Annals of Mediterranean Surgery 2021; 4 (2) 10-17
DOI: 10.22307/2603.8706.2021.01.003
ISSNe: 2603-8706

AMS Annals of Mediterranean Surgery

Original article

GASTROSTOMY TUBE NORMAL MICROBIOTA CHARACTERIZATION IN PATIENTS MANAGED BY A METABOLIC SUPPORT GROUP IN A HIGH COMPLEXITY INSTITUTION IN BOGOTA, COLOMBIA

CARACTERIZACIÓN DE LA MICROBIOTA NORMAL POR SONDA DE GASTROSTOMÍA EN PACIENTES MANEJADOS POR UN GRUPO DE APOYO METABÓLICO EN UNA INSTITUCIÓN DE ALTA COMPLEJIDAD EN BOGOTÁ, COLOMBIA

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Received: 17 October 2020 Approved: 02 April 2021 Published: December 2021

Resumen

Introducción: La nutrición enteral es una opción viable para los pacientes que necesitan someterse a una cirugía del tracto gastrointestinal. Actualmente, por su baja morbimortalidad, la gastrostomía es una de las técnicas más utilizadas para la alimentación enteral. La causa más habitual de intolerancia es un proceso inflamatorio/infeccioso, el cual podría surgir por la colonización de la punta de la sonda de gastrostomía y aumenta el riesgo de complicaciones infecciosas graves. En este estudió se buscó caracterizar la microbiota de la punta de la sonda de gastrostomía, definida como el conjunto de microorganismos que se encuentran en este entorno específico.

Materiales y métodos: Este fue un estudio de corte transversal en el que se incluyó pacientes que recibían nutrición enteral a través de tubo de gastrostomía y fueron llevados a cambio de sonda y cultivo de la punta de esta. Se extrajo la información de cada paciente y los reportes de microbiología de las historias clínicas electrónicas.

Resultados: Se incluyeron 29 pacientes en el estudio. Los microorganismos más frecuentemente aislados en la punta de la sonda de gastrostomía fueron especies de Candida, Enterococcus faecalis y Staphylococcus aureus. En el 90% de los cultivos se reportó un aislamiento polimicrobiano en el cual al menos uno de los microorganismos presentaba algún grado de resistencia antibiótica.

Conclusión: Las puntas de sonda de gastrostomía están extensamente colonizadas por una gran variedad de microorganismos. Sospechamos que esto podría explicar al menos parcialmente por qué algunos pacientes desarrollan intolerancia a la nutrición enteral y otras complicaciones infecciosas. La caracterización de esta microbiota es el primer paso para mejorar los protocolos sobre manejo de sonda de gastrostomía y potencialmente impedir la aparición de varias complicaciones.

Palabras clave: gastrostomía, nutrición enteral, microbiología, cirugía gastrointestinal.

Abstract

Introduction: Enteral nutrition is a suitable option for patients undergoing gastrointestinal surgery. Gastrostomies are currently among the most widely used techniques for enteral feeding due to their low complication and mortality rates. The most common cause of enteral feeding intolerance is an inflammatory/infectious process which could begin with the colonization of the G-tube (gastrostostomy) tip, thus theoretically increasing the risk of severe infectious complications. The objective of this study was to characterize the G-tube tip microbiota, which was defined as the set of microorganisms that are found in this specific environment.

Presentation of the case: This was a cross-sectional study in which patients who received enteral nutrition through G-tube and were taken to G-tube change had the G-tube tip cultured. Patient information and G-tube culture results were collected from electronic medical records for analysis.

Results: Twenty-nine patients were included, most of whom were 70+ years old and had multiple chronic conditions. The microorganisms most commonly isolated from G-tube tip cultures were Candida species, Enterococcus faecalis and Staphylococcus aureus. The vast majority of cultures (90%) were polymicrobial and at least one of the isolated microorganisms exhibited some degree of antibiotic resistance.

Conclusions: G-tube tips are extensively colonized by diverse types of microorganisms. We suspect this could explain at least partially why some patients develop enteral feeding intolerance and other infectious complications. G-tube tip microbiota characterization is the first step for improving enteral feeding and G-tube management protocols, so that several complications may be averted in the future.

Keywords: gastrostomy, enteral feeding, microbiology, gastrointestinal surgery.

Introduction

Enteral feeding can be provided by performing a gastrostomy, a procedure for which several techniques have been described (i.e., percutaneous, endoscopic, radiologic, and surgical). Percutaneous endoscopic gastrostomy (PEG) is the most commonly used technique due to its low cost, high success rates, and minimal risk of complications (1). Enteral nutrition is usually preferred for patients with a swallowing disorder of any kind who have a functionally intact gastrointestinal tract (2).

Patients who receive enteral feeding through a gastrostomy tube (G-tube) might develop multiple complications, especially those with comorbidities or low life expectancy (3-5). G-tube and enteral feeding intolerance has been previously reported in approximately 30% to 50% of patients with critical conditions (4, 6–12). A likely cause of intolerance is an inflammatory/infectious process, which could stem from a surgical site infection (i.e., the most common local complication) with subsequent G-tube colonization, especially in those patients who do not receive appropriate antibiotic prophylaxis (13–24). This process causes significant morbidity and can lead to potentially fatal conditions like necrotizing fasciitis, abscess formation, peritonitis, sepsis, and septic shock (25).

According to recent reports, G-tube insertion site infection is present in 16.6% of patients, and multi resistant microorganisms are implicated in 3.1% of cases (26). There is a paucity of evidence regarding G-tube insertion site infection and the associated risk factors, as well as the microorganisms that usually colonize the G-tube (i.e., its microbiome). This study sought to characterize the G-tube tip microbiota defined as the set of microorganisms that are found in this specific environment (regardless of local or systemic infections) among a set of patients who underwent G-tube replacement.

Material and methods

We conducted a cross-sectional study between January 2018 and January 2019. Patients who were receiving enteral nutrition through a G-tube that was placed either by endoscopic or surgical (open or laparoscopic) technique and were taken to G-tube replacement with tip culture were included; those with accidental removal of the G-tube or who were judged to be septic were excluded from the study.

Patient information and the microbiology reports of the G-tube tip cultures were collected from the electronic medical records for analysis. All patients received antimicrobial prophylactic antibiotics based on a clean contaminated wound. There were no risks associated with participating in this study. All personal and clinical data collected for this study is protected and was only used for research purposes.

Results

Study participants

Twenty-nine patients were included in the study. The average age was 75.8 years, and the most common principal diagnoses were respiratory tract infection, cancer, and central nervous system disease. Moreover, the most frequent comorbidities were arterial hypertension, stroke sequalae, diabetes mellitus, and chronic kidney disease (Table 1).

Characteristic	Patients (N=29)
Age (years)	
<69	13
69-81	7
>81	9
Sex	
Male	16
Female	13
Principal Diagnosis	
Respiratory tract infection	9
Cancer (pharyngeal, tongue, others)	9
Central nervous system disease	7
Other infections	2
Other conditions	2
Coexisting conditions	
Arterial hypertension	15
Stroke sequalae	7
Dementia	2
Diabetes mellitus	5
Epilepsy	2
Chronic kidney disease	4
Atrial fibrillation	2
Coronary artery disease	1
Others	9
None	7

Table 1. Principal patient characteristics

Microorganisms characterization

The most commonly isolated microorganisms from the G-tube tip cultures were Candida species, Enterococcus faecalis and Staphylococcus aureus (Figure 1). Other bacteria such as Escherichia coli, Enterobacter spp., Serratia spp., Pseudomonas spp., Proteus spp., and Klebsiella spp. were also identified. Approximately 90% of cultures were reported to be polymicrobial where at least one of the isolated microorganisms was found to exhibit some degree of antibiotic resistance.

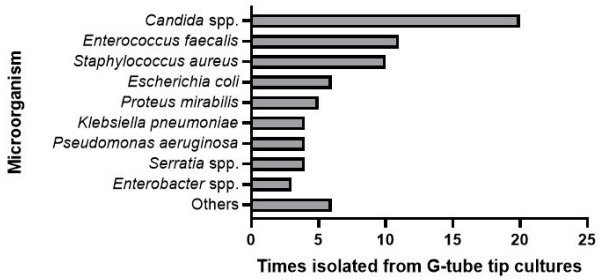

Figure 1. Microorganisms isolated from G-tube tip cultures.

Discussion

These results are consistent with previous studies in which the most commonly isolated microorganisms were Staphylococcus aureus, enterobacteria and different species of Candida; the latter was the predominant microorganism in this sample (19, 21, 24, 27-31). Likewise, the population represented in this study is similar to those described in comparable previous studies, especially regarding the diagnoses for which enteral nutrition through G-tube was indicated (6-9, 32, 33).

Skin rupture associated with gastrostomy procedures certainly facilitates microorganism entry and G-tube colonization, predisposing patients to infectious complications. Other predisposing factors include the presence of comorbidities related to immunosuppression,

which are relatively frequent among patients who receive enteral feeding (e.g., cancer, diabetes mellitus). Moreover, some of the isolated microorganisms are considered opportunistic, often associated with prolonged hospitalizations and broad-spectrum antibiotic use.

This study's limitations are those inherent to a cross-sectional study. Moreover, there was significant selection bias since G-tube tip cultures were obtained only from patients undergoing tube replacement. Therefore, at the time no assertions can be made regarding possible associations between tube colonization and enteral feeding intolerance or certain patient characteristics. Information about clinical outcomes was not collected either, which made it impossible to correlated culture results with the development of infectious complications.

Future studies should seek to recruit more patients in order to investigate potential associations between colonization by certain microorganisms and several factors unique to this population such as G-tube use duration, enteral nutrition type, G-tube placement technique, relevant comorbidities, and hospitalization in an intensive care unit. Furthermore, including a follow-up period could illustrate how G-tube colonization correlates with clinical outcomes, particularly infectious complications. Further evidence could inform the development of new G-tube management protocols that prioritize strategies for averting infection.

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