Kashmir institute of medical science Srinagar for histopathological examinations.

## Observations and Results

The below mentioned tables (Tables 1 to 14) are the observations and results of the examinations conducted.

### Discussion

This prospective study of the total 50 patients with ascites of unknown etiology who were subjected to diagnostic laparoscopy after thorough clinical, laboratory and radiological work-up, studied over 2 years from June 2013 to June 2015.

Age Group (in years)	Number patients	Percentage %	Range
15-20	5	10	15-68
21-40	25	50	
40-60	15	30	
>60	5	10	
Total	50	100	

Most of the patients in our study were in age group of 21-40(50%) years with mean age of 38 years and range 15 – 68 years.

Table 1: Age Distribution of patients.

Gender	Number	Percentage %
Male	20	40
Female	30	60
Total	50	100

Our study consisted of a total of 50 patients with male preponderance (male-female ratio 3:2)

Table 2: Gender Distribution of patients.

Symptom	Number of patients	Percentage%
Abdominal pain	44	88
Fever	35	70
Anorexia	33	66
Weight loss	30	60
Abdominal distention	17	56
Night sweats	15	30
Constipation	14	28
Pulmonary symptoms	5	10

Most common symptom of the patients in our study were abdominal pain (88%),fever (70%), anorexia (66%) and weight loss(60%),abdominal distention (56%). Night sweats(30%),constipation(28%) and pulmonary symptoms were also present.

Table 3: Symptomatology of patients.

Signs	Number of patients	Percentage %
Ascites	47	94
Fever	40	80
Pallor	39	78
Abdominal tenderness	24	48
Splenomegaly	5	10
Hepatomegaly	4	8
Peripheral lymph nodes	4	8

Most common physical findings of the patients in our study was ascites (94%), fever (80%), anemia and abdominal tenderness (48%). other findings on physical examination were splenomegaly (10%), hepatomegaly (8%) and peripheral lymph nodes in (8%).

Table 4: Clinical findings of the patients.

Test	Number of patients tested	Positive findings	Percentage%
Hemoglobin (g%) <10	50	40	80
Raised ESR >60	50	38	76
WBC count /mm <sup>3</sup> >10,000	50	36	72
Mantoux test	50	20	40
Serum albumin level(g/dl)<3	50	30	60
Sputum for AFB	50	7	14
Tumor markers	50	10	20

Low hemoglobin was most common laboratory finding in our study (80%) cases. Raised ESR and WBC count were seen in (76%) and (72%) patients respectively .low serum albumin was found in (60%) of cases, moatoux test was positive in (40%) of patients. sputum microscopy for AFB was positive in (14%) cases.

Table 5: Laboratory results of patients.

Color	Number of patients	Percentage %
Yellowish	46	92
Hemorrhagic	4	8

Table 6: Ascetic fluid analysis (Gross Appearance).

Test	Number of patient tested	Number of patients with positive findings	Percentage
Lymphocytosis	40	30	75
SAAG(<1.1 g/dl)	40	38	95
Z and N staining	40	1	2
ADA level (>36U/L)	40	28	70
Culture for MTB	40	4	10
Malignant cells	40	8	20

Ascetic fluid analysis revealed a predominance of lymphocytes on cytological analysis in (75%) of patients. Ascites was exudative (SAAG<1.1g/dl) in (95%) of patients. Ascetic fluid ADA was found in (70%) of patients. Culture of ascetic fluid was positive for MTB in (10%) of cases where as Z&N staining was positive in (2%) of patients.

Table 7: Biochemical Analysis of ascetic fluid.

Abdominal ultrasound findings ( total patients tested = 50)	Positive findings (Number of patients)	Positive findings (percentage of patients)
Ascites	50	100
Peritoneal thickening	15	30
Mesenteric adenopathy	6	12
Hepatomegaly	4	8
Splenomegaly	4	8
Gallbladder stones	1	2

The predominant findings in the abdominal ultrasound were ascites in our patients (100%) followed by peritoneal thickening (30%) and mesenteric adenopathy (12%). Other findings noted on ultrasonography were hepatomegaly and splenomegaly (8%) cases each.

Table 8: Abdominal ultrasound findings of the patients.

CT scan findings total patients tested(50)	Positive findings (number of patients)	Positive findings (percentage of patients%)
Ascites	50	100
Peritoneal and mesenteric thickening	30	60
Mesenteric adenopathy	25	50
Peritoneal nodules	13	26
Hepatomegaly	4	8
Splenomegaly	4	8
Gallbladder Stones	1	2

Majority of patients in our study had ascites (100%) as predominant finding in the abdominal CT scan, followed by peritoneal and mesenteric thickening (60%) and mesenteric adenopathy (50%), peritoneal nodes in (26%) cases, Hepatomegaly, splenomegaly in (80%) cases each and least common findings was gallbladder stones.

Table 9: Abdominal CT scan findings of the patients.

Provisional diagnosis	Number of patients	Percentage %
liver disease	8	16
Abdominal tuberculosis	30	60
Adhesions(Abdominal and pelvic adhesions)	14	28
Total	50	100

Most common indication for diagnostic laparoscopy in our study were abdominal tuberculosis (60%) , followed by adhesions (28%) and liver disease(16%) cases.

Table 10: Indication Diagnostic laparoscopy.

Laparoscopy findings	Number of patients (total =50)	Percentage %
Ascites	50	100
Peritoneal nodules	44	88
adhesions	35	70
Congested peritoneum	32	64
Cirrhosis	5	10
Normal appearance	4	8

The predominant laparoscopic findings of the patients in our study were ascites (100%) followed by peritoneal nodules (88%),adhesions (70%),congested peritoneum(64%). Cirrhosis were also noted in (10%) cases. Laparoscopic findings were unremarkable in (8%) of patients

Table 11: Laparoscopy findings of the patients.

Postoperative diagnosis	Number of patients	Percentage %
Abdominal tuberculosis	30	60
Abdominal malignancy	12	24
Cirrhosis	4	8
Normal appearance	4	8

Most common postoperative diagnosis of the patients in our study were abdominal tuberculosis (60%) followed by abdominal malignancy (24%).cirrhosis were also noted in (8%) cases and laparoscopy was unremarkable in (8%) of patients.

Table 12: Diagnosis made after Diagnostic laparoscopy.

Histopathology report	Number of patients	Percentage %
Chronic epithelioid granulomatous inflammation	34	68
Metastatic adenocarcinoma	8	16
Lymphomas	2	4
Liver cirrhosis	4	8
Normal report	2	4

Histopathological report of laparoscopically assisted peritoneal tissue biopsy revealed chronic granulomatous inflammations in (68%) cases. Metastatic adenocarcinoma was present in (16%) patients, lymphomas in (4%) of cases and liver cirrhosis in (8%) of cases. Nohistopathological abnormality was detected in (4%) of cases.

Table 13: Histopathology Reports of the peritoneal biopsies.

Complications	Number	Percentage %
Prolonged ascetic fluid leakage	1	2

**Table 14:** Post-operative complications.

Exudative ascites of unknown origin in women are dominated by tuberculosis and peritoneal carcinomatosis requiring diagnosis and early care [1,2]. The means of imaging (ultrasound, CT scan, MRI) have limited coverage in the etiological diagnosis of exudative ascites [3,4]. Several series of literature [5-11], confirmed the feasibility of laparoscopy in the exploration of the ascites of unknown origin in women as well as its high sensitivity and specificity. The main advantage of laparoscopy compared with other explorations through optical magnification, it allows an excellent exploration of peritoneal surfaces and the abdomino-pelvic cavity [12]. Biopsies are taken under direct control of the view, contrary to those obtained by imaging. Therefore, laparoscopy enables to distinguish between peritoneal tuberculosis and carcinomatosis in peritoneum [13].

In tuberculosis, three lesions have been described, commonly seen which may occur together in same patient. Peritoneal granulomas, Adhesions result from the Organization of fibrinous exudates, between two peritoneal layers and inflammatory phenomena manifested by congestion, hypervascularisation and edematous state of peritoneum [12].

In literature, the granulomas are the most frequently encountered aspect (66% to 100% of the cases), adhesions were observed in 13% to 80% of cases, and inflammatory phenomena are described in 21% to 79% of the cases [13-15] in our study patients with peritoneal tuberculosis, the grits were observed in 87% of cases, adhesions in 72% cases and inflammatory phenomena in 58% of cases.

In Peritoneal carcinomatosis, peritoneal implants are generally size different, upto to 1 cm and distributed irregularly on the peritoneum, abdomino-pelvic viscera and diaphragm [16]. In general, biopsy from primary tumor if it was identified and peritoneal implants are needed. Apart from the diagnostic interest, laparoscopy to predict the tumor resectability in cases of advanced ovarian cancer and thus avoiding laparotomy and unnecessary surgery as part of an already disseminated tumor.

In our study majority of patients (50%) were in the age group of 20 to 40 years with mean age of 38 years, and age range of 15 to 68 years. Thirty (60%) cases were females and twenty (40%) cases were males (sex ratio of male/female=1.5). These figures correlate with the study conducted by, Mohammad et al. [17]. They reported a similar age distribution with 56% of their patients being in the range of 21 to 40 years, and sex ratio of male/female patients being 1.5 (number of male patients =30, number of female patients 20).

Rooh Ul Muqin, et al [18] also noted obvious majority of females 145 (58%) and a mean age of 37.5 years in their study of 250 patients.

Abid H, et al. [19] also reported a mean age of 38 years in their study of 294 cases of peritoneal tuberculosis.

Rustam Khan, [20] studied a total of 209 patients with 123 (59%) cases being females and mean age being 33 years. Tarcoveanu E, et al. [21] reported age distribution of 17 to 74 years in their study.

The commonest type of presentation of the of the patients in our study were abdominal pain in 44 (88%) cases. This figure is comparable with Rustam et al., [20] who noted abdominal pain in 93% cases, Aouda H et al. [19] also noted abdominal pain in 77% cases in their study.

In our study other common symptoms were fever 70%, anorexia 66% weight loss 60% and abdominal distention in 56% of patients. these figures were consistent with the study Aouda H, et al. [19]. Fever 68%, and weight loss 72%, anorexia 36%, Safarpor F, et al. [22]. 75% of cases and Abdelaal A, et al. [23] also noted 56% of cases presented with weight loss in their study.

In our study other symptoms of patients were night sweats, (30%), constipation (28%), pulmonary symptoms in (10%) cases. These figures were comparable with the study conducted by Rustam et al. [20], Aouda H et al. [19] and Tarcoveanu E, et al. [21].

The predominant clinical findings in our study were ascites (100%), low grade fever (70%). These figures were comparable with Safarpor F, et al. [20], Aouda H et al. [19] and Abdelaal A, et al. [23].

In current study pallor were noticed in 39 (78%) cases. Rai S, Thomas VM [24], noted a similar observation of anemia in >90% of cases in their study. Also observed that splenomegaly was present in (10%) cases hepatomegaly (8%) cases and peripheral lymph nodes in (8%) cases. Similar figures were noted in study by Tarcoveanu E, et al. [21] and Aouda H, et al. [19].

In our study most common laboratory abnormality was low hemoglobin being present in 40 (80%) cases studied. Rai S, Thomas VM [24], reported similar observation of low hemoglobin in more than 90% of cases. We also observed in our study that leukocytosis were present in 72% of patients, hypoalbuminemia in 60% cases, elevated ESR in 76% of cases. These figures were consistent with Tarcoveanu E, et al. [21] study.

In current study mantoux test were positive in 20 (40%) of patients. Sputum microscopy detected AFB in 16% of the cases. These findings correlate with Manhor A, et al [25]. Study as 57.6% and 18% respectively. In our study, the ascetic fluid analysis revealed exudative type of ascites in 95% of cases. Manhor A, et al [25] and Sandikci MU, et al [26] reported these figures in 96.4% and 95.5% of the cases respectively. In our study, Z&N staining of ascetic fluid were negative in all patients. Rai S, Thomas VM [24], study also observed similar results.

We also observed in our study that ascetic fluid cultures were positive in 4(10%) cases. Rustam Khan [20] reported these figures in 7% of cases. Similarly, Poyrazoglu OK, et al. study reported the culture of ascetic fluid positive in only 2 patients.

In the current study, ascetic fluid ADA (>36U/L) were seen in 28 (70%) patients. This figure is consistent with several other studies as Bharagava DK, et al. [27] study. In our study abdominal ultrasonography revealed that 50 (100%) cases had ascites 15 (30%) patients had peritoneal thickening 6 (12%) had mesenteric adenopathy as predominant finding these findings were consistent with study by Tarcoveanu E, et al., H Abid, et al. [28], also found ascites in 100% of cases in their study.

We also observed in our study that commonest findings on CT scan were ascites 50 (100%) cases. Similar findings were noted in study conducted by Salgado Flores L, et al. [29] with corresponding figures of 100%. Tarcoveanu E, et al. [21] reported corresponding figures of 89% in their study.

In our study, mesenteric lymphadenopathy were present in 25 (50%) cases and peritoneal and mesenteric thickening in 30 (60%) patients these findings correlate with Salgado Flores L, et al. [29] as 50% and 58% respectively. Abdelaal A, et al [23] in their study showed ascites in 37 patients (90%), bowel nodules in 22 (54%), peritoneal

thickening and nodules in 37 (90%) and enlarged mesenteric lymph nodes in 11 (27%). MB Mabrouk, et al. [30] also noted in their study with a peritoneal thickening in 32 cases (38.5%), peritoneal nodules in 15 cases (18%), and agglutination of the digestive handles in 12 cases (14.4%), intra-abdominal lymph nodes in 17 cases (20.5%). An ovarian mass was found in 12 cases.

In our study we note that during diagnostic laparoscopy 50 (100%) cases had ascites these findings were consistent with the study by Sandikci MU, et al. [26] who reported ascites in 129 (95.5%) from total of 135 patients. In our study during laparoscopy, we also found that, homogenously distributed multiple, yellowish white, nodules were present in 44 (88%) cases over the peritoneum. Adhesions were seen in 35 (70%) cases congested peritoneum (in the form of thickening and hyperemia) in 32 (62%) cases. MB Mabrouk, et al. [30] on diagnostic Laparoscopic noted peritoneal nodules in 26 cases (31.3%), and peritoneal granules in 41 cases (49.4%). Other associated lesions were found: adhesions in 59 cases (71%), peritoneal hyperemia in 48 cases (57%), and agglutination of the digestive handles in 20 cases (24%). Only adhesions without nodules or granules were present in 8 cases (9.6%).

We also observed in our study that cirrhosis were present in 5 (10%) and splenomegaly 4 (8%) cases. Tarcoveanu E, et al. [21], in their Study reported 17% of cirrhosis cases and Luck, et al. [31] reported cirrhosis in 12% of cases.

In present study, there were 4 (8%) cases with normal laparoscopic appearance. Abdelaal A, et al. [23] also noted that 7% of patients had normal laparoscopic findings.

We also note in our study that laparoscopic visual diagnosis were in favor of peritoneal tuberculosis in 30 (60%) cases, abdominal malignancy in 12 (24%) cases and cirrhosis 4 (8%) cases. These findings were consistent with study by MB Mabrouk, et al [30] who also reported peritoneal carcinomatosis in 32 cases (38.5%), peritoneal tuberculosis in 45 cases (54.2%), and non specific infection in 6 cases (7.3%), Luck, et al. [31] showed tuberculous peritonitis in 22 (66.7%) patients and carcinomatous peritonitis in 5 (15.2%) patients.

In our study, the histopathological findings of laparoscopic guided peritoneal biopsy established the diagnosis of peritoneal tuberculosis in 34 (68%) patients where as metastatic adenocarcinoma in 8 (16%) cases and lymphoma in 2 (4%) cases 4 (8%) cases had cirrhosis. No histopathological abnormality was detected in 2 (4%) patients.

These results were comparable with the study by Krishnan P, et al [32] who reported similar histopathological findings in laparoscopically guided peritoneal biopsies in a subset of 41 patients out of 41 patients, 33 (80%) cases had peritoneal tuberculosis, 6 patients (14%) had metastatic adenocarcinoma and 2 (5%) had no abnormal histopathological findings. MB Mabrouk, et al. [30] said that the histological diagnosis was a peritoneal carcinomatosis in 26 cases (31%), and peritoneal tuberculosis in 55 cases (66%), Luck, et al. [31] said that the histopathological diagnosis was granulomatous inflammation in 20 (60.6%) and diagnosis of malignancy was made in 7 (21.2%); one (3%) had Budd Chiari Syndrome, 4 (12%) had cirrhosis of liver with super-added Hepatocellular carcinoma and biopsy was non-conclusive in 1 patient.

## Summary

1. This prospective study was conducted in post graduate department of internal medicine, sher-i-kashmir institute of medical science, Srinagar with a total of 50 patients.

2. Mea age of the patients was 38 years with range 15 to 68 years.
3. 50% patients were in the age group of 21-40 years.
4. There was female preponderance with 60% of patients being female and 40% males
5. The most common clinical manifestation was abdominal pain fever weight loss.
6. The most common clinical sign were ascites followed by fever and pallor.
7. About 80% of the cases were anemic with hemoglobin <10 g/dl.
8. Raised ESR (>60 mm) was detected in 76% of cases whereas mantoux was positive in 40% of patients.
9. Hypo-albuminemia (serum albumin<3 g/dl) was present in 60% of cases.
10. Ascetic fluid analysis revealed exudative type (SAAG<1.1g/dl) of fluid in 95% cases ADA(>36U/L) in 70% of patients culture of ascetic fluid was positive in 8% of cases where staining of AFB of the ascetic fluid was negative in all patients.
11. Abdominal ultrasound showed ascites in 100% cases, peritoneal thickening in 30% cases and mesenteric adenopathy in 12% case as predominant findings.
12. Important abdominal CT findings were ascites 100% cases, peritoneal and mesenteric thickening (60%) cases and mesenteric lymphadenopathy in (50%) cases.
13. Important laparoscopic findings of the patients were:
  - Ascites in 100%
  - Peritoneal tubercles 88%
  - Adhesion 70%
  - Congested peritoneum in 64%
  - Cirrhosis in 8%
  - Splenomegaly in 8%
  - Normal laparoscopic appearance in 8%
14. Laparoscopic guided peritoneal biopsy revealed the following histo-pathological reports
  - Chronic granulomatous inflammation 68%
  - Metastatic adenocarcinoma 16%
  - Lymphoma 4%
  - Cirrhosis 8%
  - Normal report 4%
15. Laparoscopic visual diagnosis
  - Abdominal tuberculosis 60%
  - Abdominal malignancy 24%
  - Cirrhosis 8%
  - No abnormality detected 4%
16. Histo-pathological Diagnosis
  - Abdominal tuberculosis 68%

- Metastatic adenocarcinoma 16%
- Lymphomas 4%
- Cirrhosis 8%
- Normal report 4%

## Conclusion

The etiological diagnosis of exudative ascites remains a difficult challenge despite the availability of wide range of often complex and costly complementary investigations. Currently, laparoscopy with peritoneal biopsies to establish histopathological diagnosis remains the gold standard for etiologic diagnosis. Laparoscopy is able to achieve the final diagnosis and provide tissue diagnosis without any significant complication and less operative time. It can be safely concluded that diagnostic laparoscopy is a safe, quick, and effective adjunct to diagnostic modalities, for establishing a conclusive diagnosis, but, whether, it will replace imaging studies as the primary modality for diagnosis, needs more evidence.

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