

ROLE OF ULTRASONOGRAPHY IN PRE-OPERATIVE EVALUATION OF RIGHT ILIAC FOSSA MASS

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ABSTRACT: AIMS AND OBJECTIVES: Mass in the Right Iliac Fossa (RIF) is clinically difficult to differentiate, ultrasonography a quick non-invasive investigation has bridged the gap between clinical examination and direct visualization. The study was done to know the efficacy of ultrasonography in pre operative evaluation of RIF mass. **MATERIALS AND METHODS:** The data for this prospective study was obtained from 300 patients admitted/ attending OPD with a clinical diagnosis of RIF mass. Ultrasonography was done and a provisional diagnosis was obtained. The final diagnosis was obtained with histopathological examination[HPE] or by other standard methods. The sonological diagnosis was compared with final diagnosis. **RESULTS:** Out of 300 patients studied 236 were operable. Ultrasonography was able to diagnose 228 out of the 236 (Sensitivity of 96.7%) as operable cases and the remaining eight were inconclusive report. Ultrasonography was able to rule out all non operable cases with 100% specificity. The final diagnosis correlated with sonological diagnosis in 284 cases with sensitivity of 94.6% while clinical diagnosis correlated with final diagnosis in 232 cases with sensitivity of 77.3%.The most common conditions being appendicular mass followed by appendicular abscess and ileocaecal TB. **DISCUSSION:** Thus ultrasonography in experienced hands is an invaluable tool for preoperative evaluation of RIF mass. It has favorable sensitivity and specificity in differentiating RIF mass and 100% sensitivity and specificity in detecting cases which needs emergency intervention. In countries like India where other radiological investigation modalities are present only in higher center, ultrasonography becomes an invaluable tool in diagnosis and evaluation of RIF mass for practitioners in semi-urban and rural settings.

KEYWORDS: Ultrasonography, Right Iliac Fossa Mass, Pre-operative evaluation, Diagnosis.

INTRODUCTION: Mass in the Right Iliac Fossa (RIF) is said to be the temple of surprises a common condition with diagnostic dilemma to the surgeon. It is virtual Pandoras box where the surgeon can expect to find a wide variety of diagnoses due to the complex presentation of the various conditions in this anatomical region. Of the multiple diagnoses possible in the RIF some are operable and some are to be treated conservatively, some conditions are to be operated on emergency basis while others can be treated conservatively and operated at a later date. Thus differentiating one condition from the other is absolutely necessary for a clinician as the treatment strategies differ with each different diagnoses.

The common diagnoses in RIF mass are appendicular mass, appendicular abscess, Ileocaecal Tuberculosis, carcinoma caecum, iliac lymphadenopathy and psoas abscess in order of frequency. The role of ultrasonography in each of these cases has been proved individually with defining characteristics for each condition¹⁻⁴. The low cost and lack of any preparation of the patient and short time required for the investigation makes it a very attractive and first line investigation for RIF

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mass . However the role of ultrasonography and its efficacy in differentiating between different causes of RIF mass, the sensitivity and specificity with which it can differentiate operable and non operable cases of RIF mass and the specificity with which it can identify conditions requiring emergency intervention in cases of RIF mass need to be studied in detail. Hence this study was undertaken with the aim of studying the efficacy of ultrasonography in the preoperative evaluation of RIF mass. The efficacy of ultrasonography in diagnosis is measured by considering the following parameters-sensitivity in identifying the mass, accuracy in identifying the structure of origin of the mass and correct diagnosis of the mass.

MATERIALS AND METHODS: This prospective study of patients with RIF mass is carried out between period of January 2004 to September 2009 with a total of 300 cases. The study was approved by ethical committee of the hospital. The case was taken up for study on admission and after obtaining written consent and after explaining them nature of surgery, type of anesthesia and the study being done. The Inclusion Criteria for recruiting cases in this study were patient more than 15 years, any patient admitted with RIF mass or any patient found to have RIF mass after admission and investigation. The Exclusion criteria being patients aged <15 yrs, all pts with gynecological conditions presenting as RIF mass, mass encroaching onto RIF from other region and parietal wall swellings in RIF.

Detailed clinical history was taken and all cases underwent through physical examination. Routine investigations were done for all cases and depending on the provisional diagnosis the following specific investigations and treatment plans were followed.

PROVISIONAL DIAGNOSIS	USG FINDINGS	SPECIFIC INVESTIGATION	MANAGEMENT PLAN
Appendicular mass	Echo poor, Heterogeneous Texture, Probe tenderness	HPE of Appendix	Conservative Management + Interval Appendectomy
Appendicular Abscess	Hypo echoic, para-caecal fluid collection	HPE of Appendix	Emergency Appendectomy
Ileo-Caecal TB	Hypo echogenic mass with echogenic center with pseudo kidney sign with thickening of bowel wall	Sputum for AFB, Colonoscopy and HPE, Stool for occult blood .	Conservative Management, Surgery if needed
Carcinoma Caecum	Irregular bowel wall thickening leading to target sign in caecum	Colonoscopy, Stool for occult blood, HPE	Right Hemicolectomy or Limited Ileo-Caecal resection
Psoas Abscess	Thick walled fluid collection in psoas muscle extending into pelvis ⁵	Pus Culture and sensitivity	Incision and Drainage/ Pig tail catheter incision/ Guided Aspiration
Iliac Lymphadenopathy	Iliac Hypoechoic and heterogeneous lymph	USG Guided Biopsy and HPE examination	Conservative Management

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	nodes with sonolucency and peri nodal echogenicity along iliac vessels ⁶ .		
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Table 1: USG findings, Investigations done and plan of management in different conditions of RIF mass.

A 5-7.5 Mhz linear array transducer was used in our study with graded compression technique. This technique displaces the bowel loops and compress the caecum and facilitates good sonological view of the RIF. All the ultrasonographic examinations were done by a single experienced radiologist and his opinion was considered final. After the specific intervention or investigation a final diagnosis was obtained and the provisional diagnosis (on USG) and the final diagnosis were compared.

STATISTICAL METHODS: Chi-Square and Fisher Exact tests were used along with diagnostic statistics like sensitivity, specificity positive predictive value and negative predictive value were used. Statistical software namely SAS 9.2, MedCalc 9.0.1 and Systat 12.0 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

RESULTS: A total of 300 cases were studied in this series. The cases were divided according to their final diagnosis and the comparison of final and ultrasonographic diagnosis has been done. The distribution of cases as per the final diagnosis is as follows:

Final Diagnosis	No of Cases	Percentage
Appendicular Mass	156	52% [C.I-46.19-57.76%]
Appendicular Abscess	60	20% [C.I-15.87-25.07%]
Ileo-Caecal TB	56	18.66% [C.I- 14.52-23.64%]
Carcinoma Caecum	12	4% [C.I-2.18-7.07%]
Psoas Abscess	8	2.66% [C.I-1.25-5.39%]
Iliac Lymphadenopathy	8	2.66% [C.I-1.25-5.39%]

**Table 2: Distribution of the disease based on final diagnosis.
C.I is the 95% confidence interval of the proportion.**

Out of 300 patients studied 236 were operable. Ultrasonography was able to diagnose 228 out of the 236 (Sensitivity of 96.7%) as operable cases and the remaining eight were inconclusive report. Ultrasonography was able to rule out all non operable cases with 100% specificity. The final diagnosis correlated with sonological diagnosis in 284 cases with sensitivity of 94.6% while clinical diagnosis correlated with final diagnosis in 232 cases with sensitivity of 77.3%. The most common conditions being appendicular mass followed by appendicular abscess and ileocaecal TB. The following table shows the diagnosis on ultrasonography and number of cases.

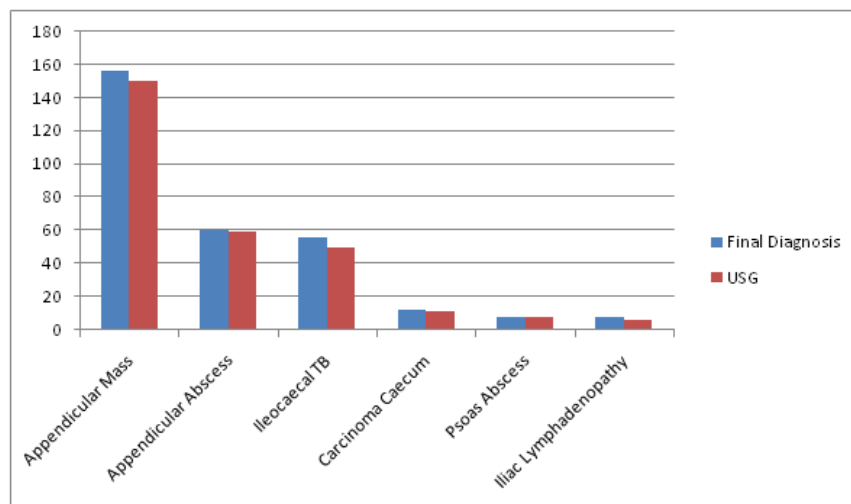
Ultrasonographical diagnosis	Number of Cases	Percentage
Appendicular Mass	150	50% [C.I -44.21-55.79 %]
Appendicular Abscess	59	19.66% [C.I -15.42-24.72 %]

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Ileo-Caecal TB	50	16.66% [C.I - 12.73-21.48%]
Carcinoma Caecum	11	3.66% [C.I - 1.94-6.66%]
Psoas Abscess	8	2.66% [C.I-1.25-5.39%]
Iliac Lymphadenopathy	6	2% [C.I - .8-4.5%]
Inconclusive study	16	5.33% [C.I - 3.18-8.68%]

Table 3: Distribution of disease based on ultrasonography.

One case diagnosed to be appendicular abscess on USG was found to be appendicular mass intra-operatively and one case of appendicular mass underwent emergency appendectomy due to worsening clinical features.



Graph1: Comparison of Final Diagnosis and Ultrasonography.

The Sensitivity, Specificity, Positive predictive Value[PPV] and Negative Predictive Value[NPV] of ultrasonography in various conditions of RIF mass as obtained from our study is as follows.

Diagnosis	Sensitivity	Specificity	PPV	NPV
Appendicular Mass	96.15%	99.30%	99.33%	95.97%
Appendicular Abscess	98.33%	99.58%	98.33%	99.58%
Ileocaecal TB	89.28%	100%	100%	97.6%
Ca. Caecum	91.66%	100%	100%	99.65%
Psoas Abscess	100%	100%	100%	100%
Iliac Lymphadenopathy	75%	100%	100%	99.31%

Table 4: Effectiveness of ultrasound in individual conditions of RIF mass

DISCUSSION: Thus the results of this study show that ultrasonography is a quick and safe first line diagnostic tool in case of mass in RIF as it can identify the mass with 100% sensitivity diagnose the organ of origin in 94.6% of cases and give accurate diagnosis in 94% of the cases. This is found to be

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superior to that of clinical assessment of 77.3%. The study showed that appendicular pathology is the chief cause of RIF mass associated with 72% of the cases and USG was able to differentiate between the two appendicular causes of RIF mass with specificity of 98.33% and 99.33% in appendicular abscess and appendicular mass respectively. This acquires importance as the line of management for the two conditions is totally different as abscess requires immediate drainage while appendicular mass is managed conservatively.

Our findings were compared with Millard F.C et al⁴, which showed improved sensitivity and specificity of USG in differentiating appendicular pathology and in diagnosing the different conditions causing RIF mass. The study showed that

1. USG is the best first line of investigation in patients with RIF mass.
2. When compared to other studies the observations are almost similar except there has been an improvement in the accuracy and no of correct diagnoses has improved possibly with expert hands.
3. It is adjuvant in many other conditions like Ca. Caecum^{7,8} and Ileo Caecal TB in which conditions the efficacy has never been quantified.
4. It is an invaluable tool in diagnosing and aspiration of Psoas abscess ⁹ with 100% sensitivity and specificity.
5. In cases with vague presentation USG has role in diagnosing organ of origin, character and extension if any.
6. It is also useful in follow up and to see response to conservative management in various conditions and if needed intervention can be done.

USG is an economical, non invasive, patient friendly procedure done in OPD set up without any preparation, without any exposure to radiation with good results is an ideal first line investigation in pre operative evaluation of RIF mass. Hence keeping in mind the high sensitivity and specificity achieved by USG in diagnosis RIF mass there is no need for further investigations in cases which are diagnosed with USG definitively. However other radiological investigations may be required when the diagnosis is still in doubt after USG. Since the cost of advanced radiological investigations is high, in developing countries like India and in semi Urban and rural setups where such investigations are not readily available USG should boost the hands and confidence of a surgeon in tackling cases of RIF mass.

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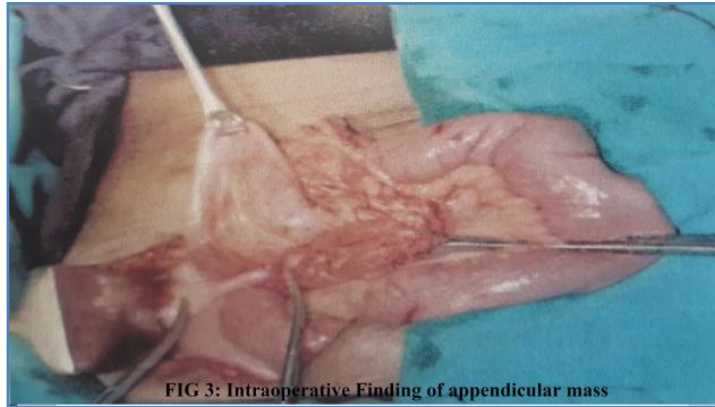


FIG 3: Intraoperative Finding of appendicular mass



FIG 4: Ultrasonography showing bowel wall thickening and target sign in a case of Carcinoma Caecum.

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