Section: General Surgery

Original Research Article

ULTRASOUND-GUIDED PERCUTANEOUS SINGLE-TIME NEEDLE ASPIRATION VS PIGTAIL CATHETER DRAINAGE IN MODERATE-SIZE SINGLE-CAVITY UNCOMPLICATED LIVER ABSCESS: A RANDOMIZED CONTROLLED TRIAL

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Received *: 04/06/2025*
Received in revised form *: 23/07/2025*
Accepted *: 15/08/2025*

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DOI: 10.70034/ijmedph.2025.3.374

Source of Support: Nil,
Conflict of Interest: None declared

Int J Med Pub Health
2025; 15 (3); 2022-2023

ABSTRACT

Background: Liver abscess is a major cause of morbidity in India. With the advancement of imaging, percutaneous techniques like single-time percutaneous needle aspiration (PNA) and pigtail catheter drainage (PCD) are widely used. This study compares the clinical outcomes of these methods in moderate-size liver abscesses.

Materials and Methods: A randomized controlled trial was conducted on 58 patients with moderate-sized (5–10 cm), solitary, uncomplicated liver abscess. Group A (n=29) underwent ultrasound-guided PNA, and Group B (n=29) underwent PCD. Outcomes included hospital stay, pain score, volume of fluid drained, post-procedure infection, and subdiaphragmatic collections.

Results: Group A had significantly shorter hospitalization (mean 4.2 days) and lower pain scores (mean 4.1) compared to Group B (mean 8.9 days, pain score 5.6). Although fluid drainage was higher in Group B (344.76 mL vs 283.97 mL), it was not statistically significant. No infections occurred in either group.

Conclusion: Both methods are effective, but PNA offers reduced hospitalization and pain, making it preferable for moderate-sized, uncomplicated abscesses.

Keywords: Liver abscess, PNA, PCD, ultrasound, catheter, needle aspiration.

INTRODUCTION

Liver abscess is a potentially life-threatening collection of pus in hepatic parenchyma caused by bacterial or parasitic infection. The most common types are pyogenic liver abscess (PLA) and amoebic liver abscess (ALA).[1] In India, PLA is frequently associated with biliary tract infections, while ALA is often linked to E. histolytica.[2]

Traditional management involved open surgical drainage, but the evolution of imaging and minimally invasive methods has led to the widespread use of ultrasound (US)-guided PCD and PNA.[3,4] However, optimal drainage modality—particularly for moderate-sized abscesses (5–10 cm)—remains debated.[5]

This study aims to compare single-time PNA and PCD in terms of effectiveness, patient comfort, and complications in moderate-size, solitary, uncomplicated liver abscesses.

MATERIALS AND METHODS

Design and Participants: A prospective, randomized controlled trial was conducted in the Department of General Surgery, Teerthanker Mahaveer Medical College, Moradabad. A total of 58 patients (aged 18–80 years) with solitary liver abscess (5–10 cm) and volume ≥100 mL were randomized into two groups.

Intervention:

- Group A (PNA): Ultrasound-guided aspiration with 18–20G needle until cavity collapse.
- Group B (PCD): Placement of 10–14 Fr pigtail catheter under ultrasound guidance, maintained until output <20 mL/day.

Outcomes Measured
- Hospital stay
- Post-procedural pain (NRS scale)
- Volume of pus drained
- Post-procedure infection
- Subdiaphragmatic collection on USG

Statistical analysis used Student's t-test and Chi-square; $p < 0.05$ was considered significant.

RESULTS

Demographics
- Mean age: 44.7 ± 10.2 years
- Male predominance (M:F = 2.2:1)
- Most abscesses were right-lobe (72.4%)

Hospital Stay and Pain
- Group A: 4.2 ± 1.1 days; NRS pain score = 4.1 ± 1.48
- Group B: 8.9 ± 2.3 days; NRS pain score = 5.6 ± 1.49
- Both differences were statistically significant ($p < 0.001$ and $p = 0.0003$, respectively).

Fluid Drained
- Group A: 283.97 ± 134.98 mL
- Group B: 344.76 ± 154.90 mL
- Difference not statistically significant ($p = 0.116$)

Complications
- No post-procedure infections in either group
- Subdiaphragmatic collection: 13.79% (Group A) vs 6.89% (Group B) – not significant ($p = 0.231$)

DISCUSSION

Our study demonstrates that both PNA and PCD are safe and effective. However, PNA offers lower pain, shorter hospital stay, and similar outcomes in uncomplicated moderate-size abscesses.

These results are consistent with Rajak et al who found that PNA is as effective as PCD for abscesses under 10 cm. Srinivas et al also reported comparable drainage success with less discomfort in the PNA group.[7-10]

Additional Indian studies support these observations:
- Singh et al,[11] found significantly higher pain scores and hospitalization in PCD.
- Kumar et al,[12] suggested PCD be reserved for larger or multiloculated abscesses due to its invasive nature.
- Malladad et al, showed PNA led to earlier symptom relief despite slightly lower drainage volume.[13,14]

Internationally, Zerem and Hadzic,[5] and Cai et al,[6] confirmed that both methods are valid but PNA is preferable in select cases due to simplicity and cost.

CONCLUSION

For moderate-sized (5–10 cm), solitary, uncomplicated liver abscess, single-time ultrasound-guided PNA provides comparable drainage efficacy with less pain, reduced hospitalization, and no increased complication risk compared to PCD.

PNA is therefore recommended as the first-line modality in appropriate patients, particularly in resource-limited settings.

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