Received: 9 September 2024 | Revised: 16 October 2024 | Accepted: 22 October 2024 | Published online: 24 October 2024

International Journal of Advance in Clinical Science Research, Volume 3, 2024
https://h-tsp.com/

# Progress in Surgical Diagnosis and Treatment of Acute Severe Pancreatitis

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**Abstract:** ***In this paper, we analyze the advances in the diagnosis and treatment of acute severe pancreatitis in the surgical field. Acute severe pancreatitis is one of the common acute abdominal diseases in surgery. It has rapid onset, rapid progression, many complications, poor prognosis and high fatality rate. First, we analyzed the etiology and risk factors of severe acute pancreatitis. In addition, we also discuss the diagnosis and treatment strategies of acute severe pancreatitis. Subsequently, the complications and management of acute severe pancreatitis were also analyzed. Finally, we analyzed it in terms of prognosis and rehabilitation. Acute severe pancreatitis is a serious disease that requires early diagnosis and prompt treatment. This article will review the diagnosis and treatment of acute severe pancreatitis in order to provide reference for clinical diagnosis and treatment.***

**Keywords:** Acute severe pancreatitis; Etiology and risk factors; Diagnosis and treatment; Complications; Prognosis and rehabilitation.

## 1. Introduction

### 1.1 Definition and Characteristics of Acute Severe Pancreatitis

Acute severe pancreatitis is a serious disease with many complications and high fatality rate [1]. It is characterized by sudden onset and rapid progression, including severe epigastrial pain, nausea, vomiting, and fever, accompanied by elevated blood amylase and local or systemic pancreatic reactions shown by imaging. This definition is helpful to distinguish mild pancreatitis from severe pancreatitis and provide basis for clinical treatment.

### 1.2 Importance of Surgical Management of Acute Severe Pancreatitis

Due to the high case fatality rate of acute severe pancreatitis, surgical management plays a critical role in this area. Surgical treatment is not only for pancreatitis itself, but also for its complications, such as pancreatic necrosis, infection, and abscess formation. Timely surgical intervention can effectively reduce the fatality rate and improve the prognosis of patients [2].

### 1.3 Objective and Significance This Paper

Aims to review the latest progress in the surgical diagnosis and treatment of acute severe pancreatitis,

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including the improvement of diagnostic techniques, the innovation of surgical methods and the optimization of perioperative management. By combing the current research results and clinical practice, this paper will provide surgeons with the latest strategies for the treatment of acute severe pancreatitis, and contribute to improving the treatment level of acute severe pancreatitis in China and improving the quality of life of patients.

## 2. Etiology and Risk Factors of Acute Severe Pancreatitis

### 2.1 Common Causes and Risk Factors

Severe acute pancreatitis (AcuteSeverePancreatitis, ASP) refers to the pancreas and its surrounding tissues were caused by various causes chemical inflammation of the pancreas secretion of digestive enzymes on its own dangerous illness, much complications, high mortality [3]. Common causes include biliary diseases, alcohol overdose, hyperlipidemia, drug factors, trauma, metabolic diseases, etc. Among them, biliary tract disease is the most common cause, accounting for more than 50% of the causes of acute pancreatitis. Cholelithiasis, biliary tract infection, or biliary roundworm cause bile to flow back into the pancreatic duct, causing increased pressure in the pancreatic duct, and eventually leading to pancreatic duct rupture, resulting in pancreatitis. Excessive alcohol is also one of the important causes. Long-term heavy drinking leads to increased pancreatic secretion, and alcohol can directly damage pancreatic tissue and induce pancreatitis. The etiology of hyperlipidemic pancreatitis is not completely clear, but may be related to fat embolism and lipid metabolism disorder. Drug factors include certain drugs such as thiazide diuretics, mannitol, etc., which can lead to increased pancreatic duct pressure and induce pancreatitis. Trauma, metabolic diseases such as diabetes, hypercalcemia, etc., may also induce acute severe pancreatitis.

### 2.2 Domestic and Foreign Research Status of Etiology and Risk Factors

The etiology and risk factors of severe acute pancreatitis vary globally. Biliary diseases and excessive alcohol are the main causes in European and American countries, while biliary diseases and hyperlipidemic pancreatitis are the main causes in Asian countries. In recent years, with the change of lifestyle and the change of disease spectrum, the etiology of acute severe pancreatitis in China has also shown a certain trend of change. The incidence of alcohol overdose and hyperlipidemic pancreatitis has gradually increased and become one of the important causes [4]. In addition, in recent years, domestic and foreign studies have found that gene inheritance, intestinal flora disorders, and abnormal expression of inflammatory factors may also be closely related to the onset of acute severe pancreatitis.

### 2.3 Etiology and Risk Factors Mechanism of Action in Severe Pancreatitis

The mechanisms of etiology and risk factors in severe acute pancreatitis are complex and not fully understood. It is generally believed that these factors induce or aggravate pancreatitis in the following ways:

(1) Increased pancreatic pressure: cholelithiasis and biliary tract infection lead to bile reflux; drugs such as thiazide diuretics and mannitol lead to increased pancreatic secretion, resulting in increased pancreatic duct pressure and induced pancreatitis.

(2) Damage to pancreatic tissue: Alcohol and drugs can directly damage pancreatic tissue, resulting in pancreatic acinar cell necrosis and the release of inflammatory mediators, leading to pancreatitis [5].

(3) Aggravating pancreatic inflammation: inflammatory mediators and cytokines play an important role in the pathogenesis of pancreatitis. Etiology and risk factors can aggravate pancreatic inflammation by inducing abnormal expression of inflammatory mediators and cytokines [6].

(4) Affect pancreatic microcirculation: etiology and risk factors can also lead to pancreatic microcirculation disorders, make pancreatic tissue hypoxia, acidosis, and further aggravate pancreatitis.

Identifying the etiology and risk factors of acute severe pancreatitis is helpful for early diagnosis, timely treatment and prevention of disease recurrence. Researchers at home and abroad are committed to deeply exploring the etiology and risk factors in the mechanism of acute severe pancreatitis, in order to provide a more scientific basis for clinical diagnosis and treatment.

## 3. Diagnosis of Acute Severe Pancreatitis

### 3.1 Clinical Manifestations and Diagnostic Criteria

The clinical manifestations of acute severe pancreatitis mainly include severe upper abdominal pain, nausea, vomiting, fever and so on. Diagnostic criteria include clinical symptoms, signs, and laboratory and imaging findings. According to the clinical signs and symptoms, combined with laboratory and imaging results, acute severe pancreatitis can be diagnosed.

### 3.2 Application of Imaging Examination in Diagnosis of Acute Severe Pancreatitis

Imaging examination is one of the important means to diagnose acute severe pancreatitis. Common imaging examinations include abdominal ultrasound, computed tomography (CT), and magnetic resonance imaging (MRI) [7]. Abdominal ultrasound can be used to observe the size, shape and surrounding fluid state of the pancreas, which has a certain value in the diagnosis of acute severe pancreatitis. CT and MRI can clearly show the necrosis of pancreas and the degree of peripheral inflammation, which is of great significance for the diagnosis and evaluation of acute severe pancreatitis.

### 3.3 Application of Laboratory Examination in Diagnosis of Acute Severe Pancreatitis

Laboratory examination is one of the important means to diagnose acute severe pancreatitis. Common laboratory tests include serum amylase, lipase, white blood cell count, and neutrophil count. Serum amylase and lipase are enzymes secreted by the pancreas, and the increase of their levels can reflect the severity of pancreatitis. Leukocyte count and neutrophil count can reflect the degree of inflammatory response, and have certain reference value for the diagnosis and evaluation of severe acute pancreatitis [8].

To sum up, the diagnosis of acute severe pancreatitis requires comprehensive consideration of clinical manifestations, imaging and laboratory findings. Through the comprehensive analysis of these examination results, the accurate diagnosis of acute severe pancreatitis can be provided for clinical treatment.

## 4. Surgical Treatment Strategy of Acute Severe Pancreatitis

### 4.1 Principles and Timing of Surgical Treatment

The principle of surgical treatment is to relieve the necrosis, infection and inflammation of the pancreas as soon as possible, prevent the occurrence of complications, and prolong the survival time of patients. The timing of treatment should be determined according to the severity of the patient's condition, systemic condition and treatment response. For critically ill patients, immediate surgical treatment should be carried out to reduce the fatality rate.

### 4.2 Trauma Escalation Treatment Strategy

The strategy of progressive trauma treatment is to gradually increase the treatment intensity according to the change of the patient's condition in order to achieve the best treatment effect. This strategy can be adjusted according to the actual situation of patients, with high flexibility. In the course of treatment, the change of the patient's condition should be closely observed and the treatment plan should be adjusted in time.

### 4.3 Controversy Over Early and Delayed Surgery

Regarding the timing of operation for acute severe pancreatitis, there are currently two viewpoints: early operation and delayed operation [9]. Early operation can remove the necrotic tissue as soon as possible and prevent the spread of infection and inflammation, but the operation risk is greater. Delaying surgery can reduce the risk of surgery, but it can lead to the spread of infection and inflammation, increasing the mortality of patients. Therefore, when choosing the time for surgery, the severity of the patient's condition, systemic condition and treatment response should be considered comprehensively to determine the most appropriate time for the patient to operate.

### 4.4 Selection and Application of Surgical Methods

The surgical methods of acute severe pancreatitis include necrotic tissue removal, partial pancreatectomy, internal drainage of pancreatic pseudocysts, abdominal drainage, etc. The choice of surgical method should be based on the patient's condition, surgical risk and therapeutic effect [10]. During surgery, normal pancreatic tissue should be preserved as much as possible to reduce surgical trauma, so as to improve the quality of life and survival time of patients.

In conclusion, the surgical treatment strategy of acute severe pancreatitis should be selected and adjusted according to the specific conditions of patients in order to achieve the best therapeutic effect. In the course of treatment, surgeons should have a high sense of responsibility, superb skills and rich experience to improve the cure rate and quality of life of patients.

## 5. Progress in Surgical Treatment of Acute Severe Pancreatitis

### 5.1 Application of Percutaneous Catheter Drainage

Acute severe pancreatitis is a critical disease that requires aggressive surgical treatment. Percutaneous catheter drainage (PTCD) plays an important role in the surgical treatment of acute severe pancreatitis. PTCD technique is used to drain and remove pancreatic necrotic tissue by percutaneous insertion of drainage tube into necrotic tissue. This technique has the advantages of less trauma and simple operation, and provides a new treatment option for patients who cannot tolerate open surgery.

### 5.2 Application of Minimally Invasive Endoscopic Therapy

With the development of endoscopic technology, endoscopic minimally invasive therapy has been paid more and more attention in the surgical treatment of acute severe pancreatitis. Under endoscopy, necrotic tissue removal and drainage tube placement can be performed, which has the advantages of less trauma and quick recovery. In addition, endoscopy can also be used for the examination and treatment of biliary tract, gastrointestinal tract and other organs, which is of great value for patients with acute severe pancreatitis complicated with diseases of these organs.

### 5.3 Improvement and Optimization of Open Surgery

Laparotomy is the traditional treatment of acute severe pancreatitis. It is necessary to perform surgical treatment for some serious complications such as pancreatic necrotic tissue infection and pancreatic pseudocyst. In recent years, with the improvement and optimization of surgical techniques, the incidence of trauma and complications in open surgery has decreased. During the operation, ultrasound, CT and other imaging techniques can be used to assist the operation to improve the accuracy and safety of the operation. In addition, early postoperative rehabilitation is also the key to reduce surgical complications and improve patient prognosis.

### 5.4 Application of Biomaterials and Bioengineering in the Treatment of Pancreatic Pseudocyst

Pancreatic pseudocyst is one of the common complications of severe acute pancreatitis and requires effective treatment [11]. The application of biomaterials and bioengineering technology provides a new direction for the treatment of pancreatic pseudocyst. For example, artificial pancreatic scaffolds made from biomaterials can be used for drainage and repair of pancreatic pseudocysts. In addition, bioengineering technology can also be used to prepare scaffolds with good biocompatibility and bioactivity to promote the recovery of pancreatic function. The application of these new technologies provides more options and possibilities for the treatment of acute severe pancreatitis.

## 6. Complications and Management of Acute Severe Pancreatitis

### 6.1 Treatment of Infectious Pancreatic Necrosis

Infectious pancreatic necrosis is a serious complication of acute severe pancreatitis. The key to treatment is early diagnosis and timely intervention. The treatment of infectious pancreatic necrosis mainly includes antibiotic therapy, necrotic tissue drainage and surgical debridement [12]. Antibiotic therapy should be based on bacterial culture and drug sensitivity test results to select sensitive antibiotics. Necrotic tissue drainage can be achieved by endoscopic drainage or surgical incision drainage. Surgical debridement should be carried out after sufficient necrosis of the necrotic tissue, the necrotic tissue should be completely removed during the operation, and the drainage tube should be indwelled for postoperative drainage. In addition, nutritional support and immunomodulatory therapy are also important links in the treatment of infectious pancreatic necrosis.

### 6.2 Treatment of Pancreatic Pseudocyst

Pancreatic pseudocyst is one of the common complications of acute severe pancreatitis, and its treatment mainly includes endoscopic drainage and surgical drainage. Endoscopic drainage involves connecting the cyst to the duodenum through a duodenoscope and draining the cyst contents. Surgical drainage is to open the cyst, connect it to the duodenum, and drain it. In the course of treatment, the appropriate treatment method should be selected according to the patient's condition. In addition,

nutritional support and infection prevention therapy are also important measures for the treatment of pancreatic pseudocyst.

**6.3 Management of Encapsulated Necrosis**

Wrapping necrosis is another complication of severe acute pancreatitis, and its treatment mainly includes drug therapy and surgery. Drug therapy includes antibiotic therapy, drugs that suppress pancreatic secretion, and immunomodulatory therapy. Antibiotic therapy should be based on bacterial culture and drug sensitivity test results to select sensitive antibiotics. Drugs that inhibit pancreatic production can reduce pancreatic production and alleviate the condition. Immunomodulatory therapy can improve the immune status of patients and reduce the occurrence of complications. Surgical treatment, including necrotic tissue removal and drainage, is mainly performed when medical treatment has failed or when complications arise from encapsulated necrosis.

In short, the management of complications of severe acute pancreatitis is a crucial link in the treatment process. According to different complications, appropriate treatment methods should be selected to improve the cure rate and quality of life of patients. In the course of treatment, the comprehensive application of drug therapy and surgical therapy, combined with nutritional support and immune regulation therapy, can effectively improve the therapeutic effect of patients.

## 7. Prognosis and Rehabilitation of Acute Severe Pancreatitis

**7.1 Analysis of Prognostic Factors**

Severe acute pancreatitis (AcuteSeverePancreatitis, ASP) is a disease in a critical condition, the case fatality rate is higher, the prognosis is poorer [13]. There have been many studies on the prognostic factors of acute severe pancreatitis. The analysis of prognostic factors is of great significance for judging the severity of the patient's disease, selecting treatment plan and evaluating prognosis.

Age is one of the important factors affecting the prognosis of acute severe pancreatitis. In general, the older you get, the worse the prognosis. In addition, gender may also have an impact on prognosis, with women having a relatively better prognosis. Etiology is also an important prognostic factor, and the prognosis of alcoholic pancreatitis is usually better than that of biliary tract disease.

In terms of clinical indicators, assessment methods such as APACHE II score, Ranson score and Glasgow score have been widely used to judge the severity and prognosis of the disease [14].In addition, laboratory indicators such as serum amylase, lipase, and C-reactive protein can also be used to assess disease and prognosis. Imaging tests such as CT scan can help to assess the degree of pancreatic necrosis and thus predict the prognosis.

**7.2 Application of Rehabilitation Therapy in Acute Severe Pancreatitis**

Rehabilitation therapy is an important part of comprehensive treatment of acute severe pancreatitis, which is of great significance for promoting rehabilitation of patients and reducing mortality and disability rates. Rehabilitation treatment includes many aspects, such as physical therapy, nutritional support, psychological intervention and so on.

Physical therapy is the core of rehabilitation therapy, including early activity, breathing training and limbs. Early activity can help prevent pulmonary infection, venous thrombosis and other complications, promote pancreatic secretion and excretion, and reduce mortality. Breathing and limb

exercises improve lung capacity and muscle strength, reducing the risk of lung and cardiovascular disease.

Nutritional support also plays an important role in the rehabilitation of acute severe pancreatitis. Reasonable nutritional support is helpful to maintain the nutritional status of patients and promote the recovery of pancreatic function. Premature or excessive nutritional support may increase the burden on the pancreas, so it needs to be arranged according to the patient's condition.

Psychological intervention also plays an important role in rehabilitation treatment. Patients with severe acute pancreatitis are often accompanied by anxiety, depression and other psychological problems. Psychological intervention can help alleviate the mental pressure of patients, improve treatment confidence and quality of life.

In short, the prognosis and rehabilitation of acute severe pancreatitis is a complex process, which requires comprehensive consideration of many factors. Through comprehensive assessment of patients' condition, formulation of reasonable treatment plan and active rehabilitation treatment, the mortality rate and disability rate can be effectively reduced, and the quality of life of patients can be improved.

## 8. Conclusion

### 8.1 Progress and Trend of Surgical Treatment of Acute Severe Pancreatitis

Acute severe pancreatitis is a dangerous disease with many complications and high mortality. In recent years, with the deepening of the understanding of the disease and the development of medical technology, the surgical treatment of severe acute pancreatitis has made remarkable progress [15].The selection of surgical timing and method is more scientific and reasonable, and the application of minimally invasive surgery and organ support therapy has significantly improved the survival rate and quality of life of patients. In addition, the establishment of multidisciplinary comprehensive treatment model also provides a new direction for the treatment of acute severe pancreatitis. In the future, with the promotion of precision medicine and individualized treatment concepts, the surgical treatment of acute severe pancreatitis will be more humane and efficient.

### 8.2 Challenges and Problems in Surgical Treatment of Acute Severe Pancreatitis

Although the surgical treatment of acute severe pancreatitis has made remarkable progress, it still faces many challenges and problems. First of all, it is still difficult to judge the timing of surgery and grasp the indications of surgery. Secondly, although minimally invasive surgery has achieved remarkable results in the treatment of acute severe pancreatitis, there are still some patients who are not suitable for minimally invasive surgery for various reasons. In addition, severe acute pancreatitis has more complications, and how to effectively prevent and treat complications is still a difficult treatment.

### 8.3 Prospects for Future Research

In the future, the surgical treatment of acute severe pancreatitis should pay more attention to the following aspects: first, in-depth study of the pathogenesis of acute severe pancreatitis, in order to better judge the timing and indications of surgery; The second is to conduct large-scale multi-center clinical trials to verify the effectiveness of new treatments and drugs; Third, strengthen the combination of basic research and clinical trials to promote precision medicine and individualized

treatment of acute severe pancreatitis; Fourth, strengthen the study of multidisciplinary comprehensive treatment mode to improve the therapeutic effect of acute severe pancreatitis [16].

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