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SURGICAL APPROACH TO TREAT ACUTE PANCREATITIS

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Abstract:

Acute pancreatitis can appear clinically in a variety of ways, from very modest symptoms to life-threatening complications. It is crucial to determine the severity and etiology of acute pancreatitis in order to develop a suitable strategy for its therapy. Acute pancreatitis is divided into two subgroups, necrotizing pancreatitis and edematous pancreatitis, based on their morphological characteristics. Eleven different CQs, or clinical questions, have been proposed. Fine needle aspiration bacteriological investigation is a useful tool in making an accurate diagnosis of infected necrosis of the pancreas. It is recommended that patients with sterile pancreatic necrosis seek out conservative therapy options. There is substantial evidence that interventional therapy approaches should be used to treat infected pancreatic necrosis. However, conservative treatment via the infusion of antibiotics is also an option in individuals who demonstrate a stable overall condition. The current consensus among medical experts is to proceed with care when deciding when to intervene surgically in cases of necrotizing pancreatitis. To the fullest extent possible, postponing surgery is recommended. Infected necrosis is best treated with a surgical procedure called necrosectomy. It is crucial to keep a watchful eye out for problems including bile duct or pancreatic duct strictures and conduct a thorough long-term surveillance of pancreatic function after a necrosectomy treatment.

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INTRODUCTION:

Acute pancreatitis is a pathological condition characterized by the sudden onset of inflammation in the pancreas, which arises due to the process of auto-digestion of the pancreatic tissue. Acute pancreatitis, in the majority of instances (approximately 75-80% of cases), manifests as a self-restricting ailment that resolves without intervention. However, a notable subset (around 20-25% of cases) of acute pancreatitis exhibits a severe clinical course, marked by the emergence of pancreatic or peri-pancreatic necrosis. This severe form gives rise to both systemic and localized complications, which contribute to a mortality range spanning from 8% to 35%. The primary etiologies of acute pancreatitis encompass the consumption of alcohol and the presence of gallstones. Various etiological factors have been implicated in the pathogenesis of pancreatitis, including but not limited to hyperlipemia, pancreatic trauma, infectious diseases, pharmacological agents, postoperative complications, pancreatitis induced by endoscopic retrograde cholangiopancreatography (ERCP) or endoscopic sphincterotomy, as well as congenital defects like pancreas divisum.

The etiological mechanisms underlying the self-digestion of the pancreas and adjacent tissues are attributed to the untimely stimulation of pancreatic enzymes. Precise mechanisms underlying intracellular enzyme activation, regardless of the underlying causes of pancreatitis, remain elusive.

Severe pancreatitis manifests in a biphasic manner, commencing with an initial phase marked by the ramifications of a systemic inflammatory response leading to organ failures. This is followed by a subsequent phase that is primarily characterized by the emergence of local complications arising from the auto-digestion of the pancreas and the surrounding peri-pancreatic tissues. These complications predominantly encompass an infection of fluid accumulations and the occurrence of necrosis. The primary etiology leading to mortality is the development of necrotic tissue accompanied by an infectious process.

The ongoing debate surrounding the requirement of surgical intervention in individuals diagnosed with acute pancreatitis has persisted for over a century, exhibiting a dichotomy between a more conservative healthcare strategy and a surgical alternative. Over the course of the previous decade and a half, there has been a substantial advancement in the understanding of the inherent characteristics and progression of acute pancreatitis, concomitant with significant breakthroughs in the field of pancreatic imaging. Consequently, the capacity to categorize the intensity of the ailment and evaluate the progression of pancreatitis in a contemporaneous manner has been attained. This advancement has facilitated the impartial evaluation of diverse novel methodologies devised with the aim of substantially mitigating the fatality rate associated with this formidable ailment.

In recent years, there has been a notable shift in the approach to managing acute pancreatitis. This phenomenon has arisen primarily as a result of the widespread accessibility of computed tomography, advancements in intensive care capabilities, the understanding of the pivotal role of pancreatic infection, and enhancements in surgical as well as other interventional methodologies.

Literature Review

The exacerbation of clinical presentations and hematological parameters, along with the positive results of blood bacterial culture testing and blood endotoxin testing, as well as the identification of gas bubbles in the vicinity of the pancreas on computed tomography (CT) imaging, collectively serve as indirect evidence that raises suspicions regarding the presence of infected necrotic pancreatic tissue. The observed outcomes indicative of potential infected pancreatic necrosis encompass the exacerbation of clinical symptoms and hematological indicators, the confirmation of bacterial growth in blood culture tests, the positive results of blood endotoxin tests, and the detection of gas bubbles in the vicinity of the pancreas as revealed by CT scans. However, it is important to note that these findings serve as mere indications of the possible existence of an infection (Büchler, Müller, Friess, 2000).

Bacteriological analysis through the utilization of fine needle aspiration (FNA) represents a valuable approach to establishing a conclusive diagnosis of infected necrosis of the pancreas. The established technique for identifying infected pancreatic necrosis involves the implementation of bacteriological examination via CT- or US-guided local FNA. Notably, the success rate of accurately diagnosing infected pancreatic necrosis through this method is notably high, ranging from 89% to 100%. By meticulously choosing a suitable puncture route, this procedure can be executed safely, minimizing the occurrence of challenges such as intestinal damage.
However, fine needle aspiration has been reported to have a false negative rate of 20% to 25%. It follows that the current agreement on the best indications, timing, and variation in frequency for this operation is still insufficient. It is generally advised to prioritize conservative treatment techniques in situations of

sterile pancreatic necrosis. The current agreement (Level 5) indicates that conservative care is the best option for treating sterile pancreatic necrosis. Conservative therapy options (Level 2c-3b) have been shown to be effective in bringing sterile necrosis into remission in a significant majority of patients. Patients who do not respond adequately to substantial conservative therapy approaches have been documented in the literature as requiring surgical intervention.

Infected pancreatic necrosis represents a compelling indication for the implementation of interventional therapeutic modalities, encompassing surgical interventions, interventional radiology techniques, and endoscopic interventions. Based on the available evidence and clinical observations, it is strongly advised to consider implementing Recommendation B in the context of medical research. Nevertheless, it is worth noting that patients who exhibit a stable general condition may also have the option of receiving follow-up care through conservative treatment, specifically by the use of antibiotic administration. Based on the available evidence, it is strongly advised to consider implementing Recommendation C in the context of this medical research study.

Numerous recent studies have shown the therapeutic strategy used to treat infected pancreatic necrosis. According to the findings of Runzi et al., a subgroup of 28 instances was diagnosed with infectious necrosis of the pancreas despite the introduction of preemptive antibiotic therapy in a cohort of 88 persons with necrotizing pancreatitis. As a result of bacteriological testing, adjustments were made in antibiotic selection, and cautious management practices were maintained. Among the cohort of 28 cases under investigation, it was observed that a total of 12 cases necessitated surgical intervention subsequent to a waiting period averaging 36 days. The rationale for surgical intervention stemmed from the manifestation of localized infection subsequent to the evaluation of infected pancreatic necrosis. Regrettably, mortality was recorded in 2 cases, representing a proportion of 16.6% within the sample. The remaining 16 cases underwent conservative management through the administration of antibiotics, with a maximum duration of 8 weeks. Unfortunately, mortality was observed in 2 cases. Furthermore, a recent study has presented findings indicating that out of a total of 24 instances involving infected pancreatic necrosis, a procedure called necrosectomy was executed in 18 cases characterized by exacerbated overall health status. Regrettably, mortality was observed in 5 cases, accounting for approximately 28% of the cohort. Conversely, it is noteworthy that 6 cases, exhibiting stable general conditions, did not necessitate surgical intervention. Remarkably, all of these individuals achieved full recovery through meticulous intensive care unit (ICU) management, which encompassed prolonged administration of antibiotics.

A recent study has presented additional findings regarding the management of infective necrosis of the pancreas. Among a cohort of 31 cases, the initial therapy involved the administration of antibiotics in 8 cases, while drainage procedures were performed in 23 cases. Specifically, percutaneous drainage was employed in 18 cases, while endoscopic drainage was utilized in 5 cases. Notably, within the group of 23 cases that underwent drainage, 4 individuals experienced a deterioration in their physical condition, necessitating necrosectomy. Conversely, the remaining 8 cases that received antibiotic administration did not require any further treatment (Rodriguez, Targarona, Rattner, 2008). It is important to highlight that among the cases subjected to percutaneous drainage, one unfortunate fatality was recorded, while the remaining cases exhibited successful recovery. Henceforth, it is imperative to consider conservative management as the primary therapeutic approach for patients afflicted with infected pancreatic necrosis, provided that their overall physiological state remains stable.

The recommendation for the management of necrotizing pancreatitis discourages the implementation of early surgical intervention. Based on the available evidence and clinical observations, it is strongly advised to consider the implementation of Recommendation D in the context of medical research. In the context of surgical intervention, specifically necrosectomy, it is recommended to exercise caution and consider delaying the procedure to the greatest extent feasible.

Severe acute pancreatitis frequently precipitates significant organ dysfunction during the initial phase following its onset, thereby prompting previous medical recommendations advocating for prompt surgical intervention in cases where accompanying signs of organ failure were evident. Nevertheless, the efficacy of prompt surgical treatment has been called into question due to the significant mortality rate of 65%. A retrospective study was undertaken with the objective of examining the most favorable timing for surgical intervention in cases of severe acute pancreatitis, specifically necrotizing pancreatitis. The study revealed a noteworthy reduction in mortality rates (12%) among patients who underwent

postponed surgery, in stark contrast to the higher mortality rates (39%) observed among those who underwent early surgical intervention. The findings of this study underscore the significance of protracting surgical intervention for individuals afflicted with severe acute pancreatitis, thereby advocating for a strategy that prioritizes delaying such interventions to the utmost extent feasible. Based on the available data from a solitary randomized controlled trial (RCT) investigating the comparative outcomes of early surgery (performed within 72 hours after onset) and delayed surgery (conducted 12 days after onset) in the context of pancreatic resection or necrosectomy, it was observed that the mortality rate for early surgery was 56%, whereas, for delayed surgery, it stood at 27%. However, it is important to note that this disparity in mortality rates did not attain statistical significance. Nevertheless, the present study was prematurely concluded due to the exceedingly elevated mortality rate observed among patients subjected to expeditious surgical intervention.

A retrospective investigation was undertaken utilizing multivariate analysis to examine the prognostic factors associated with surgical treatment for pancreatitis. The present study aimed to assess and compare various potential factors that may contribute to the prognostic outcomes in a cohort of 56 patients who went through surgical intervention, specifically necrosectomy paired with local lavage, for the management of necrotizing pancreatitis. Among the cohort of 56 individuals under investigation, it was observed that a total of 22 subjects elected to undergo early surgical intervention, with a timeframe of 12 days subsequent to the onset of symptoms. The median duration from symptom onset to early surgery was found to be 5 days. Conversely, the remaining 34 participants opted for late surgical intervention, which occurred after a period of 12 days following the initial manifestation of symptoms. The median duration from symptom onset to late surgery was determined to be 20 days. Based on the findings of the aforementioned study, it was observed that the mortality rate for patients who underwent early surgery was recorded at 54.5%, whereas for those who underwent late surgery, the mortality rate was 29.4% ($p = 0.06$).

A retrospective investigation was undertaken to explore the correlation between the timing of surgical intervention and the mortality rate in a cohort of 53 individuals who went through surgery for necrotizing pancreatitis. The present retrospective study aimed to assess and compare the mortality rates among three distinct groups of patients who underwent surgery at different time intervals following hospitalization. The first group consisted of 14 patients who went through early surgery, defined as occurring within 14 days after hospitalization. The second group comprised 11 individuals who went through intermediate surgery, which took place between 15 and 29 days after onset. Lastly, the third group consisted of 26 patients who experienced late surgery, defined as occurring after a waiting period of 30 days following onset. Upon analysis, the study revealed that the mortality rate for individuals who went through early surgery was 75%. In contrast, the mortality rate for patients who experienced intermediate surgery was 45%. Notably, patients who went through late surgery exhibited a significantly lower mortality rate of 8% ($p = 0.001$) compared to the other two groups. A comprehensive systematic review encompassing a total of 1136 cases, as documented in 11 reputable references, has revealed a noteworthy correlation between the timing of surgical interventions and the associated mortality rates. Specifically, the findings indicate that there exists a positive relationship, whereby the mortality rate tends to escalate in tandem with earlier surgical interventions (McFadden, Reber, 1994).

The aforementioned observations indicate that the optimal approach for managing necrotizing pancreatitis involves the deliberate postponement of necrosectomy to the greatest extent feasible. The underlying justification for this approach stems from the observation that the demarcation between healthy and dead pancreatic tissue becomes increasingly discernible over time. This phenomenon holds the potential to reduce intraoperative bleeding and prevent the inadvertent excision of unaffected pancreatic tissue during necrosectomy procedures.

The surgical intervention known as necrosectomy is highly recommended for patients presenting with infected necrosis. The surgical intervention known as necrosectomy, involving the removal of necrotic pancreas and peri pancreatic tissues along with debridement, is widely acknowledged as a recognized and effective approach for managing infected pancreatic necrosis. Additionally, the procedure incorporates the implementation of drainage techniques to further optimize patient outcomes. The favorable outcomes of a comprehensive approach involving adequate open necrosectomy as well as single-stage debridement via closed packing have been observed in a study spanning from 1990 to 2005. This study examined a total of 167 patients with necrotizing pancreatitis, which included 113 cases of infected necrosis. The overall mortality rate for infected pancreas was determined to be 15.0%, whereas for sterile pancreatitis, it was 4.4%. The

obtained findings have emerged as a significant benchmark for evaluating the prevailing therapeutic approaches.

Currently, a multitude of less-invasive procedures utilizing diverse approaches are being implemented, yielding superior outcomes compared to the conventional method of open surgery. Given the retroperitoneal nature of the pancreas, it is plausible to consider the utilization of a combined therapeutic approach involving retroperitoneal necrosectomy and local lavage (Rau, Pralle, Mayer, 1998). Furthermore, percutaneous necrosectomy, a technique employed utilizing intravascular robotics (IVR), involves the insertion of a drainage tube under the guidance of computed tomography (CT) into the retroperitoneum by means of the left abdomen. This is subsequently followed by the creation of openings and the endoscopic extraction of the necrotic mass. A comprehensive investigation has been conducted regarding the laparoscopic modality employed in the management of the necrotic mass encircling the pancreatic region. Novel therapeutic interventions characterized by reduced invasiveness, such as the utilization of endoscopic transgastric necrosectomy, are currently undergoing rigorous investigation. However, it is imperative to exercise caution and prudently assess the suitability of these treatment modalities on a case-by-case basis, taking into account the unique circumstances of each individual. Regarding the extended-term outlook of necrosectomy, there exist reports suggesting that necroscopy is frequently accompanied by a reduction in both hormonal and external pancreatic functionality, as well as the occurrence of bile duct stricture and pancreatic duct stenosis Lee, (Kwak, Park, 2007).

Based on the findings elucidated in a comprehensive investigation examining the protracted prognostic outcomes of necrosectomy in a cohort of 63 individuals (with a median follow-up duration of 28.9 months), it was observed that complications manifested in 39 patients (62%), with the exception of pancreatic dysfunction. Among these cases, a subset of 10 patients (16%) necessitated the implementation of surgical or endoscopic interventions for effective management. The observed complications encompassed a total of 8 instances of pancreatic fistula, 4 occurrences of biliary tract stricture, and 5 instances of pseudocysts. Furthermore, it is noteworthy to mention that a notable proportion of cases, specifically 25%, exhibited exocrine pancreatic dysfunction. Additionally, a significant percentage of cases, precisely 33%, manifested diabetes mellitus. Moreover, a comprehensive examination of a cohort comprising 98 individuals who underwent necrosectomy revealed that a subset of 14 patients (14.3%) experienced a relapse of pancreatitis due to the occurrence of stenosis in the pancreatic head and body (Widdison, Karanjia, 1993).

Consequently, these individuals necessitated interventions such as pancreatectomy, pancreaticojejunostomy, or pseudocystojejunostomy to address the aforementioned complications. A comprehensive investigation was undertaken to explore the intricate dynamics of hormonal and exocrine pancreas activity within the 12-month period subsequent to necrosectomy in individuals who successfully recovered from the debilitating condition of serious gallstone-induced necrotic pancreatitis. The study population was divided into two distinct cohorts: the necrosectomy group, consisting of 12 cases, and the non-necrosectomy group, comprising 15 cases. The findings indicate that the incidence rate of steatorrhea was 25% among the former group, whereas it was absent in the latter group. Similarly, the utilization rate of insulin alternative therapy was 33.3% in the former group, while it was non-existent in the latter group. These results underscore the notable decline in pancreatic function within the former group. In order to comprehensively assess the outcomes of patients who have undergone necrosectomy, it is imperative to conduct a thorough long-term follow-up, with particular emphasis on the occurrence of pancreatic duct stenosis, bile duct stricture, and other associated complications.

The primary manifestation observed in the majority of individuals diagnosed with pancreatic abscesses is the presence of a fluid-filled collection containing pus. Recent reports have indicated that a noteworthy proportion, ranging from 78% to 86% of patients, can achieve successful resolution of their condition through the implementation of percutaneous drainage as a standalone treatment modality (Level 3b). In cases where a secure puncture pathway can be ensured through the utilization of imaging guidance, drainage through the skin emerges as the foremost procedural option for the comprehensive management of pancreatic abscesses. Nevertheless, it is imperative to acknowledge that the positive outcomes documented for this therapeutic intervention have exclusively derived from retrospective investigations, thereby implying that certain instances may not have exclusively pertained to pancreatic abscesses. In instances characterized by a Ranson score of 5 or higher (Level 2b) and instances featuring multiple abscesses (Level 4), the

efficacy of percutaneous drainage as a one-stage treatment option is observed to be relatively low, ranging from 30% to 47%.

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Pancreatic Pseudocysts

The implementation of interventional therapeutic measures is indicated for pseudocysts of the pancreas that manifest symptomatic presentations, exhibit concurrent complications, or demonstrate progressive enlargement of cystic dimensions. The indications for drainage systems treatments in pancreatic pseudocysts encompass a range of circumstances. These include the presence of cysts that are accompanied by symptoms, particularly abdominal pain. Additionally, drainage may be warranted when complications arise, such as infection or bleeding. Furthermore, if a cyst demonstrates an increase in size during the follow-up period, it may necessitate drainage intervention. Moreover, cysts with a diameter of 6 cm or larger are also considered for drainage procedures. Lastly, cysts that do not exhibit any propensity to decrease in size over a period of more than 6 weeks during follow-up may require drainage. While the criteria of measuring 6 cm or persisting for 6 weeks are commonly referred to as the "6 cm-6 week criteria," it is important to note that they do not serve as definitive indications for drainage procedures (Level 3b-4).

The selection of procedure is contingent upon the specific conditions of each case, taking into consideration factors such as the presence of a connection with the duct that connects to the pancreas and the positional connection among the walls of the digestive tract. The therapeutic modalities utilized for the treatment of pancreatic pseudocysts encompass endoscopic drainage, percutaneous drainage, and surgical drainage techniques. A variety of viewpoints have been put forth indicating that percutaneous drainage could potentially function as a feasible substitute for surgical drainage, owing to the remarkable success rates ranging from 80% to 100% that have been attained through percutaneous drainage interventions(classified as Level 2c-3b). To date, the sole prospective controlled research (Level 2b) undertaken has yielded noteworthy findings. Specifically, it has been determined that the one-stage healing rate stood at 77% for percutaneous drainage, while surgical drainage exhibited a slightly lower rate of 73%. Importantly, no discernible disparities were observed in terms of cure and rates of recurrence between these two distinct modalities of drainage.

Given the existing literature, it has been duly noted that the mean duration of insertion of catheters for percutaneous drainage, in instances demonstrating a favorable response (Level 2c–3b), ranges from 16 to 42 days. Consequently, in scenarios where no discernible inclination towards improvement is observed beyond this aforementioned timeframe, it is prudent to contemplate the adoption of surgical drainage as a viable alternative (Widdison, Karanjia, 1993). Moreover, it has been observed that percutaneous drainage exhibits efficacy in instances wherein the structural characteristics of the pancreatic duct remain unaltered, yet fails to establish communication with the cysts, despite the concurrent existence of pancreatic duct stenosis. The implementation of endoscopic ultrasound guidance has facilitated the safe execution of transgastric puncture drainage procedures (Level 4).

Transpapillary drainage is a recommended course of action for instances wherein there exists a direct

communication pathway between cystic formations and the pancreatic duct. Surgical intervention is warranted for patients who exhibit inadequate response to conservative therapeutic approaches, including percutaneous drainage and endoscopic drainage. Furthermore, surgical treatment is recommended for patients who present with concurrent infection and/or hemorrhage. The surgical management of this condition can be categorized into two main approaches: fistulating operations involving the establishment of an anastomosis between the cysts and the digestive tract (specifically, cystogastrostomy and cystojejunostomy), and resection procedures. Presently, there exists a growing body of literature documenting instances of laparoscopic surgery. External fistulating surgery is chosen as a viable approach in instances where anastomosis is contraindicated due to the presence of an immature cystic wall. Conversely, the surgical option of resection, which involves the pancreatic tail as well as the spleen, is selected in cases where drainage poses significant challenges.

CONCLUSION:

Severe acute pancreatitis (AP) remains a critical medical condition necessitating a comprehensive, multidisciplinary approach due to its potential to endanger the patient's life. It is imperative to promptly establish an accurate diagnosis, followed by the initiation of resuscitative measures involving the administration of intravenous fluids in substantial volumes and the provision of oxygen via a mask. In the event that any uncertainty arises regarding the diagnosis, it is imperative to promptly proceed with the execution of a contrast-enhanced computed tomography (CT) scan. Surgery must be performed when there is recurrent pancreatitis.

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