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Effectiveness of CT Scan in diagnosis and management of emphysematous pyelonephritis

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Abstract
Purpose: Emphysematous pyelonephritis is a rare, severe, acute, necrotising infection of kidney. The purpose of this study is to assess diagnostic accuracy of ct scan in diagnosis and assessing further management of EPN. This is done by evaluating clinically suspected cases of EPN and there by analysing follow up CT scan after doing classification by "HUANG TSEN" method. The confirmatory assessment of CT accuracy was done by comparing CT findings with operative findings.

To the organising secretory, respected sir; kindly find attached research paper over the topic to assess diagnostic accuracy of CTscan in diagnosis and management of EPN, permission has already been obtained by RRC and study has been started. So far, we have 8 cases, we are targeting around 15 cases till November and 20 cases upto January, considering this is not a common entity, approx 15-20 cases should be adequate.

Material and Methods: implication of this study;
Class1: Gas confined to the collecting system
Class2: Gas confined to the renal parenchyma alone.
Class3A: Perinephric extension of gas/abscess
Class3B: Extension of gas beyond the Gerota"s fascia
Class4: B/L EPN or EPN in a solitary kidney.
Expected Results: After finding a fare relation between CT and operative findings and having confirmed it by comparing CT and operative findings, CT appears effective in diagnosis and grading of EPN.
Conclusion: We find fare co-relation between CT and operative findings in cases of EPN

Keywords: Emphysematous pyelonephritis, Huang Tsen classification

Introduction

Emphysematous pyelonephritis (EPN) is a rare but potentially life-threatening necrotizing renal parenchymal infection characterized by the production of intra-parenchymal gas. Till mid-1980s, the standard treatment was nephrectomy of the affected kidney because efforts in preserving the kidney by non-surgical treatment led to mortality of upto 60-80%. The situation has improved dramatically in the last two decades with earlier computed tomography (CT) scan based diagnosis and advances in multi-disciplinary intensive care of sepsis syndrome and multi-organ dysfunction syndrome (MODS) with the overall mortality estimated to be 20% to 25%.

Aim

- To access diagnostic accuracy of CT-Scan for diagnosis and management of emphysematous pyelonephritis.

Objectives

1. To evaluate clinically suspected cases of emphysematous pyelonephritis
2. To analyse findings of CT
3. To compare CT findings with operative findings.
4. To establish correlation between CT findings and operative findings.

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Materials and Methods

Total 15 cases of emphysematous pyelonephritis were evaluated with Haung Tsen classification based on ct and this findings were correlated with treatment modalities to conclude the effectiveness of ct in cases of emphysematous pyelonephritis.

Table 1: Huang TSEN classification for emphysematous pyelonephritis

Haung Tsen classification	Treatment
Class 1	Antimicrobials+/-DJ stent.
Class 2	DJ stent +/-PCN.
Class 3	Nephrectomy.
Class 4	Nephtrectomy.

|	Features
Class 1	Gas in collecting system only
Class 2	Gas in renal parenchyma without extension to the extrarenal space
Class 3A	Extension of gas or abscess to the perinephric space (between renal capsule and fascia)
Class 3B	Extension of gas or abscess to the pararenal space (beyond the renal fascia)
Class 4	Bilateral emphysematous pyelonepritis or in a solitary functioning kidney
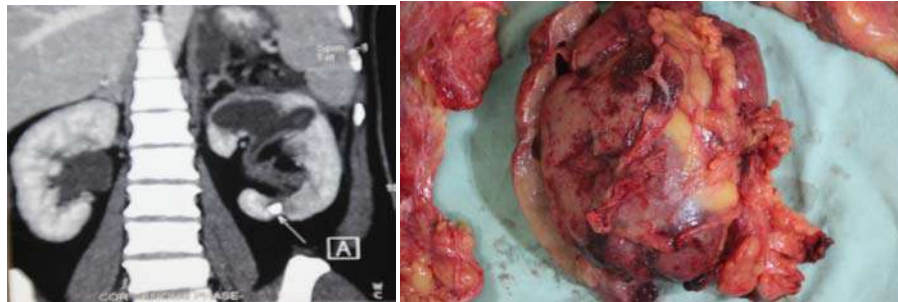
Class 1
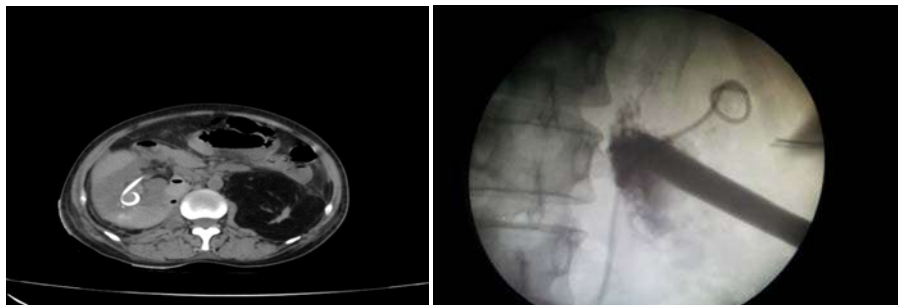
Class 2

Class3a
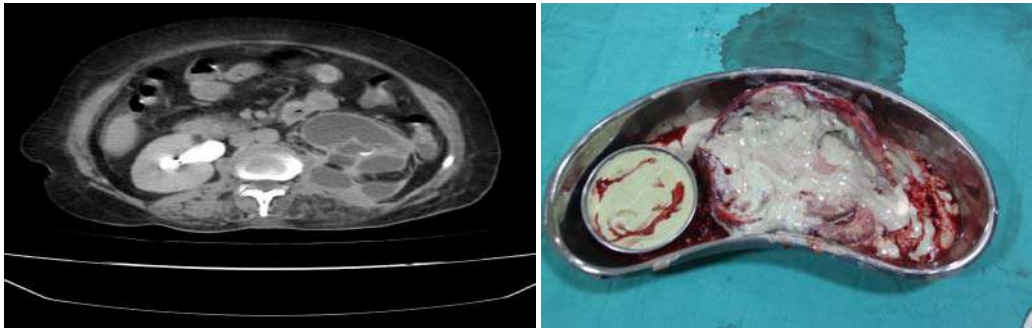
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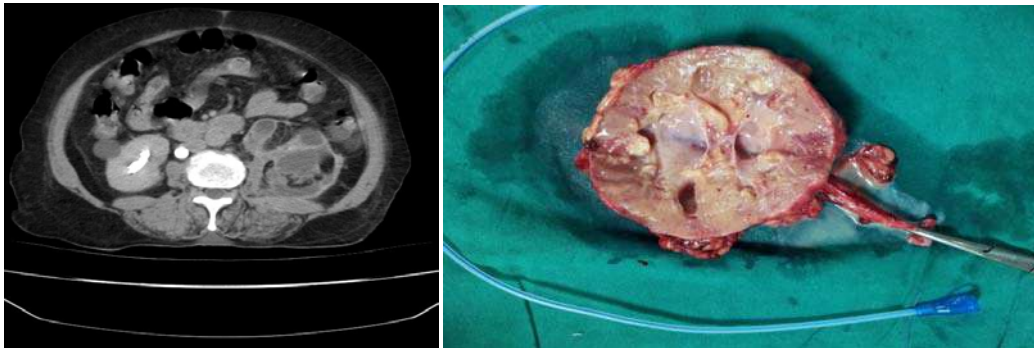
Class 4

Result

Table 1: Correlation of age with incidence of emphysematous pyelonephritis, thus EPN is more common in age group between 40-60 years

Age	Incidence
0-20	0-1%
20-40	1-3%
40-60	50-60%
60-80	20-30%
80 AND Above	10-15%

Table 2: Correlation between incidence of EPN with diabetes thus EPN is more common in comorbidities like diabetes

	Incidence of Epn
Diabetic	50-80%
Non-Diabetics	2-20%

Table 3: Correlation of incidence of EPN and causative organism, thus EPN is more common with organism like *E. coli*

Causative Organism	Incidence
E coli	80-90%
Klebsiella pneumoniae	5-6%
other	2-4%

Table 4: Total number of cases and there categorization into grades as mentioned in the classification of EPN by HUANG TSEN depending on the severity and extension

Haung Tsen Classification(n=15)	No of Patients
Class 1	05
Class2	04
Class3	03
Class4	03

Table 5: The tabulated result of the study in which considering the categorization of cases further management was done with a possible outcome

EPN Types (n=15)	Treated or operated	Mortality
Class1	05	00
Class2	04	00
Class3	03	01
Class4	03	01

Discussion

In this series of 15 cases of EPN treated by multi-disciplinary management following a standard protocol of pre diagnosis by CTscan, 13(86%) survived the illness, with a mortality rate of 2(14%).

- The outcome/prognosis correlated more with CT scan based graded classification as depicted by Haung Tsen *et al*. CT is the best diagnostic modality for emphysematous pyelonephritis, and it may show the following diagnostic features:
- enlarged, destroyed renal parenchyma
- small bubbly or linear streaks of gas
- fluid collections, with gas-fluid levels
- focal necrotic areas +/- abscess
- Differentials:
- General imaging differential considerations include:
- emphysematous pyelitis
- iatrogenic (instrumentation, or intervention of urinary tract) fistulous communication with bowel

Conclusion

- 80-90% effectiveness of CT scan has been proved in diagnosing and management of Emphysematous Pyelonephritis in this study.

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