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Early Diagnosis and Surgical Treatment of Deep Paraproctitis in Diabetic Patients

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ABSTRACT

Paraproctitis remains a significant surgical pathology, often complicated in the presence of systemic diseases such as diabetes mellitus (DM). Deep forms of paraproctitis in diabetic patients are characterized by atypical clinical manifestations, rapid progression of the infectious process, and a high risk of systemic complications. Early diagnosis and the selection of an adequate surgical approach are critical in improving outcomes for this vulnerable patient cohort. This review article summarizes the current literature and clinical experience regarding the diagnostic methods, classification systems, imaging modalities, and surgical tactics used in managing deep paraproctitis in patients with diabetes. Particular attention is paid to the peculiarities of wound healing, glycemic control, and perioperative management. Modern approaches, including minimally invasive drainage, staged surgery, and the role of antibacterial therapy, are discussed. The integration of a personalized treatment algorithm based on the severity of the inflammatory process, metabolic status, and comorbidity profile is emphasized as a promising direction in the optimization of care.

Keywords: *Deep paraproctitis, diabetes mellitus, surgical treatment, early diagnosis, complications*

INTRODUCTION

Paraproctitis represents a common yet clinically challenging entity in coloproctology, accounting for a substantial portion of emergency anorectal surgeries [1]. While superficial forms are generally manageable with timely intervention, deep paraproctitis often progresses insidiously and is associated with complex fistulous tracts, extensive purulent cavities, and a high incidence of systemic involvement [2]. In patients with diabetes mellitus (DM), the course of the disease is further complicated by impaired immune responses, vascular com-

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promise, and altered wound healing capacity, making this cohort particularly susceptible to severe outcomes [3].

The interplay between diabetes and deep paraproctitis is both clinically and pathophysiologically significant. Hyperglycemia not only impairs neutrophil function but also promotes local tissue ischemia and microbial proliferation, thereby creating a milieu conducive to rapid fascial and soft tissue destruction [4]. Furthermore, diabetic neuropathy may dull pain perception, leading to delayed presentation and underestimation of disease severity [5]. These factors, taken together, often result in late-stage diagnosis, extensive surgical debridement, prolonged hospitalization, and increased mortality risk [6].

Over the past two decades, the approach to managing deep paraproctitis in diabetic patients has evolved, driven by advancements in imaging, perioperative care, and understanding of the disease's pathophysiology [7, 8]. However, despite these developments, early detection remains suboptimal in many clinical settings. Current evidence underscores the importance of prompt recognition and classification of deep anorectal infections through a combination of physical examination, laboratory markers, and modern imaging modalities, particularly MRI and contrast-enhanced CT, which allow delineation of abscess extension and fascial involvement [9, 10].

Simultaneously, surgical tactics have also transitioned from radical excision in all cases toward more individualized, stage-dependent interventions. This includes limited drainage under imaging guidance in select patients, followed by definitive fistulotomy or flap procedures after stabilization [11]. In diabetic patients, such approaches must be further tailored to accommodate delayed tissue repair, high reinfection rates, and a fragile metabolic state [12].

In this review, we aim to consolidate current insights into the diagnosis and surgical management of deep paraproctitis in patients with diabetes mellitus. Special emphasis is placed on early clinical recognition, the role of diagnostic algorithms, modern operative strategies, and the incorporation of patient-specific factors into decision-making. By synthesizing existing literature and clinical experience, this article contributes to the formulation of a more systematic and effective framework for treating this complex patient population.

MAIN PART

The clinical course of deep paraproctitis in diabetic patients differs considerably from that in the general population due to multiple pathophysiological and immunometabolic impairments inherent in diabetes mellitus. One of the central difficulties is the masked or atypical presentation of the disease. In diabetic individuals, local signs of inflammation such as swelling, hyperemia, and pain are often attenuated, and systemic symptoms may mimic those of other complications, including urinary tract infections or diabetic ketoacidosis [13]. This clinical ambiguity frequently delays the establishment of a definitive diagnosis, leading to the progression of infection into deeper pelvic compartments, such as the ischiorectal, supralevator, or intersphincteric spaces [14].

Timely diagnosis is a cornerstone of successful management. While digital rectal examination remains an essential first-line diagnostic tool, its sensitivity is limited in deep-seated infections. In this context, radiological imaging has become indispensable. Magnetic resonance imaging (MRI) offers superior resolution of soft tissues and can delineate fistulous tracts, pus collections, and fascial plane involvement even in early stages [15]. Computed tomography (CT) with intravenous contrast is particularly helpful in unstable patients, allowing rapid identification of gas-forming infections and abscesses extending into retroperitoneal spaces [16]. Ultrasonography, especially endoanal or perineal, remains valuable for bedside evaluation, although its operator dependency limits reproducibility [17].

Laboratory markers also contribute to early recognition, although they are nonspecific. Elevated white blood cell counts, C-reactive protein (CRP), and procalcitonin levels may indicate severe infection, but in diabetic patients, inflammatory markers may remain deceptively low due to an impaired immune response [18]. Glycated hemoglobin (HbA1c) should be routinely measured, as poor long-term glycemic control correlates with more aggressive infection and impaired wound healing [19]. Additionally, the presence of comorbid conditions such as chronic kidney disease, peripheral vascular disease, and diabetic neuropathy should raise the index of suspicion and influence early diagnostic imaging thresholds.

The choice of surgical strategy is largely dictated by the extent of infection, patient stability, and metabolic status. In hemodynamically stable patients with localized abscess formation, primary drainage with or without seton placement may suffice. However, in the diabetic cohort, simple drainage is frequently inadequate due to

widespread subclinical involvement of adjacent fascial planes and the presence of microabscesses [20]. In such cases, broader debridement and staged procedures may be warranted. Radical excision of necrotic tissue should be performed with precision, avoiding damage to sphincteric structures whenever possible, while ensuring complete evacuation of purulent material [21].

Multistage approaches are increasingly favored. Initial surgery is aimed at controlling sepsis and preserving anatomical structures, followed by reevaluation and definitive fistulotomy or advancement flap surgery once inflammation subsides. Negative pressure wound therapy (NPWT) has shown promise in enhancing granulation tissue formation, especially in patients with impaired perfusion and delayed epithelialization [22]. However, in diabetic patients, its efficacy may be limited without stringent glycemic control and adequate nutritional support.

Antibacterial therapy, though adjunctive, plays a crucial role in diabetic patients due to a higher prevalence of polymicrobial flora and multidrug-resistant strains. Empiric regimens should cover Gram-negative, Gram-positive, and anaerobic organisms and be adjusted based on culture results. Prolonged antibiotic use is not uncommon in this group, particularly when surgical access is incomplete or when re-intervention is not feasible due to high anesthetic risk [23]. Importantly, antibiotics alone cannot substitute for timely surgical intervention in deep infections and should not delay operative management.

Perioperative optimization is critical. Adequate glycemic control must be achieved without inducing hypoglycemia, often requiring intravenous insulin protocols in the acute phase. Management of fluid-electrolyte balance, anemia, and cardiovascular stability must precede or accompany surgical intervention. Coordination with endocrinologists and intensivists is often necessary to stabilize patients pre- and postoperatively. Hyperbaric oxygen therapy (HBOT) has been explored as an adjunct to improve local tissue oxygenation and resistance to infection, although its accessibility remains limited [24].

Wound healing in diabetic patients is universally prolonged and prone to complications such as wound dehiscence, infection recurrence, or chronic fistulization. Therefore, close outpatient monitoring, scheduled wound care, and patient education are indispensable components of long-term management. The implementation of individualized treatment algorithms, integrating clinical stage, imaging findings, metabolic parameters, and comorbid burden, is a forward-looking strategy that aligns with the principles of personalized surgery [25].

In summary, early and aggressive diagnostic evaluation, paired with tailored surgical tactics and metabolic support, form the foundation of effective treatment of deep paraproctitis in diabetic patients. A multidisciplinary model of care, incorporating surgery, endocrinology, and infectious disease expertise, is likely to produce the best outcomes.

A distinctive aspect of deep paraproctitis in diabetic patients is the microbiological profile of the infection. Unlike uncomplicated anorectal abscesses, which are typically polymicrobial but dominated by anaerobes such as Bacteroides fragilis, infections in diabetic patients often demonstrate a broader and more aggressive spectrum, including Escherichia coli, Klebsiella pneumoniae, Enterococcus faecalis, Pseudomonas aeruginosa, and various Candida species [26]. This is compounded by the fact that long-term diabetics may have received repeated antibiotic courses, contributing to resistant strains. Identification of causative pathogens through culture and sensitivity testing of abscess fluid and wound exudates is crucial for guiding therapy, especially in cases where initial empirical treatment fails.

Recurrent paraproctitis and chronic fistula formation are particularly troublesome in the diabetic population. Several studies have demonstrated a higher incidence of recurrent abscesses and delayed wound closure in patients with poor glycemic control, even after adequate drainage and fistulotomy [27]. These findings suggest that the underlying metabolic derangements, including advanced glycation end-products (AGEs), endothelial dysfunction, and chronic low-grade inflammation, contribute significantly to tissue breakdown and failure of local defense mechanisms. As such, surgical correction alone, without addressing the systemic milieu, is often insufficient.

Modern surgical algorithms increasingly rely on risk stratification models that consider patient-specific variables when planning intervention. Factors such as HbA1c levels above 8.5%, evidence of macrovascular disease, and duration of diabetes exceeding 10 years have been proposed as predictors of unfavorable healing and recurrence [28]. These models help in deciding between one-stage versus staged surgical approaches, the need for adjunctive therapies, and the frequency of postoperative follow-up.

In complex cases where the infection extends beyond the perirectal space, more aggressive surgical strategies

are required. For example, supralevator and intersphincteric abscesses may necessitate transanal or even transabdominal approaches, depending on the accessibility and the presence of associated pelvic collections [29]. The risk of fecal incontinence in such cases mandates meticulous preservation of the sphincter apparatus. Where necessary, temporary diversion via a loop colostomy can be employed to facilitate healing in contaminated perineal wounds and minimize local trauma.

Another important consideration is the role of the host immune response in modulating infection dynamics. Diabetic patients frequently exhibit functional leukocyte abnormalities, including impaired chemotaxis and phagocytosis, rendering them less capable of localizing and containing infectious foci [30]. Additionally, the presence of diabetic microangiopathy reduces local perfusion, depriving tissues of immune cell access and essential nutrients required for repair. Immunomodulatory strategies, such as tight glycemic regulation, nutritional support with arginine and glutamine, and the judicious use of cytokine-modulating agents, have been proposed to support host defenses in such contexts [31].

Recent research also highlights the promise of using biomarkers such as interleukin-6 (IL-6), tumor necrosis factor-alpha (TNF-α), and matrix metalloproteinases (MMPs) to predict complications and wound healing potential in surgical diabetic patients [32]. While not yet standard in clinical practice, these molecular markers may soon contribute to real-time decision-making in high-risk surgical cases, including deep paraproctitis.

Several clinical series and case reports have illustrated the spectrum of presentation and outcomes in diabetic individuals with deep perianal infections. In a study by Nishigami et al., patients with uncontrolled diabetes and deep perirectal abscesses had a significantly higher rate of ICU admissions and required more frequent reoperations due to re-accumulation of pus and wound dehiscence [33]. Another multicenter retrospective analysis by Silva et al. found that early surgical intervention within 24 hours of diagnosis significantly reduced the need for secondary procedures and length of hospital stay, underscoring the role of timing in management [34].

The importance of continuity of care cannot be overstated. Discharge planning should include regular outpatient visits, repeat imaging where necessary, education on perianal hygiene, glycemic control, and signs of recurrence. In select patients with recurrent infections, consideration of long-term suppressive antibiotics or even elective proctectomy may be warranted, though these options require thorough risk-benefit assessment [35].

From a systems perspective, the burden of diabetic complications such as deep paraproctitis represents a challenge not only for individual clinicians but also for healthcare infrastructure, particularly in low-resource settings. Lack of timely access to imaging, surgical expertise, or intensive care facilities can delay treatment and worsen prognosis. Therefore, strengthening referral pathways, training surgeons in perianal anatomy and pelvic sepsis management, and integrating endocrine care into surgical pathways should be a priority in health policy [36].

CONCLUSION

Deep paraproctitis in patients with diabetes mellitus represents a complex clinical challenge characterized by an insidious onset, atypical symptomatology, rapid infectious progression, and a high incidence of complications. The interplay of impaired immune function, altered tissue perfusion, and delayed wound healing makes early recognition and prompt surgical management critical for favorable outcomes. Traditional methods of diagnosis and treatment often require significant adaptation when applied to diabetic patients, underscoring the need for a tailored and multidisciplinary approach.

Timely imaging using MRI or contrast-enhanced CT, supported by appropriate laboratory markers and meticulous physical examination, allows for accurate mapping of the infection and facilitates early intervention. The choice of surgical strategy must take into account the extent of sepsis, anatomical involvement, and the patient's metabolic and immunological status. Modern treatment regimens increasingly favor staged, minimally invasive, and individualized procedures, combined with targeted antibiotic therapy and perioperative glycemic optimization.

Long-term management should include structured outpatient care, rehabilitation protocols, and prevention strategies against recurrence. The incorporation of risk stratification tools, wound healing biomarkers, and personalized treatment algorithms is an emerging direction with the potential to significantly improve the quality of care.

In conclusion, optimizing the diagnosis and surgical treatment of deep paraproctitis in diabetic patients requires a comprehensive strategy that integrates advances in imaging, microbiology, metabolic medicine, and surgical science. Further research into predictive biomark-

ers, novel therapeutic modalities, and multidisciplinary care models is essential to reduce morbidity and improve outcomes in this vulnerable patient population.

Conflict of Interest

The authors declare no conflict of interest related to the publication of this article.

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QANDLI DIABETLI BEMORLARDA CHUQUR PARAPROKTITNI ERTA TASHXISLASH VA JARROHLIK YO‘LI BILAN DAVOLASH

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Andijon Davlat Tibbiyot Universiteti

ANNOTATSIYA

Paraproktit – bu yallig‘lanishli anorektal kasallik bo‘lib, qandli diabet fonida u chuqur shakllarda og‘ir kechadi. Diabetli bemorlarda bu kasallik ko‘pincha noaniq simptomlar, tez yomonlashuv va og‘ir asoratlar bilan kechadi. Erta tashxis qo‘yish va to‘g‘ri operatsion yondashuv natijalarni yaxshilashda asosiy omildir. Mazkur maqolada chuqur paraproktitni aniqlash va jarrohlik davolash bo‘yicha zamonaviy adabiyotlar hamda amaliy tajribalar tahlil qilinadi. Bunda tasniflash usullari, diagnostika algoritmlari, tasvirlash metodlari va individual jarrohlik taktikasi muhokama qilinadi. Glyukozani nazorat qilish, yara bitishining o‘ziga xosliklari va qo‘shilgan kasalliklarni inobatga olgan holda shaxsiylashtirilgan algoritmni tatbiq etish istiqbolli yo‘nalish sifatida baholanmoqda.

Kalit so‘zlar: Chuqur paraproktit, qandli diabet, jarrohlik davolash, erta tashxis, asoratlar

РАННЯЯ ДИАГНОСТИКА И ХИРУРГИЧЕСКОЕ ЛЕЧЕНИЕ ГЛУБОКИХ ПАРАПРОКТИТОВ У БОЛЬНЫХ САХАРНЫМ ДИАБЕТОМ

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АННОТАЦИЯ

Парапроктит остаётся актуальной проблемой абдоминальной хирургии, особенно при наличии сахарного диабета. Глубокие формы заболевания у этой категории пациентов протекают атипично, с быстрым распространением инфекции и высоким риском осложнений. Ранняя диагностика и правильно выбранная хирургическая тактика играют ключевую роль в улучшении результатов лечения. В статье обобщены данные современной литературы и клинического опыта по диагностике, классификации, визуализации и оперативному лечению глубоких парапроктитов у пациентов с сахарным диабетом. Особое внимание уделяется заживлению ран, контролю гликемии и роли сопутствующих заболеваний. Персонализированный подход, основанный на тяжести воспаления и метаболическом статусе, рассматривается как перспективное направление в оптимизации лечения.

Ключевые слова: Глубокий парапроктит, сахарный диабет, хирургическое лечение, ранняя диагностика, осложнения