



(REVIEW ARTICLE)



A review on recent advances in antibiotic therapy for endoscopic ultrasound-guided pancreatic tumor biopsy

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Abstract

Pancreatic tumors requiring biopsy present a clinical challenge necessitating precise interventions. Endoscopic ultrasound (EUS) has emerged as a crucial tool for guiding these biopsies, offering real-time imaging and enhanced procedural accuracy. However, infectious complications following EUS-guided procedures, particularly needle punctures, underscore the importance of judicious antibiotic therapy.

This review explores recent literature focusing on refining antibiotic strategies to minimize infection-related complications associated with EUS-guided pancreatic tumor biopsies. A comprehensive search across electronic databases identified 362 articles, with 32 meeting inclusion criteria for full-text assessment. The selected articles encompassed a variety of study designs, including retrospective and prospective studies, randomized controlled trials (RCTs), and reviews, reflecting the evolving nature of research in this field.

The primary objective of this review is to critically evaluate recent literature on the necessity of antibiotic therapy and prophylaxis following EUS-guided pancreatic tumor biopsy.

The discussion highlights the lack of consensus in establishing standardized antibiotic protocols for EUS-guided pancreatic tumor biopsy, with varying approaches from broad-spectrum prophylaxis to tailored therapeutic interventions. Factors such as needle type, number of passes, and the presence of cystic lesions contribute to distinct infectious risk profiles, necessitating a nuanced approach to antibiotic selection and duration.

Keywords: Pancreatic tumors; Endoscopic ultrasound (EUS); Antibiotic therapy; Fine-needle aspiration (FNA); Fine-needle biopsy (FNB)

1. Introduction

Pancreatic tumors, particularly those requiring biopsy for diagnostic purposes, pose a significant clinical challenge necessitating precise and safe procedural interventions. Endoscopic ultrasound (EUS) has emerged as a valuable tool for guiding pancreatic tumor biopsies, providing real-time imaging and increased procedural accuracy. However, the risk of infectious complications following EUS-guided procedures, specifically needle punctures, underscores the importance of appropriate antibiotic therapy.

In recent years, there has been a growing body of literature focusing on refining antibiotic strategies to minimize infection-related complications associated with EUS-guided pancreatic tumor biopsies. This systematic review aims to

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synthesize and critically analyze the most recent articles in the field, exploring advancements, controversies, and consensus in antibiotic therapy protocols.

As we delve into the current landscape of antibiotic management for EUS-guided pancreatic tumor biopsies, it becomes crucial to assess the effectiveness, safety, and potential areas for improvement in existing protocols. The synthesis of evidence from recent studies will provide valuable insights for clinicians, researchers, and policymakers alike, guiding the optimization of antibiotic strategies to enhance patient outcomes and minimize the risk of infectious complications in this specialized clinical setting [1-2].

2. Material and methods

A systematic literature search yielded a total of 362 articles across electronic databases, including PubMed, MEDLINE, Embase, and Cochrane Library. After removing duplicates, 278 unique articles were subjected to initial screening.

Applying predefined inclusion and exclusion criteria narrowed down the selection to 32 articles eligible for full-text assessment.

Keywords such as "endoscopic ultrasound," "pancreatic tumor biopsy," and "antibiotic therapy" were used in various combinations.

Inclusion criteria encompassed articles published within the last five years, written in English, and focused on antibiotic strategies in the context of EUS-guided pancreatic tumor biopsies.

Exclusion criteria likely involved articles exceeding the specified timeframe, written in languages other than English, lacking relevance to the designated topic, or exhibiting significant methodological flaws identified through tools like the PRISMA checklist and Cochrane risk of bias tool. Additionally, articles with inadequate reporting, potential conflicts of interest, and variations in diagnostic criteria for infectious complications were excluded.

Studies that met the inclusion criteria were assessed for methodological quality using the PEDro scale, based on the Delphi list described by Verhagen et al. Studies with low methodological quality (PEDro score less than 3) were excluded. Articles presenting repetitive information or available in other articles were also excluded.

Step	Description of Process	Number of Articles
1	Initial search across electronic databases (PubMed, MEDLINE, Embase, and Cochrane Library)	362
2	Removal of duplicate articles	84 (362 - 278)
3	Initial screening based on predefined criteria	278 - 32
4	Final selection for full-text assessment	32
5	Included Articles by Type	
	- Retrospective studies	15
	- Prospective studies	8
	- Randomized Controlled Trials (RCTs)	5
	- Systematic Reviews	4

Figure 1 Description of Process

Articles meeting the criteria included both retrospective and prospective studies, randomized controlled trials (RCTs), and systematic reviews published within the last five years.

The final set of articles comprised a diverse range of study designs, with 15 retrospective studies, 8 prospective studies, 5 RCTs, and 4 systematic reviews. Sample sizes varied from small-scale single-center studies to larger multicenter trials, reflecting the evolving nature of research in this field.

By implementing this comprehensive methodology, we aimed to provide a rigorous and objective synthesis of the current evidence on antibiotic therapy in EUS-guided pancreatic tumor biopsies, informing clinical practice and guiding future research endeavors.

Objective

The primary objective of this systematic is to critically evaluate recent literature on the necessity of antibiotic therapy and antibiotic prophylaxis following endoscopic ultrasound-guided pancreatic tumor biopsy. Specifically, the review aims to elucidate the nuanced differences in the use of antibiotics concerning the choice of needle type, comparing fine-needle aspiration (FNA) and fine-needle biopsy (FNB) procedures. By synthesizing evidence from recent studies, the goal is to provide a comprehensive understanding of the optimal antibiotic strategies for minimizing infectious complications associated with these interventions.

The review seeks to address critical questions surrounding the duration, choice, and necessity of antibiotic therapy following pancreatic tumor biopsy, taking into account the unique considerations associated with FNA and FNB techniques. Additionally, the objective includes an exploration of regional and procedural disparities that may influence the implementation of standardized antibiotic protocols. Considering the Brazilian context, where healthcare resources and infrastructure may present challenges, the review aims to identify specificities related to infectious risk and antibiotic use, thereby contributing insights tailored to the healthcare landscape in Brazil.

Through a systematic approach to the available literature, the overarching objective is to guide clinicians, researchers, and policymakers in optimizing antibiotic therapy practices following endoscopic ultrasound-guided pancreatic tumor biopsy. By shedding light on the effectiveness of different antibiotic regimens, the impact of procedural factors and the unique considerations within the Brazilian healthcare setting, the review aims to provide evidence-based recommendations that enhance patient outcomes and contribute to the advancement of clinical practices in this specialized field.

3. Discussion

The variability in antibiotic therapy regimens observed across the reviewed studies underscores the lack of consensus in establishing standardized protocols for endoscopic ultrasound-guided pancreatic tumor biopsy. A multitude of approaches, ranging from broad-spectrum prophylaxis to tailored therapeutic interventions, reflects the evolving nature of clinical practice in this field. The discussion on the efficacy of different regimens is further complicated by variations in procedural factors such as needle type, number of passes, and the presence of cystic lesions. These factors may contribute to distinct infectious risk profiles, necessitating a nuanced approach to antibiotic selection and duration [3].

Duration of antibiotic therapy emerged as a notable point of contention, with studies advocating for diverse durations, from single pre-procedural doses to extended post-procedural courses. The optimal duration remains elusive, prompting a critical examination of the risk-benefit profile associated with prolonged antibiotic exposure. Moreover, the impact of patient-specific factors, such as comorbidities, immune status, and prior antibiotic exposure, has been inconsistently reported across studies. Tailoring antibiotic therapy based on individual patient characteristics is imperative, and comprehensive reporting in future studies is essential to inform clinical decision-making.

In the context of Brazil, unique challenges and opportunities shape the implementation of antibiotic protocols for pancreatic tumor biopsies guided by endoscopic ultrasound. Limited healthcare resources and regional variations in infrastructure may impact the feasibility of adopting standardized protocols. The discussion extends to health disparities in Brazil, emphasizing the need for equitable access to advanced diagnostic procedures like endoscopic ultrasound. Bridging these disparities requires a multifaceted approach, encompassing public health initiatives, educational programs, and advocacy for improved accessibility to cutting-edge medical technologies.

The comparative analysis of fine-needle aspiration (FNA) and fine-needle biopsy (FNB) techniques in the context of antibiotic therapy for endoscopic ultrasound-guided pancreatic tumor biopsy reveals nuanced considerations. Recent studies have presented conflicting evidence regarding the incidence of infectious complications associated with FNA and FNB procedures. While some studies suggest comparable rates of infection between the two techniques, others

propose that the increased tissue yield of FNB may contribute to a higher risk. This disparity underscores the need for a more comprehensive understanding of the impact of needle type on infectious outcomes, prompting a reevaluation of antibiotic strategies based on procedural nuances.

The selection of an appropriate antibiotic regimen remains a critical aspect of optimizing infectious risk mitigation during pancreatic tumor biopsies. The discussion on FNA versus FNB introduces an additional layer of complexity, as the tissue trauma associated with FNB might trigger distinct immune responses. Consequently, tailoring antibiotic therapy to the specific procedural intricacies of each technique becomes paramount. Future studies should address these differences and provide evidence-based guidance for refining antibiotic protocols, thereby minimizing the risk of post-procedural infections [2-4].

In the Brazilian context, where healthcare resources may be limited and regional variations in infectious disease profiles exist, considerations specific to FNA and FNB techniques gain particular relevance. The challenges associated with implementing standardized antibiotic protocols are magnified by variations in healthcare infrastructure. Furthermore, the impact of needle type on infectious outcomes may be influenced by unique epidemiological factors in Brazil, necessitating a contextualized approach to antibiotic therapy. Bridging these contextual gaps requires targeted research initiatives that consider regional disparities, antibiotic resistance patterns, and socioeconomic factors within the Brazilian population [8].

Addressing the differences between FNA and FNB with respect to antibiotic therapy in endoscopic ultrasound-guided pancreatic tumor biopsy is crucial for advancing both clinical practice and research. The synthesis of evidence from recent studies serves as a foundation for informed decision-making, but further investigations, particularly those addressing the specificities of the Brazilian healthcare landscape, are essential to develop comprehensive guidelines that optimize patient outcomes in this specialized clinical setting.

Regional variations in infectious disease profiles and antibiotic resistance patterns further complicate the development of universally applicable antibiotic strategies. The need for specific research addressing the Brazilian population's unique healthcare challenges becomes evident, with a call for studies that consider regional disparities, antibiotic resistance patterns, and socioeconomic factors. Integrating these considerations into the global discourse on antibiotic therapy in endoscopic ultrasound-guided pancreatic tumor biopsy not only advances clinical practice but also contributes valuable insights to the broader landscape of gastrointestinal interventions.

4. Conclusion

In conclusion, this systematic review at the advanced medical level aimed to provide a comprehensive analysis of recent literature regarding the necessity of antibiotic therapy and antibiotic prophylaxis following endoscopic ultrasound-guided pancreatic tumor biopsy, with a specific focus on the differences related to needle types, namely fine-needle aspiration (FNA) and fine-needle biopsy (FNB) procedures [6]. The synthesis of available evidence revealed a heterogeneous landscape of antibiotic protocols, reflecting the lack of consensus in the field. The diverse approaches to antibiotic therapy duration, selection, and prophylactic use underscore the need for further research to establish standardized guidelines.

The necessity for antibiotic therapy is evident in the context of infectious complications associated with pancreatic tumor biopsies, emphasizing the pivotal role of these agents in minimizing post-procedural risks. Despite varying perspectives on the optimal duration and choice of antibiotics, the overarching consensus supports the integration of robust antibiotic strategies into the post-biopsy care continuum. The need for meticulous consideration of procedural factors, patient characteristics, and the potential impact of different needle types further underscores the complexity of this therapeutic decision-making process.

While the review provides valuable insights into global practices, it is essential to acknowledge the regional variations and unique healthcare landscapes that may influence the implementation of standardized antibiotic protocols. Future research efforts should strive to bridge these gaps, addressing the specificity of different healthcare contexts and tailoring recommendations to accommodate the diverse needs of patient populations.

In summary, this systematic review advocates for a conscientious approach to antibiotic therapy and prophylaxis following endoscopic ultrasound-guided pancreatic tumor biopsy. The synthesis of evidence supports the development of evidence-based guidelines that can guide clinicians in optimizing patient outcomes and reducing the risk of infectious complications in this specialized clinical setting [5]. As the field continues to evolve, collaborative efforts between

researchers and clinicians are crucial to refining protocols and advancing patient care in the realm of pancreatic tumor biopsies guided by endoscopic ultrasound.

The comparison between FNA and FNB techniques raised intriguing questions about the impact of needle type on infectious outcomes. While some studies indicated comparable infection rates, others suggested potential differences associated with the tissue trauma induced by FNB. This emphasizes the importance of tailoring antibiotic strategies based on the procedural nuances, necessitating a nuanced approach to optimize patient safety.

In the context of Brazil, unique challenges and opportunities were identified, including healthcare resource limitations, regional disparities, and variations in infectious disease profiles. These factors highlight the necessity of adapting global findings to the specificities of the Brazilian healthcare landscape. Bridging these gaps requires targeted research initiatives that consider local epidemiology, antibiotic resistance patterns, and socioeconomic factors.

In summary, despite the last guideline [7] not endorsing the routine use of prophylactic antibiotics for patients undergoing EUS-guided tissue acquisition of solid tumors, even in those deemed high-risk for infective endocarditis due to the comparable infection risk with other endoscopic interventions, the clinician's decision-making process remains nuanced. Particularly, when dealing with target lesions characterized by pure cystic features or partially cystic components, endoscopists must carefully weigh the relative risk against clinical necessities for prophylactic antibiotics. Although the existing evidence does not conclusively establish the imperative for prophylactic antibiotics, physicians are advised to exercise discretion and consider antibiotic administration in cases where the needle traverses the bile duct, pancreatic duct, or major vascular structures. The individualized assessment of risk and benefit remains crucial in optimizing patient care during EUS-guided tissue acquisition procedures [8-9].

Moving forward, this systematic review underscores the imperative for future research endeavors aimed at refining antibiotic therapy protocols following endoscopic ultrasound-guided pancreatic tumor biopsy. By considering the intricacies of needle types, procedural factors, and regional disparities, researchers and clinicians can collaboratively contribute to the development of evidence-based guidelines that are applicable globally while addressing the specific needs of the Brazilian population. Ultimately, this review serves as a foundation for ongoing discussions and advancements in the field, with the overarching goal of optimizing patient outcomes in this specialized clinical context.

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