Right Iliac Fossa Mass: Histopathology And Clinical Correlates With Special Reference To Preoperative Diagnostic Imaging-A Prospective Observational Open Label Clinical Study Among Adult Population In A Tertiary Care Center In Eastern India.

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KEYWORDS
Right iliac fossa mass, appendicular lump, ileocecal tuberculosis, carcinoma cecum, carcinoma ascending colon, iliopsoas abscess.

ABSTRACT
Introduction: Mass lesions in the right iliac fossa (RIF) are a pretty common entity faced by the surgeons and surgical pathologists. The etiologic variation ranges from inflammatory, infective to neoplastic proportions. Concomitant comorbidities in the adult subset of patients pose a considerable diagnostic and management challenge. Not infrequently, exploratory laparotomy based on traditional clinical diagnosis land up in misadventure, given the complexities in presentation, chances of postoperative complications and recurrence. Some entities respond to conservative management, while others need emergency or elective surgery. Therefore, preoperative investigations play a crucial role in decision making.
Objective: The study was conducted to acquire an in-depth knowledge on varied presentations and to evaluate preoperative investigative protocols in the light of operative findings and definitive postoperative diagnosis by means of histopathological examination (HPE).
Methods: This study was undertaken with one hundred adult patients of RIF mass presenting in the surgical outpatient and emergency units in a tertiary care center after approval of the institutional ethics committee (IEC) and written informed consent, excluding the pediatric population, female patients with gynecological pathology, RIF mass due to extra-abdominal pathology and terminally ill patients. Demographic variables, clinical parameters, preoperative diagnostic imaging, operative record and HPE findings were studied and correlated with appropriate statistical principles.
Results: Among the study participants, 70% were male with an age range of 21-70 years. Commonest presentation was appendicular lump (62%), followed by carcinoma of cecum and ascending colon (16%). Ultrasound (USG) findings correlated with that of contrast enhanced computed tomography (CECT) scan of the abdomen. All surgical specimens were subjected to HPE. A significance level of 0.05 was chosen for the calculation of *P*-value.
Conclusion: The study showed significant association of clinical and radiological profiles with histopathological findings, where definitive surgical management could be given.

Introduction

Background and rationale: Mass lesion in the right iliac fossa (RIF) is not an uncommon entity in the surgical wards, whether detected clinically or on imaging. These can be inflammatory, infective or of neoplastic nature, considerably posing diagnostic challenge to the clinician. Common conditions include appendicular lump, appendicular abscess, ileocecal tuberculosis and carcinoma in the cecum or ascending colon.[1] Rarer entities include Non-Hodgkin Lymphoma, ameboma, retroperitoneal mass and Crohn's disease.[2] Urologic and gynecologic masses may also present in the RIF.[1] Common clinical presentations of the above entities are right lower quadrant pain, nausea, vomiting, fever, alteration of bowel habit, weight loss and rectal bleeding. Associated comorbidities like diabetes mellitus, hypertensin and cardiac illness make the management

difficult.[3] Thus, the preoperative diagnosis brings forth a complex situation demanding thorough understanding of the local anatomy and pathogenesis. This facilitates accurate diagnosis and helps in formulating definitive management plan. Some entities respond to a more conservative approach, while others require surgical intervention. Hence, the management varies as per etiology and preoperative investigations play a crucial role in decision making.[4]

Specific objective of research: This study was conducted to acquire an in-depth concept of various modes of presentation, available investigations for diagnosis and different treatment modalities including complications of RIF mass. Wherever possible, preoperative clinical and investigational results were correlated with definitive postoperative histopathological examination.

Materials and Methods

This prospective observational open label clinical study was conducted in a tertiary care center in eastern India following approval of the institutional ethics committee and after obtaining written informed consent from the study participants who were above eighteen years old. From previous studies, a sample population of one hundred was considered adequate.

Inclusion criteria: Patients admitted with a provisional diagnosis of RIF mass.

Exclusion criteria:

1. Female patients with pathology related to uterus and its appendages.
2. Right iliac masses secondary to extra-abdominal pathology.
3. Masses from the structures not usually present in RIF.
4. Terminally ill patients presenting with RIF mass.
5. Children below twelve years of age.

Study variables: These include demographic details, clinical symptoms and signs, investigations done, type of the treatment offered, operative findings, definitive diagnosis and complications.

Mode of study: The detailed history and proper clinical findings were entered in a proforma case sheet. Required routine investigations were done to establish the diagnosis. Patients received supportive treatment for correction of anemia and other nutritional deficiencies. Adequate bowel preparation with appropriate antibiotics and mechanical bowel wash were given wherever required. During laparotomy, intra-abdominal examination of all organs was made in addition to specific pathology. Relevant surgical procedures were done depending on the type of pathology. The postoperative period was monitored; intake-output charts and vital charts were maintained. Diagnosis was confirmed by histopathological findings.

Follow up protocol: Patients were advised to attend for periodic follow up as per protocol after a specified interval or on recurrence of symptoms.

Outcome assessment: The final conclusive diagnosis of various entities under study were systematically evaluated by appropriate statistical methods as detailed below.

Statistical analysis: Data were entered into a Microsoft excel spreadsheet and analyzed by SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp (2017). Chi-square test was applied wherever necessary. Alternatively, Fisher exact test was conducted when expected frequency in one cell of the 2x2 contingency table became less than 5. A significance level of 0.05 was chosen for calculation of *P*-value.

Results

The current study had four (4%) patients below twenty years of age, thirty-two (32%) between 21-30 years, thirty-eight (38%) between 31-40 years, ten (10%) between 41-50 years, two (2%) between 51-60 years and fourteen (14%) patients between 61-70 years of age. For carcinoma cecum, the mean age was higher (58-68 years) than other entities. Male population was more (70%) than the female population of 30%. Distribution of different RIF masses was 6% for appendicular abscess, 62% for appendicular lump, 16% for carcinoma cecum, 12% for ileocecal tuberculosis and 4% for iliopsoas abscess. 95% patients with appendicular abscess,

appendicular lump, iliopsoas abscess and ileocecal tuberculosis presented with pain **[Table 1]** and 97.6% with fever **[Table 2],** while 12.5% and 18.7% patients with cecal carcinoma had such pain and fever respectively. Association of symptoms of pain and fever with the pathology was significant at P<0.05 level **[Tables 1 and 2].**

Table 1: Association between pain and final diagnosis

Pain	Inflammatory lesion	Neoplastic lesion	Marginal row total
No	4	14	18
Yes	80	2	82
Marginal column total	84	16	100 (Grand total)

Chi-square: Fisher exact 2 tailed *P* value <0.00001, significant at 0.05 level.

Table 2: Association between fever and final diagnosis

Fever	Inflammatory lesion	Neoplastic lesion	Marginal row total
No	2	13	15
Yes	82	3	85
Marginal column total	84	16	100 (Grand total)

Chi-square: Fisher exact 2 tailed *P* value <0.00001, significant at 0.05 level.
Similarly, the association of vomiting with the final diagnosis was significant at P<0.05 level **[Table 3].**

Table 3: Association between vomiting and final diagnosis

Vomiting	Inflammatory lesion	Neoplastic lesion	Marginal row total
No	26 (30.24)	10 (5.76)	36
Yes	58 (53.76)	6 (10.24)	64
Marginal column total	84	16	100 (Grand total)

Chi-square value with Yate's correction (1, N=100) = 4.5171, *P*=0.033557, significant at 0.05 level. Numbers inside the parenthesis in each cell indicates expected cell total.
87.5% patients with cecal carcinoma and 7.1% patients with ileocecal tuberculosis had loss of weight which was conspicuously absent in acute inflammatory conditions like appendicular abscess, appendicular lump and iliopsoas abscess; an association that was significant to the etiology at P<0.05 level **[Table 4].**

Table 4: Association between loss of weight and final diagnosis

Weight loss	Inflammatory lesion	Neoplastic lesion	Marginal row total
No	78	2	80
Yes	6	14	20
Marginal column total	84	16	100 (Grand total)

Chi-square: Fisher exact 2 tailed *P* value <0.00001, significant at 0.05 level.
However, no patient presented with rectal bleeding. Bowel disturbance was observed in 30.9% patients with inflammatory mass and 62.5%% patients with ascending colon and cecal carcinoma. Association of this symptom with the clinical condition was significant at P<0.05 level **[Table 5].**

Table 5: Association between bowel disturbance and final diagnosis

Bowel disturbance	Inflammatory lesion	Neoplastic lesion	Marginal row total
No	58 (53.76)	6 (10.24)	64
Yes	26 (30.24)	10 (5.76)	36
Marginal column total	84	16	100 (Grand total)

Chi-square value with Yate's correction (1, N=100) = 4.5171, *P*=0.033557, significant at 0.05 level. Numbers inside the parenthesis in each cell indicates expected cell total.
Abdominal tenderness was found in 88.1% patients with inflammatory lesions; whereas 18.75% patients with neoplastic lesions had pain on palpation; an association significant at P<0.05 level **[Table 6].**

Table 6: Association between abdominal tenderness and final diagnosis

Abdominal tenderness	Inflammatory lesion	Neoplastic lesion	Marginal row total
No	10	13	23
Yes	74	3	77
Marginal column total	84	16	100 (Grand total)

Chi-square: Fisher exact 2 tailed *P* value <0.00001, significant at 0.05 level.
Ultrasound examination correctly detected all patients with appendicular abscess, appendicular lump and iliopsoas abscess, while carcinoma cecum and ileocecal tuberculosis was described as thick cecum or heterogenous mass lesion. The association was significant at P<0.05 level **[Tables 7-9].**

Table 7: Association between USG findings and final diagnosis

USG abdomen	Appendicular abscess	Appendicular lump	Marginal row total
Appendicular abscess	6	0	6
Appendicular lump	0	62	62
Marginal column total	6	62	68 (Grand total)

Chi-square: Fisher exact 2 tailed *P* value <0.00001, significant at 0.05 level.

Table 8: Association between USG findings and final diagnosis

USG abdomen	Ca cecum/asc colon	Iliopsoas abscess	Marginal row total
Thick cecum	12	0	12
Iliopsoas abscess	0	4	4
Marginal column total	12	4	16 (Grand total)

Chi-square: Fisher exact 2 tailed *P* = 0.0005, significant at 0.05 level. Abbreviations: Ca-carcinoma, Asc-ascending.

Table 9: Association between USG findings and final diagnosis

USG abdomen	Ileocecal TB	Iliopsoas abscess	Marginal row total
Thick cecum	12	0	12
Iliopsoas abscess	0	4	4
Marginal column total	12	4	16 (Grand total)

Chi-square: Fisher exact 2 tailed *P* = 0.0005, significant at 0.05 level.
Ultrasound findings also correlated well with contrast enhanced computed tomography (CECT) scans of the abdomen indicated for carcinoma cecum and ileocecal tuberculosis; however, cases of appendicular, iliopsoas abscess and appendicular lump were not evaluated by CECT abdomen **[Table 10].**

Table 10: Association between CECT abdomen findings and final diagnosis

CECT abdomen	Ca cecum/asc colon	Ileocecal TB	Marginal row total
Ca cecum/asc colon	16	0	16
Ileocecal TB	0	12	12
Marginal column total	16	12	28 (Grand total)

Chi-square: Fisher exact 2 tailed *P* value <0.00001, significant at 0.05 level. Abbreviations: Ca-carcinoma, Asc-ascending. CECT was advised to confirm these two entities primarily detected by USG as thick cecum.
In appendicular abscess and appendicular lump, immediate exploratory laparotomy was not indicated and as such were managed conservatively with interval appendicectomy later on. Iliopsoas abscess was managed with the placement of extraperitoneal drain. Therefore, histopathological evaluation was limited to cases needing surgical exploration like carcinoma in the cecum or ascending colon and ileocecal tuberculosis producing obstructive features. All patients of cecal and ascending colon carcinoma were diagnosed as adenocarcinoma **[Fig 1, 2]** and 83.3% cases of ileocecal tuberculosis **[Fig 3, 4]** could be confirmed histologically with cartridge

based nucleic acid amplification test (CBNAAT) of surgical specimens showing caseating granulomas for tuberculosis **[Table 11].**

Table 11: Association between histopathological examination (HPE) and final diagnosis

HPE findings	Ca cecum/asc colon	Ileocecal TB	Marginal row total
Ca cecum/asc colon	16	0	16
Ileocecal TB	0	10	10
Marginal column total	16	10	26 (Grand total)

Chi-square: Fisher exact 2 tailed *P* value <0.00001, significant at 0.05 level. Abbreviations: Ca-carcinoma, Asc-ascending.

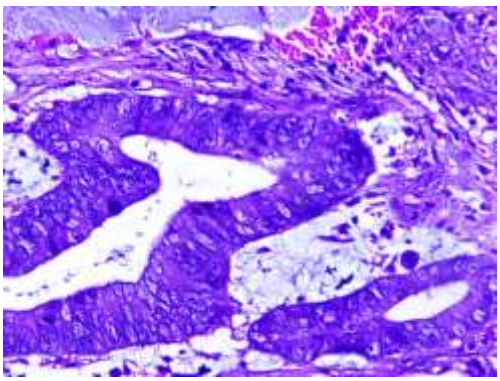

Fig 1: Cecal Adenocarcinoma-Neoplastic glands infiltrating the muscle layer with extracellular pool of mucin (H&E, 400X)

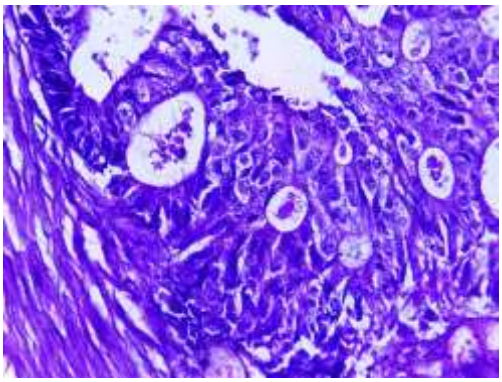

Fig 2: Carcinoma in the ascending colon-Neoplastic glands arranged in cribriform pattern with atypical mitosis, necrosis and invasion of the muscle layer (H&E, 400X)

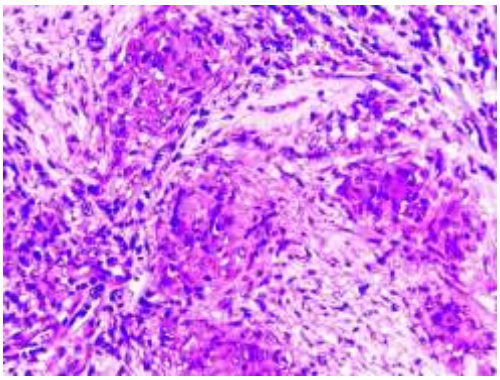

Fig 3: Ileocecal tuberculosis-Caseating granulomas with Langhans type giant cells in the lamina propria and the muscle layer of the intestine with collar of lymphocytes (H&E, 400X). Tubercular etiology was confirmed by cartridge based nucleic acid amplification test (CBNAAT).

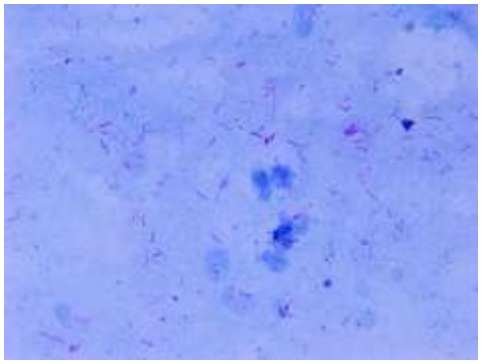

Fig 4: Ziehl Neelsen (ZN) stain of the tissue section of granulomatous lesion of intestine showing Acid Fast Bacilli (1000X, oil immersion field).

Discussion

Most of the study findings correlated well with previous and contemporary studies, some of which deserves special mention. Shashikala V et al found that neoplastic lesions in the form of cecal and ascending colon carcinoma (4%) was highest in fourth and fifth decade of life, while inflammatory conditions were predominant between 21-30 years of age with appendicular mass (60%), appendicular abscess (8%) and ileocecal tuberculosis (20%) with male predilection in all forms of pathologies.[5] Millet I et al found that though CT scan was commonly used in abdominal emergencies in general, ultrasound was recommended as first line imaging technique when confronted with suspected appendicitis.[6] Ramachandra J et al observed that, though clinical diagnosis was possible in most cases of RIF mass, ultrasound was quick, noninvasive, effective and bridged the gap between palpation and direct visualization. Moreover, ultrasound was able to diagnose appendicular abscess which were clinically diagnosed as appendicular mass. Ultrasound was able to find out bowel thickening with target sign or pseudo kidney sign in ileocecal tuberculosis and cecal carcinoma with moderate specificity. Appendicular pathology constituted 59% cases and was able to detect appendicular abscess with high sensitivity and specificity. Study findings included appendicular mass (33%), appendicular abscess (26%), ileocecal tuberculosis (19%), carcinoma caecum (12%) and Crohn's disease (3%). Commonest age distribution was appendicular mass (30-39 years), appendicular abscess (60-70 years), ileocecal tuberculosis (30-39 years), carcinoma caecum (40 years and above) and single case of Crohn's disease between 40-49 years. [7]

The current study showed significant statistical correlation between preoperative diagnostic imaging modalities and confirmatory histopathological examination of cases where surgical exploration was carried out. Again, the correlation between ultrasound and computed tomography scan was excellent, bearing testimony to the fact that ultrasound examination could be safely employed as a first line diagnostic modality in RIF mass lesions; when in doubt, CECT of abdomen can be ordered before contemplating definitive surgical management plan. In this study, patients with appendicular lump were given conservative management by Ochsner Sherren regime followed by interval appendicectomy, while cases of appendicular and iliopsoas abscess were managed by placement of extraperitoneal drain. Ileocecal tuberculosis was postoperatively managed by anti-tuberculosis treatment (ATT), and carcinoma cecum and/or ascending colon with right hemicolectomy and ileotransverse anastomosis. Some patients with carcinoma cecum and/or ascending colon needed chemotherapy. As a postoperative complication, surgical site infection was more common in RIF masses due to infective etiology. However, despite sincere effort, few lacune might persist in the present study as it was conducted in a single tertiary care center where chances of hospital bias could not be entirely ruled out. Hence, larger multicentric studies may be recommended to bring about robust outcome with sufficient external validity.

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