Modern American Journal of Medical and Health Sciences
ISSN (E): 3067-803X
Volume 2, Issue 3, March 2026
Website: usajournals.org

INDICATIONS FOR SURGERY IN ACUTE PANCREATITIS WITH MAINTENANCE OF THE BODY'S PROTEIN-ENERGY BALANCE

Khodiev Khammazhon Sidikovich
MD, Professor, Tashkent State Medical University,
Tashkent, Uzbekistan

Baimakov Sayfiddin Risbaevich
MD, Professor
Tashkent State Medical University, Tashkent, Uzbekistan
ORCID ID: 0000-0003-1096-835X

Burkhanov Zhasurjon Zhamshid o`g`li
Senior Lecturer
University of Business and Science Tashkent, Uzbekistan
ORCID ID: 0009-0003-3928-3722

Mekhmanov Sh. R.
Docent, Tashkent State Medical University
Tashkent, Uzbekistan
mekhmanovshamurat@gmail.com

Abstract

The article focuses on defining indications for surgical treatment in acute pancreatitis, taking into account the severity of the disease and ensuring adequate protein-energy balance. Indications for surgical intervention in the early and late stages of the disease, criteria for predicting the severity of the pathological process, and patient nutritional support programs are discussed. It is shown that timely determination of surgical tactics and rational protein-energy support contribute to reducing complications and improving treatment outcomes.

Modern American Journal of Medical and Health Sciences
ISSN (E): 3067-803X
Volume 2, Issue 3, March 2026
Website: usajournals.org

Keywords: Acute pancreatitis; indications for surgery; pancreatic necrosis; protein-energy balance; nutritional support; enteral nutrition.

Introduction

Indications for surgery in acute pancreatitis remain a subject of discussion. In the early days of the disease, patients' conditions are often complicated by severe intoxication, cardiovascular disorders, acute respiratory and hepatic failure. Performing surgery at an early stage is difficult due to the lack of clear demarcation of necrotic areas, which complicates determining the extent of the operation.

At the same time, several complications (shock, acute renal failure, progressive jaundice, purulent-necrotic processes) become dominant in the clinical picture and often determine the disease outcome. Timely identification of life-threatening conditions, in which the risk of surgery is lower than that of continued conservative therapy, is particularly important.

An equally important component of comprehensive treatment is the correction of protein-energy disturbances, especially in severe forms of the disease associated with pronounced catabolism.

Objective

To determine the indications for surgical treatment of acute pancreatitis based on clinical criteria of disease severity and the need for adequate protein-energy support.

Materials and Methods

The study examined 270 patients with acute pancreatitis, of whom 113 underwent surgery and 157 received conservative treatment. The critical period for assessing the effectiveness of intensive therapy is the first 24–48 hours from disease onset. Mortality in acute renal failure reaches 60–80%. A decrease in urine output to less than 1000 ml per day, despite adequate correction of water-electrolyte balance, is an indication for surgery. The development of shock is associated with

Modern American Journal of Medical and Health Sciences
ISSN (E): 3067-803X
Volume 2, Issue 3, March 2026
Website: usajournals.org

a mortality rate of 55–100%. Critical hypotension is considered as blood pressure below 90/40 mm Hg.

Unfavourable prognostic criteria include age over 55 years, leukocytosis above 15×10^9/L, and blood glucose over 10 mmol/L. During the first 48 hours, important severity indicators include a hematocrit decrease of more than 10%, blood creatinine over 110 µmol/L, base deficit over 4 mmol/L, pO_2 below 60 mm Hg, and indirect bilirubin over 60% in hyperbilirubinemia.

Mild disease corresponds to up to 3 unfavorable signs, moderate severity — 4–6 signs, severe disease — 7–9 signs. More than 9 signs indicate an extremely unfavourable prognosis.

Nitrogen losses in mild disease increase 1–2 times above physiological norms. In moderate severity, losses rise 1.5–2 times, peaking on days 3–5 and decreasing by days 7–10. In severe disease, nitrogen losses can exceed normal levels by 2–3 times.

Daily nitrogen requirements are 10–15 g for mild disease, 15–25 g for moderate severity, and 25–35 g for severe disease. Energy requirements are 1600–2000 kcal/day for mild cases, up to 3000 kcal/day for moderate cases, and 3500–4000 kcal/day for severe cases.

Infusion therapy volume is 2–3 L/day for mild cases, 3–4.5 L/day for moderate cases, and 4–6 L/day for severe cases. Fat emulsions can be used up to 2–3 L/week.

Enteral tube feeding reduces complications by 5–15% and cuts parenteral nutrition costs by more than half.

Methods

Clinical, laboratory, and instrumental diagnostic methods were used.

Severity prediction criteria evaluated during the first 24–48 hours included:

- Age over 55 years;
- Leukocytosis over 15×10^9/L;
- Hyperglycemia over 10 mmol/L;
- Hematocrit decrease over 10%;
- Blood creatinine over 110 µmol/L;

Modern American Journal of Medical and Health Sciences
ISSN (E): 3067-803X
Volume 2, Issue 3, March 2026
Website: usajournals.org

- Base deficit over 4 mmol/L;
- pO_2 below 60 mm Hg.

Catabolism degree was determined by daily nitrogen losses in urine.

Treatment Methods

Infusion therapy volume depended on disease severity.

- Mild disease: 2–3 L/day, providing 10–15 g nitrogen and 1600–2000 kcal/day.
- Moderate severity: 3–4.5 L/day, 15–25 g nitrogen, up to 3000 kcal/day.
- Severe disease: 4–6 L/day, 25–35 g nitrogen, 3500–4000 kcal/day.

Additional energy was provided by fat emulsions up to 2–3 L/week. Enteral tube feeding was included in severe cases.

Results

Among 270 patients with acute pancreatitis, disease course and the need for surgery directly depended on systemic disturbances and complication development. Of all patients, 113 (41.9%) underwent surgery, while 157 (58.1%) received conservative treatment.

Early Indications for Surgery

In the first 24–48 hours, the course of organ failure was decisive. Acute renal failure was associated with high mortality (60–80%). Urine output below 1000 ml/day despite adequate fluid therapy was an unfavorable prognostic sign and indicated surgery. Shock was extremely severe, with 55–100% mortality. Critical hypotension (<90/40 mm Hg) and lack of response to intensive therapy justified emergency surgery. Progressive mechanical jaundice also indicated surgical intervention.

Late Indications for Surgery

After 3–4 weeks or more than 1 month, patients developed encapsulated pancreatic necrosis and abscesses. Indications at this stage included:

Modern American Journal of Medical and Health Sciences
ISSN (E): 3067-803X
Volume 2, Issue 3, March 2026
Website: usajournals.org

- Abscess formation;
- Development of purulent-necrotic pancreatitis;
- Erosive bleeding from pancreatoduodenal vessels;
- Lack of response to conservative therapy.

Surgery during the encapsulation phase allowed more limited and technically justified interventions.

Prognostic Assessment of Disease Severity

Within 24 hours, unfavorable signs were: age >55, leukocytosis >15×10⁹/L, and blood glucose >10 mmol/L. Within 48 hours, additional signs included hematocrit drop >10%, creatinine >110 µmol/L, base deficit >4 mmol/L, and pO_2 <60 mm Hg.

- Up to 3 signs — mild disease;
- 4–6 signs — moderate severity;
- 7–9 signs — severe disease;
- More than 9 signs — extremely unfavorable prognosis.

Patients with severe disease showed recurrent pain, fever, increased leukocytosis, and inflammatory pancreatic infiltrate formation.

Protein-Energy Status

Nitrogen loss correlated with disease severity.

- Mild: 1–2× physiological norm.
- Moderate: 1.5–2× norm, peaking on days 3–5, normalizing by days 7–10.
- Severe: 2–3× norm, with negative nitrogen balance, lean body mass loss, and protein-energy deficiency, especially in purulent-necrotic forms.

Effectiveness of Nutritional Support

Enteral tube feeding in severe and purulent-necrotic pancreatitis reduced complications by 5–15%, decreased infection rates, poor wound healing, pneumonia, digestive disorders, and hydrothorax, and reduced parenteral nutrition volume and cost by over 50%.

Modern American Journal of Medical and Health Sciences
ISSN (E): 3067-803X
Volume 2, Issue 3, March 2026
Website: usajournals.org

Discussion

More than 7–9 unfavorable signs significantly worsen prognosis. Organ failure with urine output <1000 ml and blood pressure <90/40 mm Hg requires timely surgery. Pronounced catabolism, with nitrogen losses 2–3× normal, requires active protein-energy correction up to 4000 kcal and 35 g nitrogen/day in severe cases. Enteral nutrition reduces complications by 5–15%.

Conclusions

1. Surgery is indicated in acute pancreatitis if life-threatening complications develop.
2. Early indications (first 24–48 hours): diagnosed gallstone disease, chronic pancreatitis with main pancreatic duct obstruction, pancreatic cysts unresponsive to conservative treatment, urine output <1000 ml/day despite fluid correction, shock unresponsive to medication, progressive jaundice.
3. Late indications (>3–4 weeks): pancreatic abscess, purulent necrotic pancreatitis, erosive bleeding from pancreatoduodenal vessels, lack of conservative treatment effect.
4. Severe acute pancreatitis is associated with increased catabolism (1.5–2×), negative nitrogen balance, and reduced nutritional-metabolic status, particularly in purulent-necrotic cases.
5. Enteral tube feeding in artificial nutrition programs effectively replenishes protein and energy, tailored to disease phases and inflammatory process characteristics. Effectiveness should consider nutritional status and pancreatic rest.

References:

1. Grekova N.M., Bukhalov A.G., Lebedeva Y.V., Bukhalova S.A. Acute pancreatitis: modern classification system. Modern Problems of Science and Education. 2015.
2. Bagnienko S.F., Goltsov V.R., Savello V.E., Vashetko R.V. Classification of acute pancreatitis: current state of the problem. Bulletin of Surgery named after I.I. Grekov. 2015.

Modern American Journal of Medical and Health Sciences
ISSN (E): 3067-803X
Volume 2, Issue 3, March 2026
Website: usajournals.org

3. Duzheva T.G., Shefer A.V. Intra-abdominal hypertension in patients with severe acute pancreatitis. Surgery. Journal named after N.I. Pirogov. 2018.
4. Ivshin V.G., Ivshin M.V. Percutaneous treatment of patients with pancreatic necrosis and extensive parapancreatitis. Tula: Grif & K; 2016.
5. Revishvili A.Sh., Olovyannyy V.E., Sazhin V.P., Nechaev O.I., Zakharova M.A., Shelina N.V., Mironova N.L. Surgical care in the Russian Federation. Moscow; 2019.
6. Pendharkar S.A., Salt K., Plank L.D., Windsor J.A., Petrov M.S. Quality of life after acute pancreatitis. Pancreas. 2016.
7. Machicado J.D., et al. Acute pancreatitis has a long-term deleterious effect on physical health-related quality of life. Clinical Gastroenterology and Hepatology. 2017.
8. Ji H.B., et al. Impact of enhanced recovery after surgery programs on pancreatic surgery: a meta-analysis. World Journal of Gastroenterology. 2018.
9. Shabunin A.V., Lukin A.Yu., Shikov D.V. Optimal treatment of acute pancreatitis depending on the “model” of pancreatic necrosis. Annals of Surgical Hepatology. 2015.
10. Miko A., Vigh E., Matrai P., et al. Computed Tomography Severity Index vs other indices in the prediction of severity and mortality in acute pancreatitis: a predictive accuracy meta-analysis. Frontiers in Physiology. 2019 Aug 27.
11. Firsova V.G., Parshikov V.V., Kukosh M.V., Gorsky V.A. Surgical treatment of patients with acute pancreatitis. Annals of Surgical Hepatology. 2022;27(1):72–79.
12. Samanta J., Rana A., Dhaka N., et al. Ascites in acute pancreatitis: not a silent bystander. Pancreatology. 2019;19(5):646–652.
13. Liu R.H., Wen Y., Sun H.Y., et al. Abdominal paracentesis drainage ameliorates severe acute pancreatitis in rats by regulating polarization of peritoneal macrophages. World Journal of Gastroenterology. 2018;24(45):5131–5143.
14. Hongyin L., Zhu H., Tao W., et al. Abdominal paracentesis drainage improves tolerance of enteral nutrition in acute pancreatitis: a randomized

Modern American Journal of Medical and Health Sciences
ISSN (E): 3067-803X
Volume 2, Issue 3, March 2026
Website: usajournals.org

controlled trial. Scandinavian Journal of Gastroenterology. 2017;52(4):389–395.

15. Isaji S., Takada T., Mayumi T., et al. Revised Japanese guidelines for the management of acute pancreatitis 2015. Journal of Hepato-Biliary-Pancreatic Sciences. 2015;22(6):433–445.
16. Baron T.H., DiMaio C.J., Wang A.Y., Morgan K.A. American Gastroenterological Association clinical practice update: management of pancreatic necrosis. Gastroenterology. 2020;158(1):67–75.
17. Leppäniemi A., Tolonen M., Tarasconi A., et al. 2019 WSES guidelines for the management of severe acute pancreatitis. World Journal of Emergency Surgery. 2019;14:27.
18. Maatman T.K., Roch A.M., Lewellen K.A., et al. Disconnected pancreatic duct syndrome: spectrum of operative management. Journal of Surgical Research. 2020;247:297–303.
19. Arvanitakis M., Dumonceau J.M., Albert J., et al. Endoscopic management of acute necrotizing pancreatitis: ESGE evidence-based multidisciplinary guidelines. Endoscopy. 2018;50(5):524–546.
20. Duzheva T.G., Dzhus B.V., Shefer A.V., et al. Configuration of pancreatic necrosis and differentiated treatment of acute pancreatitis. Annals of Surgical Hepatology. 2013;18(1):92–102.
21. van Dijk S.M., Timmerhuis H.C., Verdonk R.C., et al. Treatment of disrupted and disconnected pancreatic duct in necrotizing pancreatitis: a systematic review and meta-analysis. Pancreatology. 2019;19(7):905–915.
22. Zerem E. Treatment of severe acute pancreatitis and its complications. World Journal of Gastroenterology. 2014;20(38):13879–13892.
23. Robin-Lersundi A., Abella Alvarez A., San Miguel Mendez C., et al. Multidisciplinary approach to treating severe acute pancreatitis in a low-volume hospital. World Journal of Surgery. 2019;43(12):2994–3002.
24. Lee A.H.H., Lee W.S., Anderson D. Severe pancreatitis complicated by abdominal compartment syndrome managed with decompressive laparotomy: a case report. BMC Surgery. 2019;19(1):113.

Modern American Journal of Medical and Health Sciences
ISSN (E): 3067-803X
Volume 2, Issue 3, March 2026
Website: usajournals.org

25. Jacob A.O., Stewart P., Jacob O. Early surgical intervention in severe acute pancreatitis: Central Australian experience. ANZ Journal of Surgery. 2016;86(10):805–810.
26. Manijashvili Z., Lomidze N., Akhaladze G., Tsereteli I. Fasciotomy in the complex treatment of abdominal compartment syndrome for pancreatic necrosis. Georgian Medical News. 2019;(286):40–45.
27. Jain S., Padhan R., Bopanna S., et al. Percutaneous endoscopic step-up therapy for infected necrotizing pancreatitis. Digestive Diseases and Sciences. 2020;65(2):675–682.
28. van Grinsven J., Timmerman P., van Lienden K.P., et al. Proactive versus standard percutaneous catheter drainage for infected necrotizing pancreatitis. Pancreas. 2017;46(4):578–583.
29. Wang Y.B., Yang X.L., Chen L., et al. Retroperitoneal versus open intraperitoneal necrosectomy in step-up therapy: a meta-analysis. International Journal of Surgery. 2018;56:83–93.
30. Hollemans R.A., Bakker O.J., Boermeester M.A., et al. Superiority of step-up approach vs open necrosectomy in long-term follow-up of patients with necrotizing pancreatitis. Gastroenterology. 2019;156(4):1016–1026.
31. Minami K., Horibe M., Sanui M., et al. Effect of invasive strategy for treating pancreatic necrosis on mortality. Journal of Gastrointestinal Surgery. 2020;24(9):2037–2045.
32. van Brunschot S., van Grinsven J., van Santvoort H.C., et al. Endoscopic or surgical step-up approach for infected necrotising pancreatitis: multicentre randomised trial. Lancet. 2018;391(10115):51–58.
33. Bang J.Y., Arnoletti J.P., Holt B.A., et al. Endoscopic transluminal approach reduces complications and costs in necrotizing pancreatitis. Gastroenterology. 2019;156(4):1027–1040.
34. van Brunschot S., Hollemans R.A., Bakker O.J., et al. Minimally invasive and endoscopic versus open necrosectomy: pooled analysis of 1980 patients. Gut. 2018;67(4):697–706.

Modern American Journal of Medical and Health Sciences
ISSN (E): 3067-803X
Volume 2, Issue 3, March 2026
Website: usajournals.org

35. Lyu X.J., Sun B., Li L., Chen H., Kong R. Small incision minimally invasive approach in infected pancreatic necrosis. Zhonghua Wai Ke Za Zhi. 2018;56(9):687–692.
36. Cao F., Duan N., Gao C., Li A., Li F. One-step versus step-up laparoscopic-assisted necrosectomy. Digestive Surgery. 2020;37(3):211–219.
37. Gallyamov E.A., Agapov M.A., Lutsevich O.E., Kakotkin V.V. Modern technologies for the treatment of infected pancreatic necrosis. Annals of Surgical Hepatology. 2020;25(1):69–78.
38. Chantarojanasiri T., Ratanachu-Ek T., Isayama H., et al. When to perform endoscopic drainage and necrosectomy for walled-off necrosis? Journal of Clinical Medicine. 2020;9(12):4072.
39. Trikudanathan G., Tawfik P., Amateau S.K., et al. Early (<4 weeks) versus standard (≥4 weeks) step-up interventions for necrotizing pancreatitis. American Journal of Gastroenterology. 2018;113(10):1550–1558.
40. Rana S.S., Gupta R., Kang M., et al. Percutaneous catheter drainage followed by endoscopic transluminal drainage for infected pancreatic necrosis. Endoscopic Ultrasound. 2018;7(1):41–47.
41. Isayama H., Nakai Y., Rerknimitr R., et al. Asian consensus statements on endoscopic management of walled-off necrosis. Journal of Gastroenterology and Hepatology. 2016;31(9):1555–1565.
42. Lang G.D., Fritz C., Bhat T., et al. EUS-guided drainage with lumen-apposing metal stents versus plastic stents. Gastrointestinal Endoscopy. 2018;87(1):150–157.
43. Lakhtakia S., Basha J., Talukdar R., et al. Endoscopic step-up approach using biflanged metal stent. Gastrointestinal Endoscopy. 2017;85(6):1243–1252.
44. Abu Dayyeh B.K., Mukewar S., Majumder S., et al. Large-caliber metal stents versus plastic stents. Gastrointestinal Endoscopy. 2018;87(1):141–149.
45. Bang J.Y., Navaneethan U., Hasan M.K., et al. Non-superiority of lumen-apposing metal stents over plastic stents. Gut. 2019;68(7):1200–1209.
46. Tan S., Zhong C., Ren Y., et al. Lumen-apposing metal stents versus plastic stents: systematic review and meta-analysis. Gastroenterology Research and Practice. 2020;2020:4952721.

Modern American Journal of Medical and Health Sciences
ISSN (E): 3067-803X
Volume 2, Issue 3, March 2026
Website: usajournals.org

47. Mohan B.P., Jayaraj M., Asokkumar R., et al. Lumen apposing metal stents in drainage of pancreatic walled-off necrosis. Endoscopic Ultrasound. 2019;8(2):82–90.
48. Jagielski M., Smoczynski M., Adrych K. Single transluminal gateway transcystic multiple drainage. Przeglad Gastroenterologiczny. 2018;13(3):242–248.
49. Kaprin I.A., Eldarova Z.E., Glabay V.P. Surgical treatment and complications of operations in severe acute pancreatitis. Research and Practice in Medicine. 2018;5(4):72–81.
50. Kochergin V.G., Pasechnik I.N. Nutritional support in acute pancreatitis: review of clinical recommendations.