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Clinical Profile and Outcomes of Liver Abscess: A Prospective Study from a Tertiary Care Centre in Western India

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Abstract

Background: Liver abscess remains an important cause of surgical morbidity in the Indian subcontinent, with amoebic and pyogenic forms predominating. Understanding the local clinical, biochemical, and radiological profile helps guide timely, minimally invasive management. This study was undertaken to characterise cases presenting to a tertiary care teaching hospital in western India and to evaluate the outcomes of image-guided intervention combined with medical therapy.

Methodology: A prospective observational study was conducted at MGM Medical College and Hospital, Navi Mumbai, from January 2024 to December 2025. Thirty consecutive adult patients with clinical and radiological confirmation of liver abscess were recruited after informed consent. Demographic details, presenting features, comorbidities, biochemical parameters, and sonographic characteristics were recorded using a structured proforma. Management comprised broad-spectrum intravenous antibiotics with ultrasound-guided percutaneous needle aspiration or pigtail catheter drainage; open surgical drainage was reserved for selected cases. Clinical and sonographic response was reassessed on day 3 and day 7. Data were analysed using SPSS; chi-square tests were applied where appropriate, with $p<0.05$ considered significant.

Results: The mean age was ~38 years, with a clear male preponderance (male-to-female ratio ~9:1). The majority hailed from rural or peri-urban catchment areas ~76%. Right upper quadrant pain (~96%), right hypochondrial tenderness (~92%) and fever (~88%) were the commonest presenting features. Leucocytosis (>11,000/cu.mm) was observed in ~84% of patients, raised alkaline phosphatase in ~78%, and hypoalbuminaemia (<3.8 g/dL) in ~70%. Amoebic liver abscess accounted for ~72% of cases and pyogenic abscess for ~28%. Single abscesses were seen in ~66% of patients, and the right lobe was involved in ~80%. Abscess volumes ranged from <100 cc to >500 cc, with most lying between 150 and 350 cc. By day 7, abdominal pain had resolved in ~85% and right hypochondrial tenderness in ~90% of patients. No mortality and no major procedure-related complication was recorded.

Conclusions: Liver abscess at our centre continues to affect predominantly young to middle-aged men from lower socioeconomic strata, with amoebic aetiology dominant and right-lobe single lesions most frequent. Ultrasound-guided percutaneous drainage combined with appropriate antimicrobials is a safe, effective, and reproducible approach, producing rapid symptomatic and radiological resolution with negligible morbidity. Surgical drainage remains reserved for complicated or refractory disease.

Keywords: liver abscess; amoebic liver abscess; pyogenic liver abscess; percutaneous drainage; ultrasound-guided aspiration; tropical surgery

Introduction

Liver abscess is a focal suppurative collection within the hepatic parenchyma and constitutes one of the most frequent visceral abscesses encountered in surgical practice across the tropics. In India, it continues to be a significant contributor to in-hospital surgical morbidity, driven largely by socioeconomic determinants such as overcrowding, contaminated water supply, poor sanitation, and undernutrition [1,2]. Two principal forms are recognised on aetiological grounds: amoebic liver abscess caused by Entamoeba histolytica, and pyogenic liver abscess of bacterial origin, with Escherichia coli, Klebsiella pneumoniae and Streptococcus species being the most frequently isolated organisms [3].

The clinical spectrum is wide and often non-specific. Patients typically present with right upper abdominal pain, fever and constitutional symptoms, and physical examination may reveal hepatomegaly, point tenderness, or, less often, jaundice [4,5]. Although the disease can be life-threatening when complicated by rupture, sepsis, or multiorgan involvement, outcomes have improved substantially with the widespread adoption of abdominal ultrasonography and contrast-enhanced computed tomography for early diagnosis [6].

Management has shifted decisively over the past two decades from open surgical evacuation towards image-guided minimally invasive drainage. Ultrasound-guided percutaneous needle aspiration (PNA) and percutaneous catheter drainage (PCD), in conjunction with empirical and culture-directed antimicrobial therapy, are now regarded as the standard of care for most uncomplicated collections, with reported success rates of 70–100% and minimal procedure-related morbidity [7-9]. Surgery is increasingly reserved for patients with ruptured abscess, biliary peritonitis, failure of percutaneous therapy, or suspected alternative pathology.

Despite a rich Indian literature on liver abscess, regional variation in demographic, clinical and microbiological patterns persists. Data from hospitals serving the densely populated peri-urban belt of Mumbai are relatively sparse. The present prospective study was therefore undertaken at a tertiary care teaching hospital in Navi Mumbai with the objective of characterising the contemporary clinical profile of liver abscess and evaluating the efficacy of a standardised management protocol based on ultrasound-guided intervention.

Aims and Objectives

The present study aimed to describe the clinical, biochemical, and radiological profile of patients with liver abscess presenting to a tertiary care teaching hospital and to evaluate the outcomes of their management. Specific objectives were: (i) to study the demographic distribution of cases with respect to age, sex, residence, and dietary habit; (ii) to identify potential predisposing and risk factors; and (iii) to compare modes of management and their effectiveness in terms of symptomatic and radiological resolution.

Materials and Methods

Study design and setting

This was a prospective, single-centre observational study conducted in the Department of General Surgery at MGM Medical College and Hospital, Navi Mumbai, Maharashtra, between January 2024 and December 2025. Written informed consent was obtained from every participant.

Sample size and study population

Thirty consecutive adult patients (aged 18 years or older) presenting to the outpatient or emergency service with a clinical suspicion of liver abscess that was subsequently confirmed on imaging were enrolled.

Inclusion criteria

1. Age ≥18 years, irrespective of sex or socioeconomic background.
2. Clinical and radiological confirmation of liver abscess by ultrasonography, contrast-enhanced computed tomography, or both.
3. Willingness to participate and provision of written informed consent.

Exclusion criteria

1. Patients with decompensated comorbid illness likely to confound outcome assessment (e.g., advanced congestive cardiac failure, end-stage renal disease, advanced malignancy).
2. Pregnant or lactating women, in view of the potential risks associated with repeated imaging and certain antimicrobial agents.

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3. Ruptured abscess with haemodynamic instability at presentation requiring emergency laparotomy outside the study protocol.

Clinical evaluation

A detailed history was obtained using a structured proforma, covering presenting complaints, past medical illnesses, alcohol consumption, occupational exposure, and dietary habit. A thorough general and abdominal examination was carried out in every patient, with particular attention to the right hypochondrium, hepatic span, and signs of systemic sepsis.

Investigations

Every patient underwent a standardised panel of investigations: complete blood count, erythrocyte sedimentation rate, renal function tests, and liver function tests including total bilirubin, aspartate and alanine aminotransferases (SGOT, SGPT), alkaline phosphatase, serum albumin and prothrombin time with international normalised ratio. Microbiological evaluation comprised blood culture, pus culture and sensitivity from aspirated material, urine analysis, and stool examination. Radiological imaging consisted of abdominal ultrasonography using a curvilinear 2.5–3.75 MHz transducer as the first-line modality, with contrast-enhanced computed tomography reserved for equivocal or complex cases.

Management protocol

All patients were admitted and started on empirical broad-spectrum intravenous antibiotics (most commonly a third-generation cephalosporin combined with metronidazole), later tailored to culture and sensitivity. Small uncomplicated abscesses (<5 cm with low viscosity content) were managed by single or repeated ultrasound-guided percutaneous needle aspiration. Collections larger than 5 cm, or those with thick pus or poor initial response to aspiration, underwent ultrasound-guided pigtail catheter drainage. Open surgical drainage was reserved for impending or frank rupture, biliary peritonitis, or failure of percutaneous techniques.

Outcome assessment

Clinical response was assessed daily during hospitalisation, with specific re-evaluation on day 3 and day 7 after intervention, and included resolution of pain, fever, tenderness, nausea, vomiting and jaundice. Radiological response was documented by serial ultrasonography, noting reduction in abscess volume. Patients were discharged when clinically asymptomatic with evidence of sonographic resolution, and were followed up in the outpatient clinic at 2 weeks and 6 weeks.

Statistical analysis

Data were entered in Microsoft Excel and analysed using SPSS version. Continuous variables are expressed as mean ± standard deviation and categorical variables as frequencies and percentages. Associations between categorical variables were tested using the chi-square test, with Fisher's exact test applied where expected cell counts were low. A two-sided p-value <0.05 was considered statistically significant.

Results

Demographic profile

Of the 30 patients enrolled, ages ranged from ~14 to ~70 years with a mean of 37.9 ± 13.2 years. The third and fourth decades of life together accounted for the majority of cases. The gender distribution was heavily skewed towards males, with 27 men (90%) and 3 women (10%), giving a male-to-female ratio of 9:1. Twenty-three patients (76.7%) belonged to rural or peri-urban backgrounds, while the remaining 7 (23.3%) were from urban neighbourhoods of Navi Mumbai.

Table 1. Age-wise distribution of patients .

Age group (years)	Number (N=30)	Percentage (%)
11–20	1	3.3
21–30	7	23.3

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Age group (years)	Number (N=30)	Percentage (%)
31–40	10	33.3
41–50	6	20.0
51–60	4	13.3
≥61	2	6.7

Clinical presentation

The most frequent presenting symptom was right upper quadrant abdominal pain, reported by 29 of 30 patients (96.7%), closely followed by right hypochondrial tenderness on examination (28/30; 93.3%) and fever (26/30; 86.7%). Nausea and vomiting were present in 16 patients (53.3%), and clinically detectable hepatomegaly in 23 (76.7%). Overt jaundice was documented in only 7 patients (23.3%).

Table 2. Frequency of clinical features at presentation.

Symptom / sign	Number (N=30)	Percentage (%)
Pain, right upper quadrant	29	96.7
Right hypochondrial tenderness	28	93.3
Fever	26	86.7
Hepatomegaly	23	76.7
Nausea and vomiting	16	53.3
Clinical jaundice	7	23.3

Risk factors and comorbidities

A history of chronic alcohol consumption was elicited in 12 patients (40%). Established comorbidities were present in 11 patients (36.7%), the most frequent being diabetes mellitus, followed by hypertension and pulmonary tuberculosis. Leucocytosis with a total leucocyte count above 11,000 cells/cu.mm was the single most consistent laboratory abnormality, observed in 25 of 30 patients (83.3%).

Liver function tests

Derangement of liver function tests was common. Serum alkaline phosphatase was raised above 120 IU/L in 23 patients (76.7%), and serum albumin fell below 3.8 g/dL in 21 patients (70%). Aspartate aminotransferase was elevated beyond 40 U/L in 19 patients (63.3%) and alanine aminotransferase in 14 (46.7%). Total bilirubin exceeded 1 mg/dL in 10 patients (33.3%), and the international normalised ratio was prolonged beyond 1.4 in 5 patients (16.7%).

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Table 3. Distribution of abnormal liver function and coagulation parameters.

Parameter (deranged)	Number (N=30)	Percentage (%)
Total bilirubin >1 mg/dL	10	33.3
SGOT >40 U/L	19	63.3
SGPT >40 U/L	14	46.7
Alkaline phosphatase >120 IU/L	23	76.7
Serum albumin <3.8 g/dL	21	70.0
INR >1.4	5	16.7

Radiological characteristics and classification of abscess

Ultrasonographic classification, supported by clinical and aspirate findings, showed that 22 patients (73.3%) had amoebic liver abscess and the remaining 8 (26.7%) pyogenic liver abscess. A single collection was seen in 20 patients (66.7%) and multiple collections in 10 (33.3%). The right lobe was involved in 24 patients (80%), the left lobe in 5 (16.7%), and both lobes in 1 (3.3%). Abscess volumes on admission ranged from less than 100 cc to more than 500 cc, with the majority (20/30; 66.7%) clustering between 150 and 350 cc.

Table 4. Radiological classification, number, and location of liver abscesses.

Radiological feature	Subcategory	Number (N=30)	Percentage (%)
Type	Amoebic	22	73.3
	Pyogenic	8	26.7
Number	Single	20	66.7
	Multiple	10	33.3
Lobe involved	Right	24	80.0
	Left	5	16.7
	Bilateral	1	3.3

Associations with type of abscess

The type of abscess (amoebic versus pyogenic) was cross-tabulated against the number and site of collections as well as against history of alcohol use. Multiple abscesses were proportionally more common among amoebic cases (8/10; 80%) than pyogenic cases (2/10; 20%); however, this difference did not reach statistical significance ($p>0.05$). Similarly, among patients with a history of alcohol use, the proportion with amoebic abscess (10/12; 83.3%) was numerically higher than among non-drinkers, but this association was also statistically insignificant. These findings are consistent with published Indian data, which likewise

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describe a trend rather than a robust statistical relationship.

Management and response to treatment

All 30 patients received intravenous antibiotics and a targeted antiamoebic agent (oral or intravenous metronidazole) while awaiting aspirate and culture results. Ultrasound-guided percutaneous needle aspiration was the initial procedural intervention in 18 patients (60%), while pigtail catheter drainage was chosen primarily for larger or more viscous collections in 10 patients (33.3%). Two patients (6.7%) eventually required open surgical drainage, both for impending rupture with localised peritoneal contamination.

Serial ultrasonography demonstrated a reduction in abscess volume by day 3 in 20 of 22 amoebic cases (90.9%) and in 6 of 8 pyogenic cases (75%). By day 7, a further reduction or near-complete resolution was noted in the remaining patients. Symptomatic improvement paralleled the radiological response: abdominal pain had resolved by day 7 in 25 of 29 symptomatic patients (86.2%), and right hypochondrial tenderness in 25 of 28 patients (89.3%). Fever settled by day 7 in 15 of 26 febrile patients (57.7%) and by day 3 in 10 (38.5%). There was no in-hospital mortality and no major procedure-related complication; two patients had minor self-limited pleuritic pain following percutaneous intervention.

Table 5. Symptomatic resolution at day 3 and day 7 after initiation of treatment.

Symptom (at presentation)	Resolved by Day 3, n (%)	Resolved by Day 7, n (%)
Abdominal pain (n=29)	15 (51.7)	25 (86.2)
Fever (n=26)	10 (38.5)	15 (57.7)
Right hypochondrial tenderness (n=28)	19 (67.9)	25 (89.3)
Nausea and vomiting (n=16)	6 (37.5)	11 (68.8)
Clinical jaundice (n=7)	1 (14.3)	3 (42.9)

Discussion

Liver abscess remains a clinically important problem in tropical practice, and our observations from a teaching hospital in Navi Mumbai broadly reaffirm the patterns reported across the Indian subcontinent. The mean age at presentation of approximately 38 years, with the peak incidence in the third and fourth decades of life, mirrors earlier series by Ghosh et al. and Jain et al., in whom the mean age lay between 40 and 44 years [10,11]. The striking male preponderance, yielding a 9:1 ratio in our cohort, is concordant with the 3- to 10-fold higher male susceptibility consistently documented in the literature and is often attributed to differences in alcohol intake, occupational exposure, and iron handling [12,13].

The predominantly rural or peri-urban background of our patients, accounting for more than three-quarters of the cohort, reflects persistent inequities in sanitation, potable water supply, and nutrition that continue to drive tropical enteric disease. This aligns closely with the thesis-level series of Mittal (Jaipur, 2024), in which 76% of patients were from rural backgrounds [14], and with other hospital-based Indian studies.

Right upper quadrant pain and tenderness, along with fever, dominated the clinical picture in our series—findings seen in 96%, 93% and 87% of patients respectively. These frequencies are comparable with those of Ghosh et al. (99% and 94%) and fall within the 62–94% and 67–87% ranges quoted in the broader Indian literature [10,15]. Jaundice, historically reported in up to 45–50% of cases in the pre-antibiotic

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era, was present in only 23% of our patients and echoes the 22% figure reported by the Jaipur thesis and the 26% by Ghosh et al. The decline is consistent with earlier antibiotic initiation and improved imaging access.

Laboratory abnormalities were dominated by leucocytosis (83%), raised alkaline phosphatase (77%), and hypoalbuminaemia (70%). These three parameters have consistently emerged as sensitive but non-specific markers across Indian series, and importantly, they do not reliably differentiate amoebic from pyogenic disease [16,17]. Their prognostic value, however, is well established: in our cohort, as in published literature, derangement of serum albumin, alkaline phosphatase, total leucocyte count and prothrombin time correlated with slower radiological resolution.

On imaging, amoebic liver abscess constituted 73% of our cases and pyogenic abscess 27%. Solitary collections were commoner than multiple (67% versus 33%), and the right lobe was overwhelmingly the site of predilection (80%). This distribution is in close agreement with the Jaipur series (amoebic 72%, single 66%, right lobe 80%) and with the observations of Christopher et al. and Choudhary et al. [14,18,19]. The propensity for the right lobe is physiologically explained by its larger share of portal venous return and its bulkier parenchyma.

Ultrasound-guided percutaneous intervention combined with tailored antimicrobial therapy proved safe and effective in our hands, with no deaths and no major complications. Radiological resolution by day 3 was seen in a majority of patients, irrespective of aetiology, and by day 7 the bulk of patients were clinically asymptomatic. This is consistent with the 70–100% success rates reported for ultrasound- or CT-guided percutaneous drainage in multiple systematic reviews and Indian series [7,20]. Open surgical drainage was required in only 6.7% of cases, in keeping with the contemporary evidence that laparotomy should be reserved for complications such as rupture, secondary peritonitis, or failure of percutaneous drainage.

The chief limitations of the present study are its single-centre design and modest sample size of 30 patients, which limit both statistical power and external validity. Microbiological yield from aspirated material was also variable, consistent with the experience of most Indian centres. Despite these limitations, the consistency of our findings with larger cohorts adds incrementally to the Indian evidence base and supports continued standardisation of an ultrasound-first, minimally invasive management pathway.

Conclusions

In this prospective cohort of 30 patients managed at a tertiary care teaching hospital in Navi Mumbai, liver abscess predominantly affected young to middle-aged men from rural or peri-urban backgrounds. Amoebic aetiology, solitary collections, and right-lobe involvement were the commonest patterns, while leucocytosis, elevated alkaline phosphatase and hypoalbuminaemia were the most consistent biochemical signatures. Ultrasound-guided percutaneous needle aspiration and pigtail catheter drainage, supported by appropriate antimicrobial therapy, provided prompt symptomatic relief and radiological resolution with no mortality and negligible morbidity. Open surgery should be reserved for clearly defined indications such as rupture or failure of percutaneous management. A high index of clinical suspicion, early imaging, and timely minimally invasive intervention remain the cornerstones of good outcome in this disease.

Additional Information

Disclosures

Human subjects: Consent was obtained by all participants in this study.

Animal subjects: No animal subjects were used in this study.

Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following: Payment/services info, financial relationships and other relationships: All authors have declared that no payment was received for the submitted work, no financial relationships exist with any organisation that might have an interest in the submitted work, and no other relationships or activities could appear to have influenced the submitted work.

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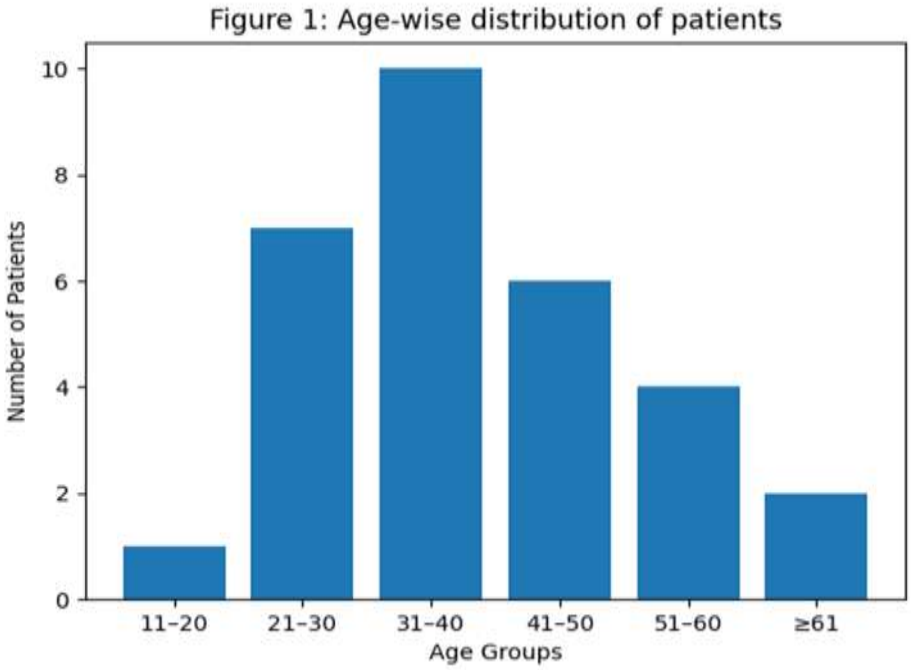
Figure Legends



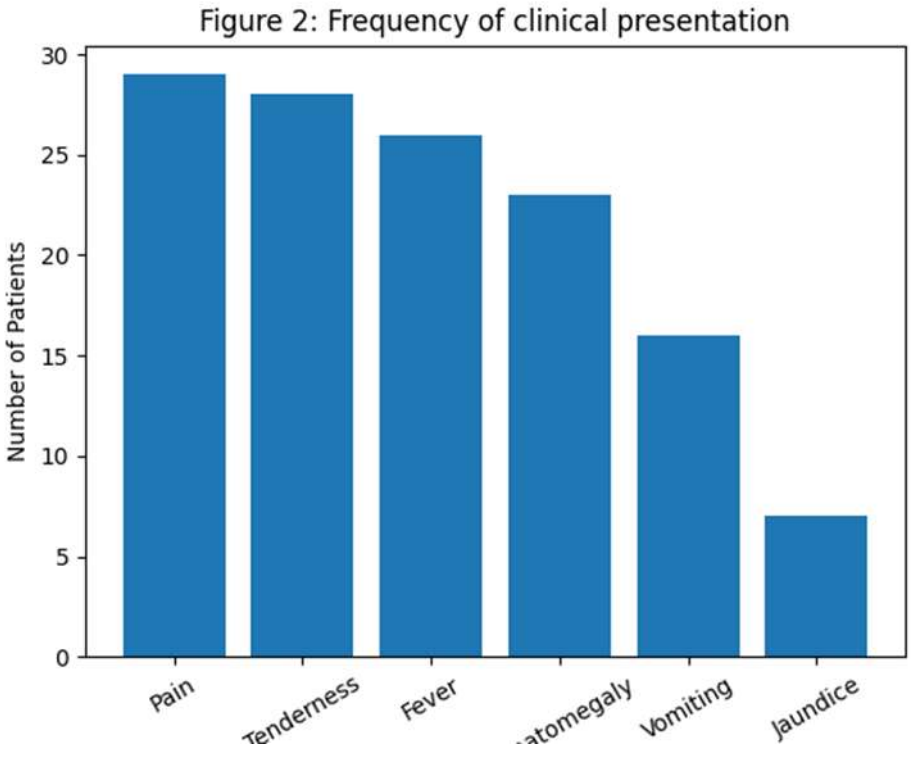


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Figure 3: Type of liver abscess

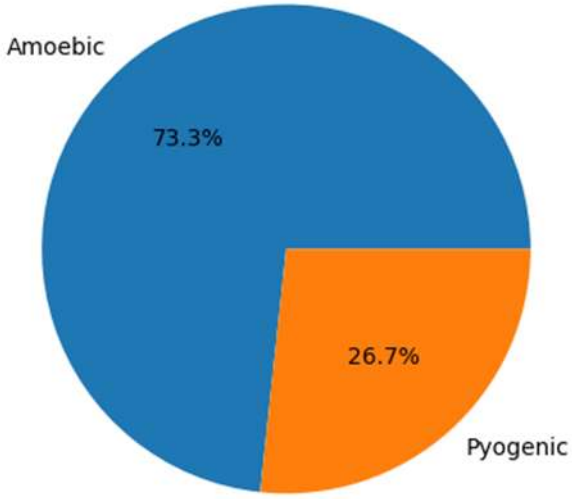
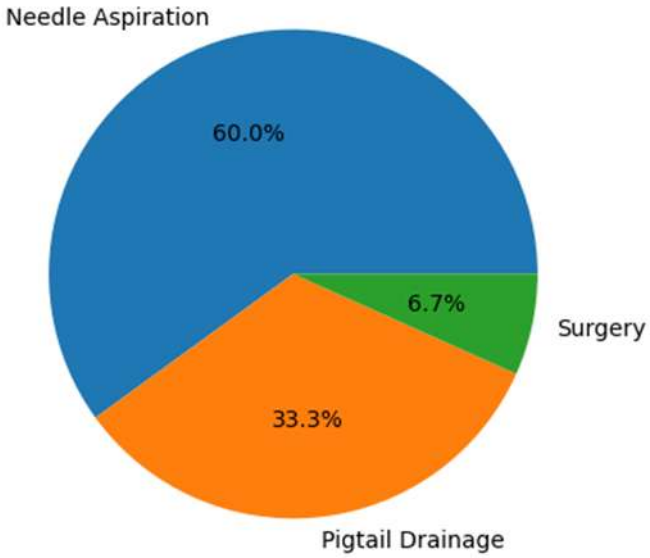


Figure 4: Treatment modalities



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