



### Research Article

## Groin Abscess: Assessing the Diagnostic Accuracy of Emergency Department Clinicians and Imaging Modalities

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### Abstract

**Objective:** To determine the clinical and imaging diagnostic accuracy in adult patients presenting to the Emergency Department with groin abscess.

**Method:** Retrospective chart review of all adult patients presenting to a district general hospital with a provisional diagnosis of groin abscess was undertaken from January 2019 to December 2019. A proforma was used to capture data such as the age, sex, co-morbidities, grade of assessing clinician and imaging profile.

**Results:** 39 patients with a provisional diagnosis of groin abscess were identified; representing approximately 1% of all ED attendances. There were 21 males and 18 females. The age range was from 23 to 73 years (mean age 42). The abscess was located on the left side in 19 patients (49%), 18 (46%) on the right and 2 (5%) were bilateral. The overall rate of correct diagnosis of the ED clinicians compared to CT diagnosis is indicated by a sensitivity of 82%, positive predictive value of 90% and an accuracy of 75%. 22 patients had CT scan which confirmed an abscess in 18 (83%).

**Conclusion:** Groin abscess is a rare presentation to the Emergency

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**Citation:** Ameh V, Khokhar HK, Abbasi AA (2020) Groin Abscess: Assessing the Diagnostic Accuracy of Emergency Department Clinicians and Imaging Modalities. J Emerg Med Trauma Surg Care 7: 050

**Received:** July 13, 2020; **Accepted:** July 30, 2020; **Published:** August 06, 2020

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department. Most patients were seen by clinicians below the consultant grade. Diagnostic accuracy was highest amongst physicians

**Keywords:** Accuracy; Clinician; CT; Emergency Department; Groin abscess; IVDU

### Introduction

Groin abscess is a rare but significant clinical condition that often presents to the Emergency department. Intravenous drug users (IVDU) who inject into the groin are particularly prone to the condition. It has potentially life and limb threatening complications.

Abscesses can occur in patients who are not intravenous drug users but who suffer from other co-morbidities [1]. The commonest culprit organisms are skin commensals such as staphylococcus and or streptococcus, but they have been known to be caused by other microbes such as gram-negative organisms and anaerobes.

The diagnosis is usually clinical but confirmed by imaging such as duplex doppler ultrasound and CT (Computerized Tomography) scanning with or without angiogram. The advantages of imaging in groin abscess are to confirm the diagnosis, calibrate the size, determine the number and extent and to identify other associated structures or pathologies such as pseudoaneurysms [2]. Patient are normally assessed by various grades of clinicians in the ED (Emergency Department). In this paper, we determine the accuracy of clinician assessment and CT imaging in patients presenting to the Emergency department with groin abscess.

### Materials and Method

We undertook a retrospective chart review of all adult patients presenting to a large district general hospital with a provisional diagnosis of groin abscess from January 2019 to December 2019. A proforma was used to capture data such as the age, sex, co-morbidities, grade of clinician assessment and imaging. Exclusion criteria were; duplicated records, direct specialty referrals and abscesses in locations other than the groin. Provisional ED Clinician diagnosis was compared with the diagnosis on CT imaging.

### Results

39 patients presenting to the Emergency department with groin abscess were identified. This represented approximately 1% of all ED attendances. There were 21 males and 18 females. The age range was from 23 to 73 years (mean age 42). The abscess was located on the left side in 19 patients (49%), 18 (46%) on the right and 2 (5%) were bilateral.

The majority of patient (64%) were intravenous drug users. All the patients were assessed by various grades of Emergency department clinicians; junior grade doctors (Foundation trainees, GP trainees and junior clinical fellows), Registrars (middle grade doctors), Advanced Nurse Practitioners (ANP) and Consultants. Most of the patients were

seen by junior grade doctors (48.7%) with a diagnostic accuracy of 89.5%. Consultant reviewed the least number of patients (5%) but had a diagnostic accuracy of 100%. The overall ability of ED clinicians to make the correct diagnosis is indicated by a sensitivity of 82%, positive predictive value of 90% and an accuracy rate of 75%. The overall diagnostic accuracy represents the overall probability that the diagnosis of groin abscess was correctly made.

The specificity of the clinicians' diagnostic acumen was not determined as there were no false negatives (Tables 1, 2 and 3). 22 patients had CT scan which confirmed an abscess in 18 (83%).

Grade	Provisional diagnosis of abscess No (%)	Correct diagnosis (as noted of CT) No (%)
Advanced Nurse Practitioners	4 (10.13%)	2 (50%)
Junior doctor (FY2, GP trainees)	19 (48.7%)	17 (89.5%)
Middle grade doctors (Specialty doctors, Clinical Fellows)	14 (35.4%)	12 (85.7%)
Consultants	2 (5%)	2 (100%)

Table 1: Grade of Assessing Clinician (n=39).

Sensitivity	81.8% (95% CI, 59.7%-94.8%)
Positive Predictive Value	90% (95% CI, 88% - 92%)
Accuracy	75% (95% CI, 53% - 90%)

Table 2: Accuracy of ED Clinician diagnosis.

Imaging type	No
CT Angiography	22
Duplex Doppler ultrasound scan	2
CT angiography and Ultrasound scan	4
No imaging	11

Table 3: Imaging (n=39).

The ED clinicians diagnosed an abscess in 20 cases resulting in 2 false positive diagnosis. 37 patients had some form of treatment; either I&D (incision and drainage) or antibiotics.

2 patients were discharged without any treatment (Table 4). There was no pseudoaneurysm identified. 2 cases incidental deep vein thrombosis (DVT) was identified.

Treatment type	No
Incision and drainage (I&D) plus antibiotics	18
Antibiotics only	18
Incision and drainage (I&D) only	1
No treatment	2

Table 4: Treatment modality (n = 39).

## Discussion

Our study showed that groin abscesses are a rare presentation

to the Emergency department, accounting for approximately 1% of Emergency department presentations. The average age in our cohort was 42 years. Most cases occurred in intravenous drug users (IVDU). A subgroup analysis in IVDUs shows that the average age of this cohort was slightly younger at 39 years.

Our patients were reviewed initially by various grades of clinicians; Advanced Nurse practitioners, junior grade doctors (Foundation trainee doctors, GP trainee doctors, Junior Clinical Fellows), middle grade doctors (specialty doctors, senior clinical fellows) and Consultants. Majority of patients were seen by junior grade doctors (48.7%) with a diagnostic accuracy of 89.5%. Middle grade doctors saw 35.4% of the cases with a diagnostic accuracy of 85.7%. Consultants saw the least number of patients but had 100% diagnostic accuracy. Advanced Nurse Practitioners (ANP) saw just 10% the cases but had a diagnostic accuracy of 50%. The overall diagnostic accuracy rate of the ED clinicians is indicated by a sensitivity of 82%, positive predictive value of 90% and an accuracy of 75%.

This finding showed that there is a high diagnostic accuracy rate among doctors. It also revealed that consultants were more likely to make the correct diagnosis and therefore provide the most appropriate care. The presence of consultants in the emergency department is by extension more likely to lead to better quality care.

Schewe, et al. noted that regular training by ED clinicians is required to improve their clinical accuracy over time. It is also interesting to note that Jo et al in their comparison of the accuracy of Emergency Medicine physicians and surgical residents in the diagnosis of acute appendicitis, found that there was no difference between the two groups of specialty residents. It has been noted that the framing of clinical information affects physician diagnostic accuracy; especially when the presentation is framed towards a particular diagnosis. This is especially so in patients presenting with pulmonary embolism and interstitial lung disease [3-5]. This does not appear to be the case in our cohort; largely because the diagnosis of groin abscess is usually obvious and not difficult to reach. Zakin, et al. examined the factors affecting mortality in patients admitted to hospital by Emergency physicians and found that Emergency physicians were normally faced with difficult admission decisions and clinical judgements. They found that their diagnosis on admission was very closely correlated with the final diagnosis [6].

The imaging modality of choice is CT scanning with or without ultrasound scan. The imaging is mainly undertaken in order to rule out pseudoaneurysm or mycotic aneurysms. Most mycotic aneurysms are infected false aneurysm (without surrounding adventitia).

The development of mycotic aneurysms is believed to be due to the presence of infection adjacent to the blood vessels which causes a breakdown of the arterial wall. This can then lead to a rupture with a possible skin loss.

Roszler, et al. in their study recommended that doppler ultrasound should be undertaken as the initial imaging modality for a groin abscess or mass; as it has 95% sensitivity and 94% specificity. They further propose that if flow is then observed, the patient may proceed to have a CT angiogram as it is 98% sensitive for pseudoaneurysm [7].

CT angiography has further advantages in that it can help to map the location and extent of the abscess. It can provide information

about the proximity to or involvement of adjacent structures. It can also help to plan for further treatment; including surgery.

In one case in our series an abscess was identified on the side opposite to the side of presenting complaint following CT angiogram. This highlights the importance of CT in identifying other associated pathologies [8]. It has been noted that abscesses may range from anechoic to echogenic masses which may be impossible to differentiate from haematomas. They may also be difficult to differentiate from mycotic aneurysms without Doppler ultrasound scan. CT finding of an abscess includes a mass of variable attenuation that is often associated with oedema around the muscles.

CT has been found to be useful when the abscess appears to be extending superiorly and inferiorly from the groin [9,10]. Taking a good history and a thorough clinical examination will help to improve the provisional diagnosis.

Although pseudoaneurysms and mycotic aneurysms are dreaded complications of groin abscess, they are in fact very rare and we did not identify any pseudoaneurysms in our series.

Another finding of note in our study is incidental deep vein thrombosis (DVT) in 2 cases. These patients did not present with features suggestive of a DVT and both had a history of intravenous drug use. This highlights the need for increased awareness and a high index of suspicion in identifying asymptomatic DVTs in IVDUs presenting with a groin abscess.

Our study had some limitations in that the numbers are small. It is also a retrospective single centre cohort review. Nevertheless, we believe it provides a significant insight into what is an uncommon but important clinical condition. We have also devised a pathway algorithm for the assessment and investigations of these patients (Figure 1).

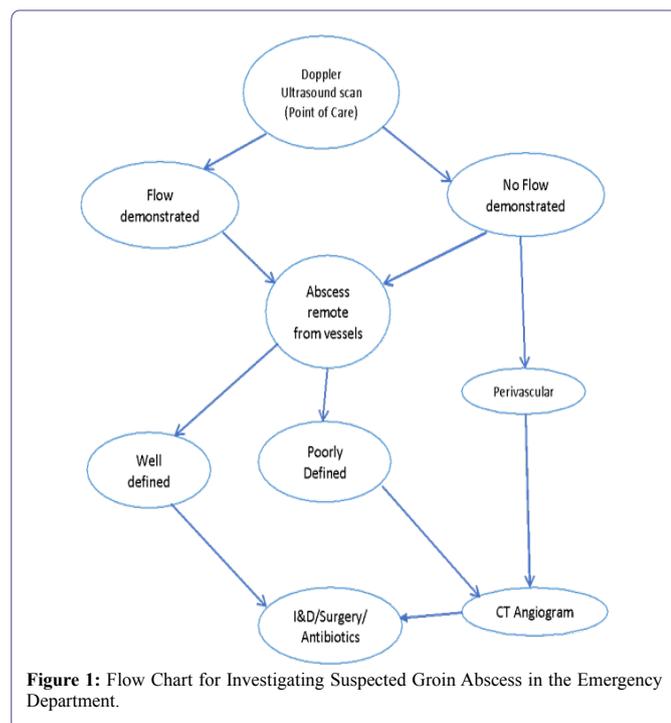


Figure 1: Flow Chart for Investigating Suspected Groin Abscess in the Emergency Department.

## Declaration

### Ethical approval and consent for study

Our institutional Research and Ethics Review Committee has determined that ethical approval is not required for the publication of this study.

### Availability of data and materials

The authors understand that the raw data and materials used for this study will be made available on request.

### Competing interest

The authors declare that there is no possibility of a conflict of interest in the preparation of this manuscript.

### Acknowledgement and Author Contribution

Mr V Ameh conceived the study. He also designed the study protocol, data collection proforma along with a review, analysis and editing of the manuscript.

Dr HK Khokher undertook the data collection, literature review and analysis. He also undertook a review and editing of the manuscript.

Mr A Abbasi undertook a review, validation and editing of the manuscript.

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