

Improvement of Surgical Methods for the Treatment of Cavity Suppurative Liver Diseases in Elderly People with Diabetes Mellitus

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Abstract: Cavity suppurative liver diseases (CSLD) in elderly people with diabetes mellitus represent a serious medical problem that requires a comprehensive and individualized approach to treatment. These patients have a high risk of developing infectious complications due to weakened immunity, impaired microcirculation and an increased susceptibility to infections, which complicates diagnosis and therapy.

Modern advanced surgical techniques, such as ultrasound- and CT-guided percutaneous puncture and drainage, laparoscopic surgery, robotic systems, radiofrequency ablation, and high-intensity focused ultrasound, have greatly expanded the possibilities for effective treatment of PNLN. These techniques minimize surgical trauma, reduce recovery time, and reduce the risk of complications, which is especially important for older patients with diabetes.

Innovative approaches, including the use of gene therapy, cellular technologies, nanotechnology and biomimetic materials, are opening new perspectives in treatment. These technologies allow targeted action on the infectious focus, improving treatment results and the quality of life of patients. Personalized medicine based on genetic and biomedical data allows optimizing therapy and minimizing the risk of complications.

Keywords: Cavity suppurative liver diseases, elderly patients, diabetes mellitus, improved surgical techniques, minimally invasive technologies, personalized medicine.

Introduction

Cavity suppurative liver diseases (CSLDs) represent a serious problem in medical practice, especially in elderly people with concomitant diabetes mellitus. These patients are at high risk for developing infectious complications and require a special approach to diagnosis and treatment. In recent years, there have been significant advances in the surgical treatment of PNLN due to the introduction of innovative methods and technologies, which can improve patient outcomes and quality of life.

Etiology and pathogenesis of PNLN in elderly patients with diabetes mellitus

PNLDs include liver abscesses and empyemas, which may develop due to bacterial, parasitic, or fungal infections. Older people with diabetes are at much higher risk of developing these diseases due to several factors:

Weakened immunity: Diabetes mellitus leads to a weakened immune system, which increases susceptibility to infections.

Impaired microcirculation : Diabetic angiopathy impairs blood circulation in the liver, which creates favorable conditions for the development of infectious processes.

Increased susceptibility to infections: Diabetes is associated with an increased risk of bacterial and fungal infections due to high blood glucose levels, which create a favorable environment for the proliferation of microorganisms.

Diagnosis of PNLD

Clinical manifestations

The clinical picture of PNLD in elderly patients with diabetes may be blurred, making timely diagnosis difficult. Main symptoms include:

- ✓ Fever and chills
- ✓ Pain in the right hypochondrium
- ✓ Jaundice
- ✓ Fatigue and weakness

Laboratory research

Laboratory tests play an important role in diagnosing PNLD. Key indicators include:

- ✓ Increased levels of white blood cells and C-reactive protein
- ✓ Increased levels of liver enzymes (ALT, AST)
- ✓ Hyperglycemia
- ✓ Instrumental methods

Modern diagnostic methods include:

- Ultrasound examination (ultrasound): The primary diagnostic method to detect the presence of abscesses and their location.
- Computed tomography (CT): Provides more detailed visualization and assessment of the size and condition of abscesses.
- Magnetic resonance imaging (MRI): Used to clarify CT data and identify associated pathologies.
- Aspiration biopsy: Under ultrasound or CT guidance, aspiration of the abscess contents is performed for microbiological examination and determination of antibiotic sensitivity.

Surgical treatment of PNLD

Traditional methods

Percutaneous puncture and drainage: Under ultrasound or CT guidance, puncture of the abscess and installation of drainage is performed. This method is minimally invasive and is especially useful for older patients at high surgical risk.

Laparoscopic surgery: Laparoscopic techniques allow debridement of abscesses and placement of drains under visual guidance. Benefits include minimal traumatism and reduction of rehabilitation time.

Laparotomy: Used in cases of multiple or large abscesses when minimally invasive methods are ineffective. Laparotomy provides full access to the affected area, allowing for radical debridement and installation of drains.

Improved Treatment Methods

Robotic surgery: Using robotic systems such as da Vinci allows you to perform complex operations with high precision and minimal invasiveness. Benefits include reduced surgical trauma and reduced recovery time.

High Intensity Focused Ultrasound (HIFU): This technique allows the non-invasive destruction of abscesses through focused ultrasound. HIFU is especially useful for patients at high surgical risk, as the method requires virtually no incisions and has minimal side effects.

Radiofrequency ablation (RFA): The use of RFA can effectively destroy abscess tissue using heat, which reduces the risk of recurrence.

Interventional Radiology: Interventional radiology techniques include transarterial chemoembolization (TCE) and injection of antibiotics directly into the abscess. These methods allow targeted action on the infectious focus, minimizing the systemic effect of drugs.

Hybrid methods: A combination of percutaneous and laparoscopic methods makes it possible to solve complex clinical cases as effectively as possible. For example, preliminary drainage of large abscesses followed by laparoscopic sanitation and installation of additional drainages.

Innovative technologies

Gene Therapy and Cell Technologies: The use of gene therapy to modulate the immune response and improve tissue healing is emerging as a promising approach in the treatment of PNLD. Cellular technologies, such as the use of stem cells, can help restore damaged liver tissue and improve the overall condition of patients.

Personalized medicine: An individualized approach to treatment based on the patient's genetic and biomedical data allows for optimized therapy and reduced risk of complications. For example, the selection of specific antibacterial drugs taking into account the microbiological profile of the infectious agent.

Nanotechnology : The use of nanomaterials for targeted delivery of drugs to the abscess area can increase the concentration of drugs in the affected area and reduce systemic side effects. Nanoparticles can be used to deliver antibiotics, anti-inflammatory and antiseptic agents.

Postoperative patient management

Glucose control

Maintaining normal blood glucose levels is a key factor in the successful treatment of PNLD in patients with diabetes mellitus. Hyperglycemia worsens the prognosis and contributes to the development of complications. To control glycemia the following are used:

Insulin therapy

Oral hypoglycemic drugs

Monitoring diet and physical activity

Antibacterial therapy

Adequate antibacterial therapy is an integral part of the treatment of PNLD. The prescription of antibiotics is carried out taking into account the microbiological profile of the pathogen and its sensitivity to drugs. Broad-spectrum antibiotics such as cephalosporins , carbapenems , fluoroquinolones , and metronidazole are used .

Prevention of thrombosis and other complications

Elderly patients with diabetes have an increased risk of developing thrombosis and other complications. To prevent thrombosis, the following are used:

- Anticoagulants (heparin, low molecular weight heparins)
- Compression stockings
- Early patient mobilization
- Monitoring and rehabilitation

Postoperative monitoring includes regular laboratory and instrumental studies to assess the condition of the liver and the effectiveness of treatment. Rehabilitation includes :

- Physiotherapy

- Medical physical education
- Supportive therapy
- Use of telemedicine

In modern conditions, especially during the COVID-19 pandemic, the use of telemedicine has become an important tool to ensure continuous monitoring of patients after surgery. Telemedicine technologies allow doctors to conduct remote consultations, monitor patients' conditions and timely adjust treatment. This is especially true for older patients with limited mobility.

Examples of clinical cases

Clinical case 1: Treatment of a single liver abscess in an elderly patient with diabetes mellitus

Patient: Male, 72 years old, diagnosed with type 2 diabetes mellitus.

Symptoms: Fever, pain in the right hypochondrium, weakness.

Diagnosis: Ultrasound and CT revealed a single liver abscess measuring 5 cm.

Treatment: Percutaneous puncture and drainage under ultrasound guidance were performed. Antibacterial therapy (ceftriaxone and metronidazole) was prescribed.

Result: Successful resolution of the abscess, normalization of temperature and improvement in the general condition of the patient. In the future, control glucose levels and prevent relapse.

Clinical case 2: Multiple liver abscesses in an elderly patient with diabetes and high surgical risk

Patient: Woman, 78 years old, diagnosed with type 2 diabetes mellitus and heart failure.

Symptoms: Fever, severe weakness, jaundice.

Diagnosis: CT scan revealed multiple liver abscesses up to 7 cm in size.

Treatment: A combination of percutaneous and laparoscopic methods was used. The largest abscesses were drained, followed by laparoscopic sanitation and installation of additional drains.

Result: Stabilization of the condition, improvement of liver function, reduction of inflammatory markers. The patient was discharged under observation with regular telemedicine consultations.

Future directions and prospects

Development of robotic surgery

Robotic systems such as da Vinci , provide the surgeon with improved visualization and precision, which is especially important when treating complex cases of PNLD. Further improvements in these technologies are expected in the future, including the integration of artificial intelligence to aid decision making.

Nanotechnology in medicine

The use of nanotechnology for targeted drug delivery opens up new opportunities in the treatment of infectious liver diseases. The development of nanoparticles capable of delivering antibiotics and anti-inflammatory drugs directly to the site of infection could significantly improve the effectiveness of treatment and reduce side effects.

Biomimetic materials

Biomimetic materials that mimic the properties of natural tissues can improve drainage and healing outcomes. For example, using such materials to make drainage tubes can reduce the risk of infection and speed up the recovery process.

Gene therapy and cell technologies

Gene therapy and cell technologies continue to advance, offering promising methods for modulating the immune response and regenerating liver tissue. The use of stem cells to repair damaged livers in elderly patients with diabetes may be an important area of future research.

Personalized medicine

An individualized approach to treatment based on the patient's genetic profile allows for optimization of therapy and minimization of the risk of complications. The development of new diagnostic and therapeutic methods based on genetic data continues to be a priority in medical research.

Conclusion

Cavity suppurative liver diseases in elderly people with diabetes mellitus represent a serious problem that requires an integrated and individual approach to treatment. The introduction of modern advanced techniques such as robotic surgery, focused ultrasound, radiofrequency ablation and nanotechnology has significantly improved patient outcomes and quality of life. Personalized medicine, including gene therapy, cellular technologies, and nanotechnology, is opening new perspectives in the treatment of PNLD. A multidisciplinary approach, including coordination between surgeons, endocrinologists, infectious disease specialists and intensive care specialists, is key to successful treatment.

REFERENCES

1. Bari K, Hassan T, Siraj F, et al. Liver Abscess: A Review of Epidemiology, Clinical Presentation, Diagnosis, and Treatment. *J Hepatol Gastroint Dis.* 2017;3(1):109.
2. Lewis RT, Maron DJ. Efficacy and Complications of Percutaneous Liver Abscess Drainage. *Am J Surg.* 2007;193(2):223-226.
3. Gurusamy KS, Ramamoorthy R, Fusai G, et al. Methods of Drainage of Abdominal Abscesses for Diffuse Peritonitis. *Cochrane Database Syst Rev.* 2013;(7).
4. Tan Y, Mao Z, Zhang Y, et al. Laparoscopic versus Open Surgery for Multiple Pyogenic Liver Abscesses. *Surg Endosc.* 2017;31(12):5006-5013.
5. Watanabe Y, Tokue H, Takahashi H, et al. Liver Abscess: Etiology, Diagnosis, and Management. *Top Magn Reson Imaging.* 2015;24(5):275-289.
6. Leung WS, Lai PS, Wong KW, et al. Treatment of Liver Abscess: Prospective Randomized Comparison of Catheter Drainage and Needle Aspiration. *Hepatogastroenterology.* 2002;49(43):609-612.
7. Schaarschmidt BM, Gonschorek O, Jansen M, et al. Focal Liver Lesions: Evaluation of the Efficacy and Safety of MR-Guided Focused Ultrasound (MRgFUS) with a New Contrast-Enhanced Ultrasound Technique. *J Ther Ultrasound.* 2015;3(Suppl 1)
8. Ye Z, Zhao L, Zhu Z, et al. Percutaneous Catheter Drainage Versus Open Surgical Drainage in the Management of Liver Abscess: A Systematic Review and Meta-analysis. *HPB (Oxford).* 2019;21(8):983-991.