Western European Journal of Medicine and Medical Science
Volume 3, Issue 09, September 2025
https://westerneuropeanstudies.com/index.php/3
ISSN (E): 2942-1918 Open Access| Peer Reviewed

MINIMALLY INVASIVE TREATMENT OF LIVER ABSCESS – RESULTS.

Bobabekov Azam Rakhmatovich [1] azam1963@mail.ru
https://orcid.org/0000-0001-8039-9776
Pulatov Ubaydulla Ibodullaevich [1] dr.ubaydulla@gmail.com
https://orcid.org/0009-0000-4524-2490
[1]-*Tashkent State Medical University*

Annotation. Mixed bacterial flora is responsible for the development of numerous abscesses, especially those resulting from systemic infection (septicemia) resulting from pathologies of the abdominal cavity or bile ducts. The number and volume of abscesses may vary, which affects the treatment method. Percutaneous drainage is effective in the treatment of solitary liver abscesses with a volume of < 5 cm3. Irregular abscesses are effectively drained using multipoint drainage. Hybrid drainage (endoscopic and percutaneous) is the method of choice in the treatment of abscesses resulting from obstruction of the bile ducts. Statistical significance for inflammatory markers was found only for C-reactive protein (CRP), since it correlated with drainage efficiency, i.e. the possibility of drainage efficiency decreased with increasing CRP values.

Keywords: liver abscess, clinic, diagnosis, treatment, microbial microflora.

Introduction:

Bacterial liver abscess is a condition that arises as a result of a bacterial infection. Abscesses can be solitary or multiple. The main causes of the pathology include *Enterococcus faecalis, Staphylococcus aureus, Escherichia coli,* or intestinal flora. The incidence of liver abscesses remains unchanged, but the etiology differs due to changes in surgical and microbiological methods. Therefore, pathologies of the bile ducts and diverticula have replaced appendicitis. This trend is also reflected in this article.

Patients usually present with high fever, chills, and increased sweating. The bacterial infection can enter the liver through different pathways. The route may be ascending from the bile ducts or portal vein, via the hepatic artery, from neighboring organs, as a result of trauma, or without an obvious cause. According to statistical data, the mortality rate in developed countries is 2–12%. The prognosis largely depends on comorbidities or response to treatment.

In addition to physical examination and history taking, diagnosis is mainly based on imaging studies, with a special role for ultrasound and computed tomography. Additional information is obtained from blood tests, which show elevated markers of inflammation. This condition is traditionally treated with targeted antibiotic therapy and sonographically controlled abscess drainage, or, in case of failure, surgical drainage. Numerous cases of ineffective percutaneous drainage prompted an analysis to identify the causes and determine the indications, principles, and types of patients in whom percutaneous drainage is effective.

The aim of the study was to evaluate the effectiveness of minimally invasive percutaneous drainage of liver abscesses.

Materials and Methods:

A total of 37 patients were treated for liver abscesses in 2017–2023. Demographic data and the main causes of abscess development are presented in Table I.

Western European Journal of Medicine and Medical Science
Volume 3, Issue 09, September 2025
https://westerneuropeanstudies.com/index.php/3
ISSN (E): 2942-1918 Open Access| Peer Reviewed

Table I. Demographic Data

Parameter	Result
Age, mean (range) [years]	74 (68–81)
Number of women/men	12/25
Cause of liver abscess development:	
Bile duct pathologies	29
Diverticular pathologies	6
Pneumonia	1
Unknown	1

Based on physical examination, history taking, and additional investigations (ultrasound and abdominal computed tomography), fluid accumulation in the liver was identified. Inflammatory markers, including C-reactive protein (CRP) and leukocytosis, confirmed the diagnosis. The size and then the volume of the abscess were determined using a computer program based on CT data.

The treatment method depended on the volume, number, and shape of the abscesses. Small solitary and multiple abscesses with a volume < 3 cm^3 were treated with percutaneous needle aspiration followed by culturing of the contents. Abscesses with a volume of 3–5 cm^3 were treated with percutaneous drainage. Volumes of 5–10 cm^3 were also indications for percutaneous drainage. Abscesses larger than 10 cm^3 were treated percutaneously with multiple drainages. Multiple drainages were also used for hourglass-shaped abscesses to reach each cavity. Each drainage procedure was monitored sonographically.

Effectiveness was evaluated based on the reduction in the amount of drained purulent material and subsequent sonographic examination performed 3–5 days after drainage and before drain removal.

Ineffective drainage with persistently elevated inflammatory parameters was an indication for surgical drainage. All patients received intravenous broad-spectrum antibiotics starting from the first day of treatment, which were modified after clarification of culture results (Table II).

Table II. Microorganisms isolated in pus cultures

Organism	Sensitivity	Number of Patients
Escherichia coli	Cotrimoxazole, Amoxicillin, Amoxicillin + Clavulanic acid, Cefotaxime, Ceftriaxone, Aminoglycosides, Fluoroquinolones	26
Klebsiella pneumoniae	Cotrimoxazole, Cefotaxime, Ceftriaxone, Aminoglycosides, Imipenem, Fluoroquinolones	29
Enterobacter sp.	Cefotaxime, Ceftriaxone, Aminoglycosides, Imipenem, Cotrimoxazole, Fluoroquinolones	6
Pseudomonas aeruginosa	Ceftazidime, Ceftriaxone, TMPLSNX, Aminoglycosides, Imipenem, Fluoroquinolones	1

Western European Journal of Medicine and Medical Science
Volume 3, Issue 09, September 2025
https://westerneuropeanstudies.com/index.php/3
ISSN (E): 2942-1918 Open Access| Peer Reviewed

Staphylococcus aureus	Methicillin, Oxacillin, Cephalosporins, Macrolides, Clindamycin, Rifampicin, Cotrimoxazole, Teicoplanin, Vancomycin, Netilmicin	4
Microaerophilic streptococci	Imipenem	8
Bacteroides fragilis	Sulbactam, Ampicillin	6

At the same time, we attempted to determine the cause of the abscess. In cases of mechanical bile duct obstruction, we performed retrograde cholangiopancreatography in order to decompress the bile duct.

Results:

The results were subjected to statistical analysis. We analyzed whether the volume of the abscess affected the effectiveness of different drainage methods. The analysis showed that abscess volume was statistically significant and associated with drainage effectiveness, with χ^2 (df = 3) = 11.711; p = 0.008. The frequency distribution in the contingency table indicated that the effectiveness of drainage significantly decreased for abscesses larger than 5 cm^3.

The analysis showed that the type of drainage was not statistically significant and was not associated with drainage effectiveness, χ^2 (df = 3) = 5.017; p = 0.171. Moreover, logistic regression analysis was conducted using the LOGIT function, transformed with a dichotomous dependent variable (drainage effectiveness) according to probability distribution. The results of the analysis showed that only the value of CRP was significantly associated with the probability of effective drainage. Based on maximum likelihood estimation, it can be stated that the probability of effective drainage decreases with increasing CRP values.

Discussion:

Liver abscess was first described by Hippocrates in 400 B.C. [1]. In 1938, Ochsner A described surgical drainage of liver abscesses in his landmark work. This aggressive approach led to a high mortality rate, reaching 60–80% [2].

Advances in radiological and therapeutic diagnostics, associated with precise microbiological identification, reduced mortality to < 5–30% [3–5]. In our patients, no cases of death were recorded during treatment. Liver abscesses are usually multiple, and solitary abscesses are most often localized in the right lobe of the liver. The mortality rate after conventional surgical treatment and systemic antibiotic therapy ranges from 11.5% to 34% [6–8].

The role of surgical drainage is gradually decreasing, and the procedure is increasingly being replaced by percutaneous drainage [9–12]. The use of antibiotics alone was recommended in the 1980s, but at present, it is not indicated for this type of treatment, even in the most severe cases. The most commonly used method is continuous percutaneous drainage of the abscess cavity under sonographic control. Its effectiveness ranges from 55% to 83% [13–16].

Fine-needle aspiration has never been popular in the treatment of liver abscesses. Currently, it is most often used for sample collection to obtain cultures and analyze the abscess. In the present study, abscess volume was assessed based on computed tomography. Professional literature provides information only on the largest abscess sizes. However, we hypothesized that volume, location, and shape are the most significant factors for effective abscess drainage. Therefore, we divided abscesses into four categories based on volume: < 3 cm^3, 3–5 cm^3, 5–10

Western European Journal of Medicine and Medical Science
Volume 3, Issue 09, September 2025
https://westerneuropeanstudies.com/index.php/3
ISSN (E): 2942-1918 Open Access| Peer Reviewed

cm³, and > 10 cm³. This categorization was used to determine the drainage technique. Apparently, abscess volume was statistically associated with the drainage technique, with p = 0.008.

The distribution in the contingency table showed that the effectiveness of drainage significantly decreased for abscesses larger than 5 cm³. The present authors demonstrated, contrary to reports in professional literature [17–20], that drainage can be effective after a single puncture and aspiration under sonographic control. However, the effectiveness of percutaneous drainage decreases in cases of irregularly shaped abscesses larger than 5 cm³, located beneath the diaphragm dome.

In this study, the volume of multiple liver abscesses ranged from 3 to 5 cm³, and they developed due to mechanical obstruction of the common bile duct. Standard treatment in such cases included a hybrid procedure, consisting of abscess drainage followed shortly thereafter by endoscopic retrograde cholangiopancreatography for decompression of infected bile leakage. Large abscesses are the most difficult to treat [21–27].

At first glance, a large collection seems easy to puncture and drain. However, an extensive inflammatory process, reflected in the patient's overall condition, and markedly elevated leukocytosis and CRP are poor prognostic factors. Based on maximum likelihood estimation, it can be stated that the probability of effective drainage decreases with increasing CRP values. In our opinion, the main reason is related to the size of the abscess, which directly affects the organ's protective mechanisms and causes septicemia. Abnormal liver function test results confirmed these findings (aspartate aminotransferase – AST, alanine aminotransferase – ALT), and the immune system was further weakened by comorbid diabetes in 8 patients (21.6%).

The drainage technique was chosen depending on the abscess volume. Small abscesses (<3 cm³) were evacuated using sonographically controlled puncture, as this method facilitates complete evacuation of the abscess in a single procedure.

Repeat biopsy was required in three patients due to recurrent abscesses, despite targeted antibiotic therapy. Abscesses larger than 3 cm³ required continuous drainage; therefore, a drain was implanted into the abscess cavity under sonographic control. The drain was left in place until purulent discharge ceased, which lasted from 7 to 34 days.

The shape of the abscess was very important for choosing the drainage technique. Multichambered, hourglass-shaped abscesses were treated with multiple drainages. This approach is aimed at reaching each cavity to increase the effectiveness of the procedure. Although terminology and definitions have been standardized, a "large" liver abscess has still not been universally defined. Chung et al. [12] proposed that abscesses larger than 5 cm should be called "large." This was based on their experience, showing that such size requires longer hospital stays and drainage is associated with a high risk of failure.

Liao et al. [28], based on computed tomography of 175 patients, reported that abscesses larger than 7.3 cm are a risk factor for effective abscess drainage. In 2011, based on a sample of 63 patients, the same authors reported that abscess size was not significant regarding treatment success. The mean abscess size in their study was 6.5 cm.

The results obtained in the present study showed that abscess volume is statistically significant and associated with drainage effectiveness, χ^2 (df = 3) = 11.711; p = 0.008. The distribution in the contingency table indicated that drainage effectiveness significantly decreased for abscesses larger than 5 cm³.

Systemic antibiotic treatment remains the primary first-line therapy. The choice of first-line antibiotic, before obtaining abscess culture results, should cover the most likely source of

Western European Journal of Medicine and Medical Science
Volume 3, Issue 09, September 2025
https://westerneuropeanstudies.com/index.php/3
ISSN (E): 2942-1918 Open Access| Peer Reviewed

infection and a broad spectrum of pathogens. The recommended duration of parenteral antibiotic therapy is 2–4 weeks or until clinical, biochemical, and radiological improvement is achieved.

Conclusions

Percutaneous drainage is effective in the treatment of solitary liver abscesses with a volume < 5 cm^3. Irregularly shaped abscesses are effectively drained using multi-point drainage. Hybrid drainage (endoscopic and percutaneous) is the method of choice for treating abscesses resulting from bile duct obstruction. Statistical significance among inflammatory markers was found only for CRP, as it correlated with drainage effectiveness, i.e., the probability of effective drainage decreased with increasing CRP values.

References

1. Krige JE, Beckingham IJ. ABC of diseases of liver, pancreas, and biliary system. BMJ 2001; 322: 537-40.
2. Huang CJ, Pitt HA, Lipsett PA, et al. Pyogenic hepatic abscess. Changing trends over 42 years. Ann Surg 1996; 223: 600-7.
3. Ochsner A, DeBakey M, Murray S. Pyogenic abscess of the liver II. An analysis of forty-seven cases with review of the literature. Am J Surg 1938; XL: 292-319.
4. Branum GD, Tyson GS, Branum MA, Meyers WC. Hepatic abscess. Changes in etiology, diagnosis, and management. Ann Surg 1990; 212: 655-62.
5. Rahimian J, Wilson T, Oram V, Holzman RS. Pyogenic liver abscess: recent trends in etiology and mortality. Clin Infect Dis 2004; 39: 1654-9.
6. Farges O, Leese T, Bismuth H. Pyogenic liver abscess: an improvement
7. in prognosis. Br J Surg 1988; 75: 862-5.
8. Pitt HA, Zuidema GD. Factors influencing mortality in the treatment of pyogenic hepatic abscess. Surg Gynecol Obstet 1975; 140: 228-34.
9. Chen SC, Huang CC, Tsai SJ, et al. Severity of disease as main predictor for mortality in patients with pyogenic liver abscess.Am J Surg 2009; 198: 164-72.
10. Бабаджанов, Б. Д., Матмуротов, К. Ж., Моминов, А. Т., Бабабеков, А. Р., Атаков, С. С., & Атажанов, Т. Ш. (2015). Эффективность внутриартериального введения флуконазола при лечении осложненных форм диабетической стопы. *ООО «Maxliyo-shifo» &*, *2014*, 28-30.
11. Матмуротов, К., Парманов, С., Атажанов, Т., Якубов, И., & Корихонов, Д. (2023). ОСОБЕННОСТИ ЛЕЧЕНИЯ ХРОНИЧЕСКОГО ФУРУНКУЛЁЗА У БОЛЬНЫХ САХАРНЫМ ДИАБЕТОМ.
12. Матмуротов, К. Ж., Ирназаров, А. А., Рузметов, П. Ю., & Рузметов, Н. А. (2022). Ампутации голени: дифференцированный подход к выполнению в зависимости от поражения артериального бассейна. *Вестник экстренной медицины*, *15*(5), 18-25.
13. Матмуротов, К. Ж. (2022). *Морфологические особенности процесса заживления венозных язв на фоне сахарного диабетаЕ сахарного диабета* (Doctoral dissertation, Rossiya. Moscow).
14. Бабаджанов, Б. Д., Матмуротов, К. Ж., Саттаров, И. С., Атажанов, Т. Ш., & Саитов, Д. Н. (2022). *РЕКОНСТРУКТИВНЫЕ ОПЕРАЦИИ НА СТОПЕ ПОСЛЕ БАЛЛОННОЙ АНГИОПЛАСТИКИ АРТЕРИЙ НИЖНИХ КОНЕЧНОСТЕЙ НА ФОНЕ СИНДРОМА ДИАБЕТИЧЕСКОЙ СТОПЫ* (Doctoral dissertation, Rossiya. Кисловодск).

Western European Journal of Medicine and Medical Science
Volume 3, Issue 09, September 2025
https://westerneuropeanstudies.com/index.php/3
ISSN (E): 2942-1918 Open Access| Peer Reviewed

15. Babadjanov, B. D., Okhunov, A. O., Atakov, S. S., Kasimov, U. K., Sattarov, I. S., Matmuratov, K. J., ... & Korikhonov, D. N. (2023). WHY DOES SURGICAL INFECTION OFTEN AFFECT DIABETICS?: Literature review of recent data. *Journal of education and scientific medicine*, *3*(3), 66-75.
16. Бабаджанов, Б. Д., Матмуротов, К. Ж., Саттаров, И. С., Атажанов, Т. Ш., & Саитов, Д. Н. (2022). *РЕКОНСТРУКТИВНЫЕ ОПЕРАЦИИ НА СТОПЕ ПОСЛЕ БАЛЛОННОЙ АНГИОПЛАСТИКИ АРТЕРИЙ НИЖНИХ КОНЕЧНОСТЕЙ НА ФОНЕ СИНДРОМА ДИАБЕТИЧЕСКОЙ СТОПЫ* (Doctoral dissertation, Rossiya. Кисловодск).
17. Бабаджанов, Б. Д., Матмуротов, К. Ж., Атажанов, Т. Ш., Саитов, Д. Н., & Рузметов, Н. А. (2022). *Эффективность селективной внутриартериальной катетерной терапии при лечении диабетической гангрены нижних конечностей* (Doctoral dissertation, Узбекистон. тошкент.).
18. Бабажданов, Б. Д., Матмуротов, К. Ж., Бабабеков, А. Р., & Сапаева, Ш. Б. (2014). Особенности поражения периферического артериального русла на фоне сахарного диабета. *Ангиология: инновационные технологии в диагностике и лечении заболеваний сосудов и сердца*, *3*, 109.
19. Рузматов, П. Ю., Матмуротов, К. Ж., Бабаджанов, А. Р., Каримов, Р. Х., & Рузметов, Б. А. (2024). Особенности выполнения реконструктивных вмешательств у больных синдромом диабетической стопы. *Journal of Universal Science Research*, *2*(3), 96-112.
20. Babadjanov, B. D., & Matmurotov, K. J. (2019). Efficacy of minimally invasive procedures in the treatment of lower extremities diabetic gangrene. *European science review*, *2*(1-2), 79-82.
21. Shalaeva, E., Janabaev, B., Babadjanov, B., Matmurotov, Q., Kasimov, U., Pulatov, U., & Bobabekov, A. (2016). Severity of coronary artery stenosis in patients with critical peripheral artery disease undergoing high amputation. *Atherosclerosis*, *252*, e141-e142.
22. Бабаджанов, Б. Д., Матмуротов, К. Ж., Моминов, А. Т., Бабабеков, А. Р., Атаков, С. С., & Атажанов, Т. Ш. (2015). Эффективность внутриартериального введения флуконазола при лечении осложненных форм диабетической стопы. *ООО «Maxliyo-shifo» &*, *2014*, 28-30.
23. Матмуротов, К., Парманов, С., Атажанов, Т., Якубов, И., & Корихонов, Д. (2023). ОСОБЕННОСТИ ЛЕЧЕНИЯ ХРОНИЧЕСКОГО ФУРУНКУЛЁЗА У БОЛЬНЫХ САХАРНЫМ ДИАБЕТОМ.
24. Chou FF, Sheen-Chen SM, Chen YS, Chen MC. Single and multiple pyogenic liver abscesses: clinical course, etiology, and results of treatment. World J Surg 1997; 21: 384-8.
25. Malik AA, Bari SU, Rouf KA, Wani KA. Pyogenic liver abscess: changing patterns in approach. World J Gastrointest Surg 2010; 2: 395-401.
26. Bari S, Sheikh KA, Ashraf M, et al. Ascaris liver abscess in children. J Gastroenterol 2007; 42: 236-40.
27. Chung YF, Tan YM, Lui HF, et al. Management of pyogenic liver abscesses – percutaneous or open drainage? Singapore Med J 2007; 48: 1158-65.
28. Hope WW, Vrochides DV, Newcomb WL, et al. Optimal treatment of hepatic abscess. Am Surg 2008; 74: 178-82.
29. Rintoul R, O'Riordain MG, Laurenson IF, et al. Changing management of pyogenic liver abscess. Br J Surg 1996; 83: 1215-8.
30. Nazir NT, Penfield JD, Hajjar V. Pyogenic liver abscess. Cleve Clin J Med 2010; 77: 426-7.

Western European Journal of Medicine and Medical Science
Volume 3, Issue 09, September 2025
https://westerneuropeanstudies.com/index.php/3
ISSN (E): 2942-1918 Open Access| Peer Reviewed

31. Hui JY, Yang MK, Cho DH, et al. Pyogenic liver abscesses caused by Klebsiella pneumoniae: US appearance and aspiration findings. Radiology 2007; 242: 769-76.
32. Rajak CL, Gupta S, Jain S, et al. Percutaneous treatment of liver abscesses: needle aspiration versus catheter drainage. AJR AmJ Roentgenol 1998; 170: 1035-9.
33. Porras-Ramirez G, Hernandez-Herrera MH, Porras-Hernandez JD. Amebic hepatic abscess in children. J Pediatr Surg 1995; 30: 662-4.
34. Berger LA, Osborne DR. Treatment of pyogenic liver abscesses by percutaneous needle aspiration. Lancet 1982; 1: 132-4.
35. Pearce N, Knight R, Irving H, et al. Non-operative management of pyogenic liver abscess. HPB (Oxford) 2003; 5: 91-5.
36. O'Farrell N, Collins CG, McEntee GP. Pyogenic liver abscesses: diminished role for operative treatment. Surgeon 2010; 8: 192-6.
37. Zerem E, Hadzic A. Sonographically guided percutaneous catheter drainage versus needle aspiration in the management of pyogenic liver abscess. AJR Am J Roentgenol 2007; 189: W138-42.
38. Giorgio A, Tarantino L, Mariniello N, et al. Pyogenic liver abscesses: 13 years of experience in percutaneous needle aspiration with US guidance. Radiology 1995; 195: 122-4.
39. Bertel CK, van Heerden JA, Sheedy PF. Treatment of pyogenic hepatic abscesses. Surgical vs percutaneous drainage. Arch Surg 1986; 121: 554-8.
40. Liao WI, Tsai SH, Yu CY, et al. Pyogenic liver abscess treated by percutaneous catheter drainage: MDCT measurement for treatment outcome. Eur J Radiol 2012; 81: 609-15.
41. Aydin C, Piskin T, Sumer F, Barut B, Kayaalp C. Laparoscopic drainage of pyogenic liver abscess. JSLS 2010; 14: 418-20.
42. Russo T, Mandell G, Bennett J, Dolin R. Mandell, Douglas and Benett's Principles and Practice of Infectious Diseases. Churchill Livingstone, New York 1995; 2280-7.
43. Liao CY, Yang YS, Yeh YC, et al. Invasive liver abscess syndrome predisposed by Klebsiella pneumoniae related prostate abscess in a nondiabetic patient: a case report.BMC Res Notes 2016; 9: 395.